# West Bay Law Law Office of J. Scott Weaver

June 8, 2018

Hon. London Breed, President San Francisco Board of Supervisors #1 Dr. Carlton B. Goodlett Place, Room 244 San Francisco, CA 94102

# Re: Case No. 2014.0376 CUA 2918 Mission Street, File No. 170808 Appeal of the November 30, 2017 Planning Commission Decisions

Dear Supervisor Breed and Members of the Board of Supervisors:

Please accept this submission on behalf of Calle 24 Latino Cultural District Council with respect to its appeal of the proposed project at 2918 Mission Street.

## Summary

The Mission Area Plan (MAP) and the Eastern Neighborhoods EIR (PEIR) were prepared in 2008, during the "great recession". It did not predict the extraordinary changes that would unfold in the Mission, sky-high prices, massive displacement and gentrification, dramatic changes in transportation patterns, and unprecedented development. These extraordinary changes have rendered both the PEIR and the MAP outdated, and they can no longer be relied on to assess CEQA impacts for the Mission. Likewise, the proposed mitigations suggested in the PEIR and the Mission Area Plan (MAP) have proven inadequate.

Notably, the PEIR and the Mission Area Plan (MAP) completely misjudged the unprecedented rate of development in the Mission. The PEIR assumed construction of up to <u>2054</u> new units in the Mission between 2008 and 2025. Currently, the number of Mission pipeline units built, entitled, and that are otherwise in the pipeline as of Q-4 2017 stands at no less than <u>3,409</u> units. This number is more than twice the "preferred project" of 1,696 units for the Mission, and we are only half way through the Eastern Neighborhoods Plan. (See Exhibit C-12, 13). Because the PEIR did not assess cumulative impacts beyond that studied, it cannot be the tool for doing so. The Community Plan Evaluation (CPE) for this project, which tiered off from the PEIR, did not undertake a cumulative impact analysis of this and the other projects, built, entitled, and in the pipeline for the Mission. As such, the Commission's CEQA approval did not include the required evaluation of the cumulative environmental impacts of this and other projects built, entitled, or in the pipeline for the Mission.

Furthermore, completely unaddressed in the Community Plan Evaluation are project specific impacts of the on the Zaida T. Rodriguez Pre-School and Transitional Kindergarten. There, the shadow impacts on the Bartlett Street campus Playground and school were not studied, nor were noise and other health impacts on the preschool, including its Speech and Learning Center evaluated in terms of shadow, construction noise and vibration, dust and debris.

# The Proposed Project.

The project sponsor proposes to construct a 75 unit eight story building, with 6,724 square feet of first floor commercial use. Only 10% of the units would be affordable. The proposed project is located at 2918 Mission Street, near 25<sup>th</sup> Street. It is in the Mission Street Corridor and across the street from the western boundary of the Calle 24 Latino Cultural District. Notably, it is also adjacent to the two campuses of the Zaida T. Rodriguez Pre-School and Transitional Kindergarten. The only environmental review for the project consisted of a Community Plan Evaluation (CPE) that tiered off the 2008 Eastern Neighborhoods Plan EIR (PEIR). (The CPE and Links to the PEIR have previously been submitted.)

# A. THE PEIR IS NO LONGER VIABLE FOR ASSESSIING CUMULATIVE ENVIRONMENTAL IMPACTS.

Public Resources Code Section 21083, subdivision (b)(2) requires environmental analysis of a project's <u>cumulative impacts</u>. That is, it must include the aggregate impacts of "past projects, other current projects, and probable future projects." (CEQA Guidelines Section 15065 subdivision (a) (3)). In *Citizens to Preserve the Ojai v County of Ventura* (1985) 176 Cal.App.3d 421, the court ruled that an understated cumulative impacts analysis "impedes meaningful public discussion and skews the decision makers' perspective concerning the environmental consequences of a project, the necessity for mitigation measures, and the appropriateness of project approval." Outdated information is insufficient in assessing Here, by using outdated information regarding potential cumulative impacts,

CEQA allows broader EIRs (such as the PEIR) to address these cumulative impacts, leaving individual projects to utilize a CPE to focus on project specific impacts. (CEQA Guidelines Section 15152). This process is called "tiering". The effectiveness of the environmental analysis is premised on the integrity of the underlying EIR. Here, the EIR is out-of-date or otherwise flawed and is no longer a viable tool for evaluating cumulative CEQA impacts.

The PEIR is no longer viable because

 Original growth projections in the PEIR have already been exceeded. The PEIR's cumulative impacts analysis is therefore necessarily understated with respect to issues of land use, pedestrian and bicycle safety, open space and recreation, childcare, schools, and youth recreation, adequacy of community benefits, transportation, open space, and recreation infrastructures and other growth inducing impacts.

- 2) Substantial changes on the ground have rendered the PEIR out of date.
- 3) The PEIR is more than five years old and the City has not met the requirements of Public Resources Code Section 21157.6 or Guidelines Section 15179.

# 1. The Eastern Neighborhoods PEIR is no Longer a Reliable Tool for Evaluating Cumulative CEQA Impacts Because its Growth Projections Have Proven Wildly Inaccurate.

The Eastern Neighborhoods PEIR was prepared in 2008, amid the "great recession". Its purpose was to address environmental consequences under three potential "project" scenarios for Eastern Neighborhoods. The neighborhoods included East SOMA, Central Waterfront, Showplace Square/Potrero Hill, and the Mission.<sup>1</sup> Growth assumptions were made within the context of a population projection for San Francisco of 835,000 by 2025 and requiring construction of an additional 17,000 units citywide.<sup>2</sup> So far, there were 20,455 Units built between 2014 and an additional 12,023 built between 2015 and the 3<sup>rd</sup> Quarter of 2017 for a total of 32,478 units. As of that time, there were an additional 13,860 units entitled.<sup>3</sup>The City's Commerce and Industry Inventory currently sets the population at 866,000, 31,000 above the projected figure, and that number will continue to climb during the next seven years.<sup>4</sup> In other words, we have far exceeded the growth projections for the entire City that underly the PEIR.

The PEIR evaluated potential CEQA impacts of forecasted growth in housing unit production for the Mission, under a "no project" scenario and with Options A, B, and C, with Option C. anticipating the more drastic rezoning option and, thus, the largest housing production.<sup>5</sup> The EIR's analysis was based on these assumptions for growth.<sup>6</sup> Put another way, the EIR did not evaluate environmental impacts where growth was greater than that stated in Option C. As you will see <sup>7</sup> the EIR anticipated up to 2,054 units for the Mission by 2025 under Option C. Rezoning was ultimately scaled back to projected growth under a "preferred project" to 1,696 units.

The Mission is now well above its projected growth numbers, with no less than 3,409 units, built, entitled, and otherwise in the pipeline as of Q-4, 2017. (See Exhibit C-13, 14) [This

<sup>3</sup> See Exhibit C146-148, (This does not include Treasure Island, Park Merced, or Bayview Hunters Point)

<sup>&</sup>lt;sup>1</sup>http://sf-planning.org/sites/default/files/FileCenter/Documents/3995-EN Final-EIR Part-3 Land-Use Plans.pdf Page 34

<sup>2</sup> http://sf-planning.org/sites/default/files/FileCenter/Documents/3995-EN Final-EIR Part-3 Land-Use Plans.pdf Page 30

<sup>&</sup>lt;sup>4</sup> <u>http://www.sfexaminer.com/sf-job-growth-steadily-climbs-housing-demand-cant-keep/</u>

<sup>&</sup>lt;sup>5</sup> <u>http://sf-planning.org/sites/default/files/FileCenter/Documents/3995-EN Final-EIR Part-3 Land-Use Plans.pdf,</u> And Exhibit C-12

<sup>&</sup>lt;sup>6</sup> http://sf-planning.org/sites/default/files/FileCenter/Documents/3995-EN Final-EIR Part-3 Land-Use Plans.pdf

<sup>&</sup>lt;sup>7</sup> <u>http://sf-planning.org/sites/default/files/FileCenter/Documents/3991-EN\_Final-EIR\_Part-1\_Intro-Sum.pdf</u>, Page 1-2

data was gathered from the Planning Department's Development Pipeline and confirmed with SF Property Information Map, <u>http://propertymap.sfplanning.org/</u>. The Planning Department itself does not keep regular track of this information (C-15-17). Projects involving less than 10 units were, as a rule, not counted because they were so numerous.] The 3409 total is more than double the preferred plan, and we have seven more years until 2025 to entitle and build even more units. This is almost 50% higher than the highest number anticipated, and we are approximately half way through the plan period. Other Eastern Neighborhoods appear to have similar growth patterns.

The PEIR for the Eastern Neighborhoods and Mission Area Plans (MAP) also included a Public Benefits Analysis, a Socioeconomic Impacts Analysis, Community Health Analysis, and Housing Nexus Study. Each component is interlinked with the PEIR and the MAP.<sup>8</sup> The PEIR and MAP did not study a scenario of a 50% overbuild in half the duration of the Plan. Impacts would include: traffic and circulation, bicycle and pedestrian safety, open space and recreation, childcare, schools, and youth recreation, adequacy of community benefits, and growth-inducing impacts on infrastructure. Undoubtedly, this compressed overbuild would create impacts unforeseen in the PEIR. This overbuild is, by necessity, inconsistent with the Eastern Neighborhoods Plan in general and the Mission Area Plan in particular.

Simply put, the PEIR and the CPE for this project could not possibly provide accurate or adequate information regarding potential cumulative impacts for the densely populated Mission. As a result, we cannot know the extent and nature of the additional impacts of overgrowth nor the mitigation measures that would ease these impacts.

# 2. The Eastern Neighborhoods PEIR is no longer a Reliable Tool for Evaluating Cumulative CEQA Impacts Because There Have Been Substantial Changes on the Ground Unaccounted for Under the PEIR.

At least part of the reason for the disconnect between the goals and the outcomes of the Eastern Neighborhoods Plan is that there have been numerous changes on the ground that have direct, indirect and cumulative impacts on the environment. When substantial new information becomes available, CEQA Guidelines require comprehensive analysis of these issues. (CEQA Guidelines Sec. 15183). In addition to the overwhelming number of housing units being built, the situation on the ground has changed substantially since the PEIR was prepared in 2008 in the following ways:

- An Unanticipated Rapid Pace of Development. The PEIR did not project the current pace of development that we are experiencing. It also did not envision the steep increase in housing prices that we have seen during the past ten years. The sheer number of units and speed with which they have been produced was not envisioned in the ENP, nor was the steep increase in the number of very high paying jobs that have come to the City. Because of the pace of development, and especially luxury development, community benefits, including improvements to the Mission's

<sup>&</sup>lt;sup>8</sup> <u>http://sf-planning.org/sites/default/files/FileCenter/Documents/3991-EN\_Final-EIR\_Part-1\_Intro-Sum.pdf</u> Pages 5-8

traffic, transportation, open space, and recreation infrastructures have been unable to keep pace (See ENCAC Response to EN Monitoring Report - The report also noted that transportation impacts hurt businesses Exhibit C-135-145, C, 143). The PEIR clearly did not anticipate this pace of development. nor the necessity to step up mitigation measures.

- **Community Benefits Have Not Kept Pace with Anticipated Needs.** Impact fees are designed to blunt the impacts created by new development; such as impacts on transportation, infrastructure, open space, pedestrian and bicycle safety, and affordable housing. Because they are set lower that than the actual impact created, the fees cannot address all the needs created by new development.<sup>9</sup> Exacerbating this problem is that the level of development has created additional needs that the EN did not anticipate and the pace of development has moved faster than the ability of the City to access and spend these fees. The ENCAC Response to EN Monitoring Report (C-135-145) details numerous unmet needs resulting from this rapid development. It includes discussion of resultant deficiencies in infrastructure, transportation and pedestrian and bicycle safety, open space, and affordable housing production. (C-141-143). The Response also pointed out the inadequacy of impact fees in addressing the increasing infrastructure requirements that resulted from the rapid pace of development.
- Changed Transportation Patterns. In addition to the cumulative concentration of traffic, the project area will experience unforeseen changes in traffic patterns that have not yet been evaluated. These include the so-called "ride share" (or TNCs<sup>10</sup>) phenomena, and increased frequency delivery trucks serving residences, which did not exist in 2008. Nor were tech shuttles they have created bedroom communities within communities, caused additional traffic burdens, and contributed to displacement. The Anti-Eviction Mapping Project has documented the connection between shuttle stops and higher incidences of no-fault evictions.<sup>11</sup>

TNCs deserve particular attention in this regard as more and more information has become available. Currently, there are at least 45,000 TNCs in San Francisco in any given day, making more than 170,000 vehicle trips daily, and accounting for 570,000 VMTs per day, or 20% of the total VMT for San Francisco. The vast majority of these trips are in the northeast quadrant of the City, including the Mission, exacerbating traffic congestion in these areas.<sup>12</sup> Other studies have reached the self-evident conclusion that it is the more financially well-heeled who use these services.<sup>13</sup> At the same time, TNCs are causing a reduction in the use of mass transportation.<sup>14</sup>

 <sup>&</sup>lt;sup>9</sup> <u>http://default.sfplanning.org/Citywide/Info Analysis Grp/2016 ENMR Mission FINAL.pdf</u>, P39
<sup>10</sup> Transportation Network Companies

<sup>&</sup>lt;sup>11</sup> http://www.antievictionmappingproject.net/techbusevictions.html

<sup>&</sup>lt;sup>12</sup>http://www.sfcta.org/tncstoday, http://www.nydailynews.com/opinion/turns-uber-clogging-streetsarticle-1.2981765

<sup>&</sup>lt;sup>13</sup> <u>https://www.citylab.com/transportation/2017/10/the-ride-hailing-effect-more-cars-more-trips-more-miles/542592/</u>

Finally, and not unimportantly, there is mounting evidence that residents of so-called "market rate" units are more likely to own vehicles than their low and moderate-income counter parts.<sup>15</sup>

- Steeply Rising Housing Costs. It is well acknowledged that the costs of renting and owning a home have risen dramatically since 2008. Nowhere in the Eastern Neighborhoods Plan nor the EIR was there any suggestion that these costs would rise as dramatically as they have. The 2007 Nexus Study put the cost to purchase a condominium at \$725 per square foot. The 2016 Nexus Study put the cost at \$1,000 per square foot, a 38% increase. Rental housing costs likewise increased from \$3.20 per square foot to \$5.00 per square foot, a 56% increase. At the same time, wages have been relatively stagnant, providing fewer housing opportunities for most residents earning under 150% AMI.
- Disproportionate Construction of Market Rate Units as compared with Affordable Units. One cannot reasonably assert that "we are not building enough housing". The 2017Q3 Residential Pipeline Report states that, only two years in, San Francisco has exceeded its 2015 to 2022 housing production goals, and has built or entitled 217% of the RHNA Goals for above moderate income housing (greater than 120% AMI).<sup>16</sup> Moderate and low-income production is well below targets even if one equates housing rehabilitation with housing production which these figures seem to indicate. These figures do not include an additional 22,680 units from the large projects at Hunters Point, Treasure Island, and Parkmerced. Put another way, approximately 70% of the housing built or entitled serve the top 20% of the population, while 80% compete for less than a third of the housing. This has implications with respect to the way in which the City especially the affected areas are transformed. In addition to the injustice, the transformation impacts of the overbuild of luxury housing has environmental implications relative to traffic, congestion, land use, and health and safety.
- State of Advanced Gentrification in the Mission. The glut of high income earners in the Mission has created an "advanced gentrification" that was not anticipated at the time of the PEIR. With this gentrification, small Latino "mom and pop" businesses and non-profits have been replaced with high end restaurants, clothing and accessory stores, and other businesses that cater to high earners. Additional high-income earners who will occupy the proposed market rate units will further exacerbate these problems.<sup>17</sup>The San Francisco Analyst has reported that the Mission has lost 27% of

<sup>14</sup> <u>http://www.vitalsigns.mtc.ca.gov/transit-ridership</u>, https://www.citylab.com/transportation/2018/01/to-measure-the-uber-effect-cities-get-creative/550295/

<sup>16</sup> Exhibit C-146-148

<sup>17</sup><u>https://www.urbandisplacement.org/sites/default/files/images/case\_studies\_on\_gentrification\_a</u> nd displacement- full report.pdf PP 24-40

its Latinos and 26% of its families with children since 2000. The PEIR made no mention of this exodus, and had it observed this phenomenon as it was occurring one would hope that it would have advocated for more protective measures.

- Gentrification Has Resulted in Changes to the Physical Environment, Including Valenciazation of the Mission Corridor and the Calle 24 Latino Cultural District. At the time of the PEIR, the level gentrification that we have was not anticipated. Today, the Mission Corridor as well as the Calle 24 Latino Cultural District both of which are adjacent to the proposed project are at risk of collapse. (See Exhibit C-74). While luxury development is not the sole cause of this phenomena, it certainly puts gasoline on the fire. Such gentrification and resulting displacement causes changes to the physical environment and subject to examination under CEQA. (See Bakersfield Citizens for Local Control v City of Bakersfield (2004) 124 Cal.App. 4<sup>th</sup> 1184 urban decay a change in physical environment; El Dorado Union High School Dist. v City of Placerville (1983) 144 Cal. App.3d, 123, 131 project's demand on School District proper subject for CEQA review; Christward Ministry v. Superior Court (1986) 184 Cal.App.3d 180, 197, effect on worship subject to CEQA. Transformations such as these were not considered under the PEIR.
- Gentrification Has Caused Unanticipated Increases in Traffic Congestion and Automobile Ownership. The unanticipated influx of high earners in the Mission has resulted, and will result, in a substantial increase in the rate of automobile ownership and "ride sharing" in the Mission. Between 2000 to 2013, the number of households with automobiles increased from 37% to 64% or 9,172 automobiles in 2000 to 16,435 in 2013. At the same time AMI increased from \$50,676 to \$75,269. It is now well recognized that high earners are twice as likely to own an automobile than their low-income counterparts even in transit rich areas such as the Mission. The displacement of Mission residents has resulted in, and will result in, long reverse commutes to places of employment, children's schools, and social services that are not available in outlying areas. These reverse commutes further exacerbate traffic congestion and create greenhouse gas emissions not contemplated in the PEIR.
- Changed Work Patterns that Skew Office Space Growth Impacts. The Eastern Neighborhoods Plan, allowed varying degrees of PDR to Office conversion. In calculating the environmental impact, the certain PDR uses could be converted to office space. The PEIR made its employment projections based on a conversion rate of 300 square feet per non-PDR worker. Due to advances in technology and changes in the work environment, that number now ranges between 151 and 225 square feet per office worker. <sup>18</sup>

<sup>&</sup>lt;sup>18</sup> <u>http://sf-planning.org/sites/default/files/FileCenter/Documents/3995-EN\_Final-EIR\_Part-3\_Land-Use\_Plans.pdf</u>, Page 31, https://mehiganco.com/?p=684 , <u>https://www.cbsnews.com/news/companies-are-packing-workers-in-like-sardines/</u>

# 3. The PEIR is More than Five Years Old, and the City has not Satisfied the Requirements of Public Resources Code Section 21157.6 and CEQA Guidelines Section 15179.

As previously stated, CEQA permits tiering from a Master EIR such as the Eastern Neighborhoods EIR. Public Resources Code Section 21157.6 and Guidelines Section 15179 limit the use of Master EIRs for tiering purposes if they are over five years old. These sections do allow the use of EIRs over five years old if lead agency either: 1) finds that there are no substantial changes on the ground or 2) it prepares an initial study and, pursuant to that study either a) certifies a subsequent EIR or b) approves a mitigated negative declaration. To date, the department has done neither.

There has been no further cumulative impacts analysis for the Eastern Neighborhoods since the PEIR. Given the circumstances described above, a comprehensive analysis is required.

# B. THE CPE DID NOT PROVIDE ADEQUATE INFORMATION REGARDING POTENTIAL HEALTH IMPACTS ON THE CHILDREN ATTENDING THE ZAIDA T. RODRIGUEZ PRESCHOOL

# 1. Information Regarding Potential Shadow Impacts Was False and Misleading.

The Zaida T. Rodriguez Preschool, immediately adjacent to the project site. It has two campuses serving approximately 135 preschool children. One campus is south of the project site, the other is west, across Osage Alley. Each have their respective playgrounds. A preliminary shadow fan analysis was prepared and, based on its finding, the CPE concluded that the proposed project would not cast shadows on the southern playground. (CPE, Page 31) The CPE was completely silent about shadow effects on the playground on Osage Alley. (See Exhibits C- 75, 76, CPE, Section 8, Page 31). To most, significant shadow impacts of an eight-story building immediately and directly east of the playground would be intuitive. Exhibits C- 75a and 76a demonstrates that the Osage playground falls clearly within the shadow fan – most likely blocking sunlight for a significant part of the day. Nevertheless, the CPE ignored this shadow impact and thereby created the false impression that the Osage playground would be unaffected.

This misleading information came into play at the November 30. 2017 Planning Commission's hearing for consideration of the proposed project. Dr. Boucher, the school's principal, stated that there were two campuses and two playgrounds, and that, in addition to shadow impacts, children at both campuses would be exposed to construction for countless years. The school is open between 7:30 a.m. and 5:00 p.m. and is year-round. The Speech and Language Center serves 40 students with speech delays is immediately adjacent to the proposed project site and will be severely impacted by the construction process.<sup>19</sup>

Commissioners Melgar and Richards both voiced their concerns regarding health impacts caused by the shadow, both in terms of lack of sunshine and colder temperatures. Commissioner

<sup>&</sup>lt;sup>19</sup> http://sanfrancisco.granicus.com/MediaPlayer.php?view\_id=20&clip\_id=29290 at 2:25, 3:27,

Melgar pointed out that these school children are an especially vulnerable population and that they have very few open space alternatives.<sup>20</sup>

The Planning Department informed the project sponsor that there were no shadow impacts.<sup>21</sup> The Department staff referred to the CPE. After questioning from the Commission, Senior Planner Richard Sucre stated that the CPE said, "The project does not cast a shadow on the playground to the South, presumably both (playgrounds) would have been analyzed in the CPE."<sup>22</sup> Unfortunately, the CPE, however, did not contain an analysis of the Osage playground to the west. This omission clearly created the false impression that there would be no shadow impact. Had the CPE contained an analysis of the shadow impacts on the Osage playground, the Commission would have had information it had sought, and then could have moved on to the question of health effects.

Lack of sunshine is known to have negative health effects – especially in young children. Vitamin D insufficiency affects nearly 50% of the population worldwide. (See attached journal articles, Exhibits C-80, C-95, C-104, C-119).<sup>23</sup> The primary source of Vitamin D is sunshine. The attached articles all affirm that Vitamin D production is a critical element in the absorption of calcium which is necessary for healthy bone growth, especially for young children. The articles also state that sunlight exposure may be protective against other diseases such as autoimmune disorders, hypertension, and cancer.

The proposed project would be a permanent structure affecting school children for generations to come. The potential health impacts resulting from the shadow cast by the proposed project on the Osage playground are potentially significant, serious, and should be thoroughly studied.

# 2. The CPE did not Provide Adequate Information to Enable the Planning Commission to Determine Whether or Not Additional Mitigation Measures Were Necessary to Minimize Disruption of the School During Construction.

Were this project to proceed, parents of Zaida T. Rodriguez preschoolers would face years of construction. Noise, vibration, dust, and debris would be an everyday occurrence and would not stop during instruction, nap time, or outdoor play time. In defiance of logic and common sense, the CPE checklist stated that these issues would have "no significant impact not

<sup>&</sup>lt;sup>20</sup> <u>http://sanfrancisco.granicus.com/MediaPlayer.php?view\_id=20&clip\_id=29290</u> at 2:55, 3:02, 3:23, and 3:26, 3:53.

<sup>&</sup>lt;sup>21</sup> http://sanfrancisco.granicus.com/MediaPlayer.php?view\_id=20&clip\_id=29290, 3:56,30

<sup>&</sup>lt;sup>22</sup> <u>http://sanfrancisco.granicus.com/MediaPlayer.php?view\_id=20&clip\_id=29290</u> at 3:57

<sup>&</sup>lt;sup>23</sup> C-80, A Review on Vitamin D Deficiency Treatment in Pediatric Patients, Journal of Pediatric Pharmacology and Therapeutics, 2013, C-95 Benefits of Sunlight, a Bright Spot for Human Health, Environmental Health Perspectives, U.S. National Institute of Environmental Health Science, 2008; C-104 Sunshine is good medicine, the health benfits of ultraviolet-B induced Vitamin D Production, Sunlight Nitrition and Research Center, 2004; C-119, Vitamin D, the "sunshine" vitamin, Journal of Pharmachology and Pharmacotheraputics, 2012.

previously identified in the PEIR". So doing, the CPE ignored the vulnerability of this young population many of whom spend the vast majority of their day at the Preschool.

As noted previously, these concerns were raised during the November 30 Planning Commission Hearing. Commissioner Melgar stated that the area around the preschool was an "equity zone" and that the school children were an especially vulnerable population.<sup>24</sup> When asked about precautions about air quality, the Department punted to the Health Department, however, Director Rahim noted that the CPE evaluated whether air quality mitigation was beyond the norm, using the Health Code as a guide.<sup>25</sup> City Attorney Kate Stacey further clarified stating that "no further air quality measures were necessary" and that the CPE (and Commission) relied solely only on mitigation measures in the PEIR.<sup>26</sup>

The potential health impacts on the preschool children is clearly foreseeable, and those risks have potentially serious consequences. The Center on the Developing Child at Harvard University has emphasized the importance of avoiding stressors like those described above. The brain's architecture is constructed through a process and continues into adulthood, with early experiences strongly influencing the quality of that architecture. Toxic stress damages the developing brain architecture, which can lead to lifelong problems in learning, behavior, and physical and mental health.<sup>27</sup>

Finally, it is of note that there are few alternatives for the parents or their children. When asked by Commissioner Richards if the preschool could be moved, Dr. Boucher stated that it could not due to lack of available locations and licensing requirements.<sup>28</sup> Moreover, the absence of adequate childcare and preschool facilities for San Francisco Parents is well recognized. Currently, there are more than 3,000 on a waiting list for childcare in San Francisco, with less than 100 placements per month.<sup>29</sup>

Neither the CPE nor the PEIR studied these potential health and safety impacts on a vulnerable population that was in the formative stage of their lives. That is information that the Commissioners asked about, however, information about impacts and about possible further mitigations was not provided. As such, it failed to provide sufficient information to allow decisionmakers to make an informed decision. It was neither infeasible for the Planning Department to perform such a health risk assessment, nor to propose potential mitigations above and beyond that provided in the PEIR.

<sup>26</sup> http://sanfrancisco.granicus.com/MediaPlayer.php?view\_id=20&clip\_id=29290 3:01

<sup>&</sup>lt;sup>24</sup> <u>http://sanfrancisco.granicus.com/MediaPlayer.php?view\_id=20&clip\_id=29290</u>, 302:25, 3:03

<sup>&</sup>lt;sup>25</sup> http://sanfrancisco.granicus.com/MediaPlayer.php?view id=20&clip id=29290, 3:00:11

<sup>&</sup>lt;sup>27</sup> <u>https://developingchild.harvard.edu/resources/inbrief-science-of-ecd/</u> See also, <u>https://developingchild.harvard.edu/science/key-concepts/toxic-stress/</u>

<sup>&</sup>lt;sup>28</sup> http://sanfrancisco.granicus.com/MediaPlayer.php?view\_id=20&clip\_id=29290 3:30:20

<sup>&</sup>lt;sup>29</sup> http://sfoece.org/wp-content/uploads/2018/05/SAN-FRANCISCO-CHILD-CARE-CONNECTION-April-2018-Monthly-Data-Report.pdf

# **CONCLUSION**

The preschoolers and their parents deserve more than what was provided in the CPE. An informed decision can only be made if the decision-makers are provided with detailed information about potential health and safety impacts on preschoolers at Zaida T. Rodriguez Preschool. Potential shadow impacts should be thoroughly evaluated, and necessary, feasible mitigation measures proposed for consideration. The Planning Department should also be requested to examine the impacts of construction-related activities, on the school children and provide feasible additional mitigation measures in light of the vulnerabilities of these children and the severity of potential negative health outcomes.

Eastern Neighborhoods communities deserve better as well. A good start would be a comprehensive cumulative impacts analysis to replace or update the current PEIR. This analysis should set forth the number of units built, entitled, and that have applied for environmental review for each of the Eastern Neighborhoods. The Department should also consider the CEQA impacts of the unanticipated and sudden growth, as well as the other changes on the ground described above. This analysis should be made available for public review and comment prior to presenting it in a final form.

The Eastern Neighborhoods PEIR is inextricably tied with Area Plans, Community Benefits Analysis, and Socio-Economic Analysis which should also be amended and updated to reflect the new realities which did not exist at the time of their initial creation.

Sincerely I. Scott Weaver For Calle 24 Latino Cultural District

# EXHIBIT C

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# West Bay Law Law Office of J. Scott Weaver

October 9, 2016

Via U.S. Mail and email Richard Sucre Julie Moore San Francisco Planning Department 1650 Mission Street, Suite 400 San Francisco, CA 94103

Richard.sucre@sfgov.org Julie.Moore@sfgov.org

## Re: Case No. 2014-0376ENV - 2918-2924 Mission Street, SF

Dear Mr. Sucre and Ms. Moore,

I am writing on behalf of the Calle 24 Latino Cultural District Council, an organization consisting of businesses, residents, and nonprofits living and working along the 24<sup>th</sup> Street corridor. In May of 2014, the Mayor and Board of Supervisors designated the geographic area between Mission and Potrero Avenue, 22<sup>nd</sup> Street and Cesar Chavez Blvd. as the Calle 24 Latino Cultural District. For clarity sake, this geographic area will hereafter be referred to as the "LCD." I am writing to express my concern regarding the likely impact that the project proposed for 2918-24 Mission Street will have on the existing businesses, residents, and nonprofits in the LCD, both short term and over time.

The proposed project cannot be considered solely inside the bubble in which it is built. It will add up to 73 "market rate" households to the neighborhood, households many of whose incomes are likely to exceed 200% AMI – that's up to 4 times the AMI of adjoining census tracts. In so doing, it would put in place economic forces that will adversely affect the neighborhood. These high earning households will interact with the neighborhood on a daily basis, creating demands for high end services and products, and thereby putting existing businesses – many of whom are on short term leases – at risk. Likewise, the proposed project will exacerbate demand for affordable housing (see reference to Nexus Analysis below). As we have seen over and over again, the economic climate created by such gentrification will provide landlords with incentives to displace residents using various means at their disposal (including Ellis Act Evictions, OMI evictions, or more commonly, threats and harassment).

Richard Sucre Julie Moore October 9, 2016 Page Two

Compounding this problem is the fact that several other projects are now proposed that are either in or adjacent to the LCD. This proposed development is one of several that will bring into the Mission approximately 500 high earning households and create an economic force that will be impossible for commercial and residential landlords to resist. Anyone skeptical of this impact need only to look at the changes on Valencia Street between 17<sup>th</sup> and 21<sup>st</sup> Streets, where less than 100 market rate units have been built, but visible gentrification has occurred. Thus, the <u>cumulative impacts</u> of these proposed projects must be assessed.

We know that those displaced residents and businesses will no longer be able to afford residential or business leases in the Mission. We have seen displaced residents forced to move to far reaches of Northern California, Vallejo, Antioch, Tracy, Sacramento and even Modesto. Many with ties to the community must make long commutes to their places of employment, their children's schools, and to services that are not otherwise available in these further locales. At the very least, the cumulative impacts of these projects creates an indirect physical impact on the environment in terms of greenhouse gases and traffic congestion, and thus implicates a CEQA analysis. SF Business Times article of October 4, 2016 just reported that: "latest MTC figures is that on some stretches, notably the westbound I-80 morning commute from Hercules and across the Bay Bridge to San Francisco, the traffic congestion literally never stops on weekdays, often lasting from 5:30 in the morning to nearly 8 p.m. http://www.bizjournals.com/sanfrancisco/news/2016/10/03/bay-area-traffic-worse-bay-bridge-

gridlock-mtc.html

These likely impacts should be evaluated and adequate mitigation measures put in place before considering the proposed project and other projects so affecting the LCD. Whether you care to view this in terms of CEQA, for the purpose of consistency (or inconsistency) with the Eastern Neighborhoods Plan, for the purpose of evaluating socioeconomic impacts under MAP 2020, or for the policy purposes enunciated in the creation of the LCD, it is imperative that these issues be analyzed before any project can be approved.

## Substantial New Information Negates the Exemption From Environmental Review.

The Department should not issue a Community Plan Exemption allowing the Department to use the Eastern Neighborhoods Plan EIR (PEIR) instead of a project EIR. The use of the PEIR in this way presupposes that it is sufficiently current to address all areas required under CEQA.

Unfortunately, circumstances on the ground have rendered the 2008 PEIR out of date, and it cannot be a reliable measure of environmental impacts of market rate development in the Mission. It is well recognized that the Mission has already experienced extensive displacement

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Richard Sucre Julie Moore October 9, 2016 Page Three

of its residents, so much so, that it is now in an advanced stage gentrification. http://missionlocal.org/2015/09/sf-mission-gentrification-advanced/ Should the project proceed, it will cause significant economic and social changes in the immediate area that will result in physical changes, not the least of which is displacement of residents and businesses which will affect air quality, traffic and transportation, as well as negative impacts on the Cultural District. (See CEQA guidelines, 15604 (e).

A 2007 Nexus Study, commissioned by the Planning Department, concluded that the production of 100 market rate rental units generates a demand of 19.44 lower income households through goods and services demanded by the market rate tenants. [These conclusions were made in 2007, well before housing prices began their steep upward trajectory. Today, new "market rate" two bedroom apartments rented in the Mission begin at about \$6,000 per month – requiring an annual household income of \$240,000.] At the time, the PEIR anticipated a 15% inclusionary rate. The current Nexus study waiting to be released is expected to show a demand of 28 affordable units for every 100 built. With a 12% inclusionary rate, there is a need for 16 additional affordable units per hundred market rate units produced. (28 minus 12 – 16) This was not anticipated in the PEIR. One must to ask: how will these low income households created by the demand of market rate units live? and how will they get to work? School? Services? and what is the impact on air quality and transportation? These questions should be addressed by the Department.

When substantial new information becomes available, CEQA Guidelines require comprehensive analysis of these issues. (CEQA Guidelines Sec. 15183). The situation on the ground has changed substantially since the PEIR was prepared in 2008.

- The cumulative total of units built, approved, and in the pipeline (2,451 as of February 23, 2016), now exceeds the highest number of units contemplated in the Plan EIR for the Mission (2,056). Worse yet, the latter number was anticipated for the period 2008 to 2025. Development has therefore accelerated at a pace higher than that anticipated in the PEIR.
- The number of "market rate" units built, approved, and in the pipeline for the Mission far exceed the projected number while the number of units affordable to low and moderate income San Franciscans is one fourth of that set forth in the RHNA.
- The glut of high income earners in the Mission has created an "advanced gentrification" that was not anticipated at the time of the PEIR. With this gentrification, small Latino "mom and pop" businesses and non-profits have been replaced with high end restaurants, clothing and accessory stores, and other businesses that cater to high earners. Additional high income earners who will occupy the proposed market rate units will further exacerbate these problems.

C-3

Richard Sucre Julie Moore October 9, 2016 Page Four

- Notably with respect to this proposed project, the PEIR did not, nor could it have considered the impact of a project on the LCD because the LCD did not exist at the time. Where, as here, the offsite or cumulative impacts were not discussed in the prior PEIR, the exemption provided by Section 15183 does not apply. (See 15183(j))
- The unanticipated influx of high earners in the Mission has resulted and will result in a substantial increase in the rate of automobile ownership in the Mission, and has thus increased greenhouse gas emissions and traffic congestion.
- The displacement of Mission residents has resulted and will result in reverse commutes to places of employment, children's schools, and social services that are not available in outlying areas. These reverse commutes further exacerbate traffic congestion and create greenhouse gas emissions not contemplated in the PEIR. A recent report by the Eviction Defense Collaborative following up on displaced clients found that nearly 39% of those clients who were forced to move moved outside San Francisco. http://antievictionmappingproject.net/edc2015.html
- The PEIR assumed that the Eastern Neighborhoods Plan and the Mission Plan would meet their goals of providing over 60% of low, moderate, and middle income housing. This goal has not come close to materializing, further exacerbating the problems of displacement.
- The PEIR did not anticipate the impact of tech shuttles from a traffic standpoint, nor from that of the demand for housing. The specter of living within a few blocks of a free ride to work has caused many tech employees to move to areas where the shuttles stop predominantly in the Mission. As such, we have high-earning employees exacerbating the already high demand for housing. The anti-eviction mapping project has documented the connection between shuttle stops and higher incidences of no-fault evictions. ( see:

http://www.antievictionmappingproject.net/techbusevictions.html )

- The recent traffic changes along Mission Street by the SFMTA forces mandatory right turns onto Cesar Chavez from Mission, and prohibits through traffic on Mission, which has added increased traffic on the surrounding residential streets. This project will add 73 more households and significantly increase the traffic on Mission Street.

These changed circumstances render the current PEIR obsolete. A **Community Plan Exemption is therefore not appropriate for this project and should not be issued**, due to new conditions that were not contemplated in the 2008 EN EIR, and the overbuilding of market rate units in the Mission, which have exceeded the unit count contemplated in the EN EIR.

C-4

Richard Sucre Julie Moore October 9, 2016 Page Five

## **Background of the LCD and Existing Threats.**

The businesses and nonprofits in the LCD have been recognized by resolution of the Board of Supervisors as an important cultural, historical and commercial resource for the City. (Resolution Creating LCD is attached as Exhibit 1) The Ordinance creating the LCD noted that "The Calle 24 Latino Cultural District memorializes a place whose richness of culture, history and entrepreneurship is unrivaled in San Francisco." The District was established "to stabilize the displacement of Latino Businesses, and residents, preserve Calle 24 as the center of Latino culture and commerce, enhance the unique nature of Calle 24 as a special place for San Francisco's residents and tourists, . . ." and that its contribution will provide "cultural visibility, vibrancy, and economic opportunity for Latinos in the City and County of San Francisco."

The Calle 24 Latino Cultural District Community Council ("the Council"), a nonprofit consisting of community stakeholders in the LCD, has stated as its mission: "To preserve, enhance, and advocate for Latino cultural continuity, vitality, and community in San Francisco's touchstone

Latino Cultural District and the greater Mission community". (See Report, Exhibit 2, page 4 Appendices may be found at http://www.calle24sf.org/wp-content/uploads/2016/02/LCD-finalreport.pdf) With funding from the Mayor's Office of Economic and Workforce Development and technical support from the Gato Group, the Council engaged in an extensive planning process that included numerous stakeholder interviews, four focus groups, a study session with expert consultants, and four community meetings. At the conclusion, the Council prepared a report on its community planning process. (Exhibit 2, Page 8) Among the Council's initiatives are the creation of a Special Use District and a Cultural Benefits Campaign district. These initiatives are currently in process.

The report noted that "there were major concerns among all stakeholders about the lack of affordable housing and about the gentrification and recent eviction and displacement of longtime residents. A related theme was the **rapid transformation** underway with some saying they wanted to prevent another 'Valencia' (referring to the way Valencia lost much of its Latino culture in the 1990s and 2000s)". (emphasis original) (Exhibit 2, P 12)

Unfortunately, we are beginning to see the Valenciazation of the LCD. Small mom and pop businesses are being replaced by upscale corporate-owned businesses. Non-profits such as the 40-year-old Galaria de la Raza, on month-to-month tenancies are extremely vulnerable. They are also seeing a diminution of their customer base due to gentrification and the resulting displacement. Richard Sucre Julie Moore October 9, 2016 Page Six

Development has already demonstrated the potential physical impacts of continued market rate development. For instance, at a proposed project on 24<sup>th</sup> and York, the owner plans to build 12 condo townhomes which will cover a mural that has been on there over 30 years and is part of the Precita eyes mural tours. The famous Carlos Santana mural on 22nd and South Van Ness was completely covered when the lot in front built housing. In balmy alley new owners of a property wanted to remodel and add a second unit which faced balmy ally, covering a 40 year old mural.

