Ancel Keys

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Ancel Keys is a major scientist of our times. He was early to consider that the "proper study of humankind" was among humans. He became founding father of a new quantitative human biology that he called "physiological hygiene." He developed objective measures to observe body structure and function, their changes over time and with aging, and their responses to stresses of heat, cold, and starvation.

Keys founded the Laboratory of Physiological Hygiene at the University of Minnesota in 1940 and established it under the university's Memorial Stadium, Gate 27. It soon became a mecca for research and training in the new field that combined physiology, nutrition, epidemiology, and prevention researches. Keys is now Professor Emeritus in the institution he established, centered in the University's School of Public Health and Division of Epidemiology.

Keys was among the first medical scientists to apply mathematical regressions and prediction equations to human biology. He regressed the weight of fishes on their length in his doctoral studies at the Scripps Institute in the 1920s, and later applied regressions to human studies of the relationship between body build and blood pressure, and among diet, serum cholesterol, and coronary disease. He was among the first to measure body composition and to understand the structural and functional relationships among body lean muscle, the skeleton, and fatty tissue. He established their different proportions in men and women by weighing people in air and again under water, and described their changes with semi-starvation. Commissioned by the government in World War II to study human performance during nutritional deficiency states, he developed the emergency K-ration that was used extensively by U.S. military troops in the war and afterward.

In a remarkably productive period during the '50s and '60s, Keys, with Minnesota colleagues Joseph Anderson and Francisco Grande, defined quantitatively the relationship between the fat composition of diet and serum cholesterol level. The resulting Keys' Equation has stood the test of thirty years' time as the most precise way to predict the effect of diet on the blood cholesterol levels of individuals and populations, and thus, their risk of coronary heart disease.

Keys was among the first to emphasize the relation among energy intake, energy expenditure, and resting metabolic rate, providing thereby greater understanding of activity calories and of the mass phenomena that lead to obesity. His classic studies on semi-starvation during and following World War II led to remarkable changes in scientific attitudes about the mutability of body form and function. He demonstrated experimentally that traits heretofore considered irrevocable and constitutional, such as body type, blood fat levels (cholesterol), blood pressure, heart rate, and responses to stress, were, in fact, largely modifiable by simple changes in the composition and quantity of diet and physical activity. This, in turn, led him, and eventually the scientific community, to think about modifying those basic characteristics and behaviors to prevent the major diseases then considered inevitable consequences of age.

Physiological hygiene, Keys application of sound physiologic principles to the health and behavior of humans, now provides the promise and the pathway to disease prevention and the promotion of health.

Finally, and probably most significantly, through his clear demonstration of geographic, social class, and ethnic differences in human characteristics and disease rates, Ancel Keys led many in the field of health to think in terms of "sick and well populations" as well as sick and well individuals. From the mid-50s to the 70s, with longterm Minnesota colleagues Henry Taylor and Henry Blackburn and other collaborators internationally, he studied whole populations contrasting in diet and lifestyles, establishing that cultural phenom ena, diet and activity, are the major causes of different population rates of heart disease. This broad population view has become a central guide to public health programs and policy that now complement the traditional domain of clinical medicine concerned with risk and disease in the individual. Keys showed that, though we are all one species, major cultural differences exist in the distribution of risk characteristics and risk behaviors, including diet, and in the geographic and time distribution of the major causes of death. His simple but powerful observations pointed to the remarkable potential for prevention of many common modern diseases. "If some developed countries can do without heart attacks, why can't we?"

Keys and his colleagues and his successors have shown that these mass phenomena may change for the better or for the worse, and within a relatively short time. Thereby Keys, more than any other, demonstrated the potential for elimination of the epidemic of coronary disease, hypertension, stroke, and peripheral artery disease. He has shown us not only the mass causes and the mass preventability of many of the major causes of premature death in the industrialized world, he has pointed the way to "primordial prevention," that is, prevention of elevated risk in the first place -- in youth and among developing nations not yet at high risk.

Keys's greatest hobby over the years was to poke fun at the insurance industry's equating relative body weight with excess risk of death. He showed that this relationship varies throughout the world according to the diet and the physical activity habits with which a population becomes obese. He has delighted in demonstrating with hard figures from real populations that in most industrial countries those people in the middle range of body weight are far better off than those at either extreme. His more recent major contribution was to show that men who gained weight during their middle years, 40 to 60, had a lower death rate and greater life expectancy than men who did not gain weight or who lost weight during those years. He showed that this unexpectedly favorable finding was partly explained by those individuals who gained weight as a result of giving up cigarette smoking.

Ancel Keys and his wife Margaret have, over many years, been effective purveyors of a healthful and attractive eating pattern for the public. In their several popular books, including Eat Well, Stay Well the Mediterranean Way and The Benevolent Bean, they were the first in the English-speaking world to describe the value of the of the Mediterranean diet and lifestyle, based on their combined

http://mmbnet.umn.edu/lmtexts/blackburn_1.html
Ancel Keys has a quick and brilliant mind, a prodigious energy, and great perseverance. He can also be frank to the point of bluntness, and critical to the point of sharpness. But by the boldness of his concepts, the vigor of his pursuits, and the rigor of his methods, as well as by his personal example, he led several generations of investigators in making powerful contributions to the public health. He has had a major impact on the thinking of the medical profession and the scientific community, particularly in the food sciences and exercise science. He has had a major influence on the public, its food choices and eating patterns. We physicians and fellow scientists learned from him that if common diseases are the result of mass behaviors there is a social responsibility for us to address these larger issues in practice and in our communities. Finally, he showed us that there is a personal responsibility to model behavior so as to provide an example of healthful living to our families and our patients.

This is the large legacy of Minnesota's senior scientist, Ancel Keys.

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