A Deficiency of Dietary Fiber May Be One Cause of Certain Colonic and Venous Disorders

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There are a number of diseases characteristic of modern Western civilization some, by no means all, of which have been postulated to relate to the removal of fiber from plant foods.

These diseases include:
1. diverticular disease of the colon
2. appendicitis
3. cancer of the colon and rectum
4. hiatus hernia
5. hemorrhoids
6. varicose veins

There are two major and complementary results of refining plant foods: on the one hand, those related to the removal of fiber, and on the other, those associated with the consumption of fiber-depleted starch, sugar, vegetable fats, and protein. These will be distinguished in discussing hypotheses of pathogenesis of different diseases. The hypothesis outlined in this communication is a modification of that first postulated with remarkable intuitive insight by Captain T.L. Cleave (1).

It is essential, at the outset, to define the term "fiber," which has been greatly misunderstood. This term, as used in food analysis, refers to "crude fiber" which is the residue of plant cells left after sequential extraction with dilute acid and dilute alkali. On average, 80% of the hemicellulose or pentosans and 50–90% of the lignin are removed, while cellulose recovery is 50–80% (2). "Dietary fiber" has been defined as the residue of plant cells left after digestion by the alimentary enzymes of man (3); it contains all the unavailable carbohydrates, cellulose, hemicellulose, and also lignin (4). Dietary fiber on average is 4–8 times the weight of the crude fiber. Food tables do not report the constituents of dietary fiber. The term "fiber" in this paper implies "dietary fiber."

Epidemiological Features

All the epidemiological evidence now available on the geographical, historical, and socioeconomic distribution of the diseases listed above indicates that they are related to environmental factors connected with economic development. This epidemiological evidence is discussed below. There are striking contrasts between the high prevalences of all these diseases in black and white Americans, on the one hand, and their low prevalences in rural Africans on the other. Intermediate prevalences are found in situations between these extremes (5, 6).

The Argument of Association

All the different effects of a common cause will tend to be associated with one another (7). Conversely associated effects (in this case diseases) suggest a causative factor which is common to each but not necessarily the only factor in any single disorder.

The diseases listed above have been shown to be related to one another not only in their geographic distribution and historical emergence in different communities, but also in the increased prevalence of each which follows emigration from a less to a more Westernized society or a change from a rural to an urban environment. Many of these diseases have also been shown to be associated with one another in individual patients (8). Whatever cause is postulated for any of these diseases, it will be inadequate unless it also explains the interrelationships between one disease and another.
Fig 1. Intestinal transit times and average daily stool weights in different communities. The time taken between swallowing 25 microopaque plastic pellets and the recovery of 20 (80%) in the stools is taken as the transit time (Hinton's method).