

Vitamin D and Pediatrics

Recent pediatric studies relating to vitamin D levels and infant development have added to growing evidence of the importance of vitamin D sufficiency in neonatal development. The data from these studies strengthens the case for an Alaskan-wide newborn vitamin D testing project.

A 2012 study conducted in Perth, Australia (Whitehouse, et al.) found that maternal blood concentrations of vitamin D during the second trimester of pregnancy had a significant positive association with language outcomes of the offspring, measured at 5 and 10 years of age. The study of 743 Caucasian mother-infant pairs found that for women with a vitamin D insufficiency (equal to or less than 18.4 ng/ml) during pregnancy the risk of having a child with moderate to severe clinical language difficulty was more than twice as great as women with vitamin D serum levels greater than 28 ng/ml. This large scale study shows an association between low maternal serum levels and offspring language impairment.

Another 2012 study conducted among 1820 mother-infant pairs in four locations in Spain (Morales, et al.) found a positive correlation between maternal blood serum concentrations of vitamin D during pregnancy and infant psychomotor and mental scores at 14 months. Infants of mothers with a vitamin D concentration greater than 30 ng/ml showed higher mental and psychomotor scores in comparison with infants of mothers under 20 ng/ml. The statistically significant sample size of this study adds to evidence that prenatal vitamin D levels can affect brain development. This study also offers relevant latitude-based results; the data from the four locations of study, Valencia (at 39°N latitude), Sabadell (at 41°N latitude), Gipuzkoa (at 42°N latitude) and Asturias (43°N latitude), showed that the locations with the northernmost latitudes had the lowest percentages of vitamin D sufficient mothers.

A 2011 study conducted in Philadelphia (Bodnar, et al.) among 200 white mother-infant pairs and 200 black mother-infant pairs found statistically significant difference in rates of vitamin D sufficiency between white and black pairings. At delivery 29.2% of black women were deficient (<15 ng/ml) and 54.1% insufficient (15-32 ng/ml), with black infants 45.6% deficient and 46.8% insufficient. That is compared with 5% and 42.1% of white women and 9.7% and 56.4% white infants.

This could be because African Americans have higher levels of the skin pigment melanin, which absorbs UV B photons and stops the body's creation of vitamin D. Additionally, the study shows that black women had a smaller mean increase in vitamin D levels between spring and summer, supporting the evidence that they are less able to synthesize vitamin D when exposed to typical sunlight. Furthermore, the data shows that over 66% of white infants and 92% of black infants in Philadelphia were vitamin D deficient or insufficient, despite approximately 90% of both groups of pregnant women reporting taking prenatal vitamins.

THE CASE FOR ALASKA: The studies in Australia and Spain (among others) have shown a connection between prenatal vitamin D levels and neural development in children and infants: specifically in language, psychomotor, and mental development. The study in Spain, conducted in four locations, provides evidence that populations at higher latitudes have lower rates of vitamin D sufficiency. The Philadelphia study shows that race (or skin pigmentation) has an effect on the body's levels of vitamin D. Alaska is further north than any of the locations studied in Spain, suggesting our state may have even lower levels of vitamin D sufficiency. Alaska includes diversely pigmented ethnic groups that may have differing levels of vitamin D. The long sleeve clothing worn in Alaska to avoid mosquitoes may also imitate the solar shield of pigmentation, leading to vitamin D insufficiency.

If we establish a project in Alaska to test newborn vitamin D levels across a wide spectrum of locations and population groups, the collected data would provide insight into how our populations are affected by Alaska's northern latitude and which subgroups are at a greater risk of vitamin D deficiency. If results show that Alaskan newborns are vitamin D deficient, the implications of neurodevelopmental effects from studies such as Australia (Whitehouse et al.) and Spain (Morales et al.) may help explain why some of our education strategies have not yet yielded the results we expect.