More disturbing has been complaints by newcomers against neighboring Latino owned businesses from the owner and residents of the Vida on Mission Street. A group of new residents on Harrison St. calling themselves "the gang of five" said they would sue to stop Carnival. During Sunday Streets on 24th a group of neighbors did not want the low riders on Harrison Street, saying that they were intimidated by them. Additionally, neighbors have complained about "Mexican" music on 24<sup>th</sup> Street. Without sufficient mitigation and community benefits, problems such as these will only get worse with the influx of hundreds more "gentrifiers", all to the detriment of the residents, businesses, and nonprofits that the City said it wanted to protect when it created the LCD. As we have seen on Valencia Street we can foresee gentrifiers requesting the police to move Latino youths, and adults, off "their" street corners.

Impacts such as these should be evaluated and adequate mitigation measures put in place before considering the proposed project and other projects so affecting the LCD. Whether you care to view this in terms of CEQA, for the purpose of consistency (or inconsistency) with the Eastern Neighborhoods Plan, for the purpose of evaluating socioeconomic impacts under MAP 2020, or for the policy purposes enunciated in the creation of the LCD, it is imperative that these issues be analyzed before any project can be approved.

# <u>The Impact of the Proposed Project on the Calle 24 Latino Cultural District is Subject to</u> <u>Environmental Review.</u>

CEQA defines "environment" as "the physical conditions which exist within the area which will be affected by a proposed project, including land, air, water, minerals, flora, fauna, noise, and objects of historic or aesthetic significance." 14 CCR Sec. 15131(a). See eg. *Eureka Citizens for Responsible Government v City of Eureka* (2007) 147 Cal.App.4<sup>th</sup> 357, 363. The LCD falls under CEQA because (1) it is both "physical" in terms of the buildings, its residents,

the businesses, and the nonprofits, and (2) it is "historic" as defined in the Public Resources Code and the CCR. Further, the indirect impacts of displacement are "environmental" in that the displacement causes greenhouse gas emissions and exacerbates already strained transportation infrastructure.

Ċ-6

Richard Sucre Julie Moore October 9, 2016 Page Seven

The near and long term preservation and enhancement of the LCD is a stated goal of the City. This, of necessity, includes the physical presence of its residents, businesses, and non-profits, which, we submit, are endangered by the extensive market rate development slated for the area. The displacement, whether direct, or indirect (i.e. via gentrification) certainly will have a physical effect on the environment because increased commuting distances for the displaced will result in greenhouse gas emissions. (See checklist in Appendix G of the Guidelines). Due to the unexpected rise in rents throughout the Bay Area, displaced residents are now required to commute distances as far as Vallejo and Tracy, distances we do not believe was contemplated in the PEIR for the Eastern Neighborhoods.

Lead agencies have the responsibility to evaluate projects against the CRHR criteria prior to making a finding as to a proposed project's impacts to historical resources (California Public Resources Code, Section 21084.1). A historical resource is defined as any object, building, structure, site, area, place, record, or manuscript that: a) Is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, or cultural annals of California; and b) Meets any of the following criteria: (1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; (2) Is associated with the lives of persons important in our past; (3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or (4) Has yielded, or may be likely to yield, information important in prehistory or history (14 CCR 15064.5(a)(3)). These businesses and nonprofits in the LCD have been recognized as an important cultural and commercial resource for the City.

The businesses and nonprofits in the LCD have been recognized as an important cultural and commercial resource for the City. The Ordinance creating the LCD noted that "The Calle 24 Latino Cultural District memorializes a place whose richness of culture, history and entrepeneurship is unrivaled in San Francisco." The District was established "to stabilize the displacement of Latino Businesses, and residents, preserve Calle 24 as the center of Latino culture and commerce, enhance the unique nature of Calle 24 as a special place for San Francisco's residents and tourists, . . ." and that its contribution will provide "cultural visibility, vibrancy, and economic opportunity for Latinos in the City and County of San Francisco."

Unfortunately, we have begun to see the impact of demographic changes along the LCD, without significant market rate development, the proposed project, along with the 540 other units in the pipeline will make the intersection of class, race, and culture, further impair the viability of the LCD. For instance, at a proposed project on 24<sup>th</sup> and York, the owner plans to build 12 condo townhomes which will cover a mural that has been on there over 30 years and is part of the Precita eyes mural tours. The famous

Richard Sucre Julie Moore October 9, 2016 Page Eight

Carlos Santana mural on 22nd and South Van Ness was completely covered when the lot in front built housing. In Balmy Alley, new owners of a property wanted to remodel and add a second unit which faced the alley, covering a 40 year old mural.

More disturbing has been complaints against neighboring Latino-owned businesses from the owner and residents of the Vida on Mission Street. A group of new residents on Harrison St. calling themselves "the gang of five" said they would sue to stop Carnaval. During Sunday Streets on 24<sup>th</sup> Street, a group of neighbors did not want the low riders on Harrison Street, saying that they were intimidated by them. Additionally, neighbors have complained about "Mexican" music on 24<sup>th</sup> Street. Problems such as these will only get worse with the influx of hundreds more "gentrifiers", all to the detriment of the residents, businesses, and nonprofits that the City said it wanted to protect

when it created the LCD. As we have seen on Valencia Street, we can foresee gentrifiers requesting the police to move Latino youths, and adults, off "their" street corners. This video, entitled "What it's like to get kicked out of your neighborhood" shows the problems of when newcomers "book" a pick-up soccer field that has been public, first-come-first- use by Latino youth for generations. <u>https://www.youtube.com/watch?v=awPVY1DcupE</u>. Continue watching, as a SF native speaks about the gentrification of the Mission. https://www.youtube.com/watch?v=tYNuRloaQts

The proposed project itself will result in the influx of approximately 73 households earning 200% AMI. In the pipeline are projects proposing over 200 units within the LCD (in addition to the 98 units proposed), and 350 proposed market rate units adjacent to the LCD. It is no leap of faith to anticipate that the proposed project will, both individually and cumulatively, result in higher rents on properties within the LCD. High wage earners have much more disposable income than most residents of the area. According to 2009-2013 census estimates, the median income for residents in the census tract on which the proposed project site is situated was \$51,510 (or 50% Median Income for a family of four). In addition to having significantly more disposable incomes and ability to purchase higher priced goods and services, these newcomers are more likely to have different consumer preferences, affecting both price and the nature of the goods and services provided by businesses in the 24th Street corridor. We might ask "how can the City provide economic opportunities for Latinos if its land use policies and practices price Latinos out of the market?" We only need look at Valencia Street to see how, with only modest market rate development (currently, about 100 units) fortifies the influx of higher wage earners and impacts a commercial corridor, substituting for mom and pop businesses with high end restaurants and clothing stores. Envisioning a similar result along 24<sup>th</sup> Street is reasonably foreseeable and must be guarded against.

Richard Sucre Julie Moore October 9, 2016 Page Nine

# <u>Cumulative Impacts of Market Rate Development on the Calle 24 Latino Cultural District</u> <u>Should be Examined.</u>

As previously mentioned, the impacts from the proposed project cannot be examined in isolation. The proposed project is not constructed inside a bubble. Both the project and its residents interact with the immediate community in multiple ways. Similarly, the environmental impacts of this project cannot be examined apart from other proposed projects currently in the pipeline. Proposed projects located within the boundaries of the LCD are: 1515 South Van Ness (140 market rate units), 2675 Folsom Street (98 market rate units), 3314 Cesar Chavez (52 units), 2600 Harrison St. (20), 2799 24th St. (8), and 3357 26<sup>th</sup> St. (8). Proposed projects immediately adjacent to the LCD are: 1198 Valencia St. (52 units), 1298 Valencia St. (35). Two blocks from the LCD is 2000-2070 Bryant Street (191 market rate units). This brings to total of 677 market rate units in or near the LCD. At least three projects are in the pipeline for the southwest corner of 22<sup>nd</sup> and Mission, and additional proposed projects are likely to be added to the pipeline as planning continues to give the green light to market rate developers.

Under Public Resources Code Section 21083 subdivision (b)(2).) "The possible effects of a project are individually limited but cumulatively considerable. As used in this paragraph 'cumulatively considerable' means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." Stated otherwise, a lead agency shall require an EIR be prepared for a project when the record contains substantial evidence that the "project has possible environmental effects that are individually limited but cumulatively considerable." (Guidelines section 15065 subdivision (a) (3).)

Therefore, the impact of the proposed project (consisting of 73 market rate units) should be evaluated in conjunction with the cumulative impacts it <u>and</u> the additional 594 units would have on the LCD.

## Traffic, Congestion, and Greenhouse Gas Impacts Should be Evaluated.

As previously stated, the addition of high end units on Mission Street will add to traffic and congestion problems, due to the significantly higher level of car ownership found among high earners. Further, the forced right turn and other new traffic limitations will create other unintended results in traffic flow that should be evaluated. Finally, the Department needs to undertake an evaluation of the problem of reverse commute.

6-9

Richard Sucre Julie Moore October 9, 2016 Page Ten

# Evaluation Requested Re: Calle 24 Latino Cultural District.

In addition to whatever evaluation that the Department may deem appropriate, we are requesting that the Department evaluate the proposed project, both individually and cumulatively, with respect to the potential impacts of the extensive market rate development on the existing residents, businesses, and non-profits in the Calle 24 Latino Cultural District. This inquiry should address the concerns stated above and include, but not be limited to, the following:

- The amount of anticipated disposable income of the households moving into the market rate units at the proposed project.
- The consumer preferences for goods and services of households moving into the market rate units at the proposed project, as compared to those Latino residents in the LCD earning 50% AMI.
- The potential venues where those consumer preferences are likely to be met.
- The short and long term impacts on neighborhood serving Latino businesses that new market rent paying households, with higher disposable incomes, will have on commercial rents in the Latino Cultural District both from the standpoint of the proposed project and from the standpoint of the cumulative impact of the projects listed above.
- The short and long term impact that rents at the proposed project (and cumulative proposed projects) will have on rents of vacant resident units in the immediate areas.
- The short and long term impact that the proposed project (and cumulative proposed projects) will have on displacement of Latinos and families now living in the Calle 24 Latino Cultural District.
- The housing alternatives of residents now living in the Calle 24 Latino Cultural District should they be displaced.
- The short and long term impact that the proposed project (and cumulative proposed projects) will have on the percentage of Latino residents and businesses living and working in the Calle 24 Latino Cultural District.
- Mitigation alternatives that, if employed, would stabilize commercial rents in the Latino Cultural District.

Richard Sucre Julie Moore October 9, 2016 Page Eleven

I have not had the opportunity to thoroughly discuss all the potential issues that would inform the impacts of the proposed project, both individually and cumulatively, and may request that you add to this inquiry in the future.

In light of the foregoing, you are requested to undertake the evaluation requested <u>before</u> considering the proposed project, or any of the other projects listed above that would have an impact on the Calle 24 Latino Cultural District. At your convenience, please let me know if the Department intends to undertake this evaluation as requested.

Sincerely, . Scott Weaver

Jsw:sme

cc. Calle 24 Latino Cultural District Our Mission No Eviction PODER MEDA John Rahaim Members, San Francisco Planning Commission Members, San Francisco Board of Supervisors Mayor, Ed Lee Joaquin Torres Dianna Ponce de Leon

bccs.

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# Table 2: Forecast Growth by Rezoning Option (continued)

# Change: Difference between 2025 Totals and Baseline(2000) Totals

	Eastern Neighborhoods						
	Mission	Showplace Sq./ _Potrero Hill	East SoMa	Central Waterfront	Subtotal	Rest of City	Total
2025 No Project							
Housing Units	420	651	1,581	219	2,871	16,207	19,078
Household Population	2,118	792	3,065	310	6,285	35,965	42,250
PDR Jobs	-985	-1,686	-1,065	360	-3,376	11,146	7,770
Non-PDR Jobs	2,884	5,607	4,238	301	13,030	108,919	121,949
Total Jobs	1,899	3,921	3,173	661	9,654	120,065	129,719
Option A							
Housing Units	782	2,294	2,294	3,645	9,015	28,368	37,383
Household Population	3,328	3,410	3,838	6,610	17,186	62,337	79,523
PDR Jobs	-861	752	-1,222	324	-1,007	11,677	10,671
Non-PDR Jobs	2,253	4,967	3,202	304	10,726	110,605	121,330
Total Jobs	1,391	5,719	1,980	628	9,719	122,282	132,001
Option B							
Housing Units	1,118	2,635	2,508	1,124	7,385	29,123	36,508
Household Population	4,301	4,049	4,199	1,928	14,477	63,004	77,481
PDR Jobs	-1,033	-1,790	-1,480	187	-4,116	8,984	4,868
Non-PDR Jobs	3,087	5,605	4,636	285	13,613	108,020	121,634
Total Jobs	2,053	3,815	3,156	472	9,497	117,004	126,501
Option C							
Housing Units	2,054	3,891	3,083	830	9,858	26,759	36,617
Household Population	7,077	6,859	5,177	1,375	20,488	57,295	77,783
PDR Jobs	-6,469	-1,903	-1,457	360	-9,469	10,185	716
Non-PDR Jobs	11,599	4,930	5,265	212	22,007	102,161	124,168
Total Jobs	5,130	3,027	3,808	572	12,538	112,346	124,884

SOURCE: San Francisco Planning Department, 2005

# Mission Projects 2008-Q-4 2017

3418 26<sup>th</sup> Street **80** Julian Street 411 Valencia Street 490 South Van Ness 3420 18<sup>th</sup> Street 1875 Mission Street 1501 15<sup>th</sup> St 480 Potrero 2550-58 Mission 1450 15<sup>th</sup> Street 346 Potrero 1785 15<sup>th</sup> Street 1801-63 Mission Street **2600 Harrison Street 1924** Mission Street 600 South Van Ness 2000-2070 Bryant 2000-2070 Bryant (affordable) 1298 Valencia Street 1198 Valencia Street 1050 Valencia Street **1979** Mission Street 2675 Folsom Street 1900 Mission Street 2750 19<sup>th</sup> Street 1515 South Van Ness 2799 24<sup>th</sup> Street 2435 16<sup>th</sup> Street 3357-59 26<sup>th</sup> Street 1726-30 Mission Street 2100 Mission Street 3314 Cesar Chavez 1798 Bryant Street 2918-24 Mission Street 793 South Van Ness 953 Treat 3620 Cesar Chavez 344 14<sup>th</sup> /1463 Stevenson

13 units (built) 8 units (built) 16 units (built) 87 units 16 units (built) 38 units (built) 40 units (built) 84 units (built) 114 units (built) 23 units (built) 72 units (built) 8 units (built) 54 units (entitled) 20 units (entitled) 12 units (entitled) 27 units (built) 194 units (entitled) 130 units (entitled) 35 units (entitled) 52 units (built) 16 units (built) 331 units 117 units (entitled) 11 units (entitled) 60 units 157 units (entitled) 4 units 53 units (entitled) 7 units 40 units (entitled) 29 units (entitled) 52 units 131 units 75 units 73 units (entitled) 8 units (entitled) 28 units (entitled) 45 units

1950 Mission Street	157 units (entitled)
1296 Shotwell	96 units (entitled)
899 Valencia	18 units (built)
3500 19 <sup>th</sup> Street	17 units (built)
1880 Mission Street/1600 15 <sup>th</sup> Street	202 units (built)
1721 15 <sup>th</sup> Street	23 units
3230-36 24 <sup>th</sup> street	21 units
198 valencia	24 units (entitled)
235 Valencia Street	50 units (entitled)
1500 15 <sup>th</sup> Street	184 units
3420 18 <sup>th</sup> Street	16 units (built)
2632 Mission Street	16 units
606 Capp Street	20 units (entitled)
2070 Folsom Street	127 units (entitled)
1990 Folsom Street	158 units
Total Built	780 units
Total entitled	1,435 units
Units in Pipeline	1,194 units
-	

# **GRAND TOTAL**

3,409 units

Preferred project approved in 2008 EIR, 1,696 units Number studied under EIR project options:

> Option A - 762 Option B - 1,118 Option C - 2,054

This information was provided through Planning Department Data, including the Development Pipeline Q-4, 2017 and SF Property Information Map. Excluded are:

- 1) Most projects with fewer than 10 units.
- 2) Projects entering pipeline after 1/1/18
- 3) Projects built that were not included in current pipeline report.

< 239 Results for carlos bocanegra

#### Fwd: Re: Projects completed or under environmental review

From: carlos <carlos@lrcl.org> To: Jscottweaver <jscottweaver@aol.com> Date: Wed, Jan 10, 2018 11:18 am

http://sf-planning.org/pipEline-report

#### ----- Original Message ----

Subject: Re: Projects completed or under environmental review Date: 2017-09-29 09:21 From: <u>carlos@lrcl.org</u> To: "Wertheim, Steve (CPC)" <<u>steve.wertheim@sfgov.org</u>>

Hi Steve,

Two weeks is not a problem, I will be sure to start checking the pipeline report around then. Thank you again for looking into this on my behalf!

Yours Truly,

Carlos Bocanegra

On 2017-09-28 16:57, Wertheim, Steve (CPC) wrote:

> Carlos,

>

> I talked with Teresa Ojeda, who manages our data team. She says the

> updated Pipeline Report will be available in mid-October. It is not

> possible to send out info ahead of time, as the effort still to be > undertaken is to comb through and vet all the data as accurate, and it

> would be better to wait a couple of weeks for data we feel confident

> it. Thanks for your patience, and please just start checking the

> website (http://sf-planning.org/pipEline-report) in a couple of weeks.

>

> -Steve

>

> STEVE WERTHEIM

> Planner, Citywide Policy & Analysis

> Planning Department

> City and County of San Francisco

> 1650 Mission St. Suite 400

> > San Francisco, CA 94103

>

> 415.558.6612

> 415.558.6409 [Fax]

> steve.wertheim@sfgov.org

> [1] [2] [3] [4] [5]

> Please note that I am out of the office on Fridays\_\_\_\_

> FROM: Wertheim, Steve (CPC)

> SENT: Friday, September 22, 2017 2:08 PM

> TO: 'carlos@lrcl.org'

> SUBJECT: RE: Projects completed or under environmental review

> > Carlos,

Curroo

> I've emailed the head of our data team to see if anyone is working on

> the latest pipeline report. I'll get back to you ASAP.

> -Steve

> STEVE WERTHEIM

>

- > Planner, Citywide Policy & Analysis
- > Planning Department

1/21/2018

- > City and County of San Francisco
- > 1650 Mission St. Suite 400
- > San Francisco, CA 94103
- > 415.558.6612
- > 415.558.6409 [Fax]
- > steve.wertheim@sfgov.org

> [1] [2] [3] [4] [5]

> \_Please note that I am out of the office on Fridays\_\_\_\_

- > FROM: <u>carlos@lrcl.org</u> [mailto:carlos@lrcl.org]
- > SENT: Wednesday, September 20, 2017 3:14 PM
- > TO: Wertheim, Steve (CPC)
- > SUBJECT: Re: Projects completed or under environmental review
- >
- > Hi Steve,
- >
- > Thank you for helping with this matter! The information you gave me
- > will be very useful. I'll be sure to familiarize myself with the
- > information provided by your website. In the interim, it would be
- > very helpful to have an updated report from Planning with info from
- > Q2. I'd really appreciate connecting with someone from data team who
- > will be able to help me with this request. Thank you again for all
- > your help!
- > Yours Truly,
- > Carlos Bocanegra
- > >( >
- > On 2017-09-18 09:00, Wertheim, Steve (CPC) wrote:
- > Carlos,
- >
- > That list looks like it was tailor-made (probably for a CEQA appeal
- > hearing). But we always have good info that you can work from on our
- > website via our Pipeline Report
- > (<u>http://sf-planning.org/pipEline-report</u>). On that site you can
- > download a spreadsheet with the same data that we have, which you can
- > manipulate as you see fit (e.g just pulling out the Mission and
- > looking into where projects are in the development process). That way
- > you don't need to ask us for special report or wait for us to get back
- > to you you can just do it yourself. That being said, it looks like
- > the latest info is from Q1 2017 (probably because the woman who
- > developed this report recently quit to work for the Fire Department).
- > Tell me if you must have info from Q2 as well and I'll pass you along
- > to our data team though given how strapped they are right now, you
- > may not be able to get more info in a timely way.
- > Hope this helps.
- >
- > -Steve
- >
- > STEVE WERTHEIM
- > Planner, Citywide Policy & Analysis
- > Planning Department
- > City and County of San Francisco
- > 1650 Mission St. Suite 400
- > San Francisco, CA 94103
- > 415.558.6612
- > 415.558.6409 [Fax]
- Steve.Wertheim@sfgov.org
- >
- > -----
- >
- > FROM: carlos@lrcl.org <carlos@lrcl.org>
- > SENT: Thursday, September 14, 2017 12:41:24 PM
- > TO: Wertheim, Steve (CPC)
- > SUBJECT: Re: Projects completed or under environmental review
- > Hi Steve,
- >

C-16

AOL Mail - Message View

<sup>&</sup>gt; I was told that this may have been a project you were working on in

#### 1/21/2018

C-17

- > your old position. Sorry for not including the attachment, please
- > find it here. Thank you for looking into this on my behalf! I really
- > appreciate the help. Let me know if you need anything further, or
- > have other questions.
- >
- > Yours Truly,
- > Carlos Bocanegra
- >
- > On 2017-09-14 09:53, Wertheim, Steve (CPC) wrote:
- >
- > Carlos, >
- > Thanks for writing. While I do not (nor ever have) maintained a list
- > of the housing pipeline in the Mission (or elsewhere in the City), I
- > can try to help figure out who does. Your email referenced an
- > attachment but did not include one. If you wouldn't mind including the
- > attachment this time I can see what you already have, so I can ask
- > around to see if there is anything more recent.
- > -Steve
- >
- > STEVE WERTHEIM
- > Planner, Citywide Policy & Analysis
- > Planning Department
- > City and County of San Francisco
- > 1650 Mission St. Suite 400
- > San Francisco, CA 94103

>

> 415.558.6612

- > 415.558.6409 [Fax]
- > Steve.Wertheim@sfgov.org
- > -----

>

- > FROM: carlos@lrcl.org <carlos@lrcl.org>
- > SENT: Tuesday, September 12, 2017 1:02:17 PM
- > TO: Wertheim, Steve (CPC)
- > CC: Sucre, Richard (CPC)
- > SUBJECT: Re: Projects completed or under environmental review

>

> Hi Steve,

>

- > My name is Carlos Bocanegra and I work in collaboration with a group
- > known as United to Save the Mission (USM). We work to ensure
- > equitable
- > development within the Mission. I messaging you on behalf of USM to
- > formally request an updating list of the housing pipeline in the
- > foreseeable future. I was told that you used to maintain the updated
- > version of this list. Would you have a more current version than the
- > one attached here? If not, we would like to request that an updated
- > list be made. We would also like to receive a copy of this list as

> well.

> Thank you for your attention to this matter.

>

> Yours Truly,

> Carlos Bocanegra

Links:

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- [4] http://www.youtube.com/sfplanning
- [5] http://signup.sfplanning.org/



# BERKELEY Research Brief

# Housing Production, Filtering and Displacement: Untangling the Relationships



Miriam Zuk Karen Chapple

# EXECUTIVE SUMMARY:

# Research Implies the Importance of Increasing Production of Subsidized and Market-Rate Housing

Debate over the relative importance of subsidized and market-rate housing production in alleviating the current housing crisis continues to preoccupy policymakers, developers, and advocates. This research brief adds to the discussion by providing a nuanced analysis of the relationship between housing production, affordability, and displacement in the San Francisco Bay Area, finding that:

- At the regional level, both market-rate and subsidized housing reduce displacement pressures, but subsidized housing has over double the impact of market-rate units.
- Market-rate production is associated with higher housing cost burden for low-income households, but lower median rents in subsequent decades.
- At the local, block group level in San Francisco, neither market-rate nor subsidized housing production has the protective power they do at the regional scale, likely due to the extreme mismatch between demand and supply.

Although more detailed analysis is needed to clarify the complex relationship between development, affordability,

and displacement at the local scale, this research implies the importance of not only increasing production of subsidized and market-rate housing in California's coastal communities, but also investing in the preservation of housing affordability and stabilizing vulnerable communities.

# About IGS

The Institute of Governmental Studies is California's oldest public policy research center. As an Organized Research Unit of the University of California, Berkeley, IGS expands the understanding of governmental institutions and the political process through a vigorous program of research, education, public service, and publishing.

# Housing Production, Filtering, and Displacement: Untangling the Relationships

#### Introduction

The ongoing crisis of housing affordability in California has deepened the divide between those who believe it can be resolved by expanding the supply of market-rate housing and those who believe that market-rate construction on its own will not meet the needs of low-income households, for whom more subsidized housing needs to be built or stabilized. These arguments over the role of market-rate versus subsidized housing have plagued strong-market cities, which are engaging in political debates at the ballot box (e.g., the "Mission Moratorium," a ballot measure that would ban luxury units in San Francisco's Mission neighborhood) and in city hall (e.g., housing density bonus programs like New York City's inclusionary housing plan) over the role and impact of housing development.

In the February 2016 report "Perspectives on Helping Low-Income Californians Afford Housing" (hereafter "the LAO Report"), the California Legislative Analyst's Office (LAO) used data we posted on our Urban Displacement Project website (www.urbandisplacement.org) to argue that market-rate development would be the most effective investment to prevent low-income households from being displaced from their neighborhoods.<sup>1</sup>

In this research brief we present a more nuanced view to contribute to this debate. We correct for the omission of subsidized housing production from the LAO Report and find that both market-rate and subsidized housing reduce displacement at the regional level, yet subsidized housing has over double the impact of marketrate units. After evaluating the impact of marketrate and subsidized housing built in the 1990s on displacement occurring in the 2000s, to ensure that we are examining before and after relationships, we find that market-rate development has an insignificant effect on displacement. Finally, when looking at the local, neighborhood scale in San Francisco, neither market-rate nor subsidized

housing production has the protective power they do at the regional scale, likely due to the extreme mismatch between demand and supply. These findings provide further support for continuing the push to ease housing pressures by producing more housing at all levels of affordability throughout strong-market regions. These findings also provide support for increasing spending on subsidized housing to ensure both neighborhood stability and income diversity into the future.

We begin this research brief by describing why the filtering process, the phenomenon in which older market-rate housing becomes more affordable as new units are added to the market, may fall short of producing affordable housing. We next revisit the question of the impact of market-rate development, looking also at the role of subsidized housing development, in mitigating displacement. After an examination of the impact of housing production on displacement over the short- and long-term, we look at why adding to housing supply in a region might not reduce housing market pressures in all neighborhoods. We conclude by suggesting next steps for research.

#### **Filtering Is Not Enough**

Using our data, the LAO report concluded that the most important solution to the housing crisis in California's coastal communities is to build more market-rate housing. The report found that new market-rate construction reduced displacement of low-income households across the region. After outlining the challenges and limited funding for subsidized units, the report argued that filtering, or the phenomenon in which older market-rate housing becomes more affordable as new units are added to the market, was the most effective way to exit the affordable-housing crisis. The report neglects the many challenges of using market-rate housing development as the main mechanism for providing housing for low-income households, in particular the timing and quality of the "filtered" housing stock.<sup>2</sup> The

... we found that both market-rate and subsidized housing development can reduce displacement pressures, but subsidized housing is twice as effective as market-rate development at the regional level. filtering process can take generations, meaning that units may not filter at a rate that meets needs at the market's peak, and the property may deteriorate too much to be habitable. Further, in many strong-market cities, changes in housing preferences have increased the desirability of older, architecturally significant property, essentially disrupting the filtering process.

Although our data is not tailored to answer questions about the speed of filtering, other researchers<sup>3</sup> have found that on average across the United States, rental units become occupied by lower-

income households at a rate of approximately 2.2% per year. Yet in strong housing markets such as California and New England the rate is much lower and researchers find that filtering rates have an inverse relationship with housing price inflation; in other words, places that have rapidly rising housing prices have slower filtering rates.<sup>4</sup> Using the estimates of Rosenthal (2014) and an annual appreciation rate

(-20

of 3.3% over the last 20 years, the pace at which units filter down to lower-income households for the Bay Area's rental market is estimated at roughly 1.5% per year. Yet, Rosenthal finds that rents decline by only 0.3% per year, indicating that units become occupied by lower-income households at a faster rate than rents are falling, which could result in heightened housing cost burden. Furthermore, if we were to assume that developers are building housing for people at the median income, then it would take approximately 15 years before those units filtered down to people at 80% of the median income and closer to 50 years for households earning 50% of the median income.<sup>5</sup> Again, however, this does not mean that such units are actually affordable to the low-income households occupying them.

We examined the relationship between market-rate housing construction, rents, and housing cost burden (Table 1). Initial results indicate a filtering effect for units produced in the 1990s on median rents in 2013. Yet market-rate development in the 2000s is associated with higher rents, which could be expected as areas with higher rents are more lucrative places for developers to build housing. Furthermore, development in both the 1990s and 2000s is positively associated with housing cost burden for low-income households. Thus, while filtering may eventually help lower rents decades later, these units may still not be affordable to lowincome households.

### **Developing Subsidized Units Is Even More Protective**

While numerous critiques of the LAO report have circulated,<sup>6</sup> we believe that the omission of subsidized housing production data from the analysis has the greatest potential to skew results.<sup>7</sup> We have reanalyzed the data on housing production, including that of subsidized housing, and show that the path to reducing displacement is more complex than to simply rely on market-rate development and filtering. Following, we present our analysis that replicates the LAO analysis with the addition of subsidized housing data.

To examine the relationship between market-rate housing construction, subsidized housing construction, and displacement of low-income households, we developed an econometric model that estimates the probability of a lowincome Bay Area neighborhood experiencing displacement. We employ the same methodology as the LAO Report, using probit regression analysis to evaluate how various factors affect the likelihood of a census tract experiencing displacement between 2000 and 2013 (see the technical appendix for definitions).

Consistent with the LAO Report, we find that new market-rate units built from 2000 to 2013 significantly predict a reduction in the displacement indicator from 2000 to 2013 (Table 2, Model 1).<sup>8</sup> Higher shares of nonwhite population and higher housing density also produced significant reductions in displacement. Higher shares of housing built before 1950, college-educated population in 2000, and low-income population in 2000 increased the likelihood of the census tract experiencing displacement. These results are generally consistent with previous research: existing residents in neighborhoods with historic housing stock and college-educated populations are at higher risk of displacement.9 We also find, however, that the production of subsidized units has a protective effect, which appears to be greater than the effect of the market-rate units (Model 2). This includes units built with low-income housing tax credits and other federal and state subsidies.<sup>10</sup> We find the effect of subsidized units in reducing the probability of displacement to be more than double the effect of market-rate units. In other words, for every one subsidized unit, we would need to produce two or more market-rate units to have the same reduction in displacement pressure.11

What we find largely supports the argument that building more housing, both market-rate and subsidized, will reduce displacement. However, we find that subsidized housing will have a much greater impact on reducing displacement than market-rate housing. We agree that marketrate development is important for many reasons, including reducing housing pressures at the regional scale and housing large segments of the population. However, our analysis strongly suggests that subsidized housing production is even more important when it comes to reducing displacement of low-income households.

## **ABOUT THE AUTHORS**

Miriam Zuk, Ph.D. is project director of the Urban Displacement Project at UC Berkeley. She specializes in equitable development and environmental justice. Dr. Zuk holds a B.A. in Environmental Sciences from Barnard College, an M.S. in Technology and Policy from MIT, and a Ph.D. in City and Regional Planning from UC Berkeley. Prior to academia, she served as the Deputy Director of Air Quality Research for the Mexican Ministry of Environment.

Karen Chapple, Ph.D., is a Professor of City and Regional Planning at the University of California, Berkeley. She specializes in housing, community and economic development, as well as regional planning. Chapple holds a B.A. in Urban Studies from Columbia University, an M.S.C.R.P from the Pratt Institute, and a Ph.D. from UC Berkeley. Prior to academia, Chapple spent ten years as a practicing planner in economic development, land use, and transportation in New York and San Francisco.

C-21

Table 1. The Impact of Development on Median Rent and Housing Cost Burden for Low-Income Households for the SF Bay Area Census Tracts (linear model)

	Median Rent (2009-2013)	Percent of Low Income Households that are Housing Cost Burdened (2009-2013)
% of housing units built pre-1950 in 2000	-202.52***	-0.04***
% of population nonwhite in 2000	47.28	0.08***
% of adult population with college degree in 2000	445.65***	0.03*
Housing density (pop/square mile) in 2000	2.6E-04	-1.6E-07
% of households with income below 80% of county median in 2000	-1185.37***	-0.05**
Number of new market-rate units built between 1990- 2000	-0.05**	2.7E-05***
Number of new market-rate units built between 2000- 2013	0.07***	2.6E-05***
Proximity to rail transit station (<1/2 mile) in 2000	60.30***	0.01
Intercept	1827.80***	0.56***
n	1569	1568
R <sup>2</sup>	0.51	0.06
***<.01 **<.05 *<.10 significance level		

Table 2. The Impact of Market-Rate and Subsidized Developments on Displacement Bay Area Tracts 2000-2013				
	Model 1	Model 2		
% of housing units built pre-1950 in 2000	0.612***	0.481***		
% of population nonwhite in 2000	-0.956***	-0.943***		
% of adult population with college degree in 2000	1.775***	1.824***		
Housing density (pop/square mile) in 2000	-1.04E-05***	-1.01E-05***		
% of households with income below 80% of county median in 2000	2.447***	3.054***		
Number of new market-rate units built between 2000- 2013	-0.002***	-0.002***		
Number of subsidized units built between 2000-2013		-0.005***		
Intercept	-1.576***	-1.709***		
n	1569	1569		
Pseudo R <sup>2</sup>	0.1456	0.1693		
***<.01 **<.05 *<.10 significance level				



Table 3. The Impact of Market-Rate and Subsidized De	evelopments on Displaceme	nt Bay Area Tracts 1990-2000	and 2000-2013
	Model 3	Model 4	Model 5
% of housing units built pre-1950 in 2000	0.614***	0.565***	0.446**
% of population nonwhite in 2000	-1.071***	-1.090***	-0.9555***
% of adult population with college degree in 2000	1.689***	1.700***	1.820***
Housing density (pop/square mile) in 2000	-5.95E-06*	-5.09E-06	-9.73E-06**
% of households with income below 80% of county median in 2000	2.251***	2.474***	3.105***
Number of new market-rate units built between 1990- 2000	-3.25E-04**	-2.91E-04**	-6.85E-05
Number of subsidized units built between 1990-2000		-0.004***	-0.002*
Number of new market-rate units built between 2000- 2013			-0.002***
Number of subsidized units built between 2000-2013	-	-	-0.005***
Intercept	-1.613***	-1.660***	-1.699***
n	1571	1571	1569
Pseudo R <sup>2</sup>	0.108	0.118	0.171
***<.01 **<.05 *<.10 significance level			

# The Effectiveness of Market-Rate Production in Mitigating Displacement Diminishes over Time

The LAO Report used data that we posted to our website for housing production numbers that were built over the same time period as our data on the change in low-income households. Yet, since both housing production and household change are occurring in a 13-year period from 2000 to 2013, it is unclear which came first: conceivably, the change in households occurred before the development, rather than vice versa, however it is also feasible that developers prefer to build in neighborhoods experiencing a decline in lowincome households. This creates the potential for errors in the model. To account for this, we correct the potential error in the LAO Report by adding housing production data that precede changes in low-income households, which we use as the proxy for displacement. In other words, instead of looking at the incidence of displacement in the same decade as housing production, we evaluate the impact of marketrate and subsidized housing built in one decade (e.g., 1990s) on what happens to residents in a subsequent decade (e.g., 2000s).

We find that market-rate housing built in the 1990s significantly reduces the incidence of displacement from 2000 to 2013 (Table 3, Model 3), confirming the findings of the LAO Report. Yet, once again, subsidized housing built in the previous decade has more than double the effect of marketrate development in that decade (Model 4). When looking at housing production in both the 1990s and 2000s (Model 5), subsidized housing continues to play a greater role in mitigating displacement in 2010s, while market development in the 1990s becomes insignificant. This suggests that there are factors dictating development in the 1990s that are related to development in the 2000s as well as displacement that are not included in the model, such as housing sales prices or school quality. An alternative interpretation of the disappearance of an effect for market-rate housing built in the 1990s is that market-rate housing in and of itself, or the filtering process, has no effect on displacement. Future research will need to further analyze these relationships as well as other factors that may improve the predictive power of the models.

Regardless of when construction happens relative to displacement—before or concurrently—our analysis shows that subsidized housing has double the impact of marketrate development. Further, the effectiveness of market-rate housing in mitigating displacement seems to diminish as more market-rate housing is built in a subsequent decade. More research would be necessary to understand this phenomenon, but this result suggests that over time, the construction of market-rate housing may have a catalytic effect on a neighborhood, increasing its attractiveness to upperincome residents, rather than a protective effect of filtering.

## Housing Production May Not Reduce Displacement Pressure in a Neighborhood

As Rick Jacobus explains,<sup>12</sup> because market mechanisms work differently at different geographic scales, market-rate construction can simultaneously alleviate housing pressures across the region while also exacerbating them at the neighborhood level. At the regional scale, the interaction of supply and demand determines prices; producing more market-rate housing will result in decreased housing prices and reduce displacement pressures. At the local, neighborhood scale, however, new luxury buildings could change the perception of a neighborhood and send signals to the market that such neighborhoods are desirable and safer for wealthier residents, resulting in new demand. Given the unmet demand for real estate in certain neighborhoods, new construction could simply induce more in-moving.<sup>13</sup> By ex-

# Table 4. The Impact of Market-Rate and Subsidized Developments on Displacement, San Francisco Block Groups, 1990-2000 and 2000-2013

	Model 6
% of housing units built pre-1950 in 2000	1.017***
% of population nonwhite in 2000	-2.306***
% of adult population with college degree in 2000	-0.427
Housing density (pop/square mile) in 2000	-1.0E-05***
% of households with income below 80% of county median in 2000	3.038***
Number of new market-rate units built between 1990-1999	-0.002
Number of subsidized units built between 1990-1999	-0.004
Number of new market-rate units built between 2000-2013	4.2E-04
Number of subsidized units built between 2000-2013	-0.001
Intercept	-0.638
n	578
Pseudo R <sup>2</sup>	0.113
***<.01 **<.05 *<.10 significance level	

tension, then, one would expect market-rate development to reduce displacement at the regional scale but increase it or have no or a negative impact at the local neighborhood scale.

Here we test this hypothesis. We do this by analyzing our regional data set at the tract level<sup>14</sup> and comparing the results to the block group level for San Francisco,<sup>15</sup> where we have our most accurate data on housing production. What we find largely confirms this regional versus local argument; there is some, albeit limited evidence that at the regional level market-rate housing production is associated with reductions in the probability of displacement (Model 5), but at the block group level in San Francisco it has an insignificant effect (Table 4, Models 6). Comparing the effect of marketrate and subsidized housing at this smaller geography, we find that neither the development of market-rate nor subsidized housing has a significant impact on displacement. This suggests that indeed in San Francisco, and by extension similar strong markets, the unmet need for housing is so severe that production alone cannot solve the displacement problem.

To illustrate this point, in Figure 1 we plot on the X-axis construction of new market-rate units in the 1990s and 2000s and on the Y-axis the change in the number of low-income households from 2000 to 2013 for both tracts in the entire region and block groups in San Francisco. Although at the regional level the relationship between market-rate development and change in low-income households appears linear, the same is not true for the block group level, where no clear pattern emerges.

# Housing Production and Neighborhood Change in SOMA, SF

To better grasp the complicated relationship between housing development and displacement at the local block group level we selected two case study areas in San Francisco's South of Market Area (SOMA) that experienced high rates of development of both market-rate and subsidized units since the 1990s, but had divergent results when it came to changes in the income profile of their residents. We examined the dynamics of block groups 2 and 3 in Census Tract 176.01. Both witnessed among the highest levels of housing construction in San Francisco for both market-rate and subsidized units, yet from 2000 to 2013 our data show that Block Group 2 gained low-income households and Block Group 3 lost low-income households.

