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FOODS FORTIFIED WITH VITAMIN D. MITH OR REALITY?

Dear Editor,

Vitamin D is currently considered a pleiotropic hormone. In fact, in addition to its contribution to bone metabolism, vitamin D fulfils a broad spectrum of biological functions related to proliferation, differentiation and cell metabolism. Vitamin D deficiency has been involved in autoimmune diseases, infections, neuropsychiatric disorders, cardiovascular risk and several types of cancer (1-3).

Naturally, vitamin D is synthesized mainly from skin exposure to solar radiation, while a smaller amount comes from natural dietary sources. Very few foods naturally contain vitamin D and, furthermore, they are not exactly the most consumed ones. These include oily fish such as herring (27.0 µg/100 g), salmon (9.9 µg/100 g), sardines (7.9 µg/100 g), tuna (4.5 µg/100 g) and mackerel (4.0 µg/100 g), sun-dried mushrooms (3.9 µg/100 g) and, especially, cod liver oil (210 µg/100 g) (4).

The Institute of Medicine suggest that infants aged 0-1 yrs require at least 10 µg/d (400 IU) of vitamin D, and children aged 1 yr and older (1-18 yrs) require at least 15 µg/d (600 IU) to maximize bone health. It also suggests that all adults aged 19-70 and > 70 years require at least 15 µg (600 IU) and 20 µg/d (800 IU), respectively, of vitamin D to maximize bone health and muscle function. To date, vitamin D guidelines have generally been based on the beneficial effects of vitamin D on musculoskeletal health and, to a lesser extent, on non-skeletal health (6,7).

At present, vitamin D deficiency is a global health problem that affects all ages and races (3,6). This eventuality is probably related to the changes that have occurred in human lifestyle habits in recent decades (little outdoor activity, always wearing clothes and frequently using sunscreen). Systematic vitamin D food fortification is an effective and safe alternative to improve vitamin D status in the general population (7).

Vitamin D fortification policies among European countries are quite heterogeneous. The vast majority of European countries, including Spain, do not appear to have established policies to adequately fortify a relevant range of foods with vitamin D. The systematic (mandatory) vitamin D food fortification in the US, Canada and Finland may provide important guidance for health authorities in other regions (Table I) (8). In particular, the example of Finland (mass fortification of milk, margarine/fat spread; fortification of selected brands for yogurt, orange juice, plant-based milk such as soy, oat or almond milk, bread, cereals) has considerably improved vitamin D status in the general Finnish population. This experience could serve as a benchmark for future vitamin D food fortification policies in other countries (10).

Foods fortified with vitamin D are an affordable and easily implemented solution to a global public health problem. There is a long and successful experience in those countries that have already implemented systematic vitamin D food fortification. It would be advisable for health authorities to design mass mandatory vit. D fortification strategies of at least one basic food product, preferably fluid milk, and make them widely available.

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Table I. Vitamin D food fortification in the United States, Canada and Finland (adapted from [8])

Food (serving)*	United Sates	Canada	Finland
Mass fortification (usually mandatory)			
Fluid cow's milk (250 ml or 1 cup)	2.5-5.0†	2.5-5.0	2.5
Margarine/Fat spread (10 g)	-	1.5-3.0	2.0
Fortification of selected foods			
Yogurt	1.5-5.0 per 170 g	1.0 per 100 g	0.5-1.0 per 100 g
Cheese slice (16 g)	1.5	-	-
Orange juice (125 ml or 1/2 cup)	1.25	1.25	1.25
Plant-based milk (250 ml or 1 cup)	1.5-3.0	1.5-3.0	1.9-3.75
Margarine 10 g	0.75-5.0	-	-
Bread (100 g)	2,25	-	1.7
Cereals, ready-to-eat (1/2-3/4 cup)	1-2.5	1.0	3.0 per 100 g

**Vitamin D per serving in µg (1 µg = 40 IU). †FDA in 2016 permitted voluntary "doubling" of mandatory vitamin D in milk.*

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