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## Cholesterol Metabolism

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# CURRENT COMMENT

## CHOLESTEROL METABOLISM\*

WALTER E. MACPHERSON, M.D.

There is much well-merited current interest in chronic degenerative diseases. As a matter of opinion, it seems entirely probable that the most important future developments in medicine will be founded upon an increase in knowledge of the basic etiologic and metabolic factors that contribute to the development of the respective pathologic states that constitute these chronic disease processes.

Even though the apparent clinical manifestations of this group of diseases are conspicuous among those individuals who constitute the older age group, there is evidence in support of the opinion that many of the chronic degenerative processes have their inception early in life. After many years of inconspicuous or undemonstrable development, they may abruptly make their unwanted presence known, and one is surprised at so sudden an appearance of such a full-grown and exceptionally well-armed and well-protected army. It is too apparent that most of these disease processes are not cured, and it is indeed a challenge to recognize that even a reasonably adequate defense is not uniformly applicable.

One of the most prevalent and important of these chronic degenerative diseases is atherosclerosis. Much is known about its pathology and its clinical result. Little is understood as to its etiology. One of the most accepted opinions is that there is some direct relationship between the metabolism of fat and the

production of arteriosclerosis. Studies in this field seem to incriminate cholesterol and cholesterol metabolism as important etiologic factors. The absorption of sterols from the intestines is under normal conditions practically limited to cholesterol and irradiated ergosterol. It is well known that cholesterol is synthesized within the body. It is chiefly a product of metabolism or of body synthesis, because it is not ordinarily eaten in any quantity as such. Where and how such synthesis occurs is unknown at the present time, and the exact nature of its precursor is also poorly understood. Current evidence is in favor of the liver as the place where most cholesterol synthesis occurs, but much investigation must be made before this is clarified. It is well known that the synthesis of cholesterol takes place faster on a high fat diet than when the fat intake is low. The quantity of cholesterol produced within the body may be increased not only by eating cholesterol but also by eating any fat if the intake is sufficiently high. What the relationship is between carbohydrate, protein, and cholesterol metabolism is far from clear. Regardless of the relative quantity of calorie-producing foods that are eaten, cholesterol is continually being formed and destroyed or eliminated. Either a positive or a negative balance may be found at any given time, depending upon the experimental condition or the metabolic condition that exists.

That cholesterol is important to normal metabolism and health cannot be questioned.

\* From the Department of Internal Medicine, College of Medical Evangelists.

Too frequently it is considered an enemy rather than an essential to normal metabolism. For example, it is a precursor to bile acids, a precursor to steroid hormones, a regulator of cell permeability, an insulator for axons, and perhaps has other important functions. Just why cholesterol is found within the walls of arteries in certain subjects and may be entirely absent in others is for future investigation to decide.

All indications support the assumption that cholesterol itself is not the only factor that

causes arteriosclerosis. It is entirely probable that certain metabolic processes that may primarily have no direct relationship to the ingestion or synthesis of cholesterol, or even to blood cholesterol levels, may be influential in causing cholesterol to be deposited within atherosclerotic areas in arterial walls. It is obvious that before much progress can be made in the prevention or treatment of arteriosclerosis, many of these present unknowns must be investigated and solved.

WALTER E. MACPHERSON, M.D.

## BOOK REVIEW

**Parenteral Alimentation in Surgery; With Special Reference to Proteins and Amino Acids.** By Robert Elman, M.D. Price \$4.50. Pp. 284, ill.: New York: Paul B. Hoeber, Inc., 1947.

Parenteral alimentation may be ranked as a major contribution in medicine along with aseptic surgical technic or anesthesia. This book deals with parenteral feeding of nutritional substances, but excludes drugs, sera, and therapeutic agents. A brief history, including many failures, is given of parenteral alimentation and a good outline of the work done in the present century.

Although the title of the book might suggest its value only in surgical cases, this discussion is just as applicable to medical as to surgical patients.

A comprehensive study is made of water and electrolyte needs, including differences between water and salt needs, clinical manifestations, acid base balance, and daily requirements. Caloric needs and vitamin needs are

likewise adequately considered, including therapeutic application.

A large section of the book is devoted to a study of protein needs, clinical manifestations of deficiencies, and methods of maintaining nitrogen balance by parenteral administration. A chapter is devoted to clinical manifestations of protein deficiency, acute and chronic. Two chapters are given to methods of parenteral protein administration; one is on plasma and blood transfusion, another on amino acids and hydrolyzed protein. Much of the success in administering amino acids has come in recent years, the author being one of the workers in this field.

The author concludes with summarizing chapters on a practical program for parenteral alimentation and clinical results. He is not unmindful of the fact that there is much to be learned yet in producing a more effective protein product for parenteral alimentation.

HAROLD R. KELLY, M.D.