# Block Group 2

At the heart of downtown San Francisco, this sevenblock area is home to nearly 2,500 residents today, nearly doubling its population since 2000. In the 1990s, 127 market-rate units were added to the area, mostly in mid-sized

C-24


Figure 1. Housing Production (1990-2013 and Change in Low-Income Households (2000-2013)

Figure 2. Housing Developments from 1990-2013 in Two Block Groups of the SOMA Neighborhood, SF



buildings of about 30 units. During that same period, 108 subsidized units were added, including 72 units in a single room occupancy (SRO) hotel. Sales prices for condos dipped in the mid-1990s, but climbed back to nearly \$400 per square foot by 1999 (in 2010 dollars, see Figure 3).

Development of market-rate units continued into the early 2000s, when the 258-unit SOMA Residences apartments were built at 1045 Mission Street in 2001. Three below-market-rate units were developed as part of the city's inclusionary housing program, but no other subsidized units were added. Sales prices increased in the area in the early 2000s, suffered from the housing crisis in the mid-2000s, but reached back up to prerecession values by 2013.

Yet the area did not witness a significant loss of lowincome households during the 13-year period of 2000 to 2013, which may be in part related to the fact that nearly a thousand units in the area are in buildings regulated by rent control (nearly 60% of all rental units), which has remained relatively constant since 2000. Finally, this area is bordered by 6th Street to the east, San Francisco's "skid row," with high rates of crime and concentrated poverty which may be dampening the attractiveness of the neighborhood. When we incorporate crime rates into our model, they significant-

IGS Research Brief, May 2016

8

Figure 3. Median Condo Sales Price per Square Foot, 1991-2013 (Source: Dataquick 2014)



ly predict a reduction in displacement probability, even at the block group level, which housing production does not.

#### Block Group 3

Block Group 3 is an eight-block area centered to the north around the Civic Center BART station and home to over 2,100 people (Figure 2). The area gained 101 marketrate units and 104 subsidized units in the 1990s. This block group was the site of a 104-SRO-unit building for disabled homeless adults in 1994. The 101 market-rate units built in the 1990s were in smaller scale developments of 30 units or less. Development accelerated the following decade with 601 market-rate units and 315 subsidized and below-market units. In 2002, 48 units were developed at 675 Minna followed by 162 affordable units at 1188 Howard. In 2008, 244 luxury condos opened in the SOMA Grand at 1160 Mission and in 2010, following years of negotiation, the Trinity Management group opened 440 high-end furnished apartments at 1188 Mission as part of the Trinity Plaza development. The development was at the center of housing debates as it involved the demolition of 377 rent-controlled units. Ultimately the developer agreed to put 360 of its new 1,900 units under rent control.<sup>16</sup> In 2015, however, the management group was accused of renting out some of those rent-controlled units to tourists.17 Overall the area lost approximately 40% of its rent-controlled housing stock since 2000 and today a little over half of the rental units are under rent control.

Despite the ongoing investments in subsidized housing in the neighborhood, the new high-end developments have contributed to the ongoing transformation of the neighborhood as characterized by the 2013 Yelp review by a SOMA Grand resident:

I bought a place here in 2009 and absolutely love it. While the neighborhood might have a bit of grit to it there are so many great restaurants nearby, inFigure 4. Canon Kip Community House Built in 1994 Houses Disabled Homeless Adults in 104 SRO Units



Figure 5. 440 Units Were Developed at Trinity Place, at 1188 Mission Street, in 2010



cluding the one right in the building.... This neighborhood is transforming fast too!<sup>18</sup>

This, along with the loss of rent-controlled units, has resulted in a net loss over 150 low-income households (with median incomes between 50% and 80% of San Francisco median income) between 2000 and 2013. It is unclear, however, how much of that loss is due to the direct displacement from the Trinity development or from indirect displacement due to rising rents associated with local development or other factors affecting housing demand.

These two block groups illustrate the complex relationships between housing development and demographic change. While both neighborhoods have witnessed dramatic development in one of the fastest growing parts of San Francisco, and have similarly seen significant growth in housing prices, one may be classified as experiencing displacement of low-income households, while the other does not. The ambiguous effects of development at the local level carry over to affordability as well. In Table 5 we show the linear modeling results of housing development on median rent and housing cost burden for low-income households, finding that subsidized units built in the 2000s are associTable 5. The Impact of Development on Median Rent and Housing Cost Burden for Low-Income Households for SF Block Groups (Linear Model)

	Median Rent (2009-2013)	Percent of Low Income Households that are Housing Cost Burdened (2009-2013)
% of housing units built pre-1950 in 2000	94.615	0.030
% of population nonwhite in 2000	-230.837	0.126
% of adult population with college degree in 2000	692.844**	0.113
Housing density (pop/square mile) in 2000	-5.2E-04	9.5E-08
% of households with income below 80% of county median in 2000	-616.005***	-0.109*
Number of new market-rate units built between 1990- 2000	6.0E-01	-3.5E-05
Number of subsidized units built between 1990-2000	1.0E+00	2.6E-05
Number of new market-rate units built between 2000- 2013	3.4E-02	1.5E-04*
Number of subsidized units built between 2000-2013	-9.1E-01**	-3.6E-04*
Intercept	1526.485***	0.590***
n	578	563
R <sup>2</sup>	0.250	0.020
***<.01 **<.05 *<.10 significance level		

ated with a decline in median rent and housing cost burden, whereas market-rate developments are associated with greater housing cost burden. Development of subsidized and market-rate units in the 1990s appears to have no significant impact on affordability in the subsequent decade at the block group level. As discussed above, housing affordability and displacement may be related to other neighborhood and regional factors, such as employment dynamics and neighborhood amenities that were not included in the models. Additional research will be needed with higherresolution housing data along with other information about neighborhood amenities to better understand the dynamics and impact of housing production at the local scale.

### Conclusions

There is no denying the desperate need for housing in California's coastal communities and similar housing markets around the U.S. Yet, while places like the Bay Area are suffering from ballooning housing prices that are affecting people at all income levels, the development of market-rate housing may not be the most effective tool to prevent the displacement of low-income residents from their neighborhoods, nor to increase affordability at the neighborhood scale.

Through our analysis, we found that both market-rate and subsidized housing development can reduce displacement pressures, but subsidized housing is twice as effective as market-rate development at the regional level. It is unclear, however, if subsidized housing production can have a protective effect on the neighborhood even for those not fortunate enough to live in the subsidized units themselves.

By looking at data from the region and drilling down to local case studies, we also see that the housing market dynamics and their impact on displacement operate differently at these different scales. Further research and more detailed data would be needed to better understand the mechanisms via which housing production affects neighborhood affordability and displacement pressures. We know that other neighborhood amenities such as parks, schools, and transit have a significant impact on housing demand and neighborhood change<sup>19</sup> and it will take additional research to better untangle the various processes at the local level.

In overheated markets like San Francisco, addressing the displacement crisis will require aggressive preservation strategies in addition to the development of subsidized and

market-rate housing, as building alone won't protect specific vulnerable neighborhoods and households. This does not mean that we should not continue and even accelerate building. However, to help stabilize existing communities we need to look beyond housing development alone to strategies that protect tenants and help them stay in their homes.

#### **Technical Appendix**

#### Data

We use the same dataset released on our website urbandisplacement.org as used in the LAO report. We add data on the production of subsidized units using data from the California Housing Partnership Corporation that compiled information from federal LIHTC and HUD subsidies, as well as California state subsidies.<sup>20</sup> We supplement this data with information for San Francisco on parcel level housing data and information on units produced under their Below Market-Rate (inclusionary housing) program.

### Defining Displacement

For the purposes of comparison, we use the same definition of displacement as the LAO report. They defined a census tract as having experienced displacement if (1) its overall population increased and its population of low-income households decreased, or (2) its overall population decreased and the rate of low-income households declined at a faster rate than the overall population decline. The time period for change in low-income households is 2000 to 2013. We apply the same methodology for San Francisco block groups.

It's important to note the limitations of this data in proxying for displacement, as it is feasible that the change in low-income households is a result not only of people moving out and in, but also income mobility of households moving down and becoming low income or up and becoming higher income. From our analysis of data from the Panel Study on Income Dynamics we estimate that there would have been a net increase in low-income households in most places from 2000 to 2013 likely due to the Great Recession; therefore, our estimates of displacement are likely an underestimate. Ideally we would be able to more accurately proxy for displacement by using a measure of out-migration of low-income households from a tract. Future research is needed accessing mobility datasets to better capture the displacement phenomenon for the Bay Area.

#### Sensitivity Analysis

In their response to the LAO Report, Alex Karner and Chris Benner argued that the LAO results may be due to lumping together the major cities and low-density suburbs into the same analysis.<sup>21</sup> Although the inclusion of density should account for such differences, there may be additional impacts from centrality of location. When we control for location in the three major cities (San Francisco, Oakland, and San Jose), the effect of market-rate housing remains, but so too does the magnitude of the effect of subsidized housing<sup>22</sup> (Table 6, City Controls Model). In other words, all locations being equal, subsidized housing still has a greater impact.

It has also been suggested that the results may be driven by neighborhood distress during the foreclosure crisis where greater evictions occurred or fewer market rate units were developed. To test this hypothesis, we controlled for foreclosure rates between 2006 and 2013, finding the results to be robust (Table 6, Distressed Tracts Model).

Finally, the categorical indicator developed by the LAO could feasibly be labeling neighborhoods as experiencing displacement that are in fact a result of other issues of decline such as high rates of foreclosures. We originally attempted to control for this by excluding tracts that had experienced overall population decline, however it is feasible that gentrifying neighborhoods that witness a shift from family to smaller households could also experience population decline. For this reason, we deemed the LAO definition of displacement acceptable for the purposes of this analysis. Nevertheless, we also ran a set of tests using a modified indicator that only counted tracts that grew from 2000-2013 as potentially experiencing displacement and also ran linear regression models on the change of low income households. When we did this, the direction and implications of the results remained the same.

#### Notes

1. Brian Uhler, "Perspectives on Helping Low-Income Californians Afford Housing," LAO Brief (Legislative Analyst's Office, February 9, 2016). Data available at <urbandisplacement. org>.

2. Michael Smith-Heimer, "The Potential for Filtering as Public Policy," *Berkeley Planning Journal* 5, no. 1 (1990): 94–104.

3. Stuart S. Rosenthal, "Are Private Markets and Filtering a Viable Source of Low-Income Housing? Estimates from a 'Repeat Income' Model †," *American Economic Review* 104, no. 2 (February 2014): 687–706, doi:10.1257/aer.104.2.687.

4. For rentals, Rosenthal estimates that filtering rate = -0.0237 + 0.2522 x housing price appreciation.

5. Allowing for annual compounding effects assuming a constant annual filtering rate of 1.5%, the amount a unit would filter down in X years is calculated as (1-0.015) X.

6. See Emily Badger, "How to Make Expensive Cities Affordable for Everyone Again," *Washington Post* (February 19, 2016). Accessed at <a href="https://www.washingtonpost.com/news/wonk/wp/2016/02/19/how-to-make-expensive-cities-affordable-for-everyone-again/>.

7. This is perhaps unsurprising, since we did not publish this data online.

8. Note the coefficients of Model 1 do not match identically those of Figure A1 in the LAO report. The year of the independent variables used for the LAO model were not indicated. We tried

Table 6. Sensitivity Analysis of Regional Displacement Model				
	City Controls Model	Distressed Tracts Model		
% of housing units built pre-1950 in 2000	0.517**	0.517**		
% of population nonwhite in 2000	-0.887***	-0.880***		
% of adult population with college degree in 2000	1.840***	1.817***		
Housing density (pop/square mile) in 2000	-8.82E-06**	-8.87E-06**		
% of households with income below 80% of county median in 2000	3.005***	2.992***		
Number of new market-rate units built between 2000- 2013	-0.002***	-0.002***		
Number of subsidized units built between 2000-2013	-0.005***	-0.005***		
San Francisco control	-0.102	-0.104		
San Jose control	-0.121	-0.124		
Oakland control	-0.067	-0.067		
Foreclosure rate, 2006-2013		-0.262		
Intercept	-1.715***	-1.697***		
n	1569	1569		
Pseudo R <sup>2</sup>	0.172	0.172		
***<.01 **<.05 *<.10 significance level				

both variables for 2000 and 2013, but were unable to replicate the coefficients identically. Nevertheless, the coefficient for market rate housing production is very similar to that produced in the LAO model and the other variables have similar results in scale, directionality, and significance.

9. Lance Freeman, "Displacement or Succession? Residential Mobility in Gentrifying Neighborhoods," *Urban Affairs Review* 40, no. 4 (March 2005): 463–91.

10. We do not analyze units developed with local funding only (e.g., Redevelopment money or through inclusionary zoning) due to lack of availability for the entire region

11. These relationships were robust for several other measures of displacement we tested including the absolute change in lowincome households.

12. Rick Jacobus, "Why We Must Build," *Shelterforce*, March 9, 2016, <http://www.shelterforce.org/article/4408/why\_we\_must\_build/>.

13. Karen Chapple and Mitchell Crispell, "Mission Accomplished? Revisiting the Solutions," November 9, 2015, <http://www.urbandisplacement.org/blog/mission-accomplished-revisiting-solutions>.

14. On average in the Bay Area tracts have 1,656 households (min=15, max=6474) and 4,593 people (min 39, max 13,855).

15. On average in SF block groups have 603 households (min-41, max=4,082) and 1,434 people (min=45, max=8,621).

16. Randy Shaw, "Historic Trinity Plaza Deal Finalized," *Beyond Chron*, June 9, 2005.

17. Laura Dudnick, "Trinity Place Developer Accused of Illegally Leasing Apartments," *San Francisco Examiner*, August 6, 2015.

18. "SOMA Grand Residential Condos - SoMa - San Francisco, CA," Yelp, accessed May 2, 2016, <a href="http://www.yelp.com/biz/soma-grand-residential-condos-san-francisco">http://www.yelp.com/biz/soma-grand-residential-condos-san-francisco</a>.

19. Miriam Zuk et al., "Gentrification, Displacement, and the Role of Public Investment: A Literature Review," Working Paper (Federal Reserve Bank of San Francisco, August 24, 2015), <a href="http://www.frbsf.org/community-development/publications/working-papers/2015/august/gentrification-displacement-role-of-public-investment/">http://www.frbsf.org/community-development/publications/working-papers/2015/august/gentrification-displacement-role-of-public-investment/</a>.

20. <http://chpc.net/advocacy-research/preservation/preservation-database/>.

21. Cities that produce a lot of market-rate housing and experience high displacement pressures with places in the suburbs and urban fringe where there has been a lot of construction but little displacement pressure.

22. The same is true if we restrict our analysis only to census tracts with above average density. The effect is also consistent when we control for tracts that gentrified in either decade (149 tracts).

# West Bay Law Law Office of J. Scott Weaver

September 12, 2017

Commissioners, San Francisco Planning Commission 1650 Mission Street, Room 400 San Francisco, CA 94103

# Re: Case No 2014.0376CUA, 2918 Mission Street

The proposed project is right across the street from the Calle 24 Latino Cultural District, and it is undeniable that, as proposed, it will have a significant impact on the District.

A little less than a year ago, the Calle 24 Latino Cultural District Council appealed this Commission's approval of the proposed project at 1515 South Van Ness Avenue. The Board of Supervisors determined that before considering the environmental impacts of the proposed project, it was necessary for the Planning Department to study the impacts of gentrification on social and economic displacement in the Calle 24 Latino Cultural District. The Department contracted with pro-development consultancy ALH consultants,

ALH hastily prepared its findings, based on cherry-picked data and without regard for many requests from community stakeholders that they look at specific issues that were pertinent to the Cultural District. The conclusion was the predictable it will not cause displacement or have no negative impacts on residents and businesses in the district – a conclusion that defies everything that we are seeing on the ground, including members of the Planning Department. Nevertheless, with little time, we were forced to put together a brief critique of the report, which is attached to this letter for your reference.

Perhaps most exemplary of the error in this report (and there are many pointed out in the attached) was the heavy reliance on a report by Rachel Meltzer, *Gentrification and Small Business, Threat or Opportunity* Pages 72-26 found at

https://www.huduser.gov/portal/periodicals/cityscpe/vol18num3/ch3.pdf. After reading this report, it appeared to us that ALH in its, haste to reach a "no impact" conclusion, either intentionally, or negligently misread the underlying data in the report. We contacted Ms. Meltzer, and she concurred with us: the underlying data demonstrated that gentrifying communities of color suffer greater business loss than non-gentrifying communities of color. We have the emails to prove it.

San Francisco Planning Commission September 12, 2017 Page Two

The Board of Supervisors never considered the attached nor the testimony that was intended accompany it, because both the 1515 South Van Ness and 2675 Folsom Street matters were settled prior to the hearing.

We believe that because ALH failed to seriously consider displacement impacts associated with gentrification in the Calle 24 Latino Cultural District<sup>1</sup> the analysis required by the Board of Supervisors remains unmet. For that reason, we are again requesting an independent analysis if these impacts

In addition to whatever evaluation that the Department may deem appropriate, we are requesting that the Department evaluate the proposed project, both individually and cumulatively, with respect to the potential impacts of the extensive market rate development on the existing residents, businesses, and non-profits in the Calle 24 Latino Cultural District. This inquiry should address the concerns stated above and include, but not be limited to, the following:

- The amount of income that households will be required to have in order to afford the market rents of the proposed project.
- The amount of anticipated disposable income of the households moving into the market rate units at the proposed project.
- The consumer preferences for goods and services of households moving into the market rate units at the proposed project, as compared to those Latino residents in the LCD earning 50% AMI.
- The potential venues where those consumer preferences are likely to be met.
- The short and long term impacts on neighborhood serving Latino businesses that new market rent paying households, with higher disposable incomes, will have on commercial rents in the Latino Cultural District both from the standpoint of the proposed project and from the standpoint of the cumulative impact of the projects listed above.
- The short and long term impact that rents at the proposed project (and cumulative proposed projects) will have on rents of vacant resident units in the immediate areas.
- The short and long term impact that the proposed project (and cumulative proposed projects) will have on displacement of Latinos and families now living in the Calle 24 Latino Cultural District.

<sup>&</sup>lt;sup>1</sup> The Calle 24 Latino Cultural District was recently designated a cultural district by the State of California.

San Francisco Planning Commission September 12, 2017 Page Three

- The housing alternatives of residents now living in the Calle 24 Latino Cultural District should they be displaced.
- The short and long term impact that the proposed project (and cumulative proposed projects) will have on the percentage of Latino residents and businesses living and working in the Calle 24 Latino Cultural District.
- Mitigation alternatives that, if employed, would stabilize commercial rents in the Latino Cultural District.

I apologize for once again being compelled to make this request.

cospectfully Submitted, J. Scott Weaver

JSW:sme

# West Bay Law Law Office of J. Scott Weaver

### April 17, 2017

President London Breed and San Francisco Board of Supervisors San Francisco City Hall 1 Dr. Carlton B Goodlett Pl #244 San Francisco, CA 94102

# *Re:* Re: Case No. 2014-000601 CUA, 2014-000601ENX- 2675 Folsom Street Appeal of the September 22, 2016 Planning Commission Decisions. <u>Response to Socioeconomic Analysis.</u>

Dear Supervisor Breed,

This is the second of two submissions made today, April 17, 2017 pertaining to the Appeal of the project at 2675 Folsom Street. This submission pertains to the numerous flaws contained in a Report prepared in conjunction with this project.

The ALH Consultants, at behest of the San Francisco Planning Department, recently completed a report regarding the impact of luxury development on the physical environment of the Calle 24 Latino Cultural District. We have given initial review of the report and see it as a work of advocacy as opposed to an even-handed treatment of the available information.

# The ALH Report is Misleading, Flawed, and Ignores Critical Information Regarding the Calle 24 Latino Cultural District.

The ALH Report and the Planning Department's Summary are flawed in several respects, and their conclusions must be viewed with skepticism. While thorough critique will be forthcoming, we wanted to provide some initial observations as this report was prepared in conjunction with the upcoming Appeal of the proposed project at 2675 Folsom Street.

The Report lacks any understanding or appreciation for the unique challenges of the Calle 24 Latino Cultural District, challenges facing its businesses, the trajectory of gentrification and displacement, and its culture and history. Instead, it attempts to superimpose macroeconomic concepts and statistical averaging on a small and unique economic and ethnic ecosystem, and draws conclusions without regard to that uniqueness.

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Hon. London Breed, President Board of Supervisors April 17, 2017 Page Two

In fact, the report seems to say that the gentrification will do the opposite of what we have observed in the past, and that accelerated gentrification will no longer have the ravaging impacts that we have witnessed. Market rate development is, by definition, gentrification because it brings large numbers of very high wage earners into poor neighborhoods. In this instance, in a working class, Latino, transit-oriented neighborhood. Right now, over a thousand gentrifiers are slated to move within easy walking distance of the LCD alone, and more than three times that number in the Mission as a whole.

As pointed out in the Report, The Eastern Neighborhoods EIR conceded that displacement would be a "secondary effect" of gentrification<sup>1</sup> yet, without any evidence, the Report suggests that effects such as these are a thing of the past, and that the new wave of even more well-heeled gentrifiers will not cause increased rents in neighboring areas or lead to evictions. The Report appears to predict that discount groceries, panaderias, and other mom and pop businesses will be destinations of choice for these new residents, and that their consumer choices will no longer fuel a demand for high end restaurants or consumer goods.

Unfortunately, our experiences in SOMA, Hayes Valley, the Fillmore and large swaths of Bayview undermine this narrative. As stated earlier, the ALH Report and Planning's summary of it must be viewed with skepticism. The Report seems to suffer from constant switching from regional to hyperlocal environments and selects data suited to prove its thesis.

In their research brief Housing Production, Filtering and Displacement: Untangling the Relationships, (May, 2016) Miriam Zuk and Karen Chapple cautioned that markets behave differently at regional and at local levels, that the "filtering" process took much longer than previously thought, and that "more detailed analysis is needed to clarify the complex relationship between development, affordability at a local scale," and that "By looking at data from the region and drilling down to local case studies, we also see that housing market dynamics and their impact on displacement operate differently at these different scales."

More recent studies have confirmed what many of us had already known to be true: that is large scale "market rate" development has a destabilizing impact on gentrifying communities – especially communities of color. This is especially true where there is a significant income differential between the current residents and those coming into the community. In addition, a very recent study out of UC Berkeley has concluded that gentrification of transit rich neighborhoods both causes displacement and leads to greater automobile use.

<sup>&</sup>lt;sup>1</sup> The PEIR does not seem to have quantified the extent of such gentrification, and, one would hope, did not anticipate the high rate of gentrification and displacement that we have witnessed since 2008.

Hon. London Breed, President Board of Supervisors April 17, 2017 Page Three

# The ALH Discussion of Commercial Displacement Misreads Available Data and Omits Critical Information with Respect to the Calle 24 Latino Cultural District.

With respect to commercial displacement, the conclusion of ALH and, by implication, the Department and the City Controller, is based, in part, on a misreading of the Meltzer Report<sup>2</sup> on which ALH strongly relied. That report made a general conclusion that market rate development did not lead to business displacement over all. The conclusion of Meltzer, as with many like studies, was based on aggregated data from a variety of communities without regard to their important individual characteristics such as race/ethnicity, income disparities, neighborhood transit richness, and recent changes in zoning.

When we drill down to Meltzer's individual study areas, the conclusion is opposite the generalized one in the report. Meltzer's data found: 1) There was lower business retention (greater business loss) in gentrifying communities of color than in non-gentrifying communities of color, and 2) Business retention was lower in gentrifying communities of color than in gentrifying white communities. In other words, both race and the trajectory of gentrification impact business loss. Throughout its Report, ALH ignores characteristics of the LCD micro environment and mistakenly defaults to generalized conclusions.

ALH also ignored the importance of the role that consumer preference plays with respect to commercial displacement. Meltzer discussed the significance of changes in consumer preferences in influencing commercial displacement – correlating consumer preferences with "population characteristics such as income, educational attainment, and race/ethnicity." If the local consumer base changes, then, on net, the local businesses could suffer. (P. 56) ALH chose to overlook basic differentiating characteristics of Calle 24 businesses including, the nature of their goods and services, demographic features of their customer base (such as race, income and employment status), their current profit margins, the term of business leases, their rent structures, and the potential upside rent potential that a more high-end consumer base could support<sup>3</sup>.

Finally, the Report undertakes an analysis of the square footage of available retail space to urge that Latino oriented mom and pop concerns would not be affected by gentrification. By this approach, ALH erroneously treats all commercial space as if it were fungible: (i.e. that a panaderia is the equivalent to a high-end coffee shop with its \$6.00 croissants, that a taqueria should be treated the same as a *Flour and Water* type restaurant, or that discount store goods are equal are the same as the \$240 gym bags we see on Valencia Street. The failure to make these

<sup>&</sup>lt;sup>2</sup> Rachel Meltzer, *Gentrification and Small Businesses, threat or Opportunity*, Cityscape: A Journal of Policy Development and Research, Volume 18, Number 3, 216, Pages 72-26 found at <a href="https://www.huduser.gov/portal/periodicals/cityscpe/vol18num3/ch3.pdf">https://www.huduser.gov/portal/periodicals/cityscpe/vol18num3/ch3.pdf</a>

<sup>&</sup>lt;sup>3</sup> Realtors are now boasting "Valencia Street prices" for Calle 24 commercial rents.

Hon. London Breed, President Board of Supervisors April 17, 2017 Page Four

distinctions is illustrative of the Report's failure to examine the unique features of the LCD itself. Such a failure is critical in this instance because the very subject matter of the Report was supposed to be impacts on the Latino Cultural District.

# The ALH Discussion Regarding Residential Displacement Ignored the Growing Data Linking Gentrification to Displacement in Certain Types of Neighborhoods.

There is a growing body of evidence linking luxury housing to the displacement of residents and businesses in sensitive neighborhoods such as the Mission. Gentrification is the introduction of the "gentry class" of high-earners into a working-class neighborhood, along with the accompanying neighborhood changes to the composition and character of the community. Currently, households in the LCD earn approximately \$40,000 to \$50,000 whereas new residents will earn over \$140,000 per years. There are three factors that have been identified that link gentrification to displacement. They are: 1) As discussed above, communities of color are more vulnerable to displacement than non-communities of color- especially where there are substantial income differentials between the existing residents and newcomers.\*\*\*<sup>4</sup> 2) Transit rich districts are more vulnerable to displacement — especially where there has been a net population loss, and 3) Development friendly zoning changes contribute to displacement in communities of color.

A very recent study lead by Karen Chapple of UC Berkeley<sup>5</sup> (2017) concludes that Transit Oriented Development (exemplified by Mission projects such as 2675 Folsom St) is connected to gentrification and the displacement of low-income households:

> Overall, we find that TOD has a significant impact on the stability of the surrounding neighborhood, leading to increases in housing costs that change the composition of the area, including the loss of low-income households. (Abstract, Pv)

Another recent report, Leo Goldberg's 2015 MIT study,<sup>6</sup> analyzed the impact of zoning changes in low income NYC neighborhoods and concluded that rezonings facilitated growth at the expense of low and moderate-income renters and were thereby "associated with residential displacement at the city's core while, at the same time, serving to exclude low-income

C-36

<sup>6</sup> Goldberg, Game of Zones may be found at. https://dspace.mit.edu/bitstream/handle/1721.1/98935/921891223-MIT.pdf?sequence=1

<sup>&</sup>lt;sup>4</sup> Atkinson, Rowland Gentrification and displacement in Greater London: an empirical and theoretical analysis. (1997). PhD thesis, University of Greenwich, P 151

<sup>&</sup>lt;sup>5</sup> Chappel, *Developing a New Methodology for Analyzing Potential Displacement*, (2017) may be found at. http://www.urbandisplacement.org/sites/default/files/images/arb\_tod\_report\_13-310.pdf

Hon. London Breed, President Board of Supervisors April 17, 2017 Page Five

households in the periphery. Goldberg stated, "development interests spurred rezonings in commercial and industrial areas as well as gentrifying neighborhoods, induc(ed) a sharp increase in housing costs and residential dislocation." (at P 3)

Goldberg's was consistent with the Meltzer data showing that race/ethnicity matters. The Goldberg report found a substantial increase in white populations in upzoned areas and a decrease in Black and Latino populations in those same areas – even though Latino population throughout the City increased by 10%. (P. 66-67)

Finally, Goldberg weighed in on the "Densification means displacement" debate. Goldberg found that upzoning-induced real estate speculation contributed to higher rents and displacement in poorer communities. As to the viability of supply side solutions in markets such as New York's or San Francisco's, he concluded that overall distortions of those markets foreclosed any meaningful impact of market rate development on rent or displacement relief.

While filtering is generally theorized to support affordability across class groups, evidence from tight housing markets suggests that for supply to keep pace with demand – without which filtering cannot occur – a politically and technically unrealistic amount of housing would have to be built. (P. 77)

In this reality, rents on vacant San Francisco units will continue to be well out of reach for most San Francisco residents. In communities such as the Mission, where gentrification is already a serious problem, market housing such as that proposed at 2675 Folsom Street will reinforce the realtor narrative of the Mission as an "up and coming" location, with fancy restaurants, little crime, near public transit, and is "the place to be".

#### The Further Gentrification of the Mission Will Lead to Deteriorating in Air Quality.

Chapple's latest study also investigated the relationship between gentrification and auto use (Vehicle Miles Traveled) near rail stations under various conditions, and found an increase in VMT was likely to occur in transit rich neighborhoods such as the Mission:

- Local Vehicle Miles Traveled are likely to increase in the station area when gentrification is occurring.
- Regional Vehicle Miles Traveled are also likely to increase "if gentrification results in a reduction in the population living near rail and if those rail station areas have good transit service, high density, and other well-known features of supportive Transit Oriented Development."

6-37

Hon. London Breed, President Board of Supervisors April 17, 2017 Page Six

Between 2000 and 2012, the Mission lost 4.8 percent of its population, while median income increased by 48 percent (gentrification), and households with cars increased from 37 percent to 64 percent.<sup>7</sup> The Mission has already lost 8,000 Latinos over the past 15 years, along with nearly a third of its families and countless family-serving businesses. It has become less dense due to the exodus of families no longer able to afford the rents.

### Conclusion.

It is clear that the ALH Report is one-sided, flawed, and has ignored critical information specific to the LCD. Critical corridors such as the LCD and the Mission St corridor need special consideration through policies that encourage development that is not harmful to the community, consideration that was completely lacking in the Report.

The City has begun to take some helpful steps forward in this direction through programs such as MAP 2020, the creation of the Latino Cultural District, on the ground work through offices such as OEWD, and direct and indirect support for neighborhood nonprofits. These are helpful opening steps, however luxury developers are a strong and persistent economic force. The will to address these challenges will only come after we address head on the issue of gentrification's role in causing displacement. The ALH Report, if accepted would set us 180 degrees in the wrong direction.

Respectfully Submitted, Weaver ttorney for alle 24 Latino Cultural District Council

JSW:sme

<sup>7</sup> Appellant's Exhibits at Pages 347, 348

FILE NO. 140421

# RESOLUTION NO.

[Establishing the Calle 24 ("Veinticuatro") Latino Cultural District in San Francisco]

Resolution establishing the Calle 24 ("Veinticuatro") Latino Cultural District in San Francisco.

WHEREAS, The Calle 24 Latino Cultural District memorializes a place whose richness of culture, history and entrepreneurship is unrivaled in San Francisco; and

WHEREAS, The Calle 24 ("Veinticuatro") Latino Cultural District has deep Latino roots that are embedded within the institutions, businesses, events and experiences of the Latino community living there; and

WHEREAS, Because of numerous historic, social and economic events, the Mission District has become the center of a highly concentrated Latino residential population, as well as a cultural center for Latino businesses; and

WHEREAS, The boundary of the Calle 24 ("Veinticuatro") Latino Cultural District shall be the area bound by Mission Street to the West, Potrero Street to the East. 22<sup>nd</sup> Street to the North and Cesar Chavez Street to the South, including the 24<sup>th</sup> Street commercial corridor from Bartlett Street to Potrero Avenue. Additionally, the Calle 24 ("Veinticuatro") Latino Cultural District shall include La Raza Park (also known as Potrero del Sol Park). Precita Park and the Mission Cultural Center because of the community and cultural significance associated with these places; and

WHEREAS, Calle 24 ("Veinticuatro") Latino Cultural District's boundary demarcates the area with the greatest concentration of Latino cultural landmarks, businesses, institutions, festivals and festival routes; and

Mayor Lee; Supervisor Campos BOARD OF SUPERVISORS

WHEREAS, The Latino population in the Mission, and in the Calle 24 ("Veinticuatro") Latino Cultural District, represents a culturally diverse population with roots from across the Americas; and

WHEREAS, According to 2012 Census data, within the Calle 24 ("Veinticuatro") Latino Cultural District, 49% of the population self-identified as Latino; 38% identified as foreign-born and 16% identified as linguistically isolated; and

WHEREAS, The Calle 24 ("Veinticuatro") Latino Cultural District plays a significant role in the history of San Francisco; and

WHEREAS, San Francisco has for centuries attracted people seeking refuge from war, upheaval and poverty in their home countries; and

WHEREAS, The immigrant experience remains an integral part of California and San Francisco's history, cultural richness and economic vibrancy; and

WHEREAS, From 1821 to 1848, the Mexican Republic controlled San Francisco and the city was home to the Mexican governorship and many Mexican families; and

WHEREAS, Beginning in 1833, the Mexican government began to secularize mission lands and distributed over 500 land grants to prominent families throughout California – known as "Californios" – in an effort to encourage agricultural development; and

WHEREAS, Mexican land grants, such as Mission Dolores, Rancho Rincon de las Salinas, and Potrero Viejo, include the geographic area that is now home to San Francisco's Mission District and have directly influenced the Calle 24 ("Veinticuatro") Latino Cultural District; and

WHEREAS, The Treaty of Guadalupe Hildalgo, ratified in 1848 ending the Mexican American War, guaranteed Mexicans living in the ceded territory – including what would become the State of California – full political rights, but such rights were often ignored, resulting in the slow dissolution of lands owned by Californios; and

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C-40

WHEREAS, San Francisco experienced several waves of immigration in the late 1800s, including massive migration from Mexico, Chile and Peru as well as migration from Latin America during the Gold Rush; and

WHEREAS, Puerto Rican migration to San Francisco began in the 1850s and increased in the early 1900s when Puerto Ricans relocated to California by way of Hawaii; and

WHEREAS, San Francisco served as a refuge for Sonorans fleeing violence and upheaval in their home country due to the Mexican Revolution of 1910; and

WHEREAS, Beginning in the 1930s, Mexican and Latin American families began settling in the Mission District, building on the roots that had already been established nearly a century before; and

WHEREAS, After World War II, the Mission District became the primary destination for new arrivals from all regions of Latin America including Central America, Mexico, Venezuela, Colombia, Ecuador, Peru, Brazil, Paraguay, Uruguay, Chile, Argentina, Cuba, Dominican Republic, and Puerto Rico; and

WHEREAS, Throughout the 1970s and 1980s, Central American countries experienced major political conflict and families fleeing from conflict immigrated to San Francisco, greatly contributing to the Latino identity of the Mission District and the Calle 24 ("Veinticuatro") Latino Cultural District; and

WHEREAS, In 1989, in response to the increased immigrant populations, the City and County of San Francisco adopted a Sanctuary Ordinance that prohibits its employees from aiding Immigration and Customs Enforcement (ICE) with immigration investigations or arrests, unless mandated by federal or state law or a warrant; and

WHEREAS, Chicano and Latino activism, arts, commerce, and culture have centered in the Calle 24 ("Veinticuatro") Latino Cultural District since the 1940s; and

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C - 41

WHEREAS, The Mission District and Calle 24 ("Veinticuatro") were central to the Chicano Movement – its art, music, and culture, as well as labor and community organizing to battle the war on poverty; and

WHEREAS, Many of the Latino community-based organizations established within the Calle 24 ("Veinticuatro") Latino Cultural District during 1960s and 1970s were an outgrowth of social justice organizing; and

WHEREAS, Much of what makes the Calle 24 ("Veinticuatro") Latino Cultural District a culturally-rich and recognizable place are the Latino businesses and community-based organizations located along 24<sup>th</sup> Street; and

WHEREAS, Latino-based organizations were established on 24<sup>th</sup> Street to serve the needs of the community and promote culture and include: Mission Neighborhood Centers (1959), offering services targeted to Latina girls and young women, including homework assistance, leadership programs and anti-violence education; Mission Education Projects Inc. (1970s), providing educational and support services to youth and their families; Galería de la Raza (1970), nurturing cultural icons Mujeres Muralistas (1972) and Culture Clash (1984), helping to inspire the creation of the Mexican Museum and making a space for Latino artists to create innovative new works, transforming Latino art in San Francisco; Mission Cultural Center for Latino Arts (1977), promoting, preserving and developing Latino cultural arts; Calle 24 SF (formerly the Lower 24<sup>th</sup> Street Merchants and Neighbors Association) (1999), advocating for neighborhood services, local businesses, arts and culture programs and improved public spaces; Precita Eyes Mural Arts & Visitors Center (1977), offering mural classes, tours, and lectures, as well as painting several murals within the Calle 24 ("Veinticuatro") Latino Cultural District; Mission Economic Cultural Association (1984), producing many of the Latino festivals and parades, including Carnaval, Cinco de Mayo, and 24th Street Festival de Las Americas; Acción Latina (1987), strengthening Latino communities

Mayor Lee; Supervisor Campos BOARD OF SUPERVISORS

~-42

by promoting and preserving cultural traditions, managing a portfolio of cultural arts, youth programs, and media programs including *El Tecolote* newspaper, which upholds a nearly two-century-long tradition of bilingual Spanish/English journalism in San Francisco; Brava Theater (1996), portraying the realities of women's lives through theater by producing groundbreaking and provocative work by women playwrights, including well-known Chicana lesbian playwright, Cherrie Moraga, and hosting a variety of Latino cultural events; and

WHEREAS, Small and family-owned businesses, including restaurants, *panaderias* (bakeries), jewelry shops and *botánicas* (alternative medicine shops), promote and preserve the Latino culture within the Calle 24 ("Veinticuatro") Latino Cultural District; and

WHEREAS, Longtime Mexican and Salvadoran *panaderias* such as La Victoria (1951), Dominguez (1967), La Reyna (1977), Pan Lido (1981), and La Mexicana (1989) have served up sweet breads to generations of Mission residents and visitors; and

WHEREAS, Restaurants, like The Roosevelt (1922) (formerly Roosevelt Tamale Parlor), Casa Sanchez (1924), and La Palma Market (1953), have sustained Latino culinary traditions, and Café La Boheme (1973), one of the first cafes established in the neighborhood, has served as both a meeting space and cultural venue among Latino activists, writers, poets and artists; and

WHEREAS, The Calle 24 ("Veinticuatro") Latino Cultural District is visually distinct because of approximately four hundred murals adorning its buildings depicting the Latino experience in San Francisco that have been painted throughout the Mission District by Chicano, Central American, and other local artists who had few, if any, opportunities to exhibit their work in galleries; and

WHEREAS, Balmy Alley has the highest concentration of murals in San Francisco and the mural project there emerged out of the need to provide a safer passage for children from the Bernal Dwellings apartments to "24<sup>th</sup> Street Place," an arts and education program located

[-43

Mayor Lee; Supervisor Campos BOARD OF SUPERVISORS

at the intersection of the alley and 24<sup>th</sup> Street, and run by Mia Gonzalez, Martha Estrella and Ana Montano; and

WHEREAS, The first mural painted in Balmy Alley was carried out in 1972 by the Chicana artist collective, Mujeres Muralistas, and, in 1984, more than 27 muralists added to the collection of outdoor murals in Balmy Alley, focusing on the conflicts in Central America, expressing anger over human rights violations and promoting peace; and

WHEREAS, Within the Calle 24 ("Veinticuatro") Latino Cultural District, additional notable murals include: Michael Rios' "BART" mural (1975), Daniel Galvez's "Carnaval" mural (1983), Precita Eyes' "Bountiful Harvest" (1978) and "Americana Tropical" (2007), Mujeres Muralistas' "Fantasy World for Children" (1975), Isaias Mata's "500 Years of Resistance" (1992), Juana Alicia's "La Llorona's Sacred Waters" (2004), and the Galería de la Raza's Digital Mural Project; and

