



A historical note on the mode of administration of vitamin A for the cure of night blindness¹

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Night blindness was described in ancient Egypt as early as 1500 BC, and was without doubt the first nutrient-deficiency disease to be clearly recognized. It is the result of a dietary deficiency of vitamin A, leading to loss of vitamin A from the rods of the retina and thereby to a decline in the visual pigment rhodopsin. As a result, the earliest sign of vitamin A deficiency in humans is impaired rod vision, i.e., inability to see in semidarkness, called night blindness (nyctalopia).

Although the relationship of night blindness to dietary deficiency was not recognized until the last century (1), a cure was described in ancient Egyptian texts. Both an article on the history of the subject (1) and a textbook on vitamin A (2) refer to the "treatment" with roasted or fried liver as the earliest known cure for night blindness. We now know, of course, that liver is a particularly rich source of vitamin A, and the therapy seems eminently rational. However, a more careful perusal of ancient Egyptian texts reveals that the early Egyptian therapy consisted of topical application of the vitamin A extract, in the form of liver juice, to the eyes. Thus, Papyrus Ebers (no. 351) reads: "Another (recipe) for night blindness in the eyes: liver of beef is cooked and squeezed out and placed against it (i.e., the eyes). Really excellent." The London Medical Papyrus (no. 35) states: "Another recipe (for night blindness). Beef liver placed on a fire of straw of emmer or barley and smoked in their (the straw's) smoke;

their (the liver's) liquid squeezed against the eyes."³ Papyrus Ebers dates from about 1520 BC, and the London Medical Papyrus from about a century or two later. They were probably found in tombs. The texts were copied from the medical sources of the times, possibly going back as a written medical tradition to about 2500 BC.

Vitamin A would not, of course, be effective in curing night blindness unless it could enter the body by the alimentary tract, whence it would be transported, via the liver and the blood circulation, to the retina. How, then could one explain the topical mode of administration used by the ancient Egyptians?

Egyptian medical practice has been described (3) as being made of three interwoven strands: the sacerdotal, the magical and the empirico-rational, the first two strands predominating over the last. A part of the magical element was the idea of "transfer" (4): for instance, migraine was treated by rubbing the aching side of the head with the head of a fish. The ox, the animal most used in everyday life, supplied many of the medicaments of animal origin

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(for example, ox liver, brain, gall, spleen, blood, marrow, meat, and fat) (5). A magical method whereby extract of ox liver is applied to the afflicted eyes is thus a typical example of Egyptian medical practice.

However, as with many ancient Egyptian remedies, the cure for night blindness was not only based on a magical element, but had its empirical aspect also, in being actually effective in curing the disease for which it was designed. It would become quite obvious to anyone testing the topical application of liver extract to the eyes that some of the liver oil must enter the lacrimal duct and thereby reach the throat via the nose. Hence, the vitamin A can enter the body despite its topical application. Furthermore, it is entirely possible that the topical application of liver extract rich in vitamin A was a cure for another vitamin A-deficiency disease, xerophthalmia, which follows upon, and is generally accompanied by, night blindness. In fact, the tradition of using a liver extract, in the form of fish-liver oil, a rich source of vitamin A, topically on the eyes of xerophthalmia patients had persisted in India until the 1930's.⁴ Since xerophthalmia is an affliction of the cornea (the outer lining of the eye), it may well respond to topical treatment. Vitamin A acid, for example, can cure xerophthalmia in rats with vitamin A deficiencies, when applied topically to the eyes.⁴ In modern medical practice, injections of vitamin A concentrate are accompanied by topical application of an emollient oil to the eyes of xerophthalmia patients. Thus, the ancient Egyptian cure for night blindness could have been effective even though no vitamin A was ingested.

The development of Greek medicine was heavily indebted to Egyptian medical theory and practice. Harris (3) describes in detail the overriding influence of Egyptian medical ideas on the Ionian school and the school of Cos. Thales of Miletus was taught by Egyptian priests; Pythagorus studied at Heliopolis. But while the Egyptian physician considered disease the result of external, supernatural influences, the Greek physician, on the other hand, observed the patient and thought of disease as a condition

of the patient himself, and designed therapy to fit into a rational system, such as the Humoral Theory in Hippocratic medicine (6).

Mani (7) gives a review of Greek therapy for night blindness. In the collection of writings *Corpus Hippocraticum* (Alexandria, ca. 300 BC), in the treatise "Concerning Vision," is contained a prescription for the cure of night blindness (Lit. IX, 158) which is exactly what modern medical practice would recommend (were it not possible today to obtain fish-liver extract): Hippocrates recommends the eating once or twice of as large an amount of beef liver as possible (dipped in honey, for palatability).

A precise definition of night blindness follows only in post-Hippocratic writings. Galen (130 to 200 AD) describes patients who are "blind at night" (Kühn XIX, 124) (7). A follower of Galen, Oribasius (ca. 325 AD) defines night blindness as: "vision is good during the day and declines at sundown; one cannot distinguish anything any longer at night" (Synopsis VIII, 48) (7). And while Galen recommends as a cure for night blindness "continuous eating of roasted or boiled liver of goats" (Kühn XII, 802/803), he also gives a topical treatment: the juice of the roasted liver should be painted on the eyes—a residue no doubt of the Egyptian influence. Much later, Aëtius of Amida (540 AD) orders goat liver, fried with salt but not oil, eaten hot, but still recommends that the "juice that runs out of the liver" be applied topically to the afflicted eye. However, the Egyptian purely topical treatment survived in the writings of the Greek Dioscurides until the first century AD.

The change from a topical mode of administration of liver or liver extract to cure night blindness, to the actual ingestion of the vitamin A source, illustrates the way in which an early therapy based on supernatural ideas was replaced by a method which, no doubt, was found empirically to be efficacious. It is an especially interesting case

⁴ The author is grateful to Dr. A. Pirie, Nuffield Laboratory of Ophthalmology, University of Oxford, England, for this information.



because the actual medicament has remained virtually the same to this day. 

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