

# VITAMIN D

## Assessing fortification with Vitamin D

**V**itamin D is one of the essential micro-nutritional elements for health and well being in our diet, and yet, its presence is very low in the foods we eat daily. Foods that are rich in natural vitamin D levels include oily fish, such as mackerel or salmon and shiitake mushrooms, but are not as commonly consumed as milk or bread. Recommended daily levels of vitamin D are 10 micrograms (mcg) per day for children and adults, which include women who are pregnant or are breastfeeding. A recent peer reviewed study has led to the question, should we be making vitamin D fortification mandatory for everyone?

Chemically, Vitamin D refers to the fat-soluble secosteroids group that act on increasing absorption in the body of calcium, iron, magnesium, phosphates and zinc. The compounds that we as humans need the most are vitamin D3 (Cholecalciferol) and vitamin D2 (Ergocalciferol) to prevent a number of problems and diseases. Deficiency of vitamin D is well known to cause Rickets, as was seen in Victorian England, however it can also be responsible for Osteomalacia (bone softening and fracture risk), Diabetes and skin pigmentation changes. This last factor is especially prevalent due to the mechanism by which we absorb the highest concentration of vitamin D, Sunlight.

Research has shown that people with darker skin living in temperate climates have lower vitamin D levels. They are less efficient at synthesizing the necessary compounds because of an increased melanin level, a factor that is not present in Caucasians. However, this does affect Caucasian populations in countries such as Iceland with limited yearly sunlight hours. Around 94 percent of their demographic is of Norse or Celtic descent and a study in 2012 by Illari Paakari, Professor of Medical Science at Helsinki University concluded that, “all the evidence that we have supports the idea that vitamin D concentrations have an inverse relationship to the occurrence of numerous diseases. It is known that breast cancer, intestinal cancer and MS are like this.”

A study by the British Medical Journal (BMJ 2017;356:i6583) in 2017 illustrated that supplementation of vitamin D could prevent the common cold or flu. Its lead author, Adrian Martineau, a clinical professor of respiratory infection and immunity at Queen Mary University of London argued, “The results are likely to change the cost/benefit analysis significantly.” To give this some context, around 70 percent of the UK population has a cold or the flu in any year with 25 percent seeking medical assistance from GP’s. Most are given antibiotics, which is ineffective as they aren’t the optimal treatment for a viral based infection. With around 300,000 hospitalizations a year in the UK for respiratory infections, including Pneumonia, and approximately 38,000 deaths, there is an obvious need to change the way we think about food fortification.

Early attempts at mandatory fortification in margarine have shown that simple steps can dramatically change the population intake level. There are plans to increase fortification in staple foods such as milk, orange juice, cereals and flour. Milk is

already fortified with vitamin D in the United States; vegetarian produce is fortified with B12 and other minerals. There are however still issues, particularly for children. Poor family dietary habits, lack of knowledge and economic constraints mean that micro-malnutrition is still a factor in developed countries perhaps as much as it is in developing countries.

Thankfully this is changing. In the UK as of 2015, Marks & Spencer, a leading retailer has now added vitamin D to its bread in response to consumer concern about their nutrition. Under UK law, all wheat flour except wholemeal must be fortified with calcium, iron, niacin and thiamine, but it is particularly refreshing to see suppliers and distributors acting on providing more than the legal minimum.

For bread, this is especially important. The milling of grain for both white and brown flour can remove several nutrients. White flour uses around 75 percent of the grain and brown uses about 85 percent. Whilst the milling process produces a finer, smoother product, it eliminates the B vitamin group, which is why they have to be added back. Wholemeal flour, as the name suggests, uses 100 percent of the grain and still contains bran, which holds its nutrient value.

### Optimal vehicle for nutrient delivery

Vitamin D by contrast has zero trace in flour, which considering it is the most widely consumed food globally, is the optimal vehicle for nutrient delivery. Research conducted by Dr. Rachel E Allen at the Department of Health in London found that if flour is fortified with 10mcg per 100g it is more effective than fortification of milk, without exceeding the tolerable levels. “This study provides new evidence that vitamin D fortification of wheat flour could be a viable option for safely improving vitamin D intakes and the status of United Kingdom population groups at risk of deficiency without increasing risk of exceeding current reference thresholds.”

If flour were to be fortified with this level of nutrients, then the percentage of at-risk individuals estimated to have below the daily-recommended amount of vitamin D would be 50 percent, which in turn is reduced from the current 93 percent.

Despite the evidence to suggest that fortification would be a health improvement, the research is ongoing and there is not necessarily a rush to implement vitamin D into the food chain. Dr. Allen was keen to stress that, “the requirement for additional research surrounding vitamin D is substantial.” She went on to address the possibility of too much vitamin D should consumers and manufacturers become caught up in the wave of feeling that vitamin D fortification and supplementation was 100 percent necessary.

“There are gaps in the knowledge in relation to the biology of vitamin D, the relation between intake and the serum 25(OH)D (vitamin D levels in the body) concentration, and the potential impact of deficiency and excess on bone health and other chronic diseases, which suggests that additional research is required before fortification is implemented in the United Kingdom. Before the introduction of universal fortification, a detailed impact assessment including consumer research on its public acceptability would be required.” ☺