WHEREAS, The York Mini Park grew from a vacant lot purchased by the City of San Francisco in the 1970s to a park adorned by murals painted by Michael Rios (1974) and Mujeres Muralistas (1975), as well as a mosaic of Quetzalcoatl that winds around the playground created by Collete Crutcher, Mark Roller and Aileen Barr under the direction of Precita Eyes (2006); and

WHEREAS, Annual festivals celebrating Latino culture, including Carnaval, Cinco de Mayo, the Lower 24th Street Festival de Las Americas (formerly the 24<sup>th</sup> Street Festival), Cesar Chavez Parade and Festival, Día de los Muertos Procession and Altars, and Encuentro del Canto Popular, represent the culture within the Calle 24 ("Veinticuatro") Latino Cultural District; and

WHEREAS, The Calle 24 ("Veinticuatro") Latino Cultural District nurtured the expansion of the Latino music scene from Latin jazz to Latin rock and pop music and the 24<sup>th</sup>

Mayor Lee; Supervisor Campos BOARD OF SUPERVISORS

-44

Street Festival (later known as Festival de las Americas) showcased musical talents including Santana, Malo and Zapotec; and

WHEREAS, The Calle 24 ("Veinticuatro") Latino Cultural District was witness to the rise of the low-rider culture in the 1970s and, on weekends, Mission Street served as a bumper-to-bumper low-rider parade route; and

WHEREAS, After San Francisco authorities attempted to suppress cruising in the 1970s, the low-riders moved to La Raza Park also known as Potrero del sol Park where the low-rider clubs congregated in order to create a safe space for recreation; and

WHEREAS, Organized youth cleaned up La Raza Park and marched from the corner of 24<sup>th</sup> Street and Bryant Streets to City Hall with Latin American flags and signs that read "Build Us a Park," and, in response, San Francisco purchased the six-acre site with voterapproved bond funds and created La Raza Park; and

WHEREAS, St. Peter's Church is an anchor of the Calle 24 ("Veinticuatro") Latino Cultural District because of the spiritual services it has provided to the community and its association with Los Siete de la Raza, the Mission Coalition of Organizations, the United Farmworkers Movements, and the Central American Resource Center (CARECEN) of Northern California, among other social justice efforts; and

WHEREAS, The 24th Street BART station plazas have long served as a popular arena for public demonstrations, ranging from those organized by the Mission Coalition of Organizations to those associated with the Central American Solidarity movements in the 1970s and 1980s; and

WHEREAS, The two BART station plazas are popularly known as "Plaza Sandino" after Nicaraguan revolutionary Augusto Cesar Sandino and "Plaza Martí" after Salvadoran leftist leader Farabundo Martí; and

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Mayor Lee; Supervisor Campos BOARD OF SUPERVISORS

WHEREAS, A prominent feature of the Northeast 24<sup>th</sup> Street BART plaza is the 1975 mural painted by Michael Rios, which depicts the controversial impact of the 16th and 24th Street BART stations that were constructed in the 1970s by hard working residents who protested the extra sales tax that financed the rapid transit system; and

WHEREAS, Community leaders have long sought to preserve the culture and community of Calle 24 ("Veinticuatro"); and

WHEREAS, In the 1990s, Supervisor Jim Gonzalez introduced a façade improvement program and a Flags of the Americas Program wherein Mission artists created banners for display within the neighborhood to call attention to its Latino heritage; and

WHEREAS, Supervisor Jim Gonzalez established the 24<sup>th</sup> Street Revitalization Committee and made efforts to establish an Enterprise Zone for the Mission District; and

WHEREAS, In 2012, Mayor Edwin Lee's Invest In Neighborhoods Initiative selected Calle 24 ("Veinticuatro") for its economic development program and the establishment of a cultural district; and

WHEREAS, As part of a collaborative effort by Calle 24 San Francisco, the San Francisco Latino Historical Society, San Francisco Heritage, Mayor Edwin Lee and Supervisor David Campos worked together to create the Calle 24 ("Veinticuatro") Latino Cultural District as part of an effort to stabilize the displacement of Latino businesses and residents, preserve Calle 24 as the center of Latino culture and commerce, enhance the unique nature of Calle 24 as a special place for San Francisco's residents and tourists, and ensure that the City of San Francisco and interested stakeholders have an opportunity to work collaboratively on a community planning process, which may result in the Designation of a Special Use District or other amendment to Planning Code; now, therefore, be it

-46

Mayor Lee; Supervisor Campos BOARD OF SUPERVISORS

supports the establishment of the Calle 24 ("Veinticuatro") Latino Cultural District as a Latino cultural and commercial district in San Francisco; and, be it FURTHER RESOLVED, That the Board of Supervisors of the City and County of San Francisco commends the efforts of the Latino community in working toward the creation of the Calle 24 ("Veinticuatro") Latino Cultural District and the contribution it will provide to the cultural visibility, vibrancy and economic opportunity for Latinos in the City and County of San Francisco. Mayor Lee; Supervisor Campos BOARD OF SUPERVISORS

-44

RESOLVED, That the Board of Supervisors of the City and County of San Francisco



# **Calle 24 Latino Cultural District Report on the Community Planning Process**



Report prepared by Garo Consulting For the Calle 24 Latino Cultural District Community Council December 2014



# Calle 24 Latino Cultural District Report on the Community Planning Process

Report: Garo Consulting Funding provided by the SF Mayor's Office of Economic and Workforce Development

December 2014

# Acknowledgements

The Calle 24 Latino Cultural District Council (Calle 24) wishes to acknowledge and thank neighborhood residents, merchants, artists, community workers and other stakeholders who provided invaluable input and perspectives throughout the planning process. In particular, Calle 24 wishes to thank the following key individuals, organizations and businesses for their contributions to the planning process: The Mayor's Office of Economic and Workforce Development (OEWD); Supervisor David Campos; Mayor Ed Lee; Acción Latina; Brava Theater; Remy De La Peza, Little Tokyo Service Center; Marsha Murrington, Local Initiatives Support Corporation (LISC); Sofia Navarro, The Unity Council; Mayor's Office/San Francisco County staff members Martin Esteban Farfan, Laura Lane, Anne Romero, Diego Sanchez and Aaron Starr; Mission Girls; Mission Cultural Center for Latino Arts; SF Heritage and SF Latino Historical Society; Tio Chilo's Grill; Pig and Pie; Vallarta's; and Cecilia Cassandra Peña-Govea.

# Contents

EXECUTIVE SUMMARY	. 5
1. INTRODUCTION	.7
2. APPROACH AND METHODOLOGY	.9
3. KEY FINDINGS	12
Challenges	13
Opportunities	14
4. VISION, MISSION, PURPOSES & GOALS 1	18
Mission and Vision Statements	18
Purposes and Goals	18
5. PROPOSED PROGRAMS AND STRATEGIES 2	20
Key Strategies	20
Program Activities	21
6. ORGANIZATIONAL STRUCTURE & GOVERNANCE 2	23
Structure	23
Governance	23
7. CONCLUSION	25
APPENDICES	27

# EXECUTIVE SUMMARY

In 2014, with support from Supervisor Campos and advocacy by the community, the Calle 24 Latino Cultural District (LCD) was formed by a Board of Supervisors resolution. The planning process was initiated to get the community's input about how the LCD should be governed and how it should serve the community. Through a competitive process, consultants were hired to facilitate the planning process, engage community stakeholders, and gather input through a number of data collection activities including community meetings, one-on-one interviews, focus groups, and a review of other cultural district plans. The objectives of the planning process were: 1) To gather community input about the Latino Cultural District's purposes, strengths, opportunities, challenges, targeted strategies, and governance; 2) To review best practices employed by other designated cultural districts (e.g., Little Tokyo, Fruitvale, Japantown), and 3) To draft a final report with findings and recommendations.

# Mission and Vision Statements

The Calle 24 Community Council adopted the following mission and vision statements as one outcome of the community planning process:

<u>Mission</u>: To preserve, enhance and advocate for Latino cultural continuity, vitality, and community in San Francisco's touchstone Latino Cultural District and the greater Mission community.

<u>Vision</u>: The Latino Cultural District will be an economically vibrant community that is inclusive of diverse income households and businesses that together compassionately embrace the unique Latino heritage and cultures of 24th Street and that celebrate Latino cultural events, foods, businesses, activities, art and music.

# Calle24 Latino Cultural District Beneficiaries

Beneficiaries of the Latino Cultural District include individuals (e.g., LCD families, including traditional, non-traditional, and extended; artists; working people; residents; immigrants; youth; and elders), organizations (neighborhood businesses, arts and culture organizations, educational institutions, and community service agencies), and San Francisco and the general public.

# Calle24 Latino Cultural District Purposes and Goals

The purposes of the LCD are to:

- 1. Strengthen, preserve and enhance Latino arts & cultural institutions, enterprises and activities
- 2. Encourage civic engagement and advocate for social justice
- 3. Encourage economic vitality and economic justice for district families, working people, and immigrants
- 4. Promote economic sustainability for neighborhood businesses and nonprofits

C-52

5. Promote education about Latino cultures

6. Ensure collaboration and coordination with other local arts, community, social service agencies, schools, and businesses

The goals of the LCD are to:

- 1. Create a safe, clean, and healthy environment for residents, families, artists, and merchants to work, live, and play.
- 2. Foster an empowered, activist community and pride in our community.
- 3. Create a beautiful, clearly designated Latino corridor along Calle 24, and preserve the unique beauty and cultures that identify Calle 24 and the Mission
- 4. Preserve and create stable, genuinely affordable and low-income housing in the District and related infrastructure.
- 5. Manage and establish guidelines for development and economic change in the District in ways that preserve the District's Latino community and cultures.
- 6. Foster a sustainable local economy that provides vital goods and services to the District and supports living Latino cultures.

### Key Strategies and Program Areas

Through community input gathered during the planning process, the following key strategies and program activities were developed:

Key Strategies

- Create an organizational entity a 501(c)(3) to manage the LCD
- Create and leverage Special Use District designations
- Implement a Cultural Benefits District campaign and assessment
- Develop a community-wide communications infrastructure and promotion of the District through traditional and social media
- Collaborate with, connect, and support existing arts and cultures and other nonprofit service organizations in implementing the Latino Cultural District's mission, rather than replacing or competing with them
- Serve as a safety net for the District's traditional cultural-critical community events, such as Carnaval, Día de los Muertos, and the Cesar E. Chavez Holiday Celebration
- Generate sufficient resources to support creation and sustainability of the Latino Cultural District programs and activities
- Pursue social and economic justice fervently, and conduct its work with the Si Se Puede spirit of determination, collective strength, and compassion

Community input also helped define four program areas: land use and housing; economic vitality; cultural assets and arts; and quality of life, with related activities that are further discussed in the report. Finally, the community provided extensive input on the governance structure for the LCD, including the organizational structure, committee structure, member eligibility, and board size, composition, and conditions. The following report shares the results of the planning process.

# 1. INTRODUCTION

In May 2014, under the leadership of Supervisor Campos, the San Francisco Board of Supervisors approved a resolution (SF Heritage, 2014) to designate 24<sup>TH</sup> Street a Latino Cultural District (LCD). This unanimous vote was the result of a collaborative effort between Calle 24 SF, a neighborhood coalition of residents, merchants, non-profits in the area, the San Francisco Latino Historical Society, San Francisco Heritage, and the Offices of Mayor Ed Lee and Supervisor David Campos. A cultural district is a region and community linked together by similar cultural or heritage resources, and offering a visitor experiences that showcase those resources. The San Francisco Board of Supervisors resolution eloquently describes the rationale for the designation of this historic neighborhood as a Latino Cultural District:

Whereas, the Calle 24 Latino Cultural District memorializes a place whose richness of culture, history and entrepreneurship is unrivaled in San Francisco; and

Whereas, the Calle 24 ("Veinticuatro") Latino Cultural District has deep Latino roots that are embedded within the institutions, events and experiences of the Latino community living there; and

Whereas, because of numerous historic, social and economic events, the Mission District has become the center of highly concentrated Latino residential population, as well as a cultural center of Latino businesses... (page 1, SF Heritage)

With the adoption of the Board of Supervisor's resolution, the City and County recognized the significance of 24<sup>th</sup> Street to the City's history and culture, while also acknowledging a number of significant factors impacting the Mission District and, in particular, the 24<sup>th</sup> Street area. Calle 24 ("Veinticuatro") is a demographically diverse area, rich in Latino cultural heritage and assets (SF Office of Economic and Workforce Development, SF Planning Department, & LISC, 2014). As noted in the Lower 24<sup>th</sup> Street Neighborhood Profile, Calle 24 features over 200 small businesses (a majority of which are retail) and a high level of pedestrian traffic. Since 2006, sales tax revenue in the area has grown faster in this area than in the city overall, and the neighborhood is rich in community-based arts, cultural, and social service organizations. Approximately 23,000 people live in the neighborhood, with significant percentages of White, Latino, and other or mixed race individuals. (SF Office of Economic and Workforce Development, SF Planning Department, & LISC, 2014). A strong sense of community and history, many cultural events, the area's walkability, its low vacancy rate, and destination as a Latino cultural center are among the area's strengths. However, challenges include the increasing commercial rents, the lack of opportunities for youth, a fear of the "Mission" culture disappearing, an increase in gang violence and crime in general, the deterioration of sidewalks and storefronts, and a lack of lighting and nighttime activity. The pursuit of community-driven strategies to preserve the local history and culture and the development of partnerships between old and new businesses

C-54

and the various commercial and non-profit entities in the area were cited as important opportunities to seize.

As a backdrop to Calle 24 organizing the community to preserve the history and culture of the 24<sup>th</sup> Street corridor was the very recent history of the dot-com boom and the departure of 50,000 from the Bay Area because of the lack of affordable housing (Zito, 2000); approximately 10% of the Latino population left San Francisco in the early 2000s, making San Francisco one of the only U.S. cities to lose Latino/a residents (Census, 2000; Census, 2005). In her project collecting oral histories from Mission district residents about the neighborhood's gentrification, Dr. Mirabal found that many saw the loss of Latino residents, businesses, and culture not only as examples of gentrification but also as acts of cultural exclusion and erasure (Mirabal, 2009). As the technology sector began to boom again and the neighborhood began to quickly change, Calle 24 advocated for the successful designation of Calle 24 as a Latino Cultural District (LCD) to preserve and further develop the area's rich cultural heritage (see Appendix D for news articles describing the recent community transformation and advocacy for the LCD). This report describes the development of a plan for governance and implementation of the LCD.

To develop a plan for the Calle 24 Latino Cultural District, San Francisco's Mayor's Office of Economic and Workforce Development provided funding to Calle 24 SF. Calle 24 SF selected the Garo Group as consultants to facilitate a process of involving the community in the development of a plan for the Calle 24 Latino Cultural District (see Appendix B for a description and map of the LCD). This project was guided by a collaborative, participatory and inclusive approach to engage the community in articulating a vision and plan for the LCD. The planning process, coordinated and guided by the Calle 24 Planning Committee<sup>1</sup>, began in July, 2014. The methods used in the planning process included the following: 10 in-depth interviews, four focus groups, one study session with experts in the field, 4 community meetings, and 1 Council retreat. The planning committee met regularly throughout the planning process to utilize community input to inform each step of the planning process. The figure below depicts the steps in the 6-month planning process.



Figure 1: Overview of the Community Planning Process

<sup>1</sup> The Calle 24 Planning Committee includes Erick Argüello, Georgiana Hernández, Anastacia Powers-Cuellar, and Miles Pickering.

## Key Stakeholder Outreach and Recruitment for Interviews and Focus Groups

The Calle 24 Planning Committee collaboratively brainstormed a list of key stakeholders (including residents, merchants, artists, non-profit service and arts organizations, etc.) to interview. Interviewees were contacted by phone or by email, and a date and time was agreed upon for them to be interviewed. All but three of the interviews were conducted by phone. Interviews were not audio recorded, but detailed notes were taken by the interviewer and edited immediately after the interview. The planning committee also felt it was important to have focus groups with each of the following stakeholder groups: residents, merchants, youth, and non-profit arts organizations. Recruitment for the focus groups was done through convenience and snowball sampling approaches. Members of the planning committee, who are also well-known and trusted community leaders, identified people from their social networks and these people invited others within their networks. For the youth focus group, two youth who were involved in the planning process contacted friends and neighbors living in the corridor. In addition, youth organizations such as Mission Girls were invited to participate. Erick Argüello of the planning committee, known to most local merchants, personally invited each merchant to attend. Stacie Powers Cuellar of the planning committee provided a list of all the artists and arts organizations in the corridor, and an email invitation was sent to all. Some of these artists invited others to attend. (See Appendix E for a full list of interviewees and focus group attendees.)

The Planning Team developed questions (see Appendix F for the interview and focus group guides) to explore the neighborhood's strengths and assets, challenges, as well as further understand critical opportunities for the LCD. Each of the group discussions was facilitated by members of the consulting team with a long history of experience in community development, community mediation and facilitation, and participatory research. Each group discussion had at least two members of the consulting team present, with 1-2 co-facilitators and a note taker. Notes from the interviews, focus groups, and community meetings were edited and analyzed using standard qualitative procedures. Themes were identified using individual and group responses to questions regarding cultural assets of the area, desired changes, vision for the LCD, and recommendations. Data collection related to vision of the LCD and challenges to be addressed was concluded when no new themes emerged, and the inventory of cultural resources in the Calle 24 corridor appeared to be complete.

The planning process was also informed by a review of other cultural district plans as well as a study session with experts from the Fruitvale and Little Tokyo Cultural Districts (see Appendix G for notes from the study session). Some of the plans reviewed included Creative Place making, Taos Arts and Cultural District Plan and Sustaining San Francisco's Living History Strategies for Conserving Cultural Heritage Assets (see Appendix C).

Three community meetings (open to the general public) and one Calle 24 Council retreat were also critical to the planning process (see Appendix I and J for community meeting agendas and notes and Appendix K for notes from the Council Retreat). These community meetings were designed to gather input from the broader community to inform the planning process and to share findings from the planning process. Outreach for the community meetings was done using Facebook, email, word-of-mouth, and handing out and posting flyers in the neighborhood. A Calle 24 Council retreat was held toward the end of the planning process in order to finalize decisions regarding governance and program activities as outlined in this report.

# 3. KEY FINDINGS

This section outlines the major findings from the interviews, focus groups, review of cultural district plans, study session and community meetings. Findings are organized according to strengths, challenges and opportunities for the Latino Cultural District. The themes identified here are those that emerged most often during the data gathering phase, and do not necessarily reflect the views of Calle 24.

# Strengths

Throughout the planning process, a number of strengths of the Latino Cultural District emerged in two broad categories: **cultural assets and arts and community identity.** The community stakeholders who participated in discussions, interviews, and the community meetings identified a vast array of cultural assets and arts (see appendices K and L for a complete inventory of the cultural assets and art that emerged throughout the planning process). These included the iconic murals and other art, cultural events such as Carnaval and Día de Los Muertos, arts organizations such as Galería de la Raza and Precita Eyes, service non-profits, parks, businesses including incredible restaurants, churches. The other major theme that emerged in stakeholder discussions of the neighborhood strengths was the **community identity** or the spirit of Calle 24, including both tangible and intangible characteristics such as the demographic diversity, the strong community connections, the commitment to social justice, and the neighborhood's walkability, tree canopy and landscaping. A more detailed listing of tangible and intangible cultural assets is below.

# **Cultural Assets and Art**

- Murals and art
- Cultural events
- Artists and arts organizations
- Latino business enclave
- Established community based organizations
- Thriving faith community
- Culinary destinations

# **Community Identity**

• Long-term presence of families and historic or legacy businesses

(-59

- Commitment to social justice
- Strong community connections
- Local leadership
- Unique neighborhood character
- Strong sense of community, place and history
- Demographic diversity
- Strong core shopper base

- Cultural events
- Tourism
- Business ownership
- Character
- Walkability

# Challenges

There were a few key challenges that emerged from the data gathering during the planning process. These challenges revolved around five key themes: the lack of affordable housing, rapid community transformation, tensions in the community, quality of life, and sustainability of the LCD. There were major concerns among all stakeholders about the lack of affordable housing and about the gentrification and recent eviction and displacement of long-time residents. A related theme was the rapid **community transformation** underway, with some saying they wanted to prevent another "Valencia" (referring to the way Valencia lost much of its Latino culture in the 1990s and 2000s). Community relations, often discussed as tensions between newcomers and old-timers, was another key challenge that emerged in many interviews, focus groups, and community meetings. Many mentioned that there often appears to be a division between the predominantly Latino, long-time residents, and the newer, predominantly White, residents. One person mentioned feeling an increased police presence to address the fear of "brown boys". The cultural differences between old and new can be challenging, and many of those who have lived in the neighborhood for years struggle with how to integrate newcomers and "convince them that Brava, Galería de la Raza, Acción Latina and the fish market are all important". Challenges affecting residents' quality of life also emerged frequently; these included things such as gang violence, liquor stores, broken sidewalks, lack of public spaces, lack of police presence, etc. Finally, a few of the often-mentioned challenges revolved around the implementation and sustainability of the LCD. The limited resources (lack of funding and staff) to develop and maintain a governance structure and implement all the desired activities of the LCD were discussed by many. These themes are elaborated below.

## Lack of Affordable Housing

- Evictions and displacements
- Inadequate rent control
- Rapid gentrification
- Housing/building code violations

## **Community Transformation**

Rapid transformation of neighborhood without a plan ("not another Valencia")

(-60
- Loss of historical businesses, residents and services
- Unaffordable commercial rents (difficult for long time tenants to pay)
- Increase in health code and building code violations
- Fear of "Mission" culture disappearing
- Loss of historical establishments

## **Community Relations**

- Tension between the old and the new (lack of integration)
- Partnership challenges with City/County
- Lack of opportunities for youth
- Frictions with new residents and businesses

## **Quality of Life**

- Lack of public spaces and seating
- Lack of signage, dilapidated structures, dirty gates drawn during day
- Gang violence and fear of gangs limiting activity
- Insufficient police vigilance (beat cops rarely seen)
- Too many liquor stores
- Dirty, broken sidewalks; public spaces, trees overgrown
- Poor lighting, dark at night, increased perception of unsafe
- Homeless populations

## Sustainability

- Limited resources to sustain the LCD
- Building a sustainable governance model
- Lack of resources to hire full time LCD Coordinator

# **Opportunities**

Throughout the data gathering process, many opportunities for the LCD emerged. These are organized according to five key areas: 1) land use design and housing; 2) economic vitality; 3) cultural assets and arts; 4) quality of life; and 5) governance. In the area of **land use design and housing**, recommendations had to do with land use and other policies to help preserve and further develop cultural assets, the preservation and development of affordable housing, and strategies to promote property ownership, particularly for Latino residents and businesses. **Economic vitality** revolved around opportunities and strategies to promote the economic viability and growth of businesses and organizations, particularly those with historic and cultural significance in the District. Stakeholders discussed many opportunities related to the preservation and promotion of **cultural assets and arts**. **Quality of life** opportunities included things that focused on improving the physical appearance and accessibility of the District, particularly things that promote the Latino Cultural District (e.g., way finding, visual

C-61

cues, etc.). Finally, a key opportunity that emerged throughout the planning process and ultimately became a priority in community discussions was the development of a **governance** structure to oversee and manage the Latino Cultural District. The opportunities in each of these key areas are listed in more detail below.

## 1) Land use design and housing

- Work with Building and Planning Developments to create new land use policies to support cultural assets. Integrate SF Heritage frameworks and language for designation and support of Cultural Heritage Assets.
- Explore Special Use District, Business Improvement District, and Community Benefit District creation. Connect with community-based efforts that have successfully adopted these tax increment measures: Castro Community Benefit District and Fruitvale Business Improvement District.
- Pursue community-driven strategies to preserve local history and culture. Continue partnerships with SF Heritage and universities to capture history and preserve it for future generations.
- Protect existing parking.
- Regulate rents for housing and cultural spaces and explore models that preserve historical residents and merchants.
- Programs to provide financial and legal assistance to residents, businesses and organizations/tenants' rights. Enforce HUD Fair Housing laws.
- Advocate for the development of affordable housing (for example, through early identification of sites that may be available for development and small sites development where existing units can be converted to affordable housing).
- Advocate for rent regulation for tenants, businesses, and non-profits. Engage diverse neighborhood stakeholders (residents, businesses, and non-profits) in affordable housing movement.
- Advocate for a moratorium on Ellis evictions.
- Educate community about local, state, federal housing laws and housing assistance programs (e.g., DALP).
- Identify funding sources and strategies to develop and purchase properties (e.g., affordable housing trust fund controlled by Mayor's Office on Housing; foundations; technology industry; land trust models, utilizing cooperative development strategies such as tenants' collective to purchase properties; eminent domain, interim controls (for businesses).
- Seek help from the city and others to help legacy institutions such as the Mission Cultural Center and Galería de la Raza purchase their buildings.
- Promote Latino ownership of businesses.
- Create artist-centered housing (artist-in-residence; work/live space; community service with art work, NPS structure) as well as housing.
- Identify strategies to decrease ability of speculators/developers to come in and sweep up real estate as soon as it becomes available (right of first refusal for locals, long-term residents).

C-62

• Develop innovative land use in line with LCD (some possibilities include pedestrian only spaces or zones on certain days/develop walkability; development of open space like a zocalo / picnic areas with grills).

## 2) Economic Vitality

- Create electronic tools to assist businesses and promote arts.
- Promote branding: logos and plaques to identify CHAs, signage to designate the LCD area, aesthetic, cultural demarcations unique to the LCD, and the development of consistent marketing of cultural activities.
- Increase business engagement: increase the engagement of local businesses in the development of the LCD, improve communication between businesses, schedule meetings at times that are convenient to local businesses, ensure that businesses have reasons to participate and are motivated to participate, and create a community through common activities and interests.
- Promote preservation: ensuring the survival and viability of tangible CHAs, developing protocols for the designation of CHAs, developing strategies to stabilize residential and commercial rents and leases, developing warning system to alert businesses and non-profits about expiring leases, and continuing façade improvement following LCD standards and design. A key priority under preservation is to conduct a SWOT analysis to determine strengths, weaknesses, opportunities and threats facing historic and legacy businesses.
- Increase capacity building: create technical assistance initiatives to help businesses improve their capacity through marketing, social media, market segmentation, strategic planning, and financial management. Strategies to strengthen the capacity of local businesses include: providing assistance to help businesses survive and expand, tailoring assistance to needs of businesses (e.g., individual, traditional, virtual), creating business incubators and accelerators, forming information technology team to support legacy businesses, providing businesses with demographic and market data to help them develop better goods and services, and creating directories and other databases with information that could be of value to local businesses.
- Articulate a legislative agenda: explore and promote designation of parts or the entire LCD as a Business Improvement District (BID), Special Use District or Community Benefit District. Two other ideas include the creation of community debit cards for legacy businesses as well as the creation of community banks or credit unions.
- Identify opportunities to leverage Mission Promise investments to support the Mission's neighborhood.
- Create loan programs targeting historical business and renters.
- Develop partnership opportunities between longtime businesses and new businesses, and between businesses and arts organizations.

C-63

## 3) Cultural Assets and Arts

- Organize advocacy efforts to identify available resources, preservation priorities, and facilities for arts programming.
- Use technology to promote LCD (e.g., create electronic calendar of cultural events that can also be printed and distributed).
- Educate new residents on CHAs (develop social connections; provide opportunities for new residents to volunteer and get involved; integrate an educational component in cultural events; create welcome packet and neighborhood newsletter; bulletin boards at CHAs.
- Learn about models that balance beautification and preservation.
- Regulate rents for housing (to help artists stay in the area) and cultural spaces/facilities.
- Leverage potential of LCD to preserve local businesses & non-profits and protect residents from displacement.
- Recognize San Francisco and LCD as a safe haven for immigrant artists.
- Invite tourism to the LCD, but avoid the commercialization/"Disneyland" effect (develop self-guided tours educating people about cultural history of area, Mayan kiosks, "This is 24th Street" events to reinforce identity and educate new residents, classes).
- Programs to provide financial and legal assistance to residents, businesses, and organizations/tenants' rights.
- Promote architectural features that emphasize the Latin American "feel" (e.g., arches at 24<sup>th</sup>/Potrero & 24<sup>th</sup>/Mission, *papel picado*, murals, Mayan kiosks.
- Create arts spaces (i.e. Gum Wall and other spaces for youth) as well as community spaces for dialogue regarding gentrification, hate tagging, historical values, traditions, discrimination in businesses, etc.

## 4) Quality of Life

- Capital improvements; prune trees, fix broken sidewalks, add pedestrian lighting, landscaping.
- Define off-hour truck loading times to reduce day-time parking problems.
- Promote free shuttle and pedestrian traffic (walkability) for the LCD.
- Facilitate access to LCD from Valencia to 24th Street.
- Create visual, tangible elements (e.g., flags, maps, way finders).
- Storefront façade improvement (e.g., murals on every façade along 24th Street, window art, for example utilizing art created by local artists or schoolchildren; colors, flowers, lights; "Welcome" signs in Spanish/English).
- Prevent chain and high-end restaurants from coming into neighborhood.

C-64

• Conduct awareness campaign about health and building codes.

## 5) Governance

- Create strong governance structure to manage LCD.
- Implement and execute LCD branding.

# 4. VISION, MISSION, PURPOSES & GOALS

The planning process engaged key stakeholders in defining and articulating a vision, mission, purpose statement, targeted beneficiaries, and goals that could guide the implementation of the Calle 24 Latino Cultural District. These strategic planning elements are outlined below.

# Mission and Vision Statements

The mission statement developed through the planning process is: To preserve, enhance and advocate for Latino cultural continuity, vitality, and community in San Francisco's touchstone Latino Cultural District and the greater Mission community.

The vision statement developed is: The Latino Cultural District will be an economically vibrant community that is inclusive of diverse income households and businesses that together compassionately embrace the unique Latino heritage and cultures of 24<sup>th</sup> Street and that celebrate Latino cultural events, foods, businesses, activities, art and music.

Beneficiaries of the Latino Cultural District include individuals (e.g., LCD families, including traditional, non-traditional, and extended; artists; working people; residents; immigrants; youth; and elders), organizations (neighborhood businesses, arts and culture organizations, educational institutions, and community service agencies), and San Francisco and the general public.

# Purposes and Goals

The purposes of the LCD are to:

- Strengthen, preserve and enhance Latino arts & cultural institutions, enterprises and activities
- Encourage civic engagement and advocate for social justice
- Encourage economic vitality and economic justice for district families, working people, and immigrants
- Promote economic sustainability for neighborhood businesses and nonprofits
- Promote education about Latino cultures
- Ensure collaboration and coordination with other local arts, community, social service agencies, schools, and businesses

The goals of the LCD are to:

- 1. Create a safe, clean, and healthy environment for residents, families, artists, and merchants to work, live, and play.
- 2. Foster an empowered, activist community and pride in our community.

C-65

- 3. Create a beautiful, clearly designated Latino corridor along Calle 24, and preserve the unique beauty and cultures that identify Calle 24 and the Mission
- 4. Preserve and create stable, genuinely affordable and low-income housing in the District and related infrastructure.
- 5. Manage and establish guidelines for development and economic change in the District in ways that preserve the District's Latino community and cultures.
- 6. Foster a sustainable local economy that provides vital goods and services to the District and supports living Latino cultures.

C-66

## 5. PROPOSED PROGRAMS AND STRATEGIES

Findings from the data gathering activities conducted throughout the planning process led to the development of the following key strategies for the LCD to prioritize. In addition, these four program areas (and related activities) will be the focus of the LCD: 1) land use design and housing; 2) economic vitality; 3) cultural assets and arts; 4) quality of life.

## Program area 1: Land Use Design

The LCD wishes to utilize land use design as a tool to promote housing and commercial stability of historical assets and demographic diversity. The planning process identified a long list of potential actions within this priority and the recommended next step should be to establish a process to analyze the feasibility of various options.

#### Program area 2: Economic Vitality

The LCD recognizes the importance of sustaining the business vitality of the District by first acknowledging the challenges affecting the stability of historical businesses. The LCD wants to clearly delineate the differences in priorities of new and historical businesses.

<u>Program area 3</u>: Preservation, Revitalization and Restoration of Cultural Assets The LCD wishes to recognize, promote and preserve cultural assets unique to the Latino Cultural District. The planning process created an inventory of close to 60 cultural assets. One crucial next step to operationalize this priority is the creation of protocols to clearly identify what constitutes a Cultural Historical Assets (CHAs). San Francisco Heritage suggests the use of this terminology to describe "the practices, representations, expressions, knowledge, skill- as well as the instruments, objects, artifacts and cultural spaces associated therewith- that communities, groups, and in some cases, individuals recognize as part of their cultural heritage. This intangible heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identify and continuity, thus promoting respect for cultural diversity and human creativity."

#### Program area 4: Quality of Life

Calle 24 recognizes that preserving positive quality of life indicators is as important as affecting negative quality of life indicators. LCD will foster further dialogue to spell out strategies for preserving and improving quality of life.

## **Key Strategies**

- 1. Create an organizational entity a 501(c)(3) to manage the activities of the Latino Cultural District
- 2. Create and leverage Special Use District designation



- 3. Implement a Cultural Benefits District campaign and assessment
- 4. Develop a community-wide communications infrastructure and promote the District through traditional and social media
- 5. Collaborate with, connect, and support existing arts and cultures and other nonprofit service organizations in implementing the Latino Cultural District's mission, rather than replacing or competing with them
- 6. Serve as a safety net for the District's traditional cultural-critical community events, such as Carnaval, Día de los Muertos, and the Cesar E. Chavez Holiday Celebration
- 7. Generate sufficient resources to support creation and sustainability of the Latino Cultural District programs and activities
- 8. Pursue social and economic justice fervently, and conduct its work with the Si Se Puede spirit of determination, collective strength, and compassion

# Program Activities

1) Land Use Design and Housing

- Design Special Use District campaign
- Advocate for genuinely affordable and low-income housing in the District and related infrastructure, including promoting education about financial literacy, home ownership, and tenants' rights
- Advocate for certificates of preference that would allow long-time residents who have been forced out of the District by waves of gentrification to return to new housing opportunities in the District
- Advocate for height limits and design guidelines
- Engage in activism and advocacy to ensure that new development is responsive to and reflective of the Latino Cultural District

2) Economic Vitality

- Provide technical and lease assistance to small businesses
- Create culturally relevant business attraction and retention strategies
- Provide district event support
- Implement neighborhood enhancements (such as arches, tiles, banderas, and/or plaques that identify the District, much as Chinatown's arches and architecture distinguish it from surrounding neighborhoods)
- Help preserve local businesses and attract new ones

3) Cultural Assets and Arts

• Participate in and support traditional culture-critical community events, such as Carnaval, Día de Los Muertos, and the Chavez Holiday Celebration

(-68)

- Identify and preserve cultural assets
- Create corridor monuments, arts projects, a walk of fame, light pole signs, and the like
- Foster collaboration among the arts organizations

4) Quality of Life

- Ensure the safety of the neighborhood
- Abate graffiti
- Develop a neighborhood-based communications infrastructure, and promote the District through traditional and social media
- Preserve street parking, public transit, and walking options
- Preserve open space, light, air, (trees, vegetation?)

# 6. ORGANIZATIONAL STRUCTURE & GOVERNANCE

## Structure

The LCD will be managed by a nonprofit organization 510(c)(3), the Calle 24 Council, which will be incorporated as a membership organization.

The follow committee structure of the 501(c)(3) is recommended.

Executive Committee: An executive committee will be comprised of officers of the Calle 24 Council.



Advisory Committees:

Figure 2: Calle 24 Organizational Structure

Advisory committees will be

comprised of at least one board member and other members. All committees will recruit youth in order to cultivate new generations of leaders. Suggested advisory committees include:

- Land Use Design and Housing
- Cultural Assets and Arts
- Quality of Life and Neighborhood Enhancements
- Economic Vitality
- Nominating Committee

## Governance

One must meet one or more of the following qualifications to become a member of the Council:

- Live and/or work in the Mission for ten or more years; or
- Born and raised in the Mission; or
- History of activism in support of the Latino Cultural District's mission; and
- Have served reliably on one of the organization's committees for at least one year.



## Membership Eligibility

There will be no charge for membership on the Council. To be eligible for membership, one must:

- Participate on one of the committees and/or volunteer for one of the endorsed events (e.g., Cesar Chavez Festival; Carnaval) or with one of the neighborhood nonprofits)
- Support the mission and vision of the organization
- Reflect Calle 24 constituencies
- Adhere to a code of good conduct and nonprofit best practices

## Board Size/Composition

The Board should be comprised of no fewer than 9 individuals, with a maximum number to be determined. The Board composition should include:

- A majority of Latino/as (% to be determined)
- Long-term residents: 15 (?) or more years (% to be determined)
- At least one youth (ages 24 or under)
- Representation from all the constituencies the Latino Cultural District is designed to benefit

## 7. CONCLUSION

The resolution that San Francisco's Board of Supervisors unanimously passed in May 2014 to designate the 24<sup>th</sup> Street corridor as the Latino Cultural District offers community residents and other stakeholders a unique opportunity to preserve and advance the rich legacy of Latino culture within the neighborhood. As stated in the resolution, "[...] the Calle 24 Latino Cultural District memorializes a place whose richness of culture, history and entrepreneurship is unrivaled in San Francisco..." The community planning process undertaken by the Calle 24 Council during the last six months of 2014 sought to solicit and distill a wide range of ideas about the strategies and actions the Council should pursue to achieve its mission to preserve, enhance and advocate for Latino cultural continuity, vitality and community in San Francisco's touchstone Latino Cultural District and the greater Mission community.

The findings from the community planning process reflect a clear consensus on the goals for the LCD, including the desire to create a safe, clean and healthy environment for residents, families, artists and merchants to work, live and play; the desire to create stable and affordable housing for working-class families; the desire to manage and establish guidelines for economic development and land use that preserve the District's Latino community and cultures; the desire to foster a sustainable local economy that provides vital goods and services; and the desire to create a beautiful, clearly designated Latino corridor along Calle 24 that exemplifies the cultural and artistic richness of San Francisco's Latino communities.

Key to achieving these goals will be the creation of an organizational infrastructure that can support the strategies adopted by the Council. Over the next few years, the Council will incorporate as a charitable, nonprofit organization and begin to pursue and leverage Special Use District designation, followed by neighborhood organizing to launch a Cultural Benefits District campaign and assessment that could potentially offer the district a source of long-term financial support. The Council will work to implement community programs that focus on land use design and housing, economic vitality, cultural assets and arts, and quality of life issues.

The community planning process undertaken by the Calle 24 Council represents just the first step in a journey that neighborhood residents and merchants, with support from city officials, are taking to preserve the authenticity and legacy of Latino culture along the 24<sup>th</sup> Street corridor. The Council looks forward to implementing the strategies outlined in the report. The vigor of our stride, given the fast pace of gentrification, will be key to the success of this endeavor.

C-72

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C-73





Penthouse height to 94 feet nments:



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SOUTHEAST 3D VIEW DENSITY BONUS SCHEME 2918 Mission Street CUA Density Bonus \_ Updated 08.25.17 45



DENSITY BONUS SCHEME

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2918 Mission Street CUA Density Bonus \_ Updated 08.25.17 47



C-79

## A Review on Vitamin D Deficiency Treatment in Pediatric Patients

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Vitamin D is essential for calcium absorption and for maintaining bone health in the pediatric population. Vitamin D deficiency may develop from nutritional deficiencies, malabsorption, enzyme-inducing medications, and many other etiologies. It may present as hypocalcemia before bone demineralization at periods of increased growth velocity (infancy and adolescence) because the increased calcium demand of the body cannot be met. In children, inadequate concentrations of vitamin D may cause rickets and/or symptomatic hypocalcemia, such as seizures or tetany. In this review, we will discuss the pharmacology behind vitamin D supplementation, laboratory assessments of vitamin D status, current literature concerning vitamin D supplementation, and various supplementation options for the treatment of vitamin D deficiency in the pediatric population.

