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Obesity & Genetics



Scientists have made great advances in understanding important environmental causes of obesity as well as identifying several of the many genes that might be implicated. Major efforts are now directed toward assessing the interactions of genes and environment in the obesity epidemic.

Obesity results when body fat accumulates over time as a result of a chronic energy imbalance (calories consumed exceed calories expended). Obesity is a major health hazard worldwide and is associated with several relatively common diseases such as diabetes, hypertension, heart disease, and some cancers.

The “Obesity Epidemic”–Can Genes Really Be Involved?

In recent decades, obesity has reached epidemic proportions in populations whose environments offer an abundance of calorie-rich foods and few opportunities for physical activity. Although, population genetic changes are too

slow to be blamed for the rapid rise in obesity in the United States and many other countries, genes do play a role in the development of obesity. The origin of these genes, however, might not be recent.



Learn more about [obesity and genetics](#).

How Might Genes Contribute to Obesity? A “Thrifty Genotype” Hypothesis

Any explanation of the obesity epidemic has to include both the role of genetics as well as that of the environment. A commonly quoted genetic explanation for the rapid rise in obesity is the mismatch between today’s environment and “energy-thrifty genes” that multiplied in the past under rather different environmental conditions. In other words, according to the “thrifty genotype” hypothesis, the same genes that helped our ancestors survive occasional famines are now being challenged by environments in which food is plentiful year round.

What Other Ways Might Genes Influence Obesity?

It has been argued that the thrifty genotype is just part of a wider spectrum of ways in which genes can favor fat accumulation in a given environment. These ways include the tendency to overeat (poor regulation of appetite and satiety); tendency to be sedentary (physically inactive); diminished ability to use dietary fats as fuel; and enlarged, easily stimulated capacity to store body fat. It is noticeable that not all people living in industrialized countries with abundant food are or will become obese; nor will all obese people suffer the same health consequences. The variation in how people respond to the same environmental conditions suggests that genes also play a role in the development of obesity. This diversity occurs even among groups of the same

racial or ethnic background and within families living in the same environment. All of these observations are consistent with the theory that obesity results from the interaction of genetic variation with shifting environmental conditions.

What Do We Know About Specific Genes Associated with Obesity?

The indirect scientific evidence for a genetic basis for obesity comes from a variety of studies. Mostly, this evidence includes studies of resemblance and differences among family members, twins, and adoptees. Another source of evidence includes studies that have found some genes at higher frequencies among the obese (association studies). These investigations suggest that a sizable portion of the weight variation in adults is due to genetic factors. Identifying these factors, however, has been difficult.

How Can Public Health Genomics Help Reduce the Impact of Obesity in Populations?

Scientists have made great advances in understanding important environmental causes of obesity as well as identifying several of the many genes that might be implicated. Major efforts are now directed toward assessing the interactions of genes and environment in the obesity epidemic. The translation of these efforts into public health practice, from a genomic point of view, will take time.



Learn more about using [family history](#) to promote health.

...And How Can Family History Help?

Fortunately, there is a simple way for public health genomics to start reducing the impact of obesity in populations. It is through the use of family history. Family history reflects genetic susceptibility and environmental exposures shared by close relatives. Health care practitioners can routinely collect family health history to help identify people at high risk of obesity-related disorders such as diabetes, cardiovascular diseases, and some forms of cancer. Weight loss or prevention of excessive weight gains are especially important in this

high-risk group. Any health promotion effort to reduce the adverse impact of obesity in populations may be more effective if it directs more intensive lifestyle interventions to high-risk groups (high-risk prevention strategy). This strategy, however, should not detract from the population prevention strategy, which recommends that regardless of genetic susceptibility and environmental exposure, all people should follow a healthful diet and incorporate regular physical activity into their daily routine to help reduce the risk of obesity and its associated conditions.

How Can You Tell If You or Your Family Members Are Overweight?

Most health care practitioners use the Body Mass Index (BMI) to determine whether a person is overweight. Check your Body Mass Index with a [BMI calculator](#).

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