

Editorial

Blinded by science, pragmatism forgotten

Some of the best brains in North America have worked for over a year to produce the Institute of Medicine's (IOM) report on vitamin D⁽¹⁾ and so we expect expertise and wise words. However, despite great care in sifting evidence, careful application of method and a desire for transparency, the report has turned out to be very controversial. Its wisdom and method are now being questioned, as can be seen from the letters published in this issue of *Public Health Nutrition*.

Of course expertise by its nature is always limited in scope and deep rather than wide. Experts often suspect the expertise of others because they understand the limitations and shortcomings of specialist knowledge. So in forming a committee of experts we generally try to include people who are not all expert in the subject in question. This, we hope, will provide a certain breadth of vision. Experts on the IOM's committee on vitamin D may well have been selected using such criteria but inevitably there were gaps.

The committee has shown a marked preference for conclusions based on randomised controlled trials. We can all understand a bias of this kind because clinical trials, when they can be done, may produce very clear conclusions and settle issues of causality unequivocally. However, much of the information that has accumulated linking insufficient vitamin D and sunshine with disease is observational. This work has been built up over many years and provides a largely consistent story.

The observational evidence has accumulated strength that goes beyond randomised trials because very different surrogate variables all tend to point to the same conclusion. These variables include exposure to sunlight, colour of skin, latitude, studies of disease in migrants, diet, and vitamin D assays of blood as well as laboratory studies and animal work. Latitude, for example, provides a measure of sun exposure throughout a lifetime and so might be expected to pick up long-term effects that cannot be discovered in a randomised trial that must be limited in duration.

Evidence that we already have suggests strongly that insufficient vitamin D in pregnancy and early life is a cause of multiple sclerosis (MS); perhaps not a unique cause but one without which MS is unlikely to occur⁽²⁾. This is supported by revealing experiments which show that vitamin D interacts directly with numerous sites on the genome, providing us with a new understanding of the nature–nurture interaction⁽³⁾. This work was available for the IOM to consider but it seems, like much else, to have been overlooked. Indeed the whole MS story

deserved much closer scrutiny by the IOM committee but it did not fit their template and so was given short shrift.

When the committee has been generally industrious and careful in its chosen method it seems harsh to conclude that its work has been less than adequate. The committee has had worthy aims. It says itself that it endeavoured to come to conclusions even when evidence might be incomplete. However its peremptory dismissal of the MS evidence suggests it lacked patience when it couldn't find the sort of evidence that it had decided, *a priori*, was needed. The committee aimed at transparency but has not published the responses of referees who were asked to comment on an incomplete version of the report. Crucially, the referees were not invited to comment on the conclusions.

Most cogent of the criticisms of the IOM report mentioned by several of our correspondents has been a failure to recognise the true baseline for normal vitamin D metabolism. Human beings appear to have lived as naked creatures in East Africa for about a million years before they began to use animal skins as capes to cover their shoulders⁽⁴⁾. But tailored clothing, something like we know it today, was not devised until about 40 000 years ago when needles first appear in the archaeological record⁽⁵⁾. The invention of tailored clothing may have been an important factor enabling the first modern human beings to settle permanently in Europe with its cold winters about 30 000 years ago. In Africa there was plenty of sunshine and plenty of vitamin D. Not so in Europe, where there were long winters and people were covered in clothing. This must have been when our species first began to evolve a lighter skin as an adaptation to the shortage of sunshine and vitamin D⁽⁶⁾.

But it was the establishment of large cities in Europe and the USA that led to gross deprivation of vitamin D together with epidemics of rickets and tuberculosis, known then as the 'white plague' from the pallid sun-starved complexions that went with it. Cities were unhealthy places because of the narrow sunless streets and smog which cut out the sun, as well as the lack of drains and the polluted water. The problem of cholera and the effect of bad drains on health were understood fully for the first time in the mid-19th century, 150 years ago. It has taken us much longer to understand the importance of sunlight and the impact of vitamin D on the human body at different stages of life.

Identification of vitamin D enabled the fortification of milk in the 1930s. Interestingly it was not a scientific committee but public demand that led to universal fortification

of milk in the USA⁽⁷⁾. At the same time the public began to enjoy leisure time in the sun. This reached a peak at the end of World War II when a French engineer is said to have invented the bikini. Sun worship became the order of the day. Around the same time the development of electricity brought about a revolution in home heating and with it came clean air acts and regulations that did much to reduce city smog and allow penetration of UV to ground level. It seemed for a while that we had all the vitamin D we needed and that rickets, which had plagued the cities of North America and Europe, had been defeated.

Then, as houses became more comfortable with air conditioning we began to spend more time indoors. African Americans who used to live in the country in the sunny south migrated in large numbers to less sunny northern cities where their dark skin limited the vitamin D they could gain. Fashions changed and children stopped wearing shorts as their regular summer clothes. Fear of skin cancer, fostered by cancer charities, together with the invention of sun creams limited sun exposure once more. Now computers and screen games keep us indoors even more. In Europe rickets began to appear again and illness caused by overuse of high-factor sunscreen has been recognised. We have come a very long way from our origins in central Africa and a very long way too from the first pioneers who colonised Europe following the Ice Age, or indeed from the native Americans who spent their lives outdoors and (as seen by the first settlers) often wore loose, off-the-shoulder clothing.

We all have a sketchy knowledge of these historical developments. It does not need an archaeologist, an anthropologist or a social historian to be on the IOM committee for them to take account of human history and its implications. Indeed, all they needed to do was consider a more natural outdoor lifestyle as the norm for blood levels of vitamin D (25(OH)D), rather than the levels found in modern city dwellers which in truth are often pathological.

So a new method presents itself. We determine the levels of vitamin D to be found in people who spend most of their time outdoors wearing informal clothing that exposes at least arms, legs and shoulders much of the time, e.g. lifeguards or professional gardeners. That can provide us with a norm for the blood level of vitamin D under relatively natural conditions. Then all we have to do is ask how best city dwellers can achieve this norm, or something near it which provides the same physiological outcome. In this way it is possible to calculate how much vitamin D supplement needs to be taken to replicate

natural conditions. This approach was described by Reinhold Vieth some years ago⁽⁸⁾.

However the IOM committee has allowed itself to be blinded by science. It has finessed a method that has summarised much evidence and produced a massive report. It claims that its methods consider incomplete data. In fact it has devised analytic premises designed primarily to identify certainty that fits its template. We need to review whether the method used by the IOM was fit for purpose because there will be other important issues on which it will deliberate. True transparency is needed at all stages, with referees contributing to the final conclusions. The conclusions are too important to be decided in camera by a small clique of experts and then, as it were, imposed *ex cathedra*.

So far as vitamin D is concerned we must start again using more pragmatic premises and a simpler method. Indeed the public is more pragmatic and, as with fortification in the 1930s, it seems likely that public opinion and public demand will get ahead of professed expertise.

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