INDEX TERMS cholecalciferol, ergocalciferol, pediatric, vitamin D deficiency

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## INTRODUCTION

Vitamin D plays an essential role in maintaining bone health through regulating calcium concentrations in the body. The development of vitamin D deficiency is associated with deteriorating bone health and in severe cases, hypocalcemia, rickets, and osteomalacia in children and adults.<sup>1</sup> Those at greatest risk of vitamin D deficiency include patients with chronic illnesses (e.g., chronic kidney disease [CKD], cystic fibrosis [CF], asthma, and sickle cell disease), dark-pigmented skin, poor nutrition, and infants who are exclusively breastfed.<sup>2,3</sup> The primary source of vitamin D is sunlight exposure, which has been limited or blocked extensively for many children over the past 20 years due to the association of skin cancer and ultraviolet rays. Chronic use of certain medications (e.g., glucocorticoids, cytochrome P450 3A4 inducers, anticonvulsants, and antiretroviral agents) has also been associated with compromised vitamin D concentrations. Given the high rate of bone development early in life, adequate serum concentrations of vitamin D are crucial for the developing child. There has also been a piquing interest in vitamin D in pediatric patients due to the recent epidemiologic reports suggesting that vitamin D may protect against autoimmune disease and play a role in innate immunity.<sup>2</sup>

## VITAMIN D DEFICIENCY

The serum concentration that constitutes vitamin D deficiency is controversial and not well supported by clinical trials, especially in the pediatric population. Deficiency is generally measured by the calcidiol concentration because of its long half-life of 2 to 3 weeks, relatively robust circulating concentration, and resilience to fluctuations in PTH concentrations.<sup>4</sup> Table 1 summarizes normal and abnormal serum vitamin D concentrations as classified by the American Academy of Pediatrics (AAP).<sup>1,2,5,6</sup> The AAP and the Institute of Medicine (IOM) both define vitamin D insufficiency as calcidiol (25-OH-D) concentrations < 20 ng/mL in the pediatric population.<sup>1,7</sup> In contrast, the Endocrine Society and the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines both classify insufficiency as calcidiol concentrations < 30 ng/mL. The Endo-

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<b>Table 1.</b> Vitatinin D Status Daseu un Calciului Concentrations."	Table	e1.∨	itamin D	Status	Based on	Calcidiol	Concentrations <sup>1,7</sup>
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Vitamin D Status	Calcidiol (ng/mL)			
	AAP 2008, IOM	Endocrine Society	KDOQI	Adult – NEJM 2007
Severe deficiency	< 5		< 5	
Mild to moderate deficiency	5-15	< 20	5-15	< 20
Insufficiency	16-20	21-30	16-30	20-30
Sufficiency	21-100	31-60	> 30	31-60
Excess	101-149		<u></u>	
Intoxication	> 150			> 150

AAP, American Academy of Pediatrics; IOM, Institute of Medicine; KDOQI, Kidney Disease Outcomes Quality Initiative; NEJM, New England Journal of Medicine

crine Society defines deficiency as < 20 ng/mL, and KDOQI defines deficiency as < 15 ng/mL.<sup>8,9</sup> The definitions in these last 2 groups are more consistent with the classification system used in adults based on evidence of compromised bone health and elevations in parathyroid hormone (PTH) at calcidiol concentrations up to 32 ng/ mL (80 nmol/L) (Table 1).<sup>210</sup>

In a vitamin D deficient patient, the intestinal absorption of calcium and phosphorus is decreased. The parathyroid gland recognizes the low serum calcium concentrations and releases PTH to increase the serum calcium back into an adequate range. PTH increases the calcium reabsorption in the kidneys and the excretion of phosphorus, therefore decreasing the risk of complication from an elevated calcium phosphate product (e.g., kidney stones). While this reduction is protecting the body, it is also decreasing bone mineralization at the same time. Over weeks to months, osteomalacia, stunted growth, and rickets may develop.1 Studies have shown that over half of infants, children, and adolescents may be inadequately supplemented.<sup>11,12</sup> In 2008, the AAP published a review article with recommended target vitamin D concentrations for healthy infants, children, and adolescents (Table 1).<sup>1,9,13</sup>

In efforts to achieve and maintain the target vitamin concentrations, the AAP recommends all infants, children, and adolescents should receive a minimum daily intake of 400 international units of vitamin D to prevent rickets and to maintain vitamin D concentrations at > 20 ng/mL (50 nmol/L).<sup>1</sup> Term infants should be supplemented with 400 to 800 units daily to account for the insufficient transfer of maternal vitamin D stores and ensure calcidiol concentrations of > 20 ng/mL (50 nmol/L).<sup>1</sup> Preterm infants are more likely to be vitamin D deficient since their transpla-

cental transfer from the mother was a shorter duration, hospitalization leading to a negligible amount of UV-mediated vitamin D formation, and possibly lower vitamin D stores due to a lower fat mass.<sup>14</sup> To address this population, the AAP published an expert opinion report in 2013 on the calcium and vitamin D requirements of enterally fed preterm infants.<sup>14</sup> Although there are no clinical outcome studies in this population, the AAP recommends 200 to 400 units per day of vitamin D supplementation in very low birth weight infants (<1500 g) and 400 units per day of vitamin D supplementation in infants weighing > 1500 g.<sup>14</sup> It is reasonable to consider increasing this dose to 1000 units per day in > 1500 g infants, as this is the established upper tolerable intake for healthy full-term infants. The calcidiol concentration goal in the preterm population remains the same as full-term infants (>20 ng/ mL).<sup>14</sup> In 2010, the IOM issued guidelines that increased the recommended dietary allowance of vitamin D to 600 units daily for healthy children 1 to 18 years of age, which has been echoed by the Endocrine Society.7,9

#### PHARMACOLOGY

Our bodies obtain vitamin D in 2 different ways. The primary source of vitamin  $D_3$  (cholecalciferol) comes from direct synthesis in our skin (>90%). Upon exposure to ultraviolet radiation, 7-dehydrocholesterol in our epidermal cells synthesizes vitamin  $D_3$ . The remainder of our need is typically obtained from dietary sources in either form, vitamin  $D_3$  or vitamin  $D_2$  (ergocalciferol). Both forms undergo hydroxylation in the liver to create the storage form of vitamin D, 25-hydroxy vitamin D (25[OH]-D, calcidiol, or calcifediol). Furthermore, in the kidneys, hydroxylation of calcidiol synthesizes the active



metabolite, 1,25-dihydroxyvitamin D (1,25[OH]-D) (calcitriol). This pathway is visually depicted in Figure. Calcitriol is responsible for increasing calcium absorption, bone resorption, and decreasing renal calcium and phosphate excretion to maintain bone health.<sup>15</sup> The synthesis of calcitriol is mediated by PTH, serum phosphate concentration, and growth hormone, and may occur in non-renal sites, such as alveolar macrophages and osteoblasts.<sup>2,16</sup> Additionally, vitamin D has extraskeletal responsibilities, with vitamin D receptors in the small intestine, colon, osteoblasts, activated T and B lymphocytes, beta islet cells, and major organs (brain, heart, skin, gonads, prostate, breast, and mononuclear cells).<sup>2,16</sup> The immunologic effects of vitamin D have stimulated great interest, but studies in these areas are currently limited in pediatric patients.

## MEDICATION INDUCED VITAMIN D DEFICIENCY

Metabolism of dietary vitamin D to calcidiol occurs in the liver through the cytochrome P450 enzyme system. Certain classes of medications act on this enzyme system to increase the metabolism of vitamin D and therefore reduce the body's systemic exposure to active vitamin D concentrations. Some anti-epileptic drugs (AEDs) are inducers of the cytochrome P450 system (phenytoin, carbamazepine, oxcarbazepine, phenobarbital, and primidone). Aside from the detrimental bone effects of vitamin D deficiency, rapid decreases in calcium may precipitate a seizure, further complicating the clinical picture (e.g., etiology of seizures). Valproic acid, though it is an inhibitor of the enzyme system, increases bone turnover through increasing osteoclast activity and therefore tilting the balance of bone formation and bone resorption.<sup>17,18</sup>

Recommendations have been made for all patients on an AED to receive a preventative dose of vitamin D 400 to 2000 units per day.<sup>17</sup> Patient characteristics such as baseline calcidiol concentration, polypharmacy, and sun exposure should help guide vitamin D therapy as well. Patients diagnosed with AED-induced osteoporosis may need larger doses of vitamin D replacement therapy to correct biochemical abnormalities (PTH, calcium, and phosphorus).18 Calcidiol concentrations should be monitored (prior to or at the start of AED initiation) and then yearly thereafter. If diagnosed with vitamin D deficiency, initiating therapy with the standard dosing recommendation for children with vitamin D deficiency is acceptable; however, the doses may need to be increased according to the calcidiol concentrations, which should be measured monthly during treatment. Doses of 5000 to 15,000 units per day have been used for AED-induced osteomalacia.17

Rates of vitamin D insufficiency are high in pediatric patients with human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome due to the disease itself and the life-saving highly active antiretroviral therapy (HAART). Rutstein and colleagues<sup>19</sup> compared the rates of vitamin D deficiency/insufficiency in children and young adults with HIV to a healthy group. Vitamin D deficiency/insufficiency was present in 36% and 89% of those with HIV (84% on HAART therapy) compared to 15% and 84% of the comparison group, respectively. Protease inhibitors inhibit the cytochrome P450 enzyme system and decrease the production of active vitamin D (calcitriol). Nucleoside reverse transcriptase inhibitors have also been linked to vitamin D deficiency through increased lactate concentrations and not due to cytochrome P450 inhibition. Due to the presence of multiple risk factors for osteoporosis and the high prevalence of deficiency, all patients on HAART should be screened annually for vitamin D deficiency and encouraged to maintain sufficient calcium and vitamin D intake.<sup>20</sup>

Other drug classes that may affect the absorp-

Table 2. Vitamin D Content of Foods<sup>88</sup>

Food	Vitamin D Content, IU	
Atlantic herring (raw)	1628/100 g	
Butter	35/100 g	
Canned pink salmon with bones in oil	624/100 g	
Canned tuna/sardines/salmon/mackerel in oil	224–332/100 g	
Cereal fortified	40/serving	
Codfish (raw)	44/100 g	
Cod liver oil	175/g; 1360/tablespoon	
Cooked salmon/mackerel	345–360/100 g	
Cow's milk	3–40/L	
Dried shitake mushrooms (non-radiated)	1660/100 g	
Egg yolk	20–25 per yolk	
Fresh shitake mushrooms	100/100 g	
Fortified milk/infant formulas*	400/L	
Fortified orange juice/soy milk/rice milk	400/L	
Margarine, fortified	60/tablespoon	
Parmesan cheese	28/100 g	
Shrimp	152/100 g	
Swiss cheese	44/100 g	
Yogurt (normal, low fat, or non-fat)	89/100 g	

IU, international unit

\*Infants consuming  $\geq$  1 L of formula daily do not require additional supplementation

tion, metabolism, or activation of vitamin D include corticosteroids, azole antifungals, and cytochrome P450 3A4 inducers. Although there is no formal recommendation for monitoring, annual monitoring of calcidiol concentrations may be warranted in pediatrics receiving these medications.<sup>21</sup>

#### SOURCES OF VITAMIN D

### UV Radiation and Cutaneous Cholecalciferol Synthesis

Cutaneous synthesis of vitamin D is a significant source of vitamin D replenishment. The amount of vitamin D synthesized by our skin depends on a number of factors: the age of the individual, the amount of skin exposed, the duration of exposure, geographic-related factors (i.e., latitude, season, time of day, shade, and air pollution), sun block use, and the skin pigment of the individual.<sup>1,2</sup> Holick<sup>2</sup> estimates exposure of the body in a bathing suit to 1 minimal erythemal dose (MED or the dose of radiation that causes a slight pinkness to the skin 24 hours after exposure) equals about 20,000 units. Thus, exposure of arms and legs to 0.5 MED approximates ingesting 3000 units of vitamin D<sub>3</sub>. Studies have shown that children, especially infants, may require less sun exposure than adults to produce adequate vitamin D concentrations because of greater surface area to volume ratio and enhanced ability to produce vitamin D than older people.<sup>22</sup> A study in 1985 found that 30 minutes of sun exposure for infants in diapers or 2 hours for fully clothed infants without a hat maintained weekly calcidiol concentrations of 11 ng/mL (27.5 nmol/L).<sup>23</sup> The AAP recommends that children younger than 6 months be kept out of direct sunlight to reduce the risks of skin cancer.<sup>24</sup> Currently, there are no recommendations available to validate the appropriate duration of sun exposure in the pediatric population, and the variability of vitamin D synthesis between individuals would make such a recommendation difficult. The lack of data and the risks associated with prolonged sun exposure suggest food and supplementation as the preferred mode of repleting vitamin D stores.

#### **Dietary Sources of Vitamin D**

There are many natural food sources of vitamin  $D_2$  and vitamin  $D_3$ , including oily fish (e.g., salmon, mackerel), cod liver oil, organ meats, and egg yolks (Table 2). However, these products are not particularly kid-friendly and routine adequate intake may be difficult. In the United States (US), there are fortified food options, including infant

Dosage Form	Strength	Trade Names
Vitamin D2 (ergocalciferol)		
Oral solution	8000-IU/mL (may contain propylene glycol)	Calcidiol, Calciferol, Drisdol,
Capsule	50,000-IU	Drisdol
Tablet	400-IU	Various
Vitamin D3 (cholecalciferol)		
Oral drops	400-, 1000-, 2000-IU/drop	Baby D drops, D drops
Oral solution	400-IU/mL	D-Vi-Sol, Just D
Capsule	400-, 1000-, 2000-, 5000-, 25,000-IU	Dialyvite, Decara (25,000-IU)
Tablet	400-, 1000-, 2000-, 5000-IU	Thera-D
Chewable tablet	400-, 1000-, 2000-, 5000-IU	Various
Dispersible tablet	2000-IU	Various
1,25-Dihydroxy Vitamin D (calcitriol)*		
Oral solution	1-mcg/mL	Rocaltrol
Capsule	0.25-, 0.5-mcg	Rocaltrol
Solution for injection	1-mcg/mL (may contain EDTA)	Calcijex

**Table 3.** Available Formulations of Vitamin D<sup>89</sup>

EDTA, ethylenediaminetetraacetic acid; IU, international unit

\*1 mg = 40,000 IU of vitamin D activity

formula, milk, and orange juice, to help meet needs. Also, all infant formulas sold in the US contain at least 400 units/L of vitamin D.<sup>25</sup>

#### Vitamin D in Breast Milk

Breast milk contains very little vitamin D, an average of 22 units/L (range 15 to 50 units/L) in a vitamin D-sufficient mother.<sup>26</sup> Recent studies suggest that maternal intake of higher than recommended doses of vitamin D (4000 to 6400 units daily) may achieve vitamin D concentrations in breast milk to provide sufficient vitamin D supplementation for breastfeeding infants. However, this approach is not recommended.<sup>27,28</sup> Due to the low vitamin D concentrations found in breast milk, the newest recommendation for exclusively breastfed infants is to provide a supplement of 400 units per day (increased from 200 units per day).<sup>1</sup>

#### Vitamin D Formulations

Vitamin D is available commercially as ergocalciferol, cholecalciferol, and calcitriol. Ergocalciferol and cholecalciferol, once thought to be equipotent, may increase vitamin D stores to varying degrees. Recent evidence suggests that cholecalciferol increases calcidiol concentrations two- to threefold more than ergocalciferol.<sup>29,30</sup> The formulations available in the US are summarized in Table 3 and the vitamin D content of commonly used pediatric multivitamins in Table 4. Despite the evidence suggesting the pharmacodynamic differences between cholecalciferol and ergocalciferol, most guidelines do not have a preference between the 2 products.<sup>17,9</sup> However, the KDOQI and Cystic Fibrosis Foundation (CFF) guidelines prefer vitamin  $D_2$  due to safety data in animals.<sup>8,31,32</sup> There are no direct comparisons of the 2 formulations and in general, calcitriol does not have a role in repleting vitamin D stores.

## VITAMIN D SUPPLEMENTATION IN CHRONIC DISEASE

#### Vitamin D Deficiency Rickets

Severe vitamin D deficiency can lead to symptomatic hypocalcemia, which can result in seizures, osteomalacia, or rickets. Rickets involves bone demineralization that occurs in areas adjacent to the growth plate.<sup>1</sup> The exact prevalence of rickets is unknown. However, case reports and case series of documented rickets suggest this problem still exists today.<sup>1</sup> Rickets may be caused by reasons other than nutritional vitamin D deficiency (e.g., calcium and phosphorus deficiency, inherited forms of hypophosphatemic rickets, and vitamin D receptor mutations); however, these etiologies will not be discussed in this review.

#### Dosing

For the treatment of vitamin D deficiency rickets, the AAP recommends an initial 2- to 3-month regimen of "high-dose" vitamin D

J Pediatr Pharmacol Ther 2013 Vol. 18 No. 4 • www.jppt.org

# JPPT

	Vitamin D2 or D3 (IU)	Calcium (mg)	Phosphorous (mg)
Infant multivitamin drops (per mL)*			
AquADEKs <sup>†</sup>	400		
D-Vi-Sol	400		
Enfamil Poly-Vi-Sol	400		
SourceCF	500		
Tri-Vi-Sol	400		
Vitamax <sup>†‡</sup>	400		
Multivitamin Tablet (per tablet)			
ADEK (chewable)	400		
AquADEKs (soft gel)	800		
Centrum	400	200	20
Centrum Kids Complete	400	100	100
Flintstones Complete	400	108	50
Flintstones Sour Gummies	100		
Phlexy-Vits (7-g packet)	400	1000	775
Source CF (chewable, soft gel)	1000		
Vitamax (chewable)	400		

Table 4. Vitamin D, Calcium, and Phosphorous Content of Common Multivitamins<sup>90</sup>

IU, international unit \*Standard dose = 1 mL

†Recommended for use in infant with fat malabsorption (e.g., cystic fibrosis, liver disease) ‡Sold exclusively via Cystic Fibrosis Services Pharmacy

therapy of 1000 units daily in neonates, 1000 to 5000 units daily in infants 1 to 12 months old, and 5000 units daily in patients over 12 months old.1 These recommendations are summarized in Table 5. Although radiologic evidence of healing occurs within 2 to 4 weeks of treatment, large dose treatment (of either vitamin  $D_3$  or  $D_2$ ) should be continued for 2 to 3 months.<sup>1</sup> After sufficient calcidiol concentrations are achieved, a maintenance dose of 400 units of vitamin D daily is recommended in all age groups.<sup>1</sup> Larger maintenance doses (800 units per day) may be considered in the following at-risk populations: premature infants, dark-skinned infants and children, children who reside in areas of limited sun exposure (>37.5° latitude), obese patients (due to fat sequestration of vitamin D), and those on medications known to compromise vitamin D concentrations discussed in this review.<sup>1,9,33</sup>

In patients where daily compliance is a concern, an alternative dosing strategy can be utilized for the treatment of vitamin D deficiency, known as "stoss therapy," from the German word *stossen*, meaning "to push." For patients over 1 month of age, 100,000 to 600,000 units of vitamin D can be given orally as a single dose, followed by maintenance doses.<sup>34,35</sup> When instituting this approach, liquid formulations (e.g., Drisdol) should be avoided to prevent potential propylene glycol toxicity.<sup>35</sup> Calcitriol is also not preferred for stoss therapy as it has a short half-life and does not build up vitamin D body stores. Strategies to safely institute stoss therapy include crushing 25,000 units or 50,000 units tablets or softening 50,000 units gel capsules in water and blending in foods, such as applesauce.<sup>35</sup> Stoss therapy has been successfully implemented using intramuscular formulations as well; however, this option will not be explored since this product is no longer available in the US.

#### Evidence

Evidence in infants, children, and adolescents are sparse concerning what dose corrects vitamin D deficiency rickets. Current recommendations have been made based on expert opinion.<sup>1,22</sup> There is, however, published evidence on the safety and efficacy of stoss therapy in children with clinical and biochemical evidence of vitamin D deficiency.<sup>34,37</sup> Shah et al<sup>35</sup> administered 300,000 or 600,000 units of vitamin D<sub>2</sub> orally (100,000 units every 2 weeks) to 42 patients with vitamin D deficiency rickets between 5 and 109 months of age. At 14 days postadministration, radiographic evaluations confirmed the efficacy of this regimen. However, routine use of stoss therapy has

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	Vitamin D Supplementation (Cholecalciferol)		
Prevention 400 IU/day			
Treatment	< 1 month: 1000 IU/day orally for × 2-3 months		
	1–12 months: 1000–5000 IU/day orally for $ imes$ 2-3 months		
	> 12 months: 5000 IU/day orally for × 2-3 months		

#### IU, international unit

overwhelming risk of hypercalcemia; 34% of infants who received 600,000 units of vitamin D every 3 to 5 months during the first one and a half years of life reported hypercalcemia.<sup>38</sup> A study involving Turkish children and adolescents 12 to 17 years old showed intake of < 100 units of vitamin D was inadequate, resulting in calcidiol concentrations < 11 ng/mL.<sup>39</sup> The 2003 AAP guideline recommendations were based on the premise that 200 units daily of vitamin D would achieve calcidiol concentrations > 11 ng/mL to prevent rickets. Since then, more studies have shown rickets can manifest in patients with calcidiol concentrations up to 20 ng/mL.<sup>40,41</sup> In the past, doses of cod liver oil equal to 400 units of vitamin D daily achieved calcidiol concentrations > 20 ng/ mL without concerning adverse effects.<sup>42,43</sup> Based on this evidence, most guidelines recommend at least 400 units of vitamin D daily.<sup>1,7,9</sup> Clinical trials are still needed to exactly determine the dose of vitamin D to achieve optimal calcidiol concentrations as well as the calcidiol concentration required to prevent bone demineralization and rickets in the pediatric population.

#### Vitamin D Deficiency in CKD

Epidemiologic studies suggest that patients with CKD are at an increased risk for vitamin D deficiency due to reduced sun exposure, lower intake of foods rich in vitamin D, and increased melanin content of the skin observed in this population.<sup>8,44,45</sup> In a cohort of children with CKD from 2005 to 2006, the prevalence of vitamin D deficiency was 39% (n=88) with the mean 25(OH)D concentration of 21.8 ng/mL.<sup>46</sup> Additionally, these patients exhibit physiologic challenges that increase risks for deficiency, including decreased endogenous production, decreased intestinal absorption, decreased enzyme activity to form functional vitamin D in the kidneys, and in those with proteinuria, increased urinary loss of calcidiol, and vitamin D-binding protein.32,47-50 In patients with CKD, vitamin D supplementation appears to have benefit in preventing or reducing hyperparathyroidism that occurs as a part of renal osteodystrophy to repair bone and mineral disturbances.<sup>32</sup> The recommendations we will explore concerning vitamin D supplementation in pediatric patients with CKD were developed based on data observed in the adult population. However, since the publication of the KDOQI guidelines, more information is available in the literature about vitamin D deficiency in pediatric patients with CKD.

#### Dosing

Table 6 summarizes the recommendations in the pediatric KDOQI guidelines for patients with vitamin D insufficiency or deficiency.8 Patients with calcidiol concentrations > 30 ng/mL are indicated for larger initial doses of vitamin D than those with adequate calcidiol concentrations. Of note, the guidelines prefer vitamin D<sub>2</sub> as the supplement of choice over vitamin D<sub>3</sub> due to safety data in animals.<sup>8,31,51</sup> However, vitamin D<sub>3</sub> is noted as an acceptable alternative. Calcidiol concentrations should be measured at 3 months of therapy, to assess the need for further treatment, and annually, once concentrations are adequate.<sup>8</sup> Additionally, serum corrected calcium concentrations and phosphorous concentrations should be assessed at 1 month and every 3 months.<sup>8</sup> If total serum corrected calcium exceeds 10.2 mg/ dL or if serum phosphate exceeds the upper limit for age and calcidiol concentrations are normal, vitamin D may be discontinued. Otherwise, once calcidiol concentrations are deemed adequate, maintenance doses of vitamin  $D_2$  (400 units daily) should be resumed.<sup>7,8</sup> For non-compliant patients, vitamin D can be administered as a single oral dose of 50,000 units monthly.<sup>35,52</sup>

#### Evidence

The prevalence of vitamin D insufficiency or deficiency in the pediatric population with CKD varies in recent literature from 39% to 77%.<sup>46,53</sup> Risk factors for more advanced deficiency include advanced CKD, non-Caucasian ethnicity,

Table 6. Recommendations for Vitamin D Supplementation in Children with CKD Stages 2 to 48				
Vitamin D Status*	Calcidiol (ng/mL)	Vitamin D2 Dose		
Severe deficiency	< 5	Initial dose: 8000 IU/day orally or 50,000 IU/week orally × 4 weeks; then 4000 IU/day orally or 50,000 IU twice monthly orally × 2 months		
Mild deficiency Insufficiency	5 to 15 16 to 30	4000 IU/day orally or 50,000 IU every other week orally × 3 months 2000 IU/day orally or 50,000 IU every 4 weeks orally × 3 months		

IU, international unit

\*Hold vitamin D if calcium  $\ge$  10.2 mg/dL or if phosphorus exceeds the upper limit for age and calcidiol is normal. If phosphorus exceeds the upper limit for age and calcidiol is < 30 ng/mL, initiate oral phosphate binder therapy

overweight or obesity, and lack of sun exposure.46,53 In a retrospective, single center study of 57 children (mean age 11 years) with CKD (stages 2 through 4), vitamin  $D_2$  was used for 12 weeks at doses recommended in the KDOQI guidelines to successfully replete vitamin D stores.<sup>54</sup> Of note in this study, PTH concentrations decreased from 122 to 80 ng/mL after treatment. In a study involving adults with CKD, administration of vitamin D, increased calcidiol concentrations from 17 to 27 ng/mL (p<0.05) and decreased PTH concentrations from 231 to 192 pg/mL (p<0.05) after 6 months.<sup>55</sup> In Zisman et al,<sup>56</sup> 52 adult patients with CKD (stage 3 or 4), vitamin D deficiency, and hyperparathyroidism observed normalization of calcidiol concentrations (p<0.05) and decrease in PTH concentrations from 13.1% to 2.0% (non-significant p-value) with vitamin D<sub>2</sub> supplementation. A prospective trial in pediatric patients with moderate CKD showed increased mean growth velocity into the normal range after 1 year of vitamin D therapy, which continued in the subsequent 2 years of treatment.<sup>57</sup>

#### Calcitriol

In vitamin D deficiency, calcitriol is not recommended as initial therapy or for routine use because of its short half-life and inability to increase vitamin D stores. Doses are limited because of its rapid onset and risk of hypercalcemia. However, calcitriol has utility in children with CKD stages 2 to 5 for the treatment of secondary hyperparathyroidism.<sup>58</sup> Additionally, it can be used as an adjunct to calcium supplementation for patients with severe vitamin D deficiency with severe symptomatic hypocalcemia, including seizure and tetany.58 As kidney function continues to decline, the enzyme activity of 1-alpha hydroxylase decreases and therefore, calcitriol preparations may be needed rather than vitamin  $D_2$  or  $D_3$ preparations.

#### Vitamin D Deficiency in CF

With the increase in life expectancy from 2 to 36 years in the last 40 years, bone disease has transpired as a common complication in patients with CF with low bone mineral density observed in 50% to 75% of patients.59 There are a myriad of contributory risk factors including malnutrition, vitamin D deficiency due to malabsorption from pancreatic insufficiency, inadequate absorption of calcium, physical inactivity, altered sex hormone production, chronic lung infection with elevated level of bone-active cytokines, and glucocorticoid use in this population. Maintaining optimal vitamin D stores in this population is especially important because severe bone disease may exclude these individuals from being qualified for lung transplantation. Guidelines from the CFF's Consensus Conference on Bone Health recommend that vitamin D, supplementation be given to maintain calcidiol concentrations  $\geq$  30 ng/ mL.59 However, a more recent study published in 2011 suggests that 35 ng/mL is the more appropriate cut off, where PTH is < 50 pg/mL and bone resorption and fracture risk is decreased.<sup>60</sup>

#### Dosing

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In CF patients with insufficient calcidiol concentrations, doses up to 50,000 units of vitamin  $D_2$  daily for several months may be necessary for initial treatment.<sup>61</sup> For maintenance therapy, the CFF guidelines recommend at least 400 units and 800 units of vitamin  $D_2$  daily for infants and patients over 1 year of age, respectively.<sup>62</sup> However, as supported by the literature, these doses have been found not to sustain calcidiol concentrations in this population and therefore, doses should be titrated to obtain calcidiol concentrations > 30 to 35 ng/mL. Dosing recommendations for children younger than 5 years old are vitamin  $D_2$  12,000 units biweekly, and 50,000 units weekly or biweekly of vitamin  $D_2$  for those 5 years and older.<sup>59</sup> Very high dosing strategies such as 700,000 units of vitamin  $D_2$  over 14 days have been safely administered to a pediatric CF population with successful adequate calcidiol concentration.<sup>63</sup> If high dose vitamin  $D_2$  is inadequate, more polar vitamin D analogs, calcitriol, or phototherapy may be reasonable alternatives.<sup>59</sup> Of note, the treatment doses are recommended in addition to the daily recommended maintenance therapy these patients are receiving.<sup>62</sup>

#### Evidence

Given that the majority (60%) of the 60,000 patients with CF in North America and Europe are under the age of 18, studies concerning vitamin D status in patients with CF often involve pediatric patients.<sup>59</sup> In a retrospective chart review of 147 concentrations from 97 pediatric individuals with calcidiol concentrations < 30 ng/mL, 50,000 units of vitamin D, daily for 28 days resulted in approximately half achieving concentrations > 30 ng/mL.<sup>61</sup> This initial regimen was more successful than vitamin D 250,000 units 1, 2, or 3 times a week for 8 weeks in pediatric patients.<sup>64</sup> Longterm follow-up (6 to 18 months posttreatment) in 39 patients showed 48% of those who achieved sufficient calcidiol concentrations became insufficient on maintenance doses of 400 to 800 units of vitamin D<sub>2</sub>.<sup>61</sup> In a 2011 trial of adult patients with CF, patients with calcidiol concentrations < 30 ng/mL were given 50,000 units of vitamin  $D_2$  daily for 30 days followed by maintenance doses of vitamin D<sub>3</sub> 800 to 1000 units daily. After 30 days of treatment, serum calcidiol increased from 15.1 to 48.7 ng/mL (p<0.05) without any concerning side effects. However, adequate concentrations were not sustained on maintenance doses. The mean serum calcidiol dropped to 18.9 ng/mL (p<0.05), and 50% of treated patients became vitamin D insufficient within 1 year.<sup>60</sup> In a study of 20 adolescent and adult patients with CF, administration of 800 units daily of vitamin D was inadequate for 40% of patients after 4 to 10 weeks of therapy.65 In another study of exclusively adult CF patients, administration of vitamin D<sub>3</sub> (>400 units daily) increased calcidiol concentrations in 92% of patients; however, normalized calcidiol concentrations were achieved in only 17% of patients and no assessment on the most appropriate dose was made.<sup>66</sup> In a study conducted by Kelly et al,67 95% of adult CF patients required 1800 units of vitamin D, daily to achieve calcidiol concentrations above 25 ng/mL. Although supplementation with calcitriol does not replete vitamin D stores, it may be an option for CF patients unresponsive to vitamin D<sub>2</sub> and D<sub>3</sub> to manage consequences of vitamin D deficiency. Brown et al<sup>68</sup> reported that calcitriol (0.5 mcg daily for 14 days) increased the fractional absorption of calcium (p<0.05) and lowered PTH (p<0.03) in 10 adults with CF.

#### Vitamin D Deficiency in Sickle Cell Disease

Pain crisis is a hallmark of sickle cell disease. The symptoms of pain crisis are thought to be somewhat similar to the symptoms that one would experience with vitamin D deficiency. For example, in both conditions, pain is characterized by an aching and dull pain. The location of the pain can be limited to the extremities and lower spine. It can be exacerbated by increased activities and exertion.<sup>2,69-71</sup> Because of these similarities, studies have looked at the prevalence of vitamin D deficiency in the sickle cell population. In fact, in 1 recent study that was performed in Madrid, Spain, 56% of children with sickle cell had concentrations of vitamin D < 20 ng/mLand 18% of them had concentrations < 11 ng/ mL.72 The ranges of prevalence from other studies, however, were as high as 65% to 100%.73-75 Supplement of vitamin D may help alleviate the pain experienced by patients with sickle cell disease and improve their overall bone health.

#### Evidence

Evidence of vitamin D supplementation in children and adolescents with sickle cell disease are limited. In 1 case report, a 16-year-old female with homozygous SS disease presented with chronic pain involving many parts of her body, which included the lower extremities, left shoulder, and neck.<sup>76</sup> Her pain was not alleviated by ibuprofen, pregabalin, amitriptyline, or various opioids (totaled about 40 mg equivalents of morphine daily). A detailed metabolic workup was performed, and she was found to have a vitamin D concentration of <7.9 ng/mL. Because of this finding, she was started on cholecalciferol 50,000 units orally twice a week for 8 weeks. At the end of this course of therapy, her vitamin D concentration had jumped up to 47 ng/mL and was switched to cholecalciferol 50,000 units once weekly. By week 14, her concentration was at 30 ng/mL, and she had complete alleviation of all

# JPPT

her pain symptoms and her bone mass density increased by 11% in 2 years.

Because of the success found in the previous case report, the same investigator performed a randomized, double blind pilot study in 2012, in which subjects (n=46;  $13.2 \pm 3.1$  years) with sickle cell disease were given either high dose cholecalciferol (40,000 to 100,000 units weekly) or placebo for 6 weeks.77 Approximately 53% and 83% of the subjects were initially found to have vitamin D insufficiency and deficiency, respectively. The treatment group was found to have fewer pain days per week, higher quality-of-life scores, and higher serum 25-hydroxyvitamin D concentrations. The authors suggested that a larger study with longer duration will need to be performed to validate this result. In fact, at the hospital where one of the authors of this review article works, he also had successes in using cholecalciferol 50,000 units orally twice a week in 2 pediatric patients with sickle cell disease, and their pain scores were greatly reduced.

Even with theses success stories, numerous questions still remain about the use of vitamin D supplementation in sickle cell disease, such as 1) what is the optimal dose of cholecalciferol, 2) what is the duration of therapy, 3) what are the long-term side effects of such a large dose therapy in the pediatric population, 4) does it work for all forms of sickle cell disease, and 5) will this therapy work for patients without vitamin D deficiency?

#### Vitamin D Deficiency in Asthma

Asthma is a common diagnosis found in the pediatric population. Scientists hypothesize that the increased prevalence of asthma may be in part due to the rise of vitamin D deficiency in the pediatric population.<sup>78</sup> Maternal intake of vitamin D during pregnancy may also play a role in the children's risk of having wheezing symptoms.<sup>79</sup> In fact, some studies have described an association between vitamin D deficiency and asthma, while one has not.<sup>80-82</sup> We will look at the evidence on the association between vitamin D deficiency and asthma and the need of vitamin D supplementation in patients with this clinical condition.

#### Evidence

Limited data exist on vitamin D concentrations in children with asthma. A case control study was performed at a pediatric allergy and immunology clinic in Qatar.<sup>81</sup> The aim of the study was to describe the association between asthma and vitamin D in children and to look at the difference in vitamin D concentrations in asthmatic children (7.0  $\pm$  3.8 years) and control (8.4  $\pm$  3.6 years). In this study, vitamin D deficiency was found to be more prevalent in asthmatics than controls. The mean value of vitamin D was 17.5  $\pm$  11 ng/mL in the group with asthma and 20.8  $\pm$  10.0 ng/mL in the controlled group. Elevated serum immunoglobulin E was observed in patients with lower vitamin D concentrations.<sup>13</sup>

In another cross-sectional study, serum 25-hydroxyvitamin D3 concentrations were compared between the group with asthma (n=50) and the healthy group (n=50).<sup>80</sup> The age of the subjects ranged from 6 to 18 years. The results of this study showed that vitamin D concentrations had direct correlations with both the forced expiratory volume/forced vital capacity (FEV1/FVC) ratio and the predicted FEV1 (p=0.024 and p=0.026, respectively), meaning that the less the vitamin D concentrations, the more significantly increased odds of the subjects' asthmatic state. However, the state of vitamin D deficiency was not associated with the duration of disease, number of hospitalization, and the eosinophil counts.<sup>80</sup>

On the other hand, one retrospective, casecontrol study did not find an association between asthma severity and serum 25-hydroxyvitamin D concentrations.<sup>82</sup> In this study, 263 subjects with asthma were compared to 284 normal subjects (ages: 2 to 19 years). Their asthma symptoms were assessed and serum vitamin D concentrations were obtained. No significant difference in vitamin D concentrations was found between the asthmatic group and the controlled group, and the severity of asthma symptoms was not correlated with the vitamin D concentrations.<sup>82</sup>

Oral or intravenous corticosteroids are often used as a regimen for patients with asthma exacerbation. If the patients' asthma is not wellcontrolled, they may potentially be exposed to repeated courses of corticosteroids. Long-term or repeated course of corticosteroids is known to cause vitamin D deficiency.<sup>83</sup> One may wonder is the decrease in serum vitamin D concentrations in children with asthma due to the disease itself or the use of corticosteroids. To answer part of this question, a retrospective review was performed in 100 asthmatic children looking at the patients' characteristics and their vitamin D concentrations.<sup>84</sup> This study showed that the total ste-

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roid dose, the use of oral steroids, and the use of inhaled steroids were associated with an inverse correlation with their vitamin D concentrations (p=0.001, p=0.02, and p=0.0475, respectively).<sup>17</sup> There may be a never ending cycle in which poor control of asthma will lead to the use of inhaled and oral corticosteroid, which in turn may cause a reduction in vitamin D concentrations, which in turn may worsen the patients' asthmatic state.

The next question that one would ask is: does vitamin D supplementation improve the clinical course of asthma? The addition of vitamin D supplementation was evaluated in a study of subjects with steroid-resistant asthma.<sup>85</sup> After exposing a small amount of vitamin D ( $5 \times 10^{-7}$  M) to cultures of CD4+ regulatory T cells, the secretion of IL-10 was greatly increased in this steroid-resistant group and was comparable to the concentrations seen in the controlled group. Similarly, in an experimental model of asthmatic patients, the addition of vitamin D helped decrease the dose of dexamethasone by 10-fold.<sup>86</sup> The authors of this study postulated that vitamin D supplementation may increase the anti-inflammatory property of corticosteroid in asthmatic patients by enhancing the glucocorticoid-induced mitogen-activated protein kinase phosphatase-1 expression.<sup>86</sup>

Before starting every asthmatic patient on vitamin D supplementation, larger studies need to be performed to evaluate the efficacy of this regimen in improving the clinical course of asthma and reducing the need of steroid use in asthmatic patients. Also, studies need to look at the optimal dose and duration of use for this clinical condition.

#### CONCLUSION

Vitamin D insufficiency is a common problem in pediatrics, especially those who have chronic illness, and who are malnourished, limited geographically to the amount of sun exposure, as well as those with darker skin, and on chronic medications. The accelerated rate of bone development during a child's life suggests that adequate concentrations of vitamin D are an important issue in this population. Although more research is needed concerning the goals of vitamin D therapy and dosing in this population, there are helpful evidence-based guidelines to direct therapy for rickets, CKD, and CF. More research is needed to evaluate the efficacy of vitamin D supplementations for pediatric patients with asthma and sickle cell disease. In patients with growth delays or reasons to suspect deficiency, calcidiol concentrations should be evaluated to assess the need for supplementation.

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**ABBREVIATIONS** AAP, American Academy of Pediatrics; AEDs, anti-epileptic drugs; CF, cystic fibrosis; CFF, Cystic Fibrosis Foundation; CKD, chronic kidney disease; HAART, highly active antiretroviral therapy; HIV, human immunodeficiency virus; IOM, Institute of Medicine; IU, international units; KDOQI, Kidney Disease Outcomes Quality Initiative; NEJM, New England Journal of Medicine; PTH, parathyroid hormone; US, United States

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J Pediatr Pharmacol Ther 2013 Vol. 18 No. 4 • www.jppt.org

# JPPT

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J Pediatr Pharmacol Ther 2013 Vol. 18 No. 4 • www.jppt.org

# JPPT

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-94


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C-95



C-96

# A Bright Spot for Human Health

ach day, Apollo's fiery chariot makes its way across the sky, bringing life-giving light to the planet. For the ancient Greeks and Romans, Apollo was the god of medicine and healing as well as of sun and light—but Apollo could bring sickness as well as cure. Today's scientists have come to a similarly dichotomous recognition that exposure to the ultraviolet radiation (UVR) in sunlight has both beneficial and deleterious effects on human health.

