

IN MEMORIAM

Ancel Keys (1904-2004)

Ancel Keys was born in Colorado Springs on 26 January 1904 and died at his home in Minneapolis on 20 November last year, a few months before his 101st birthday. His academic training was varied and distinguished: he obtained a diploma in Political Science and Economics, a degree in Biology and, in 1929, a doctorate in Oceanography and Biology, all at the University of Berkeley in California. After a period of time in Copenhagen, in the laboratory of the Nobel Prize winner, August Krogh, he worked in the physiology laboratory of Barcroft in Cambridge, United Kingdom, and earned a second doctoral degree, this one in Physiology, at that university. He was an assistant professor at Harvard (1934 to 1936) and, in 1937, he accepted a position at the University of Minnesota, Minneapolis, where he founded the Laboratory of Physiological Hygiene for the quantitative study of human biology.

From 1948 on, Ancel Keys became increasingly interested in the effects of diet on blood cholesterol and, in a seminal article published in the Dutch journal, *Voeding*, he predicted that the diseases of the end of the twentieth century would be related to dietary excesses and arteriosclerosis. His relations with Spain began in 1951, when he visited Madrid, invited by Prof. Carlos Jiménez Díaz, an occasion on which he stayed in the *Residencia de Estudiantes*, a residence peopled by an enlightened generation of artists and scientists. With some of Jiménez Díaz's coworkers, among them, Francisco Grande Covián, he carried out a study that related diet to blood cholesterol levels. As he himself explained in his memoirs, he observed that the residents of Vallecas and Cuatro Caminos, 2 neighborhoods of Madrid, who rarely drank milk or ate butter or meat, had very low cholesterol levels and that coronary heart disease was practically unknown among them. In contrast, the residents of the Barrio de Salamanca, another Madrid neighborhood, with a diet much richer in animal fats, had higher cholesterol levels, and myocardial infarction was not uncommon. These and other similar observations made in Naples led him to initiate the first multinational epidemiological study on diet, cholesterol, and coronary heart disease, known as the Seven

Countries Study, in which, unfortunately, in the end, Spain did not participate.

The Seven Countries Study confirmed the hypothesis that diet composition is one of the most important factors in the regulation of blood cholesterol and, in turn, that the increases in the level caused by diets rich in saturated fats are causally associated with arteriosclerosis and myocardial infarction. The impact of these findings led him to postulate the diet-lipids-heart hypothesis and resulted in his appearing on the cover of *Time Magazine* as "Mr. Cholesterol." Grande Covián was a close associate of his and coauthor of an equation that enables the prediction of the changes that will take place in blood cholesterol levels depending on the types of fat in the diet. Published in 1965, this equation revealed the beneficial effect of monounsaturated fats, like olive oil. Highly knowledgeable about Spain and its different cuisines, he published, together with his wife Margaret, several books stressing the advantages of the Mediterranean diet, a term coined by Keys in his Minnesota laboratory. His last visit to Spain, in 1997, was precisely on the occasion of an international congress focusing on the Mediterranean diet.

Ancel Keys was among the first to apply regression equations to human biology and contributed to the creation of the concept which we now refer to as "coronary risk factors," opening the door to modern preventive medicine. His contributions to public health, especially to the prevention of cardiovascular diseases through a healthy lifestyle, have been acknowledged throughout the world.

Through his friendship with Paul D. White, the eminent Boston cardiologist, Keys gained access to the world of cardiology and to the American Heart Association. In the mid-sixties of the last century, very few cardiologists considered there to be a causal relationship between hypercholesterolemia and coronary arteriosclerosis. Things have changed and, for the past decade, the American Heart Association has included an *Ancel Keys Lecture*, a talk that focuses on relating epidemiology and nutrition to arteriosclerosis, in the program of its annual meeting. This recognition is well deserved since cardiology, especially in its modern po-

sition on the prevention of arteriosclerosis, owes a great deal to the work of Dr. Keys.

His contact with Spanish cardiology was principally through the group at Hospital Sant Pau in Barcelona which, in Spain, led the way in the implementation of epidemiological studies in cardiovascular diseases. In 1974, Dr. Keys conducted a seminar on these subjects and, thus, became acquainted with Ignacio Balaguer Vitró, Antonio Bayés de Luna, Luis Tomás Abadal, and Dr. Susana Sans, among others.

He maintained his mental activity up to the end: last 12 September, he attended the symposium on nutrition

and health that many of his students and disciples, myself included, had the honor of organizing at the University of Minnesota to mark the centenary of his birth.

For all the above reasons, we considered it fitting to pay tribute to his memory from the pages of REVISTA ESPAÑOLA DE CARDIOLOGÍA.

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