

Obesity associated with coal ash inhalation triggers systemic inflammation and oxidative damage in the hippocampus of rats

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Abstract

People with large amounts of adipose tissue are more vulnerable and more likely to develop diseases where oxidative stress and inflammation play a pivotal role, than persons with a healthy weight. Atmospheric contamination is a reality to which a large part of the worldwide population is exposed. Half of today's global electrical energy is derived from coal. Each organism, in its complexity, responds in different ways to dietary compounds and air pollution. The objective of this study was to investigate the effects of obesity and coal ash inhalation within the parameters of oxidative damage and inflammation in different regions of the brain of rats. A diet containing high-fat concentration was administered chronically to rats, along with exposure to coal ash, simulating the contamination that occurs daily throughout human life. High-resolution transmission electron microscopy was performed to identify the particles present in coal ash samples. Our results demonstrated that obese rats exposed to coal ash inhalation were more affected by oxidative damage with subsequent systemic inflammation in the hippocampus. Since there is an inflammatory predisposition caused by obesity, the inhalation of nanoparticles increases the levels of free radicals, resulting in systemic inflammation and oxidative damage, which can lead to chronic neurodegeneration.

Keywords: Obesogenic diet, Air pollution, Hippocampus, Oxidative damage, Inflammation