

An obesity epidemic



Efficiency genes The Pima are an example of a population that has probably undergone selection in the past for genes that improve the efficiency of managing the energy obtained from food. With modern diets and lifestyles, these «efficiency genes» can contribute to obesity. Since high-fat fast foods have become prevalent in much of the developed world, a steady diet of such foods will mean weight gain for most people, and is a major reason for the «obesity epidemic» in the United States.

For thousands of years, the Pima of southwestern North America were hunters and gatherers who supplemented their diet with subsistence agriculture. Their environment was arid, so they developed sophisticated irrigation systems; even so, they frequently encountered drought and subsequent starvation. Today most individuals of the ethnic Pima population in North America are clinically obese. In fact, as a population, they are one of the heaviest in the world. With obesity come related health problems such as diabetes, high blood pressure, and heart disease. The incidence of diabetes among these native American people rose from an extremely high level of 45 percent of adults in 1965 to a staggering 80 percent in 1999. Moreover, diabetes is occurring in younger individuals than ever before. What could have caused such a radical health change in an entire population? At least two interacting factors are involved: genetics and lifestyle.

Geneticists hypothesize that recurring episodes of starvation produce strong selective pressure for «thrifty genes»: particular alleles

of the genes involved in digestion, absorption, and energy storage that result in greater-than-average efficiency in converting food into energy and into energy reserves, such as fat. Thrifty genes would give individuals a strong selective advantage when food is scarce. An example of a «thrifty» phenotype is seen among the Pima. They have a very low resting metabolic rate and convert food into fat readily. The hormone insulin facilitates the conversion of dietary sugar into fat tissue. For many Pima, consuming a standard amount of glucose causes their insulin levels to rise three times higher than it does in Americans of European ancestry.

The other factor in the Pima obesity epidemic is an abrupt change in their traditional lifestyle. When food is plentiful and has high caloric content, thrifty genes contribute to obesity by maximizing fat storage. Today the Pima eat a modern Western diet that includes high-fat, high-calorie fast foods. In general, they also engage in less physical activity than their ancestors did.

A comparative study supports the hypotheses that have been put forward to explain the obesity epidemic in the

Pima. Another population of Pima live in the Sierra Madre mountains of northern Mexico. Genetically they are the same as the Arizona population. However, they live a traditional lifestyle and eat traditional foods. Whereas the Arizona Pima engage in an average of only 2 hours of physical work per week, the Mexico Pima average 23 hours per week. Obesity and diabetes are not prevalent among the Mexican Pima.

High-calorie diet and sedentary lifestyle affect not just the Pima, but contribute to the overall increase in obesity throughout the U.S. population. Researchers are studying the Pima to learn more about the genetics of obesity and related diseases.

Answer the questions

- What are thrifty genes?
- How is Pima's lifestyle involved in their obesity epidemic?



AUDIO

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