Most public health messages of the past century have focused on the hazards of too much sun exposure. UVA radiation (95–97% of the UVR that reaches Earth's surface) penetrates deeply into the skin, where it can contribute to skin cancer indirectly via generation of DNA-damaging molecules such as hydroxyl and oxygen radicals. Sunburn is caused by too much UVB radiation; this form also leads to direct DNA damage and promotes various skin cancers. Both forms can damage collagen fibers, destroy vitamin A in skin, accelerate aging of the skin, and increase the risk of skin cancers. Excessive sun exposure can also cause cataracts and diseases aggravated by UVRinduced immunosuppression such as reactivation of some latent viruses.

However, excessive UVR exposure accounts for only 0.1% of the total global burden of disease in disability-adjusted life years (DALYs), according to the 2006 World Health Organization (WHO) report The Global Burden of Disease Due to Ultraviolet Radiation. DALYs measure how much a person's expectancy of healthy life is reduced by premature death or disability caused by disease. Coauthor Robyn Lucas, an epidemiologist at the National Centre for Epidemiology and Population Health in Canberra, Australia, explains that many diseases linked to excessive UVR exposure tend to be relatively benign-apart from malignant melanoma-and occur in older age groups, due mainly to the long lag between exposure and manifestation, the requirement of cumulative

C-97

exposures, or both. Therefore, when measuring by DALYs, these diseases incur a relatively low disease burden despite their high prevalence.

In contrast, the same WHO report noted that a markedly larger annual disease burden of 3.3 billion DALYs worldwide might result from very low levels of UVR exposure. This burden subsumes major disorders of the musculoskeletal system and possibly an increased risk of various autoimmune diseases and life-threatening cancers.

The best-known benefit of sunlight is its ability to boost the body's vitamin D supply; most cases of vitamin D deficiency are due to lack of outdoor sun exposure. At least 1,000 different genes governing virtually every tissue in the body are now thought to be regulated by 1,25-dihydroxyvitamin  $D_3$  (1,25[OH]D), the active form of the vitamin, including several involved in calcium metabolism and neuromuscular and immune system functioning.

Although most of the health-promoting benefits of sun exposure are thought to occur through vitamin D photosynthesis, there may be other health benefits that have gone largely overlooked in the debate over how much sun is needed for good health [see "Other Sun-Dependent Pathways," p. A165]. As for what constitutes "excessive" UVR exposure, there is no one-size-fits-all answer, says Lucas: "Excessive' really means inappropriately high for your skin type under a particular level of ambient UVR."

#### Vitamin D Production

Unlike other essential vitamins, which must be obtained from food, vitamin D can be synthesized in the skin through a photosynthetic reaction triggered by exposure to UVB radiation. The efficiency of production depends on the number of UVB photons that penetrate the skin, a process that can be curtailed by clothing, excess body fat, sunscreen, and the skin pigment melanin. For most white people, a half-hour in the summer sun in a bathing suit can initiate the release of 50,000 IU (1.25 mg) vitamin D into the circulation within 24 hours of exposure; this same amount of exposure yields 20,000-30,000 IU in tanned individuals and 8,000-10,000 IU in dark-skinned people.

The initial photosynthesis produces vitamin  $D_3$ , most of which undergoes additional transformations, starting with the production of 25-hydroxyvitamin D (25[OH]D), the major form of vitamin D circulating in the bloodstream and the form that is routinely measured to determine a person's vitamin D status. Although various cell types within the skin can carry out this transformation locally, the conversion takes place primarily in the liver. Another set of transformations occurs in the kidney and other tissues, forming 1,25(OH)D. This form of the vitamin is actually a hormone, chemically akin to the steroid hormones.

1,25(OH)D accumulates in cell nuclei of the intestine, where it enhances calcium and phosphorus absorption, controlling the flow of calcium into and out of bones to regulate bone-calcium metabolism. Michael Holick, a medical professor and director of the Bone Health Care Clinic at Boston University Medical Center, says, "The primary physiologic function of vitamin D is to maintain serum calcium and phosphorous levels within the normal physiologic range to support most metabolic functions, neuromuscular transmission, and bone mineralization."

Without sufficient vitamin D, bones will not form properly. In children, this causes rickets, a disease characterized by growth retardation and various skeletal deformities, including the hallmark bowed legs. More recently, there has been a growing appreciation for vitamin D's impact on bone health in adults. In August 2007, the Agency for Health Care Policy and Research published Effectiveness and Safety of Vitamin D in Relation to Bone Health, a systematic review of 167 studies that found "fair evidence" of an association between circulating 25(OH)D concentrations and either increased bone-mineral density or reduced falls in older people (a result of strengthened muscles as well as strengthened bones). "Low vitamin D levels will precipitate and exacerbate osteoporosis in both men and women and cause the painful bone disease osteomalacia," says Holick.

#### **Evolution of the Great Solar Debate**

In the 2002 book Bone Loss and Osteoporosis in Past Populations: An Anthropological Perspective, Reinhold Vieth, a nutrition professor at the University of Toronto, writes that early primates probably acquired their relatively high vitamin D requirements from frequent grooming and ingestion of oils rich in vitamin D precursors that were secreted by their skin onto their fur. The first humans evolved in equatorial Africa, where the direct angle of sunlight delivers very strong UVR most of the year. The gradual loss of protective fur may have created evolutionary pressure to develop deeply pigmented skin to avoid photodegradation of micronutrients and protect sweat glands from UVR-induced injury.

In the July 2000 issue of the *Journal of Human Evolution*, California Academy of Sciences anthropologists Nina Jablonski and George Chaplin wrote that because dark skin requires about five to six times more solar exposure than pale skin for equivalent vitamin D photosynthesis, and because the intensity of UVB radiation declines with increasing latitude, one could surmise that skin lightening was an evolutionary adaptation that allowed for optimal survival in low-UVR climes, assuming a traditional diet and outdoor lifestyle. Cooler temperatures in these higher latitudes resulted in the need for more clothing and shelter, further reducing UVR exposure. With shorter winter days and insufficient solar radiation in the UVB wavelengths needed to stimulate vitamin D synthesis, dietary sources such as fatty fish became increasingly important.

Over time, clothing became the norm in higher latitudes and then eventually a social attribute in many societies. By the 1600s, peoples in these regions covered their whole body, even in summertime. Many children who lived in the crowded and polluted industrialized cities of northern Europe developed rickets. By the late 1800s, approximately 90% of all children living in industrialized Europe and North America had some manifestations of the disease, according to estimates based on autopsy studies of the day cited by Holick in the August 2006 Journal of Clinical Investigation and the October 2007 American Journal of Public Health.

Doctors throughout Europe and North America began promoting whole-body sunbathing to help prevent rickets. It was also recognized that wintertime sunlight in the temperate zone was too feeble to prevent rickets. For this reason, many children were exposed to UVR from a mercury or carbon arc lamp for one hour three times a week, which proved to be an effective preventive measure and treatment.

Around the time the solar solution to rickets gained widespread traction in medical circles, another historic scourge, tuberculosis (TB), was also found to respond to solar intervention. TB patients of all ages were sent to rest in sunny locales and generally returned in good health. Dermatology professor Barbara A. Gilchrest of Boston University School of Medicine says that, whereas sun exposure was shown to improve cutaneous TB, sanatorium patients with pulmonary TB likely responded as much or more to rest and good nutrition than to UVR. Nevertheless, a meta-analysis published in the February 2008 International Journal of Epidemiology found that high vitamin D levels reduce the risk of active TB (i.e., TB showing clinical symptoms) by 32%.

Almost overnight, as awareness of the sun's power against rickets and TB spread, attitudes toward sun exposure underwent a radical shift. The suntan became valued in the Western world as a new status symbol that signified both health and wealth, as



## Serotonin, Melatonin, and Daylight



A s diurnal creatures, we humans are programmed to be outdoors while the sun is shining and home in bed at night. This is why melatonin is produced during the dark hours and stops upon optic exposure to daylight. This pineal hormone is a key pacesetter for many of the body's circadian rhythms. It also plays an important role in countering infection, inflammation, cancer, and autoimmunity, according to a review in the May 2006 issue of *Current Opinion in Investigational Drugs*. Finally, melatonin suppresses UVR-induced skin damage, according to research in the July 2005 issue of *Endocrine*.

When people are exposed to sunlight or very bright artificial light in the morning, their nocturnal melatonin production occurs sooner, and they enter into sleep more easily at night. Melatonin production also shows a seasonal variation relative to the availability of light, with the hormone produced for a longer period in the winter than in the summer. The melatonin rhythm phase advancement caused by exposure to bright morning light has been effective against insomnia, premenstrual syndrome, and seasonal affective disorder (SAD).

The melatonin precursor, serotonin, is also affected by exposure to daylight. Normally produced during the day, serotonin is only converted to melatonin in darkness. Whereas high melatonin levels correspond to long nights and short days, high serotonin levels in the presence of melatonin reflect short nights and long days (i.e., longer UVR exposure). Moderately high serotonin levels result in more positive moods and a calm yet focused mental outlook. Indeed, SAD has been linked with low serotonin levels during the day as well as with a phase delay in nighttime melatonin production. It was recently found that mammalian skin can produce sero-

tonin and transform it into melatonin, and that many types of skin cells express receptors for both serotonin and melatonin. With our modern-day penchant for indoor activity and staying up well past dusk, nocturnal melatonin production is typically far from robust. "The light we get from being outside on a summer day can be a thousand times brighter than we're ever likely to experience indoors," says melatonin researcher Russel J. Reiter of the University of Texas Health Science Center. "For this reason, it's important that people who work indoors get outside periodically, and moreover that we all try to sleep in total darkness. This can have a major impact on melatonin rhythms and can result in improvements in mood, energy, and sleep quality."

For people in jobs in which sunlight exposure is limited, full-spectrum lighting may be helpful. Sunglasses may further limit the eyes' access to full sunlight, thereby altering melatonin rhythms. Going shades-free in the daylight, even for just 10–15 minutes, could confer significant health benefits.

only the affluent could afford to vacation by the sea and play outdoor sports. Phototherapy quickly emerged as a popular medical treatment not only for TB, but also for rheumatic disorders, diabetes, gout, chronic ulcers, and wounds. The "healthy tan" was in, and "sickly-looking" pale skin was out.

#### Cancer: Cause, Protection, or Both?

The first reports of an association between sun exposure and skin cancer began to surface in dermatology publications in the late nineteenth century. Nevertheless, it was not until the 1930s that the U.S. Public Health Service began issuing warnings about sunrelated health risks. People were cautioned

etty

to avoid the midday summer sun, cover their heads in direct sunlight, and gradually increase the time of sun exposure from an initial 5–10 minutes per day to minimize the risk of sunburn.

In the decades that followed, the skin cancer hazards of excessive sun exposure would be extensively studied and mapped. Today, the three main forms of skin cancer—melanoma, basal cell carcinoma, and squamous cell carcinoma—are largely attributed to excessive UVR exposure. Skin cancers became the most common form of cancer worldwide, especially among groups such as white residents of Australia and New Zealand.

- 4

When atmospheric scientists first called attention to possible chemical destruction of the stratospheric ozone layer in the early 1970s, one predicted consequence of the increased UVB radiation was a rise in skin cancer rates, especially in Australia, New Zealand, South Africa, and Latin America. To counter this threat, the WHO, the United Nations Environment Programme, the World Meteorological Organization, the International Agency for Research on Cancer, and the International Commission on Non-Ionizing Radiation Protection established INTERSUN, the Global UV Project, with the express goal of reducing the burden of UVR-related disease.

Environmental Health Perspectives • VOLUME 116 | NUMBER 4 | April 2008

INTERSUN activities have included the development of an internationally recognized UV Index to help frame sun protection messages related to the daily intensity of UVR. [For more information on these activities, see "WHO Ultraviolet Radiation Website," p. A157 this issue.]

Australia was among the first countries to spearhead large-scale sun protection programs, with the Slip-Slop-Slap initiative (short for "slip on a shirt, slop on some sunscreen, and slap on a hat") introduced in the early 1980s. "This program and the subsequent SunSmart campaign have been highly effective in informing Australians of the risks and providing clear, practical instructions as to how to avoid excessive UVR exposure," says Lucas. As a result of increased use of hats, sunscreen, and shade, the incidence of malignant melanoma has begun to plateau in Australia, New Zealand, Canada, and Northern Europe among some age groups. However, because other UVR-induced skin cancers typically take longer than melanoma to develop, their incidence rates continue to rise in most developed countries. Lucas says a gradual improvement in these rates is to be expected as well.

Whereas skin cancer is associated with too much UVR exposure, other cancers could result from too little. Living at higher latitudes increases the risk of dying from Hodgkin lymphoma, as well as breast, ovarian, colon, pancreatic, prostate, and other cancers, as compared with living at lower latitudes. A randomized clinical trial by Joan Lappe, a medical professor at Creighton University, and colleagues, published in the June 2007 issue of the American Journal of Clinical Nutrition, confirmed that taking 2-4 times the daily dietary reference intake of 200-600 IU vitamin  $D_3$  and calcium resulted in a 50-77% reduction in expected incidence rates of all cancers combined over a four-year period in postmenopausal women living in Nebraska.

Moreover, although excessive sun exposure is an established risk factor for cutaneous malignant melanoma, continued high sun exposure was linked with increased survival rates in patients with early-stage melanoma in a study reported by Marianne Berwick, an epidemiology professor at the University of New Mexico, in the February 2005 *Journal* of the National Cancer Institute. Holick also points out that most melanomas occur on the least sun-exposed areas of the body, and occupational exposure to sunlight actually reduced melanoma risk in a study reported in the June 2003 Journal of Investigative Dermatology.

#### Other Health Links

Various studies have linked low 25(OH)D levels to diseases other than cancer, raising the possibility that vitamin D insufficiency is contributing to many major illnesses. For example, there is substantial though not definitive evidence that high levels of vitamin D either from diet or from UVR exposure may decrease the risk of developing multiple sclerosis (MS). Populations at higher latitudes have a higher incidence and prevalence of MS; a review in the December 2002 issue of *Toxicology* by epidemiology professor Anne-Louise Ponsonby and colleagues from The Australian National University revealed that living at a latitude above 37° increased the risk of developing MS throughout life by greater than 100%.

Still to be resolved, however, is the question of what levels of vitamin D are optimal for preventing the disease—and whether the statistical associations reflect different gene pools rather than different levels of 25(OH)D. (Interestingly, Holick reported in the August 1988 issue of *The Journal of Clinical Endocrinology & Metabolism* that no previtamin D<sub>3</sub> formed when human skin was exposed to sunlight on cloudless days in Boston, at 42.2°N, from November through February or in Edmonton, at 52°N, from October through March.)

"Scientific evidence on specific effects of vitamin D in preventing MS or slowing its progression is not sufficient," says Alberto Ascherio, a nutritional epidemiologist at the Harvard School of Public Health. "Nevertheless, considering the safety of vitamin D even in high doses, there is no clear contraindication, and because vitamin D deficiency is very prevalent, especially among MS patients, taking vitamin D supplements and getting moderate sun exposure is more likely to be beneficial than not."



C-100

As with MS, there appears to be a latitudinal gradient for type 1 diabetes, with a higher incidence at higher latitudes. A Swedish epidemiologic study published in the December 2006 issue of Diabetologia found that sufficient vitamin D status in early life was associated with a lower risk of developing type 1 diabetes. Nonobese mice of a strain predisposed to develop type 1 diabetes showed an 80% reduced risk of developing the disease when they received a daily dietary dose of 1,25(OH)D, according to research published in the June 1994 issue of the same journal. And a Finnish study published 3 November 2001 in The Lancet showed that children who received 2,000 IU vitamin D per day from 1 year of age on had an 80% decreased risk of developing type 1 diabetes later in life, whereas children who were vitamin D deficient had a fourfold increased risk. Researchers are now seeking to understand how much UVR/vitamin D is needed to lower the risk of diabetes and whether this is a factor only in high-risk groups.

There is also a connection with metabolic syndrome, a cluster of conditions that increases one's risk for type 2 diabetes and cardiovascular disease. A study in the September 2006 issue of Progress in Biophysics and Molecular Biology demonstrated that in young and elderly adults, serum 25(OH)D was inversely correlated with blood glucose concentrations and insulin resistance. Some studies have demonstrated high prevalence of low vitamin D levels in people with type 2 diabetes, although it is not clear whether this is a cause of the disease or an effect of another causative factor-for example, lower levels of physical activity (in this case, outdoor activity in particular).

People living at higher latitudes throughout the world are at higher risk of hypertension, and patients with cardiovascular disease are often found to be deficient in vitamin D, according to research by Harvard Medical School professor Thomas J. Wang and colleagues in the 29 January 2008 issue of Circulation. "Although the exact mechanisms are poorly understood, it is known that 1,25(OH)D is among the most potent hormones for down-regulating the blood pressure hormone renin in the kidneys," says Holick. "Moreover, there is an inflammatory component to atherosclerosis, and vascular smooth muscle cells have a vitamin D receptor and relax in the presence of 1,25(OH)D, suggesting a multitude of mechanisms by which vitamin D may be cardioprotective.'

To determine the potential link betwen sun exposure and the protective effect in preventing hypertension, Rolfdieter Krause of the Free University of Berlin Department of Natural Medicine and colleagues exposed a group of hypertensive adults to a tanning bed

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**Other Sun-Dependent Pathways** 



he sun may be best known for boosting production of vitamin D, but there are many other UVR-mediated effects independent of this pathway.

**Direct immune suppression.** Exposure to both UVA and UVB radiation can have direct immunosuppressive effects through upregulation of cytokines (TNF- $\alpha$  and IL-10) and increased activity of T regulatory cells that remove self-reactive T cells. These mechanisms may help prevent autoimmune diseases.

Alpha melanocyte-stimulating hormone ( $\alpha$ -MSH). Upon exposure to sunshine, melanocytes and keratinocytes in the skin release  $\alpha$ -MSH, which has been implicated in immunologic tolerance and suppression of contact hypersensitivity.  $\alpha$ -MSH also helps limit oxidative DNA damage resulting from UVR and increases gene repair, thus reducing melanoma risk, as reported 15 May 2005 in *Cancer Research*.

Calcitonin gene-related peptide (CGRP). Released in response to both UVA and UVB exposure, this potent neuropeptide modulates a number of cytokines and is linked with impaired induction of immunity and the development of immunologic tolerance. According to a report in the September 2007 issue of *Photochemistry and Photobiology*, mast cells (which mediate hypersensitivity reactions) play a critical role in CGRP-mediated immune suppression. This could help explain sunlight's efficacy in treating skin disorders such as psoriasis.

Neuropeptide substance P. Along with CGRP, this neuropeptide is released from sensory nerve fibers in the skin following UVR exposure. This results in increased lymphocyte proliferation and chemotaxis (chemically mediated movement) but may also produce local immune suppression.

Endorphins. UVR increases blood levels of natural opiates called endorphins. Melanocytes in human skin express a fully functioning endorphin receptor system, according to the June 2003 *Journal of Investigative Dermatology*, and a study published 24 November 2005 in *Molecular and Cellular Endocrinology* suggests that the cutaneous pigmentary system is an important stress-response element of the skin.

that emitted full-spectrum UVR similar to summer sunlight. Another group of hypertensive adults was exposed to a tanning bed that emitted UVA-only radiation similar to winter sunlight. After three months, those who used the full-spectrum tanning bed had an average 180% increase in their 25(OH)D levels and an average 6 mm Hg decrease in their systolic and diastolic blood pressures, bringing them into the normal range. In constrast, the group that used the UVA-only tanning bed showed no change in either 25(OH)D or blood pressure. These results were published in the 29 August 1998 issue of *The Lancet*. According to Krause, who currently heads the Heliotherapy Research Group at the Medical

Environmental Health Perspectives • VOLUME 116 | NUMBER 4 | April 2008

University of Berlin, a serum 25(OH)D level of at least 40 ng/mL should be adequate to protect against hypertension and other forms of cardiovascular disease (as well as cancers of the prostate and colon).

William Grant, who directs the Sunlight, Nutrition, and Health Research Center, a research and education organization based in San Francisco, suspects that sun exposure and higher 25(OH)D levels may confer protection against other illnesses such as rheumatoid arthritis (RA), asthma, and infectious diseases. "Vitamin D induces cathelicidin, a polypeptide that effectively combats both bacterial and viral infections, Grant says. "This mechanism explains much of the seasonality of such viral infections as influenza, bronchitis, and gastroenteritis, and bacterial infections such as tuberculosis and septicemia." For example, RA is more severe in winter, when 25(OH)D levels tend to be lower, and is also more prevalent in the higher latitudes. In addition, 25(OH)D levels are inversely associated with the clinical status of RA patients, and greater intake of vitamin D has been linked with lower RA risk, as reported in January 2004 in Arthritis & Rheumatism.

Some reports, including an article in the October–December 2007 issue of *Acta Medica Indonesiana*, indicate that sufficient 1,25(OH)D inhibits induction of disease in RA, collagen-induced arthritis, Lyme arthritis, autoimmune encephalomyelitis, thyroiditis, inflammatory bowel disease, and systemic lupus erythematosus. Nonetheless, interventional data are lacking for most autoimmune disorders and infectious diseases, with the exception of TB.

#### How Much Is Enough?

Gilchrest points out a problem with the literature: "Everyone recommends something different, depending on the studies with which they are most aligned. One study reports an increased risk of prostate cancer for men with 25(OH)D levels above 90 ng/mL, for example." In the June 2007 Lappe article, she notes, subjects in the control "highrisk" unsupplemented group had 25(OH)D levels of 71 nmol/L and the supplemented group had levels of 96 nmol/L.

Nevertheless, given the epidemiologic backdrop described above, there are now calls to rethink sun exposure policy or to promote vitamin D supplementation in higher-risk populations. Such groups include pregnant or breastfeeding women (these states draw upon a mother's own reserves of vitamin D), the elderly, and those who must avoid the sun. Additionally, solely breastfed infants whose mothers were vitamin D deficient during pregnancy have smaller reserves of the nutrient and are at greater risk of developing rickets. Even in the sun-rich environment of the Middle East, insufficient vitamin D is a severe problem among breastfed infants of women who wear a *burqa* (a traditional garment that covers the body from head to foot), as reported in the February 2003 *Journal of Pediatrics*.

Several recent reports indicate an increase in rickets particularly among breastfed black infants, though white babies also are increasingly at risk. A study in the February 2007 Journal of Nutrition concluded that black and white pregnant women and neonates in the northern United States are at high risk of vitamin D insufficiency, even when mothers take prenatal vitamins (which typically provide 100-400 IU vitamin D<sub>3</sub>). Studies by Bruce Hollis, director of pediatric nutritional sciences at the Medical University of South Carolina, and colleagues suggest that a maternal vitamin D<sub>3</sub> intake of 4,000 IU per day is safe and sufficient to ensure adequate vitamin D status for both mother and nursing infant.

These days, most experts define vitamin D deficiency as a serum 25(OH)D level of less than 20 ng/mL. Holick and others assert that levels of 29 ng/mL or lower can be considered to indicate a relative insufficiency of vitamin D. Using this scale and considering various epidemiologic studies, an estimated 1 billion people worldwide have vitamin D deficiency or insufficiency, says Holick, who adds, "According to several studies, some forty to one hundred percent of the U.S. and European elderly men and women still living in the community [that is, not in nursing homes] are vitamin D deficient." Holick asserts that a large number of infants, children, adolescents, and postmenopausal women also are vitamin D insufficient. "These individuals have no apparent skeletal or calcium metabolism abnormalities but may be at much higher risk of developing various diseases," Holick says.

In the context of inadequate sunlight or vitamin D insufficiency, some scientists worry that the emphasis on preventing skin cancers tends to obscure the much larger mortality burden posed by more lifethreatening cancers such as lung, colon, and breast cancers. Many studies have shown that cancer-related death rates decline as one moves toward the lower latitudes (between 37°N and 37°S), and that the levels of ambient UVR in different municipalities correlate inversely with cancer death rates there. "As you head from north to south, you may find perhaps two or three extra deaths [per hundred thousand people] from skin cancer," says Vieth. "At the same time, though, you'll find thirty or forty fewer deaths for the other major cancers. So when you estimate the number of deaths likely to be attributable to UV light or vitamin D, it

C-102

does is not appear to be the best policy to advise people to simply keep out of the sun just to prevent skin cancer."

To maximize protection against cancer, Grant recommends raising 25(OH)D levels to between 40 and 60 ng/mL. Research such as that described in Holick's August 2006 *Journal of Clinical Investigation* article indicates that simply keeping the serum level above 20 ng/mL could reduce the risk of cancer by as much as 30–50%.

Cedric F. Garland, a medical professor at the University of California, San Diego, says that maintaining a serum level of 55-60 ng/mL may reduce the breast cancer rate in temperate regions by half, and that incidence of many other cancers would be similarly reduced as well. He calls this "the single most important action that could be taken by society to reduce the incidence of cancer in North America and Europe, beyond not smoking." Moreover, these levels could be readily achieved by consuming no more than 2,000 IU/day of vitamin D3 at a cost of less than \$20 per year and, unless there are contraindications to sunlight exposure, spending a few minutes outdoors (3-15 minutes for whites and 15-30 minutes for blacks) when the sun is highest in the sky, with 40% of the skin area exposed.

Holick, Vieth, and many other experts now make a similar daily recommendation: 4,000 IU vitamin  $D_3$  without sun exposure or 2,000 IU plus 12–15 minutes of midday sun. They say this level is quite safe except for sun-sensitive individuals or those taking medications that increase photosensitivity.

Gilchrest says some sunlight enters the skin even through a high-SPF sunscreen, so people can maximize their dermal vitamin D production by spending additional time outdoors while wearing protection. "Without the sunscreen, this same individual would be incurring substantially more damage to her skin but not further increasing her vitamin D level," she says.

#### Creating a Balanced Message

A growing number of scientists are concerned that efforts to protect the public from excessive UVR exposure may be eclipsing recent research demonstrating the diverse health-promoting benefits of UVR exposure. Some argue that the health benefits of UVB radiation seem to outweigh the adverse effects, and that the risks can be minimized by carefully managing UVR exposure (e.g., by avoiding sunburn), as well as by increasing one's intake of dietary antioxidants and limiting dietary fat and caloric intake. Antioxidants including polyphenols, apigenin, curcumin, proanthocyanidins, resveratrol, and silymarin have shown promise in laboratory studies in protecting

VOLUME 116 | NUMBER 4 | April 2008 . Environmental Health Perspectives

against UVR-induced skin cancer, perhaps through antimutagenic or immunemodulating mechanisms.

Central to the emerging debate is the issue of how to best construct public health messages that highlight the pros and cons of sun exposure in a balanced way. Such messages must necessarily take into account variations in skin pigmentation between groups and these groups' differing susceptibilities to the dangers and benefits of sun exposure. Moreover, says Patricia Alpert, a nursing professor at the University of Las Vegas, age matters. "The elderly [have a] declining capacity to make vitamin D," she says. "Many elderly, especially those living in nursing homes, are vitamin D deficient, [even] those living in areas considered to have adequate sunshine."

Many experts are now recommending a middle-ground approach that focuses on modest sun exposures. Gilchrest says the American Academy of Dermatology and most dermatologists currently suggest sun protection in combination with vitamin D supplementation as a means of minimizing the risk of both skin cancer and internal cancers. Furthermore, brief, repeated exposures are more efficient at producing vitamin D. "Longer sun exposures cause further sun damage to skin and increase the risk of photo-aging and skin cancer, but do not increase vitamin D production," she explains.

Lucas adds that people should use sun protection when the UV Index is more than 3. As part of Australia's SunSmart program, "UV Alerts" are announced in newspapers throughout the country whenever the index is forecast to be 3 or higher. "Perhaps," she says, "this practice should be extended to other nations as well." U.S. residents can obtain UV Index forecasts through the EPA's SunWise website (http://epa.gov/sunwise/uvindex.html).

In the near future, vitamin D and health guidelines regarding sun exposure may need to be revised. But many factors not directly linked to sun protection will also need to be taken into account. "Current observations of widespread vitamin D insufficiency should not be attributed only to sun protection strategies," says Lucas. "Over the same period there is a trend to an increasingly indoor lifestyle, associated with technological advances such as television, computers, and video games." She says sun-safe messages remain important-possibly more so than ever before-to protect against the potentially risky high-dose intermittent sun exposure that people who stay indoors may be most likely to incur.



G rowing evidence of the beneficial effects of UVR exposure has challenged the sun-protection paradigm that has prevailed for decades. Before a sunexposure policy change occurs, however, we need to know if there is enough evidence to infer a protective effect of sun exposure against various diseases.

Only through well-designed randomized clinical trials can cause-and-effect relationships be established. However, most sunlight-related epidemiologic research to date has relied on observational data that are subject to considerable bias and confounding. Findings from observational studies are far less rigorous and reliable than those of interventional studies. But interventional studies would need to be very large and carried out over several decades (since most UVRmediated diseases occur later in life). Moreover, it is not at all clear when, over a lifetime, sun exposure/vitamin D is most important. So for now scientists must rely on the results of well-conducted observational analytic studies.

In sunlight-related research, there are two main exposures of interest: vitamin D status, which is measured by the serum 25(OH)D level; and personal UVR dose, which involves three fundamental factors: ambient UVR (a function of latitude, altitude, atmospheric ozone levels, pollution, and time of year), amount of skin exposed (a function of behavioral, cultural, and clothing practices), and skin pigmentation (with dark skin receiving a smaller effective dose to underlying structures than light skin).

When measuring sun exposure at the individual level, many scientists have relied on latitude or ambient UVR of residence. But these measures are fraught with uncertainties. "While ambient UVR varies, . . . so too do a variety of other possible etiological factors, including diet, exposure to infectious agents, temperature, and possibly even physical activity levels," says Robyn Lucas, an epidemiologist at Australia's National Centre for Epidemiology and Population Health. "Additionally, under any level of ambient UVR, the personal UV dose may vary greatly. In short, there is no real specificity for ambient UVR."

Researchers also assess history of time in the sun at various ages, history of sunburns, dietary and supplemental vitamin D intake, and other proxy measures. Nonetheless, says Lucas, "there are drawbacks to inferring that a relationship with any proxy for the exposure of interest is a relationship with personal UV dose or vitamin D status." On the bright side, she adds, our ability to accurately gauge an individual's UV dose history has been enhanced with the use of silicone rubber casts of the back of subjects' hands. The fine lines recorded by the cast provide an objective measure of cumulative sun damage.

M. Nathaniel Mead

NASA

# Sunshine is good medicine. The health benefits of ultraviolet-B induced vitamin D production

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#### Summary

Most public health statements regarding exposure to solar ultraviolet radiation (UVR) recommend avoiding it, especially at midday, and using sunscreen. Excess UVR is a primary risk factor for skin cancers, premature photoageing and the development of cataracts. In addition, some people are especially sensitive to UVR, sometimes due to concomitant illness or drug therapy.

However, if applied uncritically, these guidelines may actually cause more harm than good. Humans derive most of their serum 25-hydroxycholecalciferol ( $25(OH)D_3$ ) from solar UVB radiation (280-315 nm). Serum  $25(OH)D_3$  metabolite levels are often inadequate for optimal health in many populations, especially those with darker skin pigmentation, those living at high latitudes, those living largely indoors and in urban areas, and during winter in all but the sunniest climates. In the absence of adequate solar UVB exposure or artificial UVB, vitamin D can be obtained from dietary sources or supplements.

There is compelling evidence that low vitamin D levels lead to increased risk of developing rickets, osteoporosis and osteomaloma, 16 cancers (including cancers of breast, ovary, prostate and non-Hodgkin's lymphoma), and other chronic diseases such as psoriasis, diabetes mellitus, hypertension, heart disease, myopathy, multiple sclerosis, schizophrenia, hyperparathyroidism and susceptibility to tuberculosis.

The health benefits of UVB seem to outweigh the adverse effects. The risks can be minimized by avoiding sunburn, excess UVR exposure and by attention to dietary factors, such as antioxidants and limiting energy and fat consumption. It is anticipated that increasing attention will be paid to the benefits of UVB radiation and vitamin D and that health guidelines will be revised in the near future.

*Keywords*: cancer, hypertension, melanoma, multiple sclerosis, psoriasis, sunbeds, ultraviolet radiation, vitamin D

-104

## Introduction

Solar ultraviolet radiation (UVR) has well-known roles in the aetiology of basal cell carcinoma (BCC) and squamous

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cell carcinoma (SCC),<sup>1</sup> immune system suppression,<sup>2,3</sup> premature ageing of the skin,<sup>4–6</sup> and cataract formation.<sup>7</sup> However, the beneficial effects for human health are less well recognized. The observation of lighter human skin pigmentation with increasing latitude provides the clue that sunlight is beneficial. The current hypothesis on the evolution of skin pigmentation in ancestral peoples is that the amount of melanin in the skin as a function of latitude is a careful balance between opposing

requirements of the skin. On the one hand, the skin must be dark enough to reduce the risk of melanoma and other skin cancers and prevent the destruction of folic acid. On the other hand, the skin must be light enough to permit the photoinitiation of vitamin D production.<sup>8</sup> Vitamin D is generated in humans by the action of UVB radiation on subcutaneous 7-dehydrocholesterol (7-DHC) into previtamin D<sub>3</sub>, after which it undergoes thermal conversion to 25-hydroxycholecalciferol (25(OH)D<sub>3</sub>).<sup>9</sup> If there were not such trade-offs between different functions of the skin, all humans would be likely to have similar pigmentation. Such evolutionary pressures on skin pigmentation were exerted at a time when human populations spent substantial parts of the day outdoors. At present, the proportion of the workforce with outdoor jobs is relatively small, and UVR exposure is often obtained from recreation, which tends to involve shorter exposures.

This paper outlines what is known about the health benefits of UVB radiation and put them into perspective with the health risks of UVR exposure.

#### Vitamin D reduces the risk of certain diseases

The recognition that there are important health benefits from solar UVB radiation through production of vitamin D has been slow in coming. It was not realized until the 1920s that rickets was a disease related to insufficient vitamin D.<sup>10</sup> In the 1960s UVB was found to play a role in heart disease,<sup>11</sup> and it was shown to be involved in osteoporosis and other musculoskeletal diseases.<sup>12,13</sup> In the 1980s, it was found to reduce the risk of colon cancer,<sup>14</sup> and to reduce blood pressure.<sup>15</sup> In the 1990s it was found to reduce the risk of multiple sclerosis<sup>16</sup> and the risk of being born with schizophrenia.<sup>17</sup>

Insufficient vitamin D is a significant health risk in the US and Northern Europe. This fact was underscored by the recent vitamin D conference held by the US National Institutes of Health.<sup>18</sup> The impetus for the conference came from recent reports of rickets among breast-fed babies born to African–American mothers in the state of North Carolina.<sup>19</sup> The goal of the conference was to help develop a research plan for improved guidelines for vitamin D. Some of the material presented here was developed for a manuscript relating to the topic of estimating the economic burden in the US due to insufficient vitamin D (Grant, submitted).

A list of diseases for which vitamin D is a risk-reduction factor and representative papers indicating some of the stronger evidence is presented in Table 1, whereas Table 2 indicates which types of evidence are satisfied for each disease (Grant and Holick, submitted). The list includes many diseases that are not ordinarily linked to vitamin D, such as diabetes mellitus, heart disease, hypertension, myopathy, psoriasis, and schizophrenia. There have been many good reviews published recently on the role of vitamin D in reducing the risk of disease.<sup>36–43</sup>

Table 1Summary of some of the stronger and/or most recent evidence indicating that UVB and/or vitamin D reduce the risk of variousdiseases.

Disease	Evidence	Reference	
Cancer	Geographical variation with respect to solar UVB		
	Serum 25(OH)D <sub>3</sub> preceding colon cancer	21,22	
Diabetes mellitus	Hypovitaminosis D	23	
	Correlation with vitamin D receptors	23	
Heart disease	Correlation with vitamin D receptors	24	
	Inverse correlations of 25(OH)D <sub>3</sub> with congestive heart failure	25	
Hyperparathyroidism	Reduction in parathyroid hormone with UVB, vitamin D	26	
Hypertension	Geographical and racial variations in blood pressure	27	
Infectious disease susceptibility	Vitamin D and susceptibility to tuberculosis	28	
Multiple sclerosis	Geographical variation	29	
	Seasonal variation	30	
	Risk from low childhood UVB	31	
Myopathy	Inverse correlations of 25(OH)D <sub>3</sub> with body sway and muscle strength	32	
	Association with hypovitaminosis D	33	
Osteoporosis	Urban/rural difference in hip fracture rates	34	
	Hip fracture prevention through calcium vitamin D supplements	35	
Psoriasis	Treatment with UVB	36	
Rickets	Treatment with vitamin D	10	
Schizophrenia	Variation of risk with respect to sunshine during pregnancy	17	



Sunshine is the best medicine • *W B Grant* et al.

Disease	Latitude or geography	Solar exposure	Vitamin D receptors	Mechanisms	Serum 25(OH)D	Vitamin D analogues	Clinical studies	Animal or laboratory studies	Vitamin D intake
Colon cancer	+	+	+	+	+	+	+	+	+
Breast cancer	+	+	+	+	+	+			
Ovarian cancer	+	+	+			+			
Prostate cancer	+	+		+	+	+		+	
Pancreatic cancer			+			+		+	
Other cancers	+	+		+				+	
Multiple sclerosis	+	+	+	+	+		+	+	+
Hypertension	+	+	+	+	+	+	+	+	+
Psoriasis		+	+	+	+	+	+	+	+
Diabetes mellitus Type 1	+	+	+	+				+	+
Hyperparathyroid-secondary		+	+	+	+	+	+		
Myopathy, muscle weakness		+	+	+	+		+		
Heart disease		+	+	+	+	+	+	+	
Schizophrenia	+		+	+	+		+	+	
Renal disease end stage				+	+		+	+	
Rheumatoid arthritis			+		+	+			+
Hyperparathyroid-primary	+	+					+		
Tuberculosis			+	+	+				
Graves' disease			+		+				
Diabetes mellitus Type 2			+						+
Periodontal disease		+							

Table 2 Summary of evidence that vitamin D reduces the risk of specific diseases.

#### Cancer

As early as 1936 there were reports in the literature that solar radiation was inversely related to cancer mortality rates.<sup>44–47</sup> However, it was not until a publication by the brothers Cedric and Frank Garland in 1980 that recent interest in the protective role of solar UVB radiation against cancer was initiated. Using the ecological approach, the Garlands established a link between colon cancer mortality rates in the US and solar UVB radiation and the production of vitamin D.14 (In ecological studies, populations are treated as entities within geographical confines; measures of disease outcome and possible influencing factors are found for the populations in the various geographical units, and statistical correlations are determined.) Additional ecological studies also found inverse correlations between solar UVB radiation and breast cancer,<sup>48</sup> ovarian cancer,<sup>49</sup> prostate cancer,<sup>50</sup> and non-Hodgkin's lymphoma.<sup>51,52</sup>

These ecological studies provided the primary impetus for further studies on the role of solar UVB radiation and vitamin D in reducing the risk of cancer. A number of case-control and cohort studies were subsequently conducted on breast, colon, ovarian and prostate cancer. Sunlight associated with residence and/or occupation and serum vitamin D levels were found to be associated with 20–50% reductions in breast cancer incidence rates between the highest and lowest quartiles or quintiles.<sup>53,54</sup> Similar results were obtained for studies on the risk of colon cancer, colon adenomas, and ovarian cancer.<sup>55–60</sup>

#### Colorectal cancer and vitamin D

A cursory review of the literature regarding the relation between colorectal cancer and vitamin D suggests that there is a general inconsistency in the findings: ecological studies always find that UVB and vitamin D are significant risk-reduction factors, whereas case-control and cohort studies generally find that dietary vitamin D is not a significant risk-reduction factor, pre-diagnostic  $25(OH)D_3$ is sometimes a significant risk-reduction factor, and total ingested vitamin D is generally a significant riskreduction factor. A critical review of these papers concluded that dietary sources of vitamin D are, by themselves, insufficient to provide sufficient protection against colorectal cancer; additional sources such as supplements or natural or artificial UVB are required.<sup>61</sup>

# *Geographical variation of cancer mortality rates in the US: UVB and other factors*

In the first comprehensive ecological study of cancer mortality rates with respect to UVB radiation in the US,<sup>20</sup>

UVB radiation for July 1992 was obtained using the Total Ozone Mapping Spectrometer.<sup>62</sup> These data were digitized to correspond to the approximately 500 state economic areas of the US that comprise the mid-level geographical division for cancer mortality data in the *Atlas of Cancer Mortality in the United States.*<sup>63</sup> Cancer mortality rates for all states except six rapid-growth states were used in regression analyses with the UVB data. Solar UVB radiation was confirmed as a risk-reduction factor for 12 cancers, including bladder, endometrial, gastric, oesophageal, pancreatic, and renal cancer.<sup>20</sup>

Critics of that study pointed out that other factors that might also explain the geographical differences in cancer mortality rates in the US, and that all contiguous states should have been included. Accordingly, the ecological study was extended using additional covariates with the cancer mortality data averaged by state, for all contiguous states plus the District of Columbia (Grant, submitted). The fraction of the population living rurally<sup>64</sup> was included as an additional index of solar UVB radiation, since rural life is associated with more time spent in the sun.<sup>65</sup> Lung cancer mortality rates were used to account for the longterm adverse health effects of smoking, since smoking accounts for 87% of lung cancer mortality rates in the US<sup>66</sup> Data on the proportion of the population who were of Hispanic heritage<sup>64</sup> were used to help take into account the cancers with high mortality rates in states with large Mexican and Latin American populations.<sup>67</sup> Alcohol consumption for  $1980^{68}$  was also included. Finally, a measure of socio-economic status, the fraction of people living below the poverty level.<sup>69</sup> was included.

