PHYSIOLOGY

Establishes Amount of Vitamin B Needed in Diet

WHAT is believed to be the first exhaustive study of any of the vitamins from the point of view of how much a human being needs has been made at Yale University by Dr. George R. Cowgill, associate professor of physiological chemistry.

Dr. Cowgill has devoted his research to the vitamin B requirements of man and has established a measure by which nutritionists can determine whether an individual's diet contains enough of this important food factor. The results of Dr. Cowgill's study have been published by the Yale University Press for the Institute of Human Relations.

Deficiency of vitamin B in the diet has long been known to be the cause of beriberi, a disease which constitutes one of the most serious medical problems in the Far East.

The greatest significance attaching to vitamin B for people living in North America is the fact that it may be a cause of various chronic conditions summarized under the vague term "ill-health," according to Dr. Cowgill. In these instances the shortage of the vitamin may not be great enough to result in manifest beriberi but sufficient to produce a complication difficult to recognize and one which therefore escapes treatment, he observes. Various gastrointestinal disorders, such as gastric ulcers and colitis, can be related to vitamin B deficiency; certain heart disorders; and various neurological conditions may have their beginnings in a diet lacking sufficient amounts of this vitamin.

Body weight and vigor of vital processes (metabolism) were found by Dr. Cowgill to be the most important variables determining vitamin B requirement.

In approaching the problem, Dr. Cowgill made studies of diets associated with beriberi and diets not associated with the disease. Among the former were those of families in Labrador, Newfoundland, and Calcutta; prison diets in the Far East, notably in Manila, Selangor, and Singapore; and diets of various seamen and soldiers. A study of limited diets not associated with beriberi included a variety such as those of American white and Negro families, rations allowed by the German Government for civilians during the winter of 1916-1917, and the dietaries of workers on sugar and cacao plantations in the East and West Indies.

He has established that the ratio of the amount of the vitamin to the energy yielding value of the diet correlated with the body weight and metabolism expresses the adequacy of the diet in vitamin content. Thus the diets associated with beriberi showed an average ratio of 1.74, while in diets where the disease did not occur, the ratio was 2.18.

Men require more vitamin B than women, it appears from Dr. Cowgill's report.

"Students of the beriberi problem have frequently commented on the fact that this disorder is preeminently a disease of young adult males," he says. "As an explanation of this it has been suggested that beriberi is chiefly an 'institutional disease,' that is to say, a disorder found in jails, asylums, groups of laborers and the like, and that the conditions in society which operate to form these groups affect men more than women. The results of the present study suggest another explanation. The formula derived from the quantitative studies indicates that the two most important variables determining the vitamin B requirement are the body weight and the metabolism.

"Now it is generally known that males have a distinctly higher rate of metabolism than females, and being usually heavier and more active, consequently consume greater quantities of food. Therefore, males have a higher total energy exchange per day. Under conditions where the vitamin B content of the ration proves to be very close to that required by the organism, there is little or no factor of safety against beriberi, and this sex difference in total metabolism may be the chief factor determining whether beriberi shall develop. Under such circumstances it is obvious that the males should be more liable to the disease."

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ENGINEERING

Synthetic Gasoline Promises Sixth More Power for Planes

BY using a new "rebuilt" gasoline with ideal 100 octane antiknock rating, the Army has found a way to increase the power output of airplane engines by nearly a sixth to a third without increasing the weight of gasoline used.

Lieut. Frank D. Klein of Wright Field revealed to the Institute of the Aeronautical Sciences meeting at New York that experiments during the past few months with 2000 gallons of a special lead blended iso-octane gasoline have demonstrated the superiority of the new fuel over the 92 octane gasoline that is the present Army Air Corps standard.

This means that with engines designed to take full advantage of the new fuel, the fighting and bombing planes of the Army Air Corps will be able to fly farther and faster without carrying more gasoline weight.

In 1928, a 33 per cent. increase in power output was obtained by redesign of engines to use the now standard 92 octane gasoline instead of a 50 octane gasoline. Thus army airplanes will in the future be delivering about 70 per cent. more power per pound of gasoline than the airplanes used earlier than seven years ago.

Synthetic gasoline must be made to satisfy the very high octane rating demanded, Dr. Graham Edgar of the Ethyl Gasoline Corporation explained. Petroleum will still be used as raw material but the molecules will be broken down into small bits and then rebuilt into new fuels.

Several oil refineries have made in the last two years substantial quantities of iso-octane which is the chemical compound used as the ideal standard in testing the antiknock qualities of tetraethyl