

THE VITAMINS IN MEDICINE

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"This book is a review and appraisal of our current knowledge of the vitamins, with correlation of their chemistry, physiology, nutritional importance and clinical uses. It may be considered as a source book in that it contains approximately 4,500 references to the literature, and the discussion is extensive and often detailed. Information of this type and scope presumably has not been collected previously in a single work. While the authors have attempted a critical evaluation of the literature, they themselves state that they cannot hope to have avoided errors of judgment in selection and interpretations of the literature. Though critical readers may expect to find a number of interpretations at variance with their own, the book nevertheless is worth while and should serve its purpose well. It should be valuable to any one with a scientific interest in vitamins. It is profusely illustrated, and the illustrations are clear and well chosen. Comment on specific phases is not attempted because of the great variety and extensive ramifications of the subject matter."

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DENTAL DECAY

There is such a widespread belief that lack of vitamin D is the chief cause of dental decay that it seems important to consider the subject in some detail. Dental decay, or dental caries, is due to the destruction of the enamel and dentine of the teeth by saprophytic organisms. Their growth and the progress of decay may be assisted by any one of several different factors. The more important are (a) the use of refined foods, especially white flour and white sugar, (b) the use of heated milk instead of raw milk, (c) the failure of the individual to produce "immune saliva," and (d) possibly, but improbably, a diet deficient in vitamin D.

Refined Foods. The bad effects of refined foods have been observed for many years. The most classical observations were made on the island of Tristan de Cunha. When the island was visited in 1932 caries was practically non-existent, especially among people of under fifty. No food was imported, the islanders living entirely on the unrefined produce of the island. In the next five years, however, a large amount of refined flour and sugar was left by visiting ships, so that the inhabitants suddenly had added to their diet foods which they had never had before save in minute quantities at long intervals. The result from the point of view of dental decay was tragic. Barnes [103] observed that in only five years caries from being almost unknown in children was common, while in adults between forty and fifty years old it had increased by fifty per cent.

If further proof is required of the effect of refined foods it is furnished by the teeth of the Bantu [104]. These people had exceptionally fine teeth, but when they started eating refined European foods caries became as common as in England. In one generation perfect teeth, which have often been considered to be an inherited racial characteristic, were utterly lost. That it was the fault of their new foods appears certain because there was no other change in their manner of life which appeared to have any possible significance. The increase in dental decay in the island of Lewis also tells the same story [105].

It is generally stated that white flour and sugar cause decay by clinging round the teeth while coarse fibre-containing flours and sugarless foods being less sticky are easily removed by the natural self-cleansing action of the mouth—the "detergent diet" of Sim Wallace. The sticky white flour and sugar are decomposed by bacteria, thus producing acids which erode the enamel. This appears to be true, but is not the whole truth about the bad effects of refined foods.

The work of Osborn and Noriskin [106] showed that unrefined sugars and cereals have a protective action against the destruction of enamel. When they incubated human teeth with saliva and white flour, or refined sugar, the enamel was dissolved. If, however, wholemeal flour or unrefined sugar were used the enamel was hardly affected, especially with the unrefined sugar.

The protective substance present in unrefined food has not yet been isolated, but its action is not dependent on any change of acidity in the saliva. It explains the puzzling observations that dental decay may be absent in the mouths of native children whose teeth are always coated in sticky sugar from eating raw sugar cane all day [104].

Heated Milk. Raw milk, that is unpasteurized and unboiled milk, has a very marked protective action against dental decay. This was found to be so by Sprawson [107], who noticed a sudden startling fall in caries in a children's institution. The only change which had been made was giving each child daily a pint of raw milk. Further enquiries among dentists confirmed that children brought up on raw milk—either cow's or goat's—were free of caries. Sprawson [108] also points out that in the island of Pitcairn caries was very common, while in Tristan de Cunha it was very rare. The only difference between the diets was that in the latter island raw milk was drunk though probably less vitamin D was taken.

In the first edition of this book the contentious subject of pasteurization was discussed in its wider aspects. As, however, one of the authors (F. B.) believes pasteurization is unwise while the other (F. P.) believes in its value, it seems better to omit this wider discussion, referring the reader to the sections in each chapter for the narrower issue of how pasteurization alters the individual vitamins of milk.

Immune Saliva. Fish [112] has pointed out that some human saliva prevents decay and some does not. Dog's saliva always does so, while monkey's saliva varies as in man. When Fish placed carious human teeth in a dog's mouth in a few days they were sterile; the saprophytic organisms which cause decay had been destroyed. The same occurred if a carious tooth was incubated with human saliva from a man with no active caries. But saliva from a mouth with progressive caries did not sterilize the tooth nor did that from a monkey with caries. There is, therefore, a quality in immune saliva which protects teeth from the organisms of decay. This immune saliva is most frequent after adolescence and is commoner in men than women [113]. If it is the product of a healthy general metabolism it would explain why a good diet gives protection against caries in children, without having to postulate the unsatisfactory theory that the protection apparently given in some cases by vitamin D is directly due to improved dental calcification [183].

Traces of fluorine in the drinking water cause mottling of the enamel of the teeth. Such teeth are very resistant to decay, even when the mottling is so slight as not to be aesthetically objectionable [181]. It is possible that the fluorine, excreted into the saliva, acts by inhibiting the growth of saprophytic organisms in the mouth: in other words a form of immune saliva is produced.