The new ecological study links UVB to a total of 16 types of cancer, primarily those of the digestive and reproductive systems (Grant, submitted). Six types of cancer (breast, colon, endometrial, oesophageal, ovarian, and non-Hodgkin's lymphoma) were inversely correlated to solar UVB radiation and rural residence in combination. Another 10 types of cancer (bladder, gallbladder, gastric, pancreatic, prostate, rectal, renal, testicular, vulvar, and Hodgkin's lymphoma) were inversely correlated with UVB but not with urban residence. Ten types of cancer were significantly correlated with smoking, six types with alcohol, and seven types with Hispanic heritage. Poverty status was inversely correlated with seven types of cancer. For African-Americans, UVB was inversely correlated with breast, colon, and rectal cancer, whereas smoking was correlated with bladder, breast, colorectal, oral, and pancreatic cancer. Since the results for alcohol, Hispanic heritage, and smoking for white Americans agree well with the literature, they provide a high level of confidence in the approach and its results for UVB radiation.

The number of premature cancer deaths prevented annually by vitamin D or ultraviolet exposure from 1970 to 1994, based on this multivariate analysis, was estimated to be 20 000–25 000, which agrees closely with the estimate of premature deaths due to insufficient solar UVB radiation,  $16\ 000-23\ 000$ .<sup>20</sup> However, the number of premature cancer deaths due to living in an urban residence, determined by plotting the mortality rate vs. the regression rate twice, once as calculated, and once with the fraction of urbanization set equal to zero, was about 25 000, bringing the total number of premature deaths to 45 000–50 000 per year. This number is about five times the number that die annually from melanoma and other skin cancers annually in the US, approximately 9800.<sup>69</sup>

#### Mechanisms of vitamin D for cancer prevention

Vitamin D may reduce the risk of cancer by mechanisms such as inducing cell differentiation, increasing cancer cell apoptosis, reducing metastasis and proliferation, and reducing angiogenesis.<sup>70–74</sup> In addition, vitamin D down-regulates parathyroid hormone (PTH),<sup>75,76</sup> which has been linked to cancer cell growth.<sup>75</sup> The role of vitamin D in reducing the risk of cancer is so compelling that a considerable effort is being expended to find vitamin D analogues that have the effectiveness of vitamin D in fighting cancer without the problems of disregulating calcium metabolism.<sup>77</sup> A recent MEDLINE search identified approximately 1000 papers reporting on vitamin D or its metabolites and cancer as major subjects of the reports.

Many organs have been shown to convert the inactive form of vitamin D,  $25(OH)D_3$ , to the active, cancerreducing form,  $1,25(OH)_2D_3$ . This ability has been shown for the prostate<sup>78</sup> and for the brain, colon, lymph nodes, pancreas, placenta, and skin.<sup>79</sup>

#### Prostate cancer

Luscombe *et al.*<sup>80</sup> recently examined the association between UV exposure and prostate cancer risk using a case-control approach in Northern European Caucasians (210 prostate cancer cases and 155 patients with benign prostatic hypertrophy BPH). Exposure was assessed using a validated questionnaire. Chronic exposure was assessed by: (i) daily sun exposure (weekdays and weekends, considered separately and combined) in three age categories (20–39, 40–59 and over 60 years old) (ii) proportion of working life spent outdoors and (iii) history of residence abroad in a hot country for over 6 months. Acute exposure was assessed by: (i) childhood sunburn (erythema for more than 48 h or blistering) recorded as yes/no and number of recalled sunburn events (ii) history of foreign



holidays with average weeks abroad/year (iii) sunbathing calculated as never, rare, occasional, or frequent (scored as 1, 2, 3 and 4, respectively) in the three age categories above. Factors related to response to UV including skin type, hair, and eye colour were also recorded.

The cancer cases had less cumulative exposure than the BPH patients (P = 0.006). In particular, subjects with the lowest 25% of exposure (below 1639 days or 1.9 h/ day) were at greatest risk of the cancer. Thus, compared with the upper three quartiles, patients with the lowest 25% of exposure had a 2.5-fold increased risk of prostate cancer (P = 0.001). There were no significant associations with outdoor work or history of living abroad. For acute exposure, a positive history of childhood sunburn was protective (P < 0.0001) and increasing numbers of childhood sunburn events increased this effect (OR = 0.64 per event, P < 0.001). Other factors associated with acute UV exposure (cumulative sunbathing score, history of regular holidays), were also significantly associated with cancer risk. There was no demonstrable effect from the use of sunscreens. Susceptibility was not associated with hair colour, eye colour or skin type. There was a trend for individuals with skin type 4 (tans but never burns) to have an increased risk relative to other skin types, although this was not significant (OR = 1.49, P =0.143). Indeed, further analysis of the data showed that among men with low levels of exposure, skin type 1 conferred protection compared with skin types 2-4 (OR = 4.78, 95% CI 3.01–8.25, P < 0.0009).<sup>81</sup> These findings indicate that susceptibility to prostate cancer is in part determined by extent of exposure to UVR and that the ability to pigment mediates this effect. Importantly, these data were confirmed in a new group comprising 242 prostate cancer cases and 157 BPH patients in the UK.82

More recent results from Scandinavia indicate that a moderate concentration of  $25(OH)D_2$  (40–60 nmol/L) is correlated with the lowest risk of prostate cancer.<sup>83</sup> The authors suggested that low serum 25(OH)D<sub>2</sub> concentration leads to a low tissue concentration and to weakened mitotic control of target cells, whereas a high vitamin D level might lead to vitamin D resistance through increased inactivation by enhanced expression of 24-hydroxylase. This result is not peculiar to Scandinavia; a similar finding was made in an ecological analysis of the geographical variation of prostate cancer mortality rates in the US. Unlike many cancers such as breast, colon, and ovarian cancer, which have their highest mortality rates in the north-east and lowest in the south-west,63 prostate cancer has a fairly pronounced latitudinal gradient in mortality rates with the highest values at the highest latitudes. In the ecological analysis, it was determined that latitude had the highest correlation with prostate cancer mortality rates, with the square of UVB being more weakly correlated, and urban residence being weakly inversely correlated.<sup>84</sup> This result suggests that wintertime UVB levels (minimum values of  $25(OH)D_3$ ) are most important in reducing the risk of prostate cancer, whereas summertime UVB levels (highest  $25(OH)D_3$  levels) are a risk factor. Thus, moderate levels may be associated with the lowest risk.

#### A role for genetic polymorphisms

The link between prostate cancer risk. UV exposure and vitamin D synthesis suggests that an individual's ability to initiate pigment synthesis may mediate the harmful and beneficial effects of UV.85 Allelism in genes associated with ability to pigment following exposure may influence prostate cancer risk.85 Thus, under conditions of moderate exposure common in Northern Europe, individuals with lighter skin and little ability to pigment (skin type 1) will synthesize more vitamin D than subjects with darker skin.<sup>86</sup> Accordingly, risk of prostate cancer will be lowest in men with light skin who fail to pigment. This risk will be moderated by extent of exposure. In particular, individuals with skin type 1 often develop sun avoidance strategies to avoid burning. Genetic factors in the synthesis of melanin need to be considered, because melanin largely determines skin colour. The rate-limiting steps in melanin synthesis are catalysed by tyrosinase (TYR) under the influence of melanocyte-stimulating hormone. This hormone acts via the melanocortin-1 receptor (MC1R). Both TYR and MC1R have polymorphisms with functional consequences.85 Vitamin D itself is also clearly important and some but not other studies have shown links between vitamin D receptor (VDR) genotypes and prostate cancer risk. Luscombe et al.85.87 found that polymorphisms in TYR (codon 192 variants) and MC1R were associated with prostate cancer risk. Homozygosity for MC1R Arg<sup>160</sup> was associated with increased risk (OR = 2.18), whereas homozygosity for the TYR A2 allele was linked with reduced risk of cancer (OR = 0.42). Importantly, the protective effect of TYR genotypes found in the total group reflects an association with risk in subjects with the highest quartile of exposure. Similar associations between VDR polymorphisms and prostate cancer risk and the level of exposure to UVR have also been recently reported; in men with UVR exposure above the median (11.00 h/year), the CDX-2 GA (odds ratio = 2.11), CDX-2 AA (odds ratio = 2.02), and Fok1 ff (odds ratio = 2.91) genotypes were associated with increased prostate cancer risk.<sup>88</sup> These data show for the first time, that allelism in genes linked with skin pigment synthesis is associated with prostate cancer risk.



#### Multiple sclerosis

The story of how it was realized that vitamin D is an important risk-reduction factor for multiple sclerosis (MS) is interesting, especially since the data required to make this connection have been available since the 1920s, but the interpretation did not come until 1997. Data on prevalence of MS in the various US states were developed for veterans of World Wars I and II and of the Korean War. In both data sets, there were very strong latitudinal gradients, with MS prevalence increasing rapidly with latitude.<sup>29</sup> In 1997, the first paper appeared suggesting that vitamin D explains this gradient.<sup>16</sup> A strong case for UV radiation in reducing the risk of MS was made on the basis of a case-control study in Australia in which it was determined that childhood sun exposure, especially in winter, was associated with a significant reduction in risk.<sup>31</sup> More recently, a study based on the Nurses' Health Study found that total ingested vitamin D was a significant risk-reduction factor,<sup>89</sup> and a study in the UK found that MS among those with non-melanoma skin cancer, an indication of time spent in the sun, was at half the value for the general population, unlike the association for other diseases among this group.<sup>90</sup> Furthermore, vitamin D will also reduce the symptoms of MS. The mechanisms for the effect of vitamin D on MS are known.<sup>91</sup> Interestingly, recent studies have reported associations between polymorphisms in genes associated with skin pigmentation and MS risk.<sup>92</sup> Thus, the evidence available indicates that that MS rates in the US and the UK could be reduced significantly through adequate vitamin D. In addition, there is evidence from the seasonal cycle of lesions associated with MS that UVB and vitamin D can reduce by about half the number of lesions that occur for low serum levels of 25(OH)D<sub>3</sub>.<sup>30</sup>

#### **Psoriasis**

Psoriasis and other skin diseases benefit from UVB. An uncontrolled study of the use of commercial indoor tanning facilities to treat those with psoriasis found 30-50% improvements in symptoms.<sup>93</sup> Analogues of vitamin D3 have been used as a topical therapy for psoriasis.<sup>94</sup>

## Serum vitamin D levels and sources of vitamin D

One problem with the current guidelines regarding solar UVB exposure and vitamin D supplementation in many countries is that many people are not getting adequate amounts of vitamin D. Vitamin D insufficiency is a serious problem in the US due to a variety of factors. Winter doses of UVB radiation are insufficient to produce vitamin D in all but the most southern parts of the country. In addition, the modern lifestyle includes little time spent outdoors, and when people are in the summer sun, they often use sunscreens, which block the UVB radiation and reduce serum  $25(OH)D_3$  production.<sup>95</sup> Examples of vitamin D insufficiency can be found readily in the health literature for dark-skinned people in the US,<sup>19</sup> Australians,<sup>96</sup> and Canadians.<sup>97</sup> Hypovitaminosis D is common in the UK and USA and is associated with various abnormalities in bone chemistry among elderly residents in these countries. This reason alone is a sufficient rationale for these countries to adopt a vitamin D supplementation programme, with 10 micrograms of vitamin D recommended.<sup>98</sup>

There is considerable evidence that levels of serum  $25(OH)D_3$ , the intermediate compound between cholecalciferol (vitamin  $D_3$ ) and  $1,25(OH)_2D$ , are often inadequate in residents of European countries. For example, the prevalence of subclinical vitamin D deficiency decreases with latitude in winter in Europe, falling from 50 to 80% in Greece to 20-30% in Norway.99,100 This finding is counterintuitive, but is probably related to a higher intake of vitamin D from diet and supplements in northern Europe to compensate for lower annual levels of UVB radiation, and the fact that there is insufficient UVB to produce vitamin D in winter even in southern Europe.<sup>101</sup> There have been reports that vitamin D consumption and serum 25(OH)D<sub>3</sub> are inadequate in Austria.<sup>102</sup> Although serum  $25(OH)D_3$  levels were similar for both genders in an adult population in Finland, serum parathyroid hormone (PTH) levels for women started to increase at half the serum vitamin D levels for men.<sup>103</sup> Based on measurements of PTH, 86% of the women and 56% of the men were determined to have insufficient vitamin D status. Similar results were found for male adolescents in France, where serum 25(OH)D<sub>3</sub> fell from approximately 59 nmol/L (24 ng/mL) in summer to approximately 21 nmol/L in winter.<sup>104</sup> Pre-school children in the UK were found to be prone to low  $25(OH)D_3$ levels in winter unless they were taking vitamin D supplements.<sup>105</sup> Half of the pregnant women from the non-European ethnic minority population in South Wales had serum vitamin D levels below 8 ng/mL. $^{106}$ 

Vitamin D supplementation at moderate dosages of 400-600 IU per day appear to be without any significant risk.<sup>107</sup> It has been argued<sup>108,109</sup> that daily intakes of 100 µg (4000 IU) of vitamin D<sub>3</sub> per day is safe. However, serum vitamin D<sub>3</sub> levels vary widely by individual for the same intake. Dosages in children should correspond to body mass and should be determined with greater caution. Oral doses from supplements in excess of 2000 IU/



day may be associated with adverse effects such as increased calcium loss from bones in some individuals and should be avoided until further data are available. Vitamin D status would be best assured by periodic measurement of serum  $25(OH)D_3$  levels, a simple test that is widely available.

Another way to obtain vitamin D in winter or when confined indoors is through use of UV lamps. A study in the UK found that the use of low-intensity UV lamps turned on 15 min per day and yielding a summertime dose of UVB for ambulatory people raised serum  $25(OH)D_3$  levels from a mean near 12 nmol/L to about 32 nmol/L after about a year.<sup>110</sup>The end values are still not optimal, but do represent a substantial improvement. It should be noted that the efficiency of vitamin D production in skin decreases with age.

Mean values of serum  $25(OH)D_3$  in Boston are  $35 \pm 10$  ng/mL at the end of summer and  $30 \pm 10$  ng/mL at the end of winter.<sup>111</sup> Taking multivitamins reduced vitamin D insufficiency significantly at the end of winter. These values are for a region of the USA where mortality rates for eight types of cancer are about twice those in the south-western states.<sup>63</sup> Thus, values for  $25(OH)D_3$  in the range 60-70 ng/mL might be required for optimal protection against cancer and several other chronic diseases. What is not well understood is the amount of casual or intentional UVB dose required to generate adequate levels of serum  $25(OH)D_3$ . The amount varies considerably depending on a number of factors, and there has been little systematic study for any of the various conditions linked to vitamin D.

Some changes in public health policy regarding vitamin D intake are being considered. There have been suggestions that vitamin D supplementation be increased in Denmark<sup>112</sup> and Boston.<sup>113</sup> In Europe, there is a programme named OPTIFORD underway to investigate if fortification of food with vitamin D is a feasible strategy to remedy the insufficient vitamin D status of large population groups.<sup>114</sup>

#### Adverse health effects of UVR

#### Melanoma and other skin cancers

It is worthwhile to examine whether the risk of melanoma and other skin cancers can be minimized while at the same time increasing the production of vitamin D from solar UVB radiation. The risks that have been identified for melanoma include light hair, skin, and eye colour, a history of heavy freckling in adolescence, and a tendency to burn readily and tan poorly.<sup>115</sup> Intermittent sunburns, such as on weekends or vacations, are more commonly associated with melanoma than is daily sun exposure.<sup>116</sup>

The UVA spectral region appears to be more strongly associated with melanoma than is UVB radiation.<sup>117–121</sup> UVA radiation penetrates the skin deeper than does UVB radiation, where UV generates free radicals that subsequently damage DNA.<sup>120,121</sup> UVB seems therefore to be more involved in melanoma indirectly through temporarily reducing the protective layer of skin through sunburn rather than directly through DNA damage or free radicals. Although UVB does generate free radicals, their concentration at the basal epithelium is only 1/ 70th that of the more common and deeper-penetrating UVA photons.<sup>121</sup> Vitamin D present in the epidermis may actually reduce the risk of melanoma.<sup>117,122</sup> The ratio of UVA to UVB increases with latitude, which seems to be linked to the increase in melanoma mortality rates with latitude in Europe.<sup>122</sup>

Further evidence for UVA comes from the recent meta-analysis of studies that investigated whether use of sunscreen reduced the risk of melanoma – the finding was that it did not.<sup>123</sup> This finding is probably due to the fact that sunscreen is much more effective at blocking UVB than UVA.

The dietary links to melanoma and other skin cancers are also important. High-fat diets are thought to be risk factors for melanoma and other skin cancers.<sup>124,125</sup> Increased height, weight, and body surface area are associated with increased risk of melanoma among males in Washington State.<sup>126</sup> A low-fat diet was found to increase the survival rates of patients with advanced melanoma.<sup>127</sup> Vitamin E is inversely correlated with BCC.<sup>128</sup> Vitamin A is a risk-reduction factor for melanoma.<sup>129</sup> Smoking is a risk factor for BCC and SCC.<sup>130</sup> Thus, UVR is not the only risk factor associated with skin cancers, and the risk factors may act synergistically.

Thus, an overall recommendation to minimize, or even avoid, time in the sun may not be the best way to reduce the risk of melanoma and other skin cancer.<sup>131</sup> A better recommendation may be to seek limited but regular solar UVB exposure for vitamin D production and normal seasonal skin accommodation in summer, but to avoid sunburns and excessive tanning. When solar UVB radiation is not sufficient for vitamin D production, which could be for 5–6 months of the year in the UK, based on results in Boston,<sup>101</sup> then the possible use of artificial UVB lamps or vitamin D supplements or fortification of food needs to be considered.

#### Other adverse health effects from UVR

There are several other adverse health effects from UVR, especially from high doses. One is cataract formation. In the US, the prevalence of cataracts increases by 3% per

degree of latitude to the south.<sup>132</sup> One way to reduce the risk of cataract formation is to wear UV blocking glasses when exposed to UVR. Another way is to include luteinrich fruit and vegetables or supplements.<sup>133,134</sup>

Premature skin ageing is another major concern with respect to UVR exposure.<sup>6</sup> Excess UVR exposure should be avoided. However, a good way to reduce these effects of UVR exposure is through consuming plenty of antioxidants.<sup>135</sup>

There are some conditions for which the best policy is near total avoidance of UVB radiation. One of these is systemic lupus erythematosus (SLE). In the US, a high correlation was found between SLE mortality rates and solar UVB radiation for July.<sup>136</sup>

### Sunbeds

That the careful use of sunbeds may be an appropriate way to obtain vitamin D can be supported from several directions. First, the lamps used in sunbeds today have nearly the same ratio of UVB to UVA as sunlight incident at mid-latitudes - about 0.04. Second, in Europe, although use of sunbeds has been associated with a 50% increase in risk of melanoma, <sup>137</sup> this is not the case in the US and in a recent UK study.<sup>138</sup> The two studies that investigated this link in the US found no significant risk.<sup>139,140</sup> The UK study found that the only significant associations in this study were with 10 or more sunburns and the use of a sunbed in young subjects with fair skin.<sup>138</sup> This study also found a risk reduction for melanoma for the greatest total hours of sunbed usage, and pointed out that many studies of melanoma and sunbed use had failed to demonstrate the dose-response relationship that is required to show causality. It is suggested that the difference may be that the use of sunbeds is more carefully regulated in the US than in Europe, especially in regard to initial dose, maximum dose, and frequency of use. However, other confounding factors such as smoking and types of lamps used may also play a role. These important issues need to be addressed. Third, even if there were a 50% increased risk of melanoma, the health benefits from indoor tanning would mirror those from solar UVB exposure. A preliminary study of the economic burden in the US in 2003 associated due to impaired health or mortality due to insufficient UVB, the primary source of vitamin D in the US<sup>141</sup> found that it was approximately \$50 billion (range \$25-\$75 billion), which was much larger than the \$3 billion attributed to the health risks of BCC, SCC, melanoma, cataracts, and premature skin ageing (Grant, in preparation). Fourth, it is noted that melanoma is much more related to recreational UVR exposure than to occupational UVR exposure.<sup>116</sup> One of the advantages of sunbeds is that if

properly used, they could provide a tan in a controlled manner more in accordance with occupational exposure, so that when one does take that vacation trip to the beach, one is much less likely to sunburn.

## Discussion

It appears that the concern with the adverse effects of solar UV radiation exposure, namely increased risk for melanoma, basal cell and squamous cell carcinoma, premature ageing of the skin, and cataracts, may have led to public health recommendations that also have unintentionally reduced serum 25(OH)D<sub>3</sub> levels. The health benefits of UVB seem to outweigh the adverse effects by a ratio of 15:1 in the US (Grant, in preparation), with a higher ratio likely in the UK, since solar UVB levels are lower there. We recognize the need for public health recommendations that protect the public from undue harm, but current guidelines regarding solar and artificial UVB radiation exposure and vitamin D fortification and supplementation appear to be inconsistent with new data on UVB and vitamin D. All findings should be reviewed and new guidelines developed that would provide a better balance between the health benefits and risks of sun exposure.

## Conclusions

There are many health benefits from UVB radiation, which is an important source of vitamin D for most people on Earth. The health benefits include reductions in risk of 16 types of internal cancers, of diabetes mellitus, heart disease, hypertension, multiple sclerosis, myopathy, osteoporosis, psoriasis, rickets, schizophrenia, and tuberculosis.

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William Grant is forming an organization called Sunlight, Nutrition and Health Research Center (SUNARC), which will have as its goals the continued research into the health benefits of vitamin D and UVB radiation and the health effects of diet and nutrition, the collection of information on these topics, and advocacy of revised health guidelines based on the findings. It is anticipated that the indoor tanning industry will be providing some of the funding for SUNARC. The North Staffordshire Medical Institute provided Richard Strange with some of the funding for work described in this paper.

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C-111

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## Editorial

# **Rickets Today — Children Still Need Milk and Sunshine**

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Rickets has been a childhood scourge for centuries. Before the Industrial Revolution in England it was a disease of the affluent, because their style of clothing and the fact that they spent most of their time indoors limited their exposure to sunlight. Later, urbanization and atmospheric pollution caused city-dwelling poor children to be more commonly affected. By the end of the 19th century, rickets was known in Europe as "the English disease."

Studies during the early part of the 20th century seemed to link both exposure to sunlight and diet to rickets, but debate about the relative importance of these two factors delayed progress toward effective treatment. The healing of rickets in dogs by treatment with cod liver oil in 1919 and in children by exposure to sunlight on the roof of a hospital in New York City in 1921 demonstrated that a common factor, later called vitamin D, was essential for skeletal health. Vitamin D<sub>3</sub>, produced in the skin by the action of sunlight, and vitamin D<sub>2</sub>, obtained through food, have equal biologic potency. Vitamin D is converted first to 25-hydroxyvitamin D in the liver and then to its active metabolite, 1,25-dihydroxyvitamin

D, in the kidney. 1,25-Dihydroxyvitamin D acts through specific receptors to increase calcium absorption in the intestine and, with parathyroid hormone, mobilizes calcium from bone to maintain serum calcium concentrations.  $\underline{1}$ 

Rickets remains a major health problem in many developing countries and among immigrants in developed countries. Affected children typically present at the age of 18 months with delayed motor development, hypotonia, and short stature, and they have knock knees or bowed legs. The causes usually are inadequate exposure to sunlight because the children are clothed and kept indoors and prolonged breast-feeding without vitamin D supplementation. Additional dietary factors may reduce calcium and vitamin D absorption. For example, a vegetarian diet and high intake of phylate

and fiber have been associated with reduced calcium and vitamin D absorption and an increased incidence of rickets among children of Asian immigrants in Britain.2

Rickets may have severe consequences. It is strongly associated with pneumonia in young children in developing countries. In a case–control study at the Ethio-Swedish Children's Hospital in Addis Ababa, <u>3</u> Muhe and colleagues demonstrated an incidence of rickets among children with pneumonia that was 13 times as high as that among control children, after adjustment for family size, birth order, crowding, and months of exclusive breast-feeding. The relative risk of death for the children with rickets as compared with the children without rickets was 1.7. Furthermore, bony deformity of the pelvis in women leads to obstructed labor and increased perinatal morbidity and mortality.

The standard treatment for rickets is vitamin D. Vitamin D deficiency is not the only cause of rickets, however. Rickets can develop in premature infants who have outgrown their dietary intake of calcium and phosphate. Such infants should be given more calcium and phosphate, not vitamin D. Rickets also occurs when the supply of phosphate required for soft-tissue and skeletal growth is reduced by excessive urinary loss, which occurs in children with X-linked hypophosphatemic rickets or renal tubular disease.

Calcium deficiency has been suggested as a cause of rickets in African children with apparently good exposure to sunlight, <u>4</u> but definitive evidence has been lacking. In this issue of the *Journal*, Thacher and colleagues report that calcium, with or without vitamin D supplementation, was more effective than vitamin D alone in achieving biologically important changes in biochemical and radiologic measures of rickets in Nigerian children. <u>5</u> The children with rickets in this study (median age, 46 months) were somewhat older than would be expected for children presenting with vitamin D deficiency and had good exposure to sunlight. Most had serum 25-hydroxyvitamin D concentrations within the normal range.

Notwithstanding the beneficial effects of calcium in these children, unanswered questions remain about the cause of their rickets. Their early calcium intake may have been lower than that of the control group because of a shorter period of breast-feeding, although at the time of study enrollment calcium intake was similar in the two groups. Calcium absorption and urinary excretion were not measured in this study, but low or even undetectable urinary calcium excretion has been reported in similar children. There may have been individual variations in fiber or phylate intake that affected the absorption of dietary calcium.

Genetic factors might also have affected calcium absorption and usage. In the vitamin D receptor, the *FokI* polymorphism predicts calcium absorption and bone mineral density in children, <u>6</u> and the *BsmI* polymorphism is associated with variations in intrauterine and early postnatal growth. <u>7</u> Combinations of these and other genetic variations might alter the susceptibility of some rapidly growing children to rickets while they are consuming a diet low in calcium.

It seems likely that the rickets in these Nigerian children resulted from calcium deficiency. After weaning, the staple diet of many young African children is maize porridge, with low calcium and high fiber content. Dietary calcium comes from dairy products, which may be consumed only occasionally. If there is to be progress in preventing rickets in such children, then mothers need to be encouraged to breast-feed for at least 18 months and calcium from a cheap, locally available source must be incorporated into the diet.

Children in developed countries need calcium, too. There is clear evidence from prospective studies of dietary supplementation that increased calcium intake during childhood results in increased calcium retention and increased bone mass. Young adults with a history of greater milk consumption have a higher total-body bone mass than those with lower intake after the influence of body size is taken into account. Calcium, vitamin D, and phosphate are essential nutrients for the growing skeleton. Wherever children live, they should follow Grandma's advice: "Drink up your milk, and go play outside."

C-118

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# Vitamin D: The "sunshine" vitamin

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# Abstract

Vitamin D insufficiency affects almost 50% of the population worldwide. An estimated 1 billion people worldwide, across all ethnicities and age groups, have a vitamin D deficiency (VDD). This pandemic of hypovitaminosis D can mainly be attributed to lifestyle (for example, reduced outdoor activities) and environmental (for example, air pollution) factors that reduce exposure to sunlight, which is required for ultraviolet-B (UVB)-induced vitamin D production in the skin. High prevalence of vitamin D insufficiency is a particularly important public health issue because hypovitaminosis D is an independent risk factor for total mortality in the general population. Current studies suggest that we may need more vitamin D than presently recommended to prevent chronic disease. As the number of people with VDD continues to increase, the importance of this hormone in overall health and the prevention of chronic diseases are at the forefront of research. VDD is very common in all age groups. As few foods contain vitamin D, guidelines recommended supplementation at suggested daily intake and tolerable upper limit levels. It is also suggested to measure the serum 25-hydroxyvitamin D level as the initial diagnostic test in patients at risk for deficiency. Treatment with either vitamin D2 or vitamin D3 is recommended for deficient patients. A meta-analysis published in 2007 showed that vitamin D supplementation was associated with significantly reduced mortality. In this review, we will summarize the mechanisms that are presumed to underlie the relationship between vitamin D and understand its biology and clinical implications.

Keywords: Cancer, fat soluble vitamin, hypertension, obesity, vitamin D analogs

# INTRODUCTION

Vitamin D insufficiency affects almost 50% of the population worldwide.[1] An estimated 1 billion people worldwide, across all ethnicities and age groups, have a vitamin D deficiency (VDD).[1-3] This pandemic of hypovitaminosis D can mainly be attributed to lifestyle and environmental factors that reduce exposure to sunlight, which is required for ultraviolet-B (UVB)-induced vitamin D production in the skin. Black people absorb more UVB in the melanin of their skin than do white people and, therefore, require more sun exposure to produce the same amount of vitamin D.[4]

The high prevalence of vitamin D insufficiency is a particularly important public health issue because hypovitaminosis D is an independent risk factor for total mortality in the general population.[5] Emerging research supports the possible role of vitamin D against cancer, heart disease, fractures and falls, autoimmune diseases, influenza, type-2 diabetes, and depression. Many health care providers have increased their recommendations for vitamin D supplementation to at least 1000 IU.[6] A meta-analysis published in 2007 showed that vitamin D supplementation was associated with significantly reduced mortality.[7] In this review, we will focus on the biology of vitamin D and summarize the mechanisms that are presumed to underlie the relationship between vitamin D and its clinical implications.

# **Biology of the sunshine vitamin**

Vitamin D is unique because it can be made in the skin from exposure to sunlight. [3,8–10] Vitamin D exists in two forms. Vitamin D<sub>2</sub> is obtained from the UV irradiation of the yeast sterol ergosterol and is found naturally in sun-exposed mushrooms. UVB light from the sun strikes the skin, and humans synthesize vitamin D<sub>3</sub>, so it is the most "natural" form. Human beings do not make vitamin D<sub>2</sub>, and most oil-rich fish such as salmon, mackerel, and herring contain vitamin D<sub>3</sub>. Vitamin D (D represents D<sub>2</sub>, or D<sub>3</sub>, or both) that is ingested is incorporated into chylomicrons, which are absorbed into the lymphatic system and enter the venous blood. Vitamin D that comes from the skin or diet is biologically inert and requires its first hydroxylation in the liver by the vitamin D-25-hydroxylase (25-OHase) to 25(OH)D.[3,11] However, 25(OH)D requires a further hydroxylation in the kidneys by the 25(OH)D-1-OHase (CYP27B1) to form the biologically active form of vitamin D 1,25(OH)2D.[3,11] 1,25(OH)2D stimulates intestinal calcium absorption.[12] Without vitamin D, only 10–15% of dietary calcium and about 60% of phosphorus are absorbed. Vitamin D sufficiency enhances calcium and phosphorus absorption by 30–40% and 80%, respectively.[3,13]

Vitamin D receptor (VDR) is present in most tissues and cells in the body. [6,14] 1,25(OH)2D has a wide range of biological actions, such as inhibition of cellular proliferation and inducing terminal differentiation, inhibiting angiogenesis, stimulating insulin production, inhibiting renin production, and stimulating macrophage cathelicidin production. [6,14–16] The local production of 1,25(OH)2D may be responsible for regulating up to 200 genes[17] that may facilitate many of the pleiotropic health benefits that have been reported for vitamin D. [3,8,9,14]

# Vitamin D deficiency: Prevalence

VDD has been historically defined and recently recommended by the Institute of Medicine (IOM) as a 25(OH)D of less than 0.8 IU. Vitamin D insufficiency has been defined as a 25(OH)D of 21–29 ng/mL. [1,18–23] Children and young- and middle-aged adults are at equally high risk for VDD and insufficiency worldwide. VDD is common in Australia, the Middle East, India, Africa, and South America.[1,24,25] Pregnant and lactating women who take a prenatal vitamin and a calcium supplement with vitamin D remain at high risk for VDD.[26–28]

# Vitamin D deficiency, why it happens?

The major source of vitamin D for children and adults is exposure to natural sunlight. [1,29-32] Thus, the major cause of VDD is inadequate exposure to sunlight. [29,33-35] Wearing a sunscreen with a sun protection factor of 30 reduces vitamin D synthesis in the skin by more than 95%. [36] People with a naturally dark skin tone have natural sun protection and require at least three to five times longer exposure to make the same amount of vitamin D as a person with a white skin tone. [37,38] There is an

C-120

#### Vitamin D: The "sunshine" vitamin

inverse association of serum 25(OH)D and body mass index (BMI) greater than 30 kg/m<sup>2</sup>, and thus, obesity is associated with VDD.[39]

Patients with one of the fat malabsorption syndromes and bariatric patients are often unable to absorb the fat-soluble vitamin D, and patients with nephritic syndrome lose 25(OH)D bound to the vitamin Dbinding protein in the urine.[1] Patients on a wide variety of medications, including anticonvulsants and medications to treat AIDS/HIV, are at risk because these drugs enhance the catabolism of 25(OH)D and 1,25(OH)2D.[40] Patients with chronic granuloma-forming disorders (sarcoidosis, tuberculosis, and chronic fungal infections), some lymphomas, and primary hyperparathyroidism who have increased metabolism of 25(OH)D to 1,25(OH)2D are also at high risk for VDD.[41,42]

# Vitamin D deficiency: Consequences

VDD results in abnormalities in calcium, phosphorus, and bone metabolism. VDD causes a decrease in the absorption of dietary calcium and phosphorus, resulting in an increase in PTH levels. [1,3,18,43] The PTH-mediated increase in osteoclastic activity creates local foci of bone weakness and causes a generalized decrease in bone mineral density (BMD), resulting in osteopenia and osteoporosis. An inadequate calcium–phosphorus product causes a mineralization defect in the skeleton. [1,44] In young children who have little mineral in their skeleton, this defect results in a variety of skeletal deformities classically known as rickets. [45,46] VDD also causes muscle weakness; affected children have difficulty in standing and walking, [46,47] whereas the elderly have increasing sway and more frequent falls, [48,49] thereby increasing their risk of fracture.

# Groups at risk of vitamin-D inadequacy

Obtaining sufficient vitamin D from natural food sources alone is difficult. Consumption of vitamin D-fortified foods and exposure to some sunlight are essential for maintaining a healthy vitamin D status. Dietary supplements might be required to meet the daily need for vitamin D in some group of people. [50]

**Breastfed infants** Vitamin D requirements cannot ordinarily be met by human milk alone,[23,51] which provides <25 IU/L to 78 IU/L.[52] Vitamin D content of human milk is related to the mother's vitamin D status; therefore mothers who supplement with high doses of vitamin D may have high levels of vitamin D in their milk.[52] American Association of Paediatricians (AAP) recommends that exclusively and partially breastfed infants must be supplemented with 400 IU of vitamin D per day, [52,53] the recommended daily allowance for this nutrient during infancy.

**Older adults** Older adults are at high risk of developing vitamin D insufficiency because of aging. Their skin cannot synthesize vitamin D as efficiently, they are likely to spend more time indoors, and they may have inadequate intakes of the vitamin.<sup>[23]</sup>

**People with limited sun exposure** Homebound individuals, women who wear long robes and head coverings for religious reasons, and people with occupations that limit sun exposure are unlikely to obtain adequate vitamin D from sunlight.[54,55] The significance of the role that sunscreen may play in reducing vitamin D synthesis is still unclear.[23] Intake of RDA levels of vitamin D from foods and/or supplements will provide adequate amounts of this nutrient to these individuals.

**People with dark skin** Larger amounts of the pigment melanin in the epidermal layer result in darker skin and reduce the skin's ability to produce vitamin D from sunlight.[23] It is not sure that lower levels of 25(OH)D for persons with dark skin have significant health consequences. Intake of RDA levels of vitamin D from foods and/or supplements will provide adequate amounts of this nutrient to these individuals.

#### Vitamin D: The "sunshine" vitamin

**People with fat malabsorption** Vitamin D is fat soluble, therefore it requires some dietary fat in the gut for absorption. Individuals with reduced ability to absorb dietary fat might require vitamin D supplements.[56] Fat malabsorption is associated with a variety of medical conditions including some forms of liver disease, cystic fibrosis, and Crohn's disease.[57]

**People who are obese or who have undergone gastric bypass surgery** A BMI value of  $\geq$ 30 is associated with lower serum 25(OH)D levels compared with nonobese individuals. Obese people may need larger than usual intakes of vitamin D to achieve 25(OH)D levels comparable to those of normal weight.[23] Greater amounts of subcutaneous fat sequester (captivate) more of the vitamin and alter its release into the circulation. Individuals who have undergone gastric bypass surgery may become vitamin D deficient over time without a sufficient intake of vitamin D from food or supplements; moreover part of the upper small intestine where vitamin D is absorbed is bypassed.[58,59]

# Sources of vitamin D

A major source of vitamin D for most humans is synthesized from the exposure of the skin to sunlight typically between 1000 h and 1500 h in the spring, summer, and fall. [1,29,33,60] Vitamin D produced in the skin may last at least twice as long in the blood compared with ingested vitamin D.[61] When an adult wearing a bathing suit is exposed to one minimal erythemal dose of UV radiation (a slight pinkness to the skin 24 h after exposure), the amount of vitamin D produced is equivalent to ingesting between 10,000 and 25,000 IU.[33] A variety of factors reduce the skin's production of vitamin D<sub>3</sub>, including increased skin pigmentation, aging, and the topical application of a sunscreen.[1,36,37] An alteration in the zenith angle of the sun caused by a change in latitude, season of the year, or time of day dramatically influences the skin's production of vitamin D<sub>3</sub>.[1,33]

# Physiological actions of vitamin D

Vitamin D is a fat-soluble vitamin that acts as a steroid hormone. In humans, the primary source of vitamin D is UVB-induced conversion of 7-dehydrocholesterol to vitamin D in the skin [Figure 1]. [1,62] Vitamin D influences the bones, intestines, immune and cardiovascular systems, pancreas, muscles, brain, and the control of cell cycles.[63]



Figure 1 Vitamin D synthesis

Vitamin D undergoes two hydroxylations in the body for activation. Calcitriol (1,25-dihydroxyvitamin D<sub>3</sub>), the active form of vitamin D, has a half-life of about 15 h, while calcidiol (25-hydroxyvitamin D<sub>3</sub>) has a half-life of about 15 days.[63] Vitamin D binds to receptors located throughout the body. 25(OH)D is transformed by renal or extrarenal 1 $\alpha$ -hydroxylase into 1,25-dihydroxyvitamin D (1,25[OH]2D), which circulates at much lower serum concentrations than 25(OH)D, but has a much higher affinity to the VDR.[64] Studies have, however, shown that many other cell types, including those of the vascular wall, express 1 $\alpha$ -hydroxylase with subsequent intracellular conversion of 25(OH)D to 1,25(OH)2D, which exerts its effects at the level of the individual cell or tissue before being catabolized to biologically inactive calcitroic acid.[1,65,66] Factors such as fibroblast growth factor 23 and Klotho, which suppress 1 $\alpha$ -hydroxylase expression, have also been shown to regulate the renal conversion of 25(OH)D to 1,25(OH)D to 1,25

macrophages are stimulated by Toll-like receptor as part of the innate immune response against intracellular bacteria. [68] Another example of extrarenal regulation of 1 $\alpha$ -hydroxylase is that the increased production of 1,25(OH)2D by keratinocytes in wounds[69] therefore provides a good estimate of vitamin D status, but regulation of 1 $\alpha$ -hydroxylase activity should also be considered. Vitamin D crosses the blood-brain barrier and the receptors for vitamin D are found across the brain, but its precise role is still not known.

