

There are two characteristics common to both vitamins A and E. They are both fat soluble, and both are necessary to reproduction. The need for these vitamins in reproduction is evident particularly for human beings and other mammals, is less essential for single celled organisms like paramecium or yeast.

Tissues that have rapidly proliferating cells, epithelial tissue being the outstanding example, must have vitamin A and E to prevent degenerative changes. Apparently, these vitamins are necessary to the proper formation of the chromatin elements of the cell nucleus.

Rosenberg reviews the few facts known about the physiology of these vitamins as follows:

(Vitamin A) "A possible clue to (the mechanism of) vitamin A action may be seen in the increase of purines in the growing vitamin A-depleted tissue after this vitamin has been administered. Purines are necessary building units of cell nuclei. Actually all the primary and secondary symptoms of vitamin A deficiency can be explained in this basis." (1)

It is my opinion that the purin components of the blood must be protected with a protective coating of a fat complex including vitamin A, to prevent the known toxic effects of the purines from being manifest. The vitamin factor insures a proper wrapping for the dangerous purin molecules while they are in transport. Burrows has established some facts that point in this direction. (2) If the vitamin is lacking, purin bodies cannot be transported, and nuclear synthesis is inhibited, if this theory is correct.

As to vitamin E, Rosenberg says this:

"The primary physiological action of vitamin E is apparently to direct certain activities of the cell nucleus."

"It has been found that the application of this vitamin is especially useful . . . to effect the growth of prematurely born infants or to heal skin wounds in rats." (3)

"Besides chromatolysis, there appears to be an interference in the formation of chromatin (in the germinal cells, in E deficiency)." (4). "In the young of vitamin E deficient rats cretinism is observed." (5)

Now, we begin to see some light. Both vitamin A and E are necessary to cell proliferation, especially of the skin, both required for normal metabolism of the cell nucleus, particularly the metabolism and reproduction of the chromatin material of the cell, the material of which the chromosomes are made, the chromatin.

Now, remember that chromosomes are those parts of the cell that carry the blueprints for the reproduction of the cell, or for the reproduction of the animal itself, if we refer to the germinal cells produced by the sex glands.

We can now realize how it is that vitamin A and E deficiency can result in sterility of both sexes. Their capacity to create the chromatin for making the germinal cells is destroyed. In case of partial deficiency, monsters are common among the tests made with animals, the blueprints are garbled, as it were, and a true replica of the parent is impossible. A monkey wrench has been thrown into the machinery of heredity.

Cancer is another case where chromatin changes are suspected to be the cause of the disease. The cells of your body cannot reproduce their own kind if their chromosomes are damaged by deficiency. Dr. Zwick of the University of Cincinnati a few years ago discovered that the epithelial cell changes that precede cancer were apparently identical with those changes that resulted from vitamin A deficiency also. Vitamin A deficiency aggravated metaplasia of irritated epithelium, according to McCulloch and Dalldorf. (6)

Davidson in a study of 600 mice found that a deficiency of vitamins A, B, and E promotes the incidence of tar cancer, and a rich diet in those vitamins tends to prevent the cancer. (7)

"Burrows has shown how diets rich in vitamins will improve human cancer cases after operation and X-rays; and Oike found that diets rich in vitamin A prevented rabbits from developing tar cancer. (8)

The latest opinion on cancer is that it is a disease arising out of changes in the nuclear integrity of the cell. It seems definite that a deficiency of vitamins A and E in particular is contributory to such changes. If a lack of vitamin E can cause a dissolution or lysis of the chromatin, as stated by Rosenberg, it is obvious that the first symptom of disease the victim will notice is an alteration in the nature of some characteristic of the tissue involved. In the case of the skin, these changes are obvious. If the chromatin is damaged, the cells cannot reproduce their exact replica. There will be roughening, it may be labeled eczema, or dermatitis. Take oil dermatitis, that disease found in industrial workers who get constantly in contact with fat soluble materials

that can extract more of the vitamins we are discussing from the skin. We wonder what is wrong when we look at the severe damage that has been created. Often the use of the right kind of vitamin E will heal these sufferers very rapidly. What kind of vitamin E? It has just been discovered that the so-called tocopherol group is not the vitamin E that will prevent sterility. Therefore the tocopherol group is not the vitamin that will protect the chromosome.

It must be another associated factor that was lost in the refining, and until now we have used the wrong component, at least a component that still failed to carry the most important active principle. (9)

Professor Voegt-Moeller, of Denmark, made careful tests with dogs and found that pure tocopherol aggravated, rather than cured, symptoms of deficiency of vitamin E. Only the entire wheat germ oil was effective. This is evidence of the complex nature of the vitamin E as naturally supplied in green leafy vegetables or wheat germ. (10) In this case the action of the vitamin was tested on muscular degeneration of dogs that had suffered degenerative attacks. The real vitamin E produced highly beneficial results.

We begin to see how the imitation vitamins commercially exploited without clinical tests have destroyed the confidence of the doctor in their use. Certainly if we only get a part of a vitamin we cannot expect results that would be produced by a whole vitamin. To take vegetable oils and distill off the tocopherol content and sell it as vitamin E certainly sounds reasonable. But after years of such exploitation we find that it makes tests animals worse instead of better, and we certainly will not get set right by the people who have misled us.

References

- (1) Southern Med. J., 19 (4): 279, 1926.
- (2) Ibid, 19:88, 1926.
- (3) Ibid, 19:458, 1926.
- (4) Ibid, 19:459, 1926.
- (5) Ibid, 19:460, 1926.
- (6) McCulloch and Dalldorf: Arch. Path. 24:486-496, 1937.
- (7) Davidson, J. R.: Canad. M. A. J. 37:434-440, 1937.
- (8) Chidester, F. E.: The Medical World, 55 (4):246-250, 1938.
- (9) Levin, E., Vitamin E vs. Wheat Germ Oil, Amer. J. Dig. Dis., 12 (1): 20-21, Jan., 1945.
- (10) Voegt-Moeller, P.: Tierrartzl, Rundschau, 48:274, 1942.

Reprint No. 16

Price - \$0.01

LEE FOUNDATION FOR NUTRITIONAL RESEARCH

Milwaukee 1, Wisconsin

Printed in U.S.A.