Additional Resources

Links to the following articles can be found at the UWCGPH website:
http://depts.washington.edu/cgph/

Genetics of Obesity Review:
Loos RJ, Bouchard C. *J Intern Med*. Nov 2003; 254(5):401-25.

Family History
Yoon PW, Scheuner MT, Khoury MJ. *Am J Prev Med*. Feb 2003;24(2):128-135.

Genetics of Taste Review:
Drewnowski A. *Annu Rev Nutr*. 1997;17:237-253.

Pharmacogenomics Review:
Goldstein DB, Tate SK, Sisodiya SM. *Nat Rev Genet*. Dec 2003;4(12):937-947.

Web Resources:

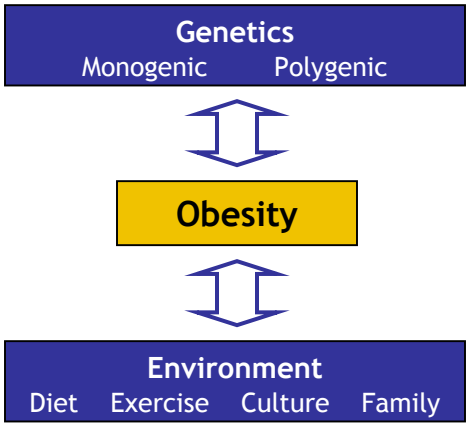
CDC Public Health Perspective:
www.cdc.gov/genomics/info/perspectives/obesity.htm

Obesity Gene Map:
http://obesitygene.pbrc.edu.

Center for Nutrigenomics at UC Davis:
http://nutrigenomics.ucdavis.edu/

UW Center for Genomics and Public Health Mission:
To integrate advances in genetic technology into public health practice and offer research and educational opportunities for public health students and professionals.

Obesity likely involves a complex interaction between genetic and environmental factors



The Role of Genetics in Obesity is Still Not Fully Understood

A Healthy Diet and Exercise are Still the Best Cure!

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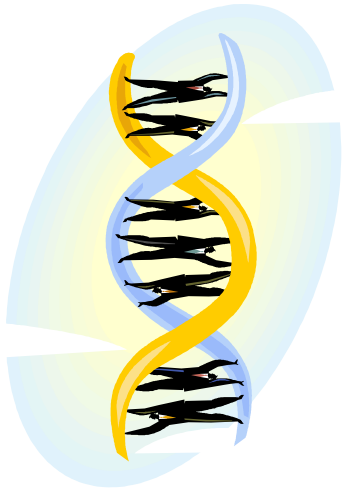
GENETICS & HEALTH

Obesity

Current Topics in Genetics



Implications for Public Health Practice

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Genetics of Obesity

The increasing prevalence of obesity in the US is a major public health concern.

Obesity is a complex condition. Although environmental factors play an important role in the development of obesity, there is strong evidence from both human and animal studies indicating that genes also contribute to the development of obesity.

Rare Forms of Obesity

Some rare forms of severe obesity are caused by mutations in single genes (monogenic forms of obesity). Currently, six different genes leading to severe obesity have been identified, including, the leptin, the leptin receptor, and the melanocortin 4-receptor genes. Altogether, these rare monogenic forms of obesity account for less than 1% of all cases of obesity, and will probably not be the target for most public health programs. However, knowledge of these genes and their functions has increased our understanding of obesity.

Common Forms of Obesity

The more common form(s) of obesity likely involve both gene-gene and gene-environment interactions. However, unlike the monogenic forms of obesity, identifying specific susceptibility genes is proving to be very difficult. Currently, over 430 genes or chromosomal regions have been implicated in the etiology of obesity; only 15 of these have been replicated by multiple studies.

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Genomic Examples

Genes can indirectly influence obesity through a variety of mechanisms, as illustrated by the following examples.

Genetics of Taste

Taste perception is genetically influenced and can influence our dietary behavior. One well-studied example is PTC, a bitter compound that only some people can taste. Individuals who can taste PTC are more likely to avoid certain foods that also taste bitter, such as cruciferous vegetables. This type of information could be utilized in prevention and education campaigns aimed at improving diet.

Nutrigenomics

Nutrigenomics is a relatively new field that integrates genomics and nutrition. For example, diets could be tailored to an individual's genetic profile to maximize nutritional benefit or disease prevention. While this approach holds promise, there is currently very little evidence to indicate that it is efficacious, particularly for weight loss and prevention of obesity. However, despite a lack of evidence, many companies are marketing personalized diets based on tests that include genes and variants whose functions are not fully understood.

Pharmacogenomics

Pharmacogenomics uses genomic information to personalize medicine. Certain medications are known to be more or less effective in patients with a particular genetic profile. For example, leptin therapy is only effective in obese patients who have a mutation in their leptin gene. Pharmacogenomics may eventually provide information leading to personalized treatment options based on genetic profiles.

Genomic Applications

There is no magic bullet to fight obesity. Nutrigenomics and pharmacogenomics may eventually provide new treatment and prevention options for obesity, but such tools are less likely to be used in public health settings.

So what genomic tools can public health use right now? Family history information is readily obtained and provides genomic information.

Family History of Obesity

Family history information reflects both shared genetic susceptibility and exposure to common environmental, cultural, and behavioral factors that may contribute to disease. For example, the risk of obesity is doubled if you have a first-degree relative that is overweight (Body Mass Index (BMI) > 25), tripled if your first-degree relative is moderately obese (BMI>30), and five times greater if your first-degree relative is severely obese (BMI>40). Importantly, although risk is increased among those with a positive family history, many of the environmental risk factors are modifiable.

Family history of obesity may be used to identify at risk individuals, such as children, for targeted prevention efforts. For example, family centered approaches involving the entire family could be more effective in preventing obesity in at risk children. Further, these approaches may have added benefits to other family members, such as improving diet and reducing weight.

Family history information is a promising public health tool. However, it still needs further evaluation in the field.