## **Drug interactions**

Vitamin D supplements may interact with several types of medications. Corticosteroids can reduce calcium absorption, which results in impaired vitamin D metabolism.[9] Since vitamin D is fat soluble, Orlistat and Cholestyramine can reduce its absorption and should be taken several hours apart from it. [9] Phenobarbital and phenytoin increase the hepatic metabolism of vitamin D to inactive compounds and decrease calcium absorption, which also impairs vitamin D metabolism.[9]

## Dosing

Only a few foods are a good source of vitamin D. The best way to get additional vitamin D is through supplementation. Traditional multivitamins contain about 400 IU of vitamin D, but many multivitamins now contain 800 to 1000 IU. A variety of options are available for individual vitamin D supplements, including capsules, chewable tablets, liquids, and drops. Cod liver oil is a good source of vitamin D, but in large doses there is a risk of vitamin A toxicity.[70]

## **Clinical benefits of vitamin D**

**Cancer** Vitamin D decreases cell proliferation and increases cell differentiation, stops the growth of new blood vessels, and has significant anti-inflammatory effects.[71,72] Many studies have suggested a link between low vitamin D levels and an increased risk of cancer, with the strongest evidence for colorectal cancer. In the Health Professionals Follow-up Study (HPFS), subjects with high vitamin D concentrations were half as likely to be diagnosed with colon cancer as those with low concentrations. [71] A definitive conclusion cannot yet be made about the association between vitamin D concentration and cancer risk, but results from many studies are promising. There is some evidence linking higher vitamin D intake to a lower risk for breast cancer.[72] The effect of menopausal status on this association is still unclear.

**Heart disease** Several studies are providing evidence that the protective effect of vitamin D on the heart could be via the renin–angiotensin hormone system, through the suppression of inflammation, or directly on the cells of the heart and blood-vessel walls.[17] In the Framingham Heart Study, patients with low vitamin D concentrations (<15 ng/mL) had a 60% higher risk of heart disease than those with higher concentrations.[17] In another study, which followed men and women for 4 years, patients with low vitamin D concentrations (<15 ng/mL) were three times more likely to be diagnosed with hypertension than those with high concentrations (>30 ng/mL).[73]

**Hypertension** The third National Health and Nutrition Examination Survey (NHANES-III),[74] which is representative of the noninstitutionalized US civilian population, showed that systolic blood pressure and pulse pressure were inversely and significantly correlated with 25(OH)D levels among 12,644 participants. Age-associated increase in systolic blood pressure was significantly lower in individuals with vitamin D sufficiency.[75,76] The prevalence of arterial hypertension was also associated with reduced serum 25(OH)D levels in 4030 participants of the German National Interview and Examination Survey,[77] in 6810 participants of the 1958 British Birth Cohort,[78] and in other study populations.[79–87] The antihypertensive effects of vitamin D are mediated by renoprotective effects,

#### Vitamin D: The "sunshine" vitamin

suppression of the RAAS, by beneficial effects on calcium homeostasis, including the prevention of secondary hyperparathyroidism, and by vasculoprotection.[85]

**Obesity** Low concentrations of circulating vitamin D are common with obesity and may represent a potential mechanism explaining the elevated risk of certain cancers and cardiovascular outcomes. Levels of 25(OH)D are inversely associated with BMI, waist circumference, and body fat but are positively associated with age, lean body mass, and vitamin D intake.

The prevalence of VDD is higher in black versus white children regardless of season predictors of VDD in children include black race, female sex, pre-pubertal status, and winter/spring season.[88] Weight loss is associated with an increase in 25(OH)D levels among postmenopausal overweight or obese women.[89]

**Type 2 diabetes** A trial of nondiabetic patients aged 65 years and older found that those who received 700 IU of vitamin D (plus calcium) had a smaller rise in fasting plasma glucose over 3 years versus those who received placebo.[90] A correlation between vitamin D and the risk diabetes can be ruled in from the results.

**Depression** A Norwegian trial of overweight subjects showed that those receiving a high dose of vitamin D (20,000 or 40,000 IU weekly) had a significant improvement in depressive symptom scale scores after 1 year versus those receiving placebo.[91] The result determines a correlation between vitamin D and the risk of depression.

**Cognitive impairment** In the Invecchiare in Chianti (InCHIANTI) Italian population-based study, low levels of vitamin D were associated with substantial cognitive decline in the elderly population studied during a 6-year period.[92] Low levels of 25(OH)D may be especially harmful to executive functions, whereas memory and other cognitive domains may be relatively preserved.

**Parkinson's disease** Parkinson's disease is a major cause of disability in the elderly population. Unfortunately, risk factors for this disease are relatively unknown. Recently, it has been suggested that chronically inadequate vitamin D intake may play a significant role in the pathogenesis of Parkinson's disease. A cohort study based on the Mini-Finland Health Survey demonstrated that low vitamin D levels may predict the development of Parkinson's disease.[93]

**Fractures and falls** Vitamin D is known to help the body absorb calcium, and it plays a role in bone health. In addition, VDRs are located on the fast-twitch muscle fibers, which are the first to respond in a fall.[94] It is theorized that vitamin D may increase muscle strength, thereby preventing falls.[6] Many studies have shown an association between low vitamin D concentrations and an increased risk of fractures and falls in older adults.

A combined analysis of 12 fracture-prevention trials found that supplementation with about 800 IU of vitamin D per day reduced hip and nonspinal fractures by about 20%, and that supplementation with about 400 IU per day showed no benefit.[95] Researchers at the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University have examined the best trials of vitamin D versus placebo for falls. Their conclusion is that "fall risk reduction begins at 700 IU and increases progressively with higher doses."[94]

**Autoimmune diseases** VDD can contribute to autoimmune diseases such as multiple sclerosis (MS), type 1 diabetes, rheumatoid arthritis, and autoimmune thyroid disease.[96]

A prospective study of white subjects found that those with the highest vitamin D concentrations had a 62% lower risk of developing MS versus those with the lowest concentrations.[97] A Finnish study that followed children from birth noted that those given vitamin D supplements during infancy had a nearly

C-124

90% lower risk of developing type 1 diabetes compared with children who did not receive supplements.[98]

**Influenza** VDD in the winter months may be the seasonal stimulus that triggers influenza outbreaks in the winter.[96] In a Japanese randomized, controlled trial, children given a daily vitamin D supplement of 1200 IU had a 40% lower rate of influenza type A compared with those given placebo; there was no significant difference in rates of influenza type B.[99]

**Bacterial vaginosis** An analysis of data from the National Health and Nutrition Examination Survey showed that in pregnant women, VDD was associated with nearly a 3-fold increased risk for Bacterial Vaginosis (BV).[100] In non-pregnant women, VDD modulated the association between smoking and BV.

**Pelvic floor disorders** The frequency of Pelvic floor disorders, including urinary and fecal incontinence, is increasing with age. Pelvic floor disorders have been linked to osteoporosis and low BMD and remain one of the most common reasons for gynaecologic surgery, with a failure rate of 30%. Subnormal levels of 25(OH)D are common among women, and lower levels are associated with a higher likelihood of pelvic floor disorders.[101] Results from the National Health and Nutrition Examination Survey confirmed that lower 25(OH) D levels are associated with a greater risk for urinary incontinence in women older than 50 years.

**Age-related macular regeneration** High vitamin D blood levels appear to be associated with a decreased risk for the development of early age-related macular degeneration (AMD) among women younger than 75 years.[102] Among women younger than 75 years, there is a lower risk for early AMD with higher vitamin D levels, with a threshold effect at 15.22 ng/L serum 25 (OH)D.

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# **Diagnostic procedure**

ESCP recommend screening for VDD in individuals at risk for deficiency and not for patients who are not at risk. Serum circulating 25-hydroxyvitamin D [25(OH) D] level should be measured to evaluate vitamin D status in patients who are at risk for VDD. VDD is defined as a 25(OH) D below 20 ng/mL (50 nmol/L).[103]

# Recommended dietary intakes of vitamin D

ESCP suggests that obese children and adults on anticonvulsant medications, glucocorticoids, antifungals such as ketoconazole, and medications for AIDS should be given at least two to three times more vitamin D for their age group to satisfy their body's vitamin D requirement[Table 1].



# Table 1

Recommended dietary intakes of vitamin D for patients at risk for vitamin D deficiency [103]

ESCP suggests that the maintenance tolerable upper limits (UL) of vitamin D, which is not to be exceeded without medical supervision, should be 1000 IU/d for infants up to 6 months, 1500 IU/d for infants from 6 months to 1 year, at least 2500 IU/d for children aged 1–3 years, 3000 IU/d for children aged 4–8 years, and 4000 IU/d for everyone over 8 years. Higher levels of 2000 IU/d for children 0–1 year, 4000 IU/d for children 1–18 years, and 10000 IU/d for children and adults 19 years and older may be needed to correct VDD.[103]

# Treatment and prevention strategies

Vitamin  $D_2$  or vitamin  $D_3$  can be used for the treatment and prevention of VDD [Table 2]. In patients with extrarenal production of 1,25(OH)2D, serial monitoring of 25(OH)D levels and serum calcium levels during treatment with vitamin D to prevent hypercalcemia is suggested [Table 2]. Primary hyperparathyroidism and VDD need treatment with vitamin D.[103]



Table 2

Treatment and prevention strategies[103]

# Noncalcemic benefits of vitamin D

ESCP recommends prescribing vitamin D supplementation for fall prevention and do not recommend supplementation beyond recommended daily needs for the purpose of preventing cardiovascular disease or death or improving quality of life.[103]

# Vitamin D analogs

Vitamin D has five natural analogs, called vitamers, and four synthetic analogs which are made synthetically. Vitamin D analogs are chemically classified as secosteroids, which are steroids with one broken bond.

# Natural analogs of vitamin D

- Vitamin  $D_1$  is a molecular compound of ergocalciferol ( $D_2$ ) with lumisterol in a 1:1 ratio.
- Vitamin D<sub>2</sub> (ergocalciferol) is produced by invertebrates, some plants, and fungi. Biological production of D<sub>2</sub> is stimulated by ultraviolet light.
- Vitamin D<sub>3</sub> (cholecalciferol) is synthesized in the skin by the reaction of 7-dehydrocholesterol with UVB radiation, present in sunlight with an UV index of three or more.
- Vitamin D<sub>4</sub> is an analog scientifically known as 22-dihydroergocalciferol.
- Vitamin D<sub>5</sub> (sitocalciferol) is an analog created from 7-dehydrositosterol.

# Synthetic analogs of vitamin D

- Maxacalcitol (22-oxacalcitriol or OCT) is the first analog found to have a wider therapeutic window than 1,25(OH)2D<sub>3</sub>.[<u>104</u>]
- Calcipotriol is derived from calcitriol was first discovered during trials involving the use of vitamin D for treating osteoporosis.
- Dihydrotachysterol (DHT) is a synthetic form of vitamin D that many consider superior to natural  $D_2$  and  $D_3$ . It becomes active by the liver without needing to go through hydroxylation in the kidneys.
- Paricalcitol (19-norD<sub>2</sub>) is also derived from calcitriol. It is the first of the new vitamin D analogs to be approved for secondary hyperparathyroidism and differs from calcitriol in that it lacks the exocyclic carbon 19 and has a vitamin D<sub>2</sub> side chain instead of a vitamin D<sub>3</sub> side chain.[105]
- Tacalcitol is a derivative of vitamin D<sub>3</sub>. It is known to hinder keratinocytes in the skin.
- Doxercalciferol (1α(OH)<sub>D2</sub>) is a prodrug and must be activated *in vivo*. It is less toxic than 1α (OH)<sub>D3</sub>[<u>106</u>] when administered chronically.
- Falecalcitriol (1,25(OH) 2-26, 27-F6-D3) is approved for secondary hyperparathyroidism in Japan.[<u>105</u>] It is more active than calcitriol because of its slower metabolism.[<u>107</u>]

# CONCLUSION

Numbers of people with VDD are continuously increasing; the importance of this hormone in overall health and the prevention of chronic diseases are at the forefront of research. VDD is very common in all age groups. Very few foods contain vitamin D therefore guidelines recommended supplementation of vitamin D at tolerable UL levels. It is also suggested to measure the serum 25-hydroxyvitamin D level as the initial diagnostic test in patients at risk for deficiency. Treatment with either vitamin  $D_2$  or vitamin  $D_3$  is recommended for the deficient patients. More research is required to recommend screening individuals who are not at risk for deficiency or to prescribe vitamin D to attain the noncalcemic benefit for cardiovascular protection.

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Vitamin D: The "sunshine" vitamin

Go to:

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Go to:

#### Vitamin D: The "sunshine" vitamin

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September 20, 2016

San Francisco Planning Department 1650 Mission Street San Francisco, CA 94103

#### Subject: Eastern Neighborhoods Citizen Advisory Committee (EN CAC) Response to the EN Monitoring Reports (2011-2015)

Dear President Fong and Members of the Planning Commission:

At your September 22, 2016 Regular Meeting, you will hear a presentation on the Eastern Neighborhoods Five Year Monitoring Report (2011 – 2015). Attached, please find the statement prepared by the Eastern Neighborhoods Citizen Advisory Committee (EN CAC) in response to this report.

As you know, we are a 19 member body created along with the Eastern Neighborhoods Plans in 2009. We are appointed by both the Mayor and the Board of Supervisors and are made up of wide range of residents, business and property owners, developers, and activists. Our charge is to provide input on many aspects of the EN Plans' implementation including but not limited to: (1) how to program funds raised through impact fees, (2) proposed changes in land use policy, and (3) the scope and content of the Monitoring Report.

We have been working closely with staff over the course of the last year to assure the Monitoring Report is accurate and contains all of the material and analysis required by the Planning and Administrative Codes. At our regular monthly meeting in August, we voted to endorse the Monitoring Report that is now before you. We understand that while the Monitoring Report is to provide data, analysis, and observations about development in the EN, it is not intended to provide conclusive statements about its success. Because of this, we have chosen to provide you with the attached statement regarding the where we believe the EN Plan has been successful, where it has not, and what the next steps should be in improving the intended Plans' goals and objectives.

Several of our members will be at your September 22 hearing to provide you with our prospective. We look forward to having a dialog with you on what we believe are the next steps.

Please feel free to reach out to me, Bruce Huie, the CAC Vice-Chair or any of our members with questions or thoughts through Mat Snyder, CAC staff. (<u>mathew.snyder@sfgov.org</u>; 415-575-6891)

Sincerely,

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Chris Block Chair Eastern Neighborhoods Citizen Advisory Committee

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# Eastern Neighborhoods Citizen Advisory Committee Response to the Five-Year EN Monitoring Report (2011-2015)

# INTRODUCTION

The Eastern Neighborhoods Citizen Advisory Committee (EN CAC) is comprised of 19 individuals appointed by members of the Board of Supervisors and the Mayor to represent the five neighborhoods included in the Eastern Neighborhoods Plan (EN Plan) - Mission, Showplace Square/Potrero Hill, Central Waterfront, East SoMa and Western SoMa.

The EN CAC has prepared this document in response to the five-year monitoring report, which was prepared under the specifications of the EN Plan adopting ordinance and approved for submittal to the Planning Commission by the EN CAC on September 22, 2016. This response letter was prepared to provide context and an on-the-ground perspective of what has been happening, as well as outline policy objectives and principles to support the community members in each of these neighborhoods who are most impacted by development undertaken in response to the Plan.

# BACKGROUND

High Level Policy Objectives and Key Planning Principles of the EN Plan: The Eastern Neighborhoods Plans represent the City's and community's pursuit of two key policy goals:

- 1. Ensuring a stable future for PDR businesses in the city by preserving lands suitable to these activities and minimizing conflicts with other land uses; and
- 2. Providing a significant amount of new housing affordable to low, moderate and middle income families and individuals, along with "complete neighborhoods" that provide appropriate amenities for the existing and new residents.

In addition to policy goals and objectives outlined in individual plans referenced above, all plans are guided by four key principles divided into two broad policy categories:

The Economy and Jobs:

- 1. Reserve sufficient space for production, distribution and repair (PDR) activities, in order to support the city's economy and provide good jobs for residents.
- 2. Take steps to provide space for new industries that bring innovation and flexibility to the city's economy.

People and Neighborhoods:

1. Encourage new housing at appropriate locations and make it as affordable as possible to a range of city residents.



2. Plan for transportation, open space, community facilities and other critical elements of complete neighborhoods.

The ordinances that enacted the EN Plan envision an increase of 9,785 and over 13,000 new jobs in the Plan Area over the 20 year period - 2009 to 2029.

The Eastern Neighborhood's approval included various implementation documents including an Interagency Memorandum of Understand (MOU) among various City Departments to provide assurances to the Community that the public benefits promised with the Plan would in fact be provided.

# COMMENTARY FROM THE EN CAC

The below sections mirror the four key principles of the EN Plan in organization. Below each principle are the aspects of the Plan that the EN CAC see as "working" followed by "what is not working".

**PRINCIPLE 1.** Reserve sufficient space for production, distribution and repair (PDR) activities, in order to support the city's economy and provide good jobs for residents.

#### What Seems to be Working:

PDR has been preserved and serves as a model for other cities

A hallmark of the EN Plan is that the City preserved and protected industrial space and land in the newly created PDR Districts. In fact, many other cities with robust real estate markets often look to San Francisco to understand how the protections were implemented and what the result have been since protections were put in place. While other cities struggle with preserving land for industrial uses, the EN Plan actually anticipated the possible changes and growth we are now facing and provided specific space for industrial uses.

Job Growth in the EN, including manufacturing, is almost double the amount that was anticipated in the EN Plan.

#### What Seems to Not be Working

#### Loss of PDR jobs in certain sectors.

There is much anecdotal evidence of traditional PDR businesses being forced out of their long-time locations within UMU zones. In certain neighborhoods, the UMU zoning has lead to gentrification, as long standing PDR uses are being replaced with upscale retail and other commercial services catering to the large segment of market rate housing.



The relocation and displacement of PDR has been especially severe in the arts and in auto repair businesses.

Outside of the PDR zoning, there is no mechanism to preserve the types of uses that typified existing light industrial neighborhoods, such as traditional PDR businesses that offered well-paying entry level positions, and arts uses. This has resulted in a fundamental loss of the long-time creative arts community character of the South of Market, and now also in the Mission District and Dogpatch Neighborhood, with more to come. Traditional PDR businesses cannot afford the rents of new PDR buildings and do not fit well on the ground floor of multi-unit residential buildings. The CAC suggests that the City develop mechanisms within the Planning Code to encourage construction of new PDR space both in the PDR-only zones and the mixed-use districts suitable for these traditional uses, including exploring mandatory BMR PDR spaces.

**PRINCIPLE 2:** Take steps to provide space for new industries that bring innovation and flexibility to the city's economy.

#### What Seems to be Working:

The Mixed Use Office zone in East SOMA has produced a number of ground-up office projects which provide space for new industries that can bring innovation and flexibility to the City's economy.

There has been a substantial growth in jobs (approx 32,500 jobs) between 2010-2015 - this far exceeds what was expected over the 20 year term (13,000 jobs). The EN Growth rate appears to be much higher than most other areas of SF.

In other PDR areas, the focus of the EN Plan was to preserve land and industrial space (as opposed to constructing new industrial space) in the various PDR zones within the Plan. Based in part on the robust amount of job growth including job growth within the PDR sector and the need for new industrial space, the City did amend some of the PDR zoning controls on select sites to encourage new PDR space construction in combination with office and/or institutional space. One project has been approved but not yet constructed and features approximately 60,000 square feet of deed-restricted and affordably priced light industrial space and 90,000 square feet of market rate industrial space, for a total of 150,000 square feet of new PDR space.

#### What Seems to Not be Working

The EN Plan includes a Biotechnology and Medical Use overlay in the northern portion of the Central Waterfront that was put in place to permit expansion of these types of uses resulting from the success of Mission Bay. As of the date of this document, no proposal has been made by the private sector pursuant to the Biotechnology and Medical Use overlay. It's the CAC's view that





the residential uses of the UMU zoning in this specific area supports greater land values then those supported by the Overlay. In addition, the relatively small parcel sizes that characterize the Central Waterfront / Dogpatch area are less accommodating of larger floorplate biotechnology or medical use buildings.

**PRINCIPLE 3:** Encourage new housing at appropriate locations and make it as affordable as possible to a range of city residents.

### What Seems to be Working:

Affordable Housing has been created beyond what would have otherwise:

Throughout San Francisco and certainly in the Eastern Neighborhoods, San Franciscans are experiencing an affordable housing crisis. That being said, the EN Plan's policy mechanisms have created higher levels of inclusionary units than previously required by the City (see Executive Summary, pg. 7). For example, at the time of enactment, UMU zoning required 20% more inclusionary where density controls were lifted, and higher where additional heights were granted. In this regards, UMU has shown to be a powerful zoning tool and is largely responsible for the EN Plan's robust housing development pipeline & implementation. At the same time, community activists and neighborhood organizations have advocated for deeper levels of affordability and higher inclusionary amounts contributing to the creation of additional affordable housing.

Affordable housing funds for Mission and South of Market have been raised: Some of the initial dollars of impact fees (first \$10M) were for preservation and rehabilitation of existing affordable housing that would not have otherwise existed if not for the EN Plan.

A new small-sites acquisition and rehab program was implemented in 2015, and has been successful in preserving several dozen units as permanent affordable housing, protecting existing tenants, and upgrading life-safety in the buildings.

After a few slow years between 2010-2012, the EN Plan is now out-pacing housing production with 1,375 units completed, another 3,208 under construction and 1,082 units entitled with another 7,363 units under permit review (in sum 13,028 units in some phase of development).

#### What Seems to Not be Working

There is a growing viewpoint centered on the idea that San Francisco has become a playground for the rich. Long-established EN communities and long-term residents of these neighborhoods (people of color, artists, seniors, low-income and working class people,) are experiencing an economic disenfranchisement, as they can no longer afford to rent, to eat out, or to shop in the neighborhood. They see the disappearance of their long-time neighborhood-serving businesses and shrinking sense of community.



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Eastern Neighborhoods Citizen Advisory Committee Response to the EN Five Year Monitoring Report (2011-2015) September 20, 2016 Page 5

#### Insufficient construction of affordable housing

Although developments have been increasing throughout the Eastern Neighborhoods, we have seen a lack of affordable housing included in what is being built compared to the needs of the current community members. Market-rate development, often regarded as "luxury," is inaccessible to the vast majority of individuals and families living in the city. The demand for these units has been the basis for a notable level of displacement, and for unseen pressures on people in rent controlled units, and others struggling to remain in San Francisco. A robust amount of affordable housing is needed to ensure those with restricted financial means can afford San Francisco. We have yet to see this level of development emulated for the populations who are most affected by the market-rate tremors. It is time for an approach towards affordable housing commensurate with the surge that we have seen for luxury units.

#### High cost of housing and commercial rents

Due to the high cost of housing in San Francisco, many long-term residents are finding it increasingly difficult, if not outright impossible, to even imagine socioeconomic progress. As rents have entered into a realm of relative absurdity, residents have found it ever more challenging to continue living in the city. The only way to move up (or even stay afloat, in many cases), is to move out of San Francisco. This situation has unleashed a force of displacement, anxiety, and general uneasiness within many segments of the Eastern Neighborhoods.

#### Pace of Development

The pace of development within the Eastern Neighborhoods has far exceeded the expectations originally conceived by the City. Since the market is intended to ensure situations are harnessed to maximize profit, we have seen development unaffordable to most. With a few thousand units in the pipeline slated for the Eastern Neighborhoods, much yet needs to be done to ensure that the city can handle such rapid change without destroying the essence of San Francisco.

**PRINCIPLE 4:** Plan for transportation, open space, community facilities and other critical elements of complete neighborhoods.

#### What Seems to be Working:

# The EN Plan leverages private investment for community benefits by creating predictability for development.

With a clear set of zoning principles and codes and an approved EIR, the EN Plan has successfully laid a pathway for private investment as evidenced by the robust development pipeline. While in some neighborhoods the pace of development may be outpacing those benefits – as is the case in the throughout the Eastern Neighborhoods, there are community benefits being built alongside the development – and a growing impact fee fund source, as developments pay their impact fees as required by the EN Plan.

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Funds have been raised for infrastructure that would not otherwise be raised. To date \$48M has been raised and \$100M expected in the next five years (see Tables 6.2.3; 6.2.2)

Priority Projects have been incorporated into the City's Ten Year Capital Plan and the Implementing Agencies' Capital Improvement Plans and work programs.

The Plan has lead to the development of parks and open space recreation. Streetscape improvements to 16<sup>th</sup> Street, Folsom and Howard, 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> Streets are now either fully funded or in process of being funded.

It is expected that more street life will over time support more in-fill retail and other community services.

New urban design policies that were introduced as part of the EN Plan are positive. The creation of controls such as massing breaks, mid-block mews, and active space frontages at street level create a more pedestrian friendly environment and a more pleasant urban experience. In Western Soma, the prohibition of lot aggregation above 100' has proven useful in keeping the smaller scale.

#### What Seems to Not be Working

A high portion of impact fees (80%) is dedicated to priority projects, such as improvements to 16<sup>th</sup> Street and, Folsom and Howard Streets. The vast majority of impact fees have been set aside for these large infrastructure projects that might have been better funded by the general fund. This would allow for more funding for improvements in the areas directly impacted by the new development. This also limits the availability of funds for smaller scale projects and for projects that are more EN-centric. There are very limited options in funding for projects that have not been designated as "priority projects".

In-kind agreements have absorbed a significant percentage of the discretionary fees collected as well.

#### Absence of open space

The Eastern Neighborhoods lag behind other neighborhoods in San Francisco and nationwide in per capita green space (see Rec and Open Space Element Map 07 for areas lacking open space). Although the impact fees are funding the construction of new parks at 17th and Folsom in the Mission, Daggett Park in Potrero Hill and the rehabilitation of South Park in SOMA, there is a significant absence of new green or open space being added to address the influx of new residents. The Showplace Square Open Space Plan calls for four acres of new parks in the neighborhoods where only one is being constructed.



As a finite and valuable resource, we believe the City has an obligation to treat the waterfront uniquely and should strive to provide green and open waterfront space to the residents of the Eastern Neighborhoods and all City residents in perpetuity.

### The pace of infrastructure development is not keeping up with development

There is a lag time between development and the implementation of new infrastructure, seemingly with no clear plan for how to fund the increased infrastructure needs. The plan is now 8 years old: the number of housing units that were projected to be built under the Plan is being exceeded, and we have to date not identified additional infrastructure funds to make up the funding gap. This appears to be a clear failure in the EN Plan implementation, especially because we now have little chance to fill that gap with higher development fees.

The data contained in the Monitoring Report indicates that the EN Plan has been successful in the development of new housing. However, the pace of development appears to have far exceeded the pace of new infrastructure. This is true in each of the EN areas. There is a deficiency in transit options and development of new open space within all plan neighborhoods. A single child-care center in the Central Waterfront has been built as a part of the Plan. As of this time, not one new open space park has opened within the Plan area. The deficiency in public transportation is especially apparent. Ride services have become an increasingly popular option. However, their use contributes to the traffic congestion that is common throughout the city of San Francisco.

#### The impact fees inadequate

Although the amount of impact fees currently projected to be collected will exceed the sums projected in the Plan, the funding seems inadequate to address the increasing requirements for infrastructure improvements to support the EN Plan. The pace of development has put huge pressure on transportation and congestion and increased the need and desire for improved bike and pedestrian access along major routes within each Plan neighborhood. There is a striking absence of open space, especially in the Showplace/Potrero neighborhood. There has been a significant lag time in the collection of the Plan impact fees and with the implementation of the community benefits intended to be funded by the fees.

Large portions of impact fees are dedicated, which limits agility with funding requests from discretionary fees. The CAC has allocated funding for citizen-led initiatives to contribute a sustainable stream of funding to the Community Challenge Grant program run out of the City Administrators' office. Our past experience is that this program has doubled capacity of local "street parks" in the Central Waterfront from 2 to 4 with the addition of Tunnel Top Park and Angel Alley to the current street parks of Minnesota Grove and Progress Park.



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Eastern Neighborhoods Citizen Advisory Committee Response to the EN Five Year Monitoring Report (2011-2015) September 20, 2016 Page 8

#### Impacts of non-EIR projects

Data in the report does not properly reflect the impacts of non-EIR projects, such as Pier 70, recent UCSF expansion into Dogpatch and the Potrero Annex. These very large projects are not required to provide impact fees; the public must rely on the developers working with the community to add benefits to their projects.

Upcoming non-EIR projects such as the Warriors arena, Seawall 337 / Pier 48, continued housing development in Mission Bay and UCSF student housing further increase the pressures of density on the neighborhoods. The square footage included in these various projects may equal or exceed all of the projects under the EN Plan. Although these projects are not dependent on the EN Plan to provide their infrastructure, their impacts should be considered for a complete EN approach to infrastructure and other improvements.

#### Deficiency in Complete Neighborhoods

Complete neighborhoods recognize the need for proximity of daily consumer needs to a home residence. Combining resources to add shopping for groceries, recreation for families, schools for children will create a complete neighborhood. This will then have the additional benefit of reducing vehicle trips.

Many new developments have been built with no neighborhood -serving retail or commercial ground floor space. The UMU zoning has allowed developers to take advantage of a robust real estate market and build out the ground floor spaces with additional residential units, not neighborhood services such as grocery and other stores.

#### Evictions and move-outs

There are many reports of long-term residents of the neighborhoods being evicted or forced or paid to move out of the area. Younger, high wage-earning people are replacing retirees on fixed incomes and middle and low wage earners.

#### Traffic congestion and its impact on commercial uses

Transportation improvements have not kept pace with the amount of vehicular traffic on the streets, leading to vehicular traffic congestion in many parts of the Eastern Neighborhoods. While the slow movement of traffic has affected all residents, it has become a serious burden for businesses that rely on their ability to move goods and services quickly and efficiently. The additional transit that has been implemented through MUNI Forward is welcome but not sufficient to serve new growth. There does not seem to be sufficient increase in service to meet the increase in population.

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Eastern Neighborhoods Citizen Advisory Committee Response to the EN Five Year Monitoring Report (2011-2015) September 20, 2016 Page 9

## Loss of non-profit and institutional space

There are many reports of non-profits and institutions being forced to relocate due to rent pressures.

# Urban Design Policies and Guidelines

While the EN Plans did provide urban design provisions to break up building and provide active frontages, additional urban design controls are warranted. New buildings would be more welcome if they provided more commercial activity at the ground level. Other guidelines should be considered to further break down the massing of new structures.

# PROPOSED STRATEGIES TO ADDRESS WHAT'S NOT WORKING:

# **Retaining PDR:**

- Study trends of specific PDR sectors, such as repair and construction to see what is happening to them.
- Implement temporary or permanent relocation assistance programs for displaced PDR tenants through the OEWD.
- Consider implementing programs to transition workers from PDR sectors being lost.
- Potentially preserve additional land for PDR both inside and outside of the EN (i.e. Bayshore).
- Establish new mechanisms and zoning tools to encourage construction and establishment of new and modern PDR space within the PDR districts.
- The EN Plan should consider making a provision for temporary or permanent relocation assistance for PDR uses displaced by implementation of the EN Plan and/or use impact fees to assist in the acquisition/development of a new creative arts facility similar to other city-sponsored neighborhood arts centers like SOMArts.

# **Retaining Non-Profit Spaces:**

- Study impacts of rent increases on non-profit office space.
- Where preservation/incorporation of PDR uses will be required (i.e. Central Waterfront), consider allowing incorporation of non-profit office as an alternative.
- Consider enacting inclusionary office program for non-profit space, PDR, and similar uses.

# Housing

- Consider increases in affordability levels.
- More aggressively pursue purchasing opportunity sites to ensure that they can be preserved for affordable housing before they are bought by market-rate developers.

C-144

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Eastern Neighborhoods Citizen Advisory Committee Response to the EN Five Year Monitoring Report (2011-2015) September 20, 2016 Page 10

# Infrastructure / Complete Neighborhoods

- Work with Controller's Office, Capital Planning Office, and the Mayor's Budget Office to solve the existing known funding gap for EN Infrastructure Projects.
- Deploy impact fees more quickly or find ways to use impact fees to leverage other sources that could be deployed sooner (i.e. bond against revenue stream).
- Consider increasing impact fee levels.
- Increase amount of infrastructure, such as additional parks, given that more development has occurred (and will likely continue to occur) than originally anticipated.
- Study how to bring infrastructure improvements sooner.
- Study new funding strategies (such as an IFD or similar) or other finance mechanisms to supplement impact fees and other finance sources to facilitate the creation of complete neighborhoods, a core objective of the EN Plan.
- Improve the process for in kind agreements.
- Consider allocation of waterfront property to increase the amount of green and open space for use by the general public, as illustrated by the successful implementation in Chicago.
- Review structure of the EN CAC. Consider how the CAC can deploy funds faster. Possibly broaden the role of the CAC to include consideration of creation of complete neighborhoods.
- Consider decreasing the number of members on the EN CAC in order to meet quorum more routinely. Impress on the BOS and the Mayor the importance of timely appointments to the CAC.
- Consider legislation that would enable greater flexibility in spending between infrastructure categories so that funds are not as constrained as they are currently set to be by the Planning Code.
- Explore policies that maximize the utilization of existing and new retail tenant space for neighborhood serving retail, so that they are not kept vacant.

# Non EN-EIR Projects

• Encourage the City to take a more holistic expansive approach and analysis that include projects not included in the current EN EIR or the EN Geography.



# SAN FRANCISCO PLANNING DEPARTMENT

# **RESIDENTIAL PIPELINE** COMPLETED AND ENTITLED HOUSING UNITS 2007 to 2014

California state law requires each city and county to adopt a Housing Element as a part of its general plan. The State Department of Housing and Community Development (HCD) determines a Regional Housing Need (RHNA) and sets production targets that each jurisdiction's Housing Element must address. The RHNA allocation represents the minimum number of housing units that a region must plan for in each reporting period.

The table below shows completed units to the fourth quarter of 2014 (Q4), or the end of the 2007-2014 RHNA reporting period.

2014 Q4	RHNA Allocation 2007 - 2014	Units Built 2007 - 2014	Percent of RHNA Targets Built	
Total Units	31,193	20,455	65.6%	
Above Moderate ( > 120% AMI )	12,315	13,391	108.7%	
Moderate Income ( 80 - 120% AMI )	6,754	1,283	19.0%	
Low Income ( < 80% AMI )	12,124	5,781	47.7%	

The second table below lists production targets for the new 2015-2020 RHNA reporting period. It also accounts for units that have received entitlements from the Planning Department but have not been built as of December 31, 2014. Once completed, these entitled units will count towards the 2015-2022 RHNA production targets. The total number of entitled units is tracked by the San Francisco Planning Department and is updated quarterly in coordination with the *Quarterly Pipeline Report*. Publicly subsidized housing units (including moderate and low income units) and inclusionary units are tracked by the Mayor's Office of Housing; these are also updated quarterly.

2014 Q4	RHNA Allocation 2015 - 2022	Entitled by Planning*	Percent of RHNA Targets Entitled by Planning	
Total Units	28,869	13,860	48.0%	
Above Moderate ( > 120% AMI )	12,536	11,996	95.7%	
Moderate Income ( 80 - 120% AMI )	5,460	676	12.4%	
Low Income ( < 80% AMI )	10,873	1,188	10.9%	

\*These totals do not include a total of 23,270 net new units from three major entitled projects: Hunters' Point, Treasure Island and ParkMerced. However, Phase I of Hunter's Point (about 444 units) is under construction and is included in this table.

C-146

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# **RESIDENTIAL PIPELINE** ENTITLED HOUSING UNITS 2017 Q3

San Francisco reports actual production in its progress towards meeting RHNA goals. These figures are submitted annually on April to the State Department of Housing and Community Development. The following table shows actual production – i.e. built units – through the third quarter of 2017.

### Progress Towards Meeting 2022 RHNA Production Goals, as of 2017 Q3

	RHNA Housing Goals, 2015 - 2022	Actual Production, 2015-2016	Actual Production, Q1 to Q3 2017	Actual Production, 2015 to Q3 2017	Actual Production, 2015 to Q3 2017 as % of RHNA Housing Goals
TOTAL	28,869	10,026	1,997	12,023	41.6%
Very Low Income	6,234	2,048	206	2,254	36.2%
Low Income	4,639	537	416	953	20.5%
Moderate Income	5,460	489	30	519	9.5%
Above Moderate	12,536	6,952	1,345	8,297	66.2%

Administrative Code 10E.4 (b)(1) calls for a summary of data on the total number of units at various stages of the housing production process and how completed and pipeline projects compare with San Francisco's Regional Housing Need Assessment (RHNA) production goals. The table below presents a summary of completed units and development projects in the current residential pipeline to the third quarter of 2017 (Q3).

# Summary of Completed and Entitled Units, as of 2017 Q3, As Required by Administrative Code 10E.4(b)(1)

	RHNA Housing Goals, 2015 - 2022	Actual Production, 2015 to Q3 2017	Total Entitled by Planning, 2017 Q3*	Actual Production and Entitled, 2017 Q3*	Actual Production and Entitled, as % of RHNA Housing Goals
TOTAL	28,869	12,023	21,529	33,552	116.2%
Very Low Income	6,234	2,254	344	2,598	41.7%
Low Income	4,639	953	1,913	2,866	61.8%
Moderate Income	5,460	519	835	1,354	24.8%
Above Moderate	12,536	8,297	18,437	26,734	213.3%

\* This column does not include seven entitled major development projects that are not expected to be fully completed within this current RHNA reporting period. These projects have a total of 25,790 net new units, including about 5,490 net affordable units (23% affordable). However, phases of these projects are included when applications for building permits are filed and proceed along the development pipeline.

C-147



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Planning Information: 415.558.6377 The residential pipeline for the purposes of this report only includes entitled projects. The following table shows entitled units at various stages of development but are not yet built. Units under construction and projects with active building permits are likely to be completed within the RHNA reporting period. Typical duration from filing of building permit to building completion typically ranges from two to four years, depending on the size and complexity of the project. The current eight year RHNA period ends in 2022.

	Entitled by Planning, No Permits Filed*	Entitled, Building Permit Filed	Building Permit Approved or Issued	Under Construction	Total Entitled by Planning*
TOTAL	6,178	2,846	5,931	6,574	21,529
Very Low Income	-	-	118	226	344
Low Income	184	32	734	963	1,913
Moderate Income	358	107	73	297	835
Above Moderate	5,636	2,707	5,006	5,088	18,437

# Entitled Units, 2017 Q3

\* This column does not include seven entitled major development projects that are not expected to be fully completed within this current RHNA reporting period. These projects have a total of 25,790 net new units, including about 5,490 net affordable units (23% affordable). However, phases of these projects are included when applications for building permits are filed and proceed along the development pipeline.

The State Department of Housing and Community Development (HCD) determines these RHNA goals that San Francisco's Housing Element must address. The RHNA total is the minimum number of housing units that a region or jurisdiction must plan for in each RHNA reporting period. The total number of entitled units is tracked by the San Francisco Planning Department and is updated quarterly in coordination with the *Quarterly Pipeline Report*. Subsidized housing units – including moderate and low income units – as well as inclusionary units are tracked by the Mayor's Office of Housing; these are also updated quarterly.