

Re-evaluation of the Etiologies of Obesity

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Summary

Obesity is a chronic, life-long disease of multiple etiologies. About 1980, the prevalence of obesity began to rise in most countries of the world, both developed and undeveloped. In the USA, the prevalence of obesity in adults rose from 15% of the population in 1980 to over 30% in 2000. The prevalence of obesity tripled in children and similar rises were seen in children across the world. The increasing obesity in poor countries occurred despite great differences in access to fast foods, sugary beverages, television, and computers compared to the USA. Likely of greater importance than these factors are genetics and novel concepts including epigenetic factors in women of childbearing age, certain drugs, insufficient sleep, and environmental factors such as infections and chemical pollutants. This talk will focus on two important etiologies of obesity that recently have been identified: factors affecting women of childbearing age and infection with adenovirus 36. There is a cluster of factors that affect women before and during pregnancy that produce weight gain and obesity in offspring, both in childhood and as adults. These include the mother being either large or small for gestational age at her birth, being obese at the onset of pregnancy, excess weight gain during pregnancy, smoking during pregnancy, lack of exercise during pregnancy, later age at first pregnancy, and development of gestational diabetes. The magnitude of risk for offspring obesity may be 20 fold or more if all of these factors are present vs none being present. This dwarfs the contributions of fast foods, sugary beverages, TV, and computers to the development of obesity in children and adolescents. Adenovirus 36 (Adv36) may be a major contributor to the worldwide epidemic of obesity. Experimental infection of chickens, mice, rats, and monkeys causes obesity in 60%-70% of lower animals and 100% in monkeys, producing a rise of 50% to 150% of total body fat or visceral fat. Adv36 infection does not increase food intake or decrease activity in animals. Prior Adv36 infection can be detected in humans by presence of antibodies to Adv36 or Adv36 DNA in adipose tissue biopsies of humans. Initial studies in the USA found that 30% of obese humans and 11% of non-obese humans had been infected. Infected individuals were heavier than uninfected. Multiple studies across the world confirm the higher prevalence rate of Adv36 infection in obese humans, especially in children. Prevalences of Adv36 infection range from

6% to 65% in obese adults and 22% to 30% in obese children. Prevalence in lean individuals ranges from 4% to 35%. Obesity due to a virus may be preventable by effective vaccines. In conclusion, obesity is a complex disease that is greatly misunderstood and underappreciated. Much research is needed to identify all the causes of obesity and to identify appropriate, individualized treatments for affected people.