



## Calorie Restriction and Exercise: Neuroprotection Benefits

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### DESCRIPTION

When body fat builds up to the point that it is detrimental to health, it is called obesity. The Body Mass Index (BMI), which measures an individual's body weight in relation to their height, is typically used to characterize it. Obese people are defined as having a BMI more than 30. Chronic conditions like type 2 diabetes, high blood pressure, heart disease, stroke, and several types of cancer are more common in obese people. It has been discovered that Calorie Restriction (CR) is a useful strategy for battling obesity. In CR, energy intake is decreased while maintaining sufficient nutrient intake for optimal health [1].

It is significant to remember that while CR can aid in weight loss, it also has other advantages like lowering inflammation and enhancing metabolic and cardiovascular health. Fitness has long been linked to a healthy body composition and a lower risk of obesity-related illnesses. Recent studies, however, point to possible extra advantages of regular exercise for neuroprotection in individuals who are overweight or obese as a result of eating a high-fat diet. Regular moderate exercise has been linked to improved cognitive performance, decreased brain inflammation, and a lower risk of Alzheimer's disease and other types of dementia, according to studies [2-5].

Any healthy lifestyle must include calorie restriction since it lowers calorie consumption without resulting in malnutrition. Research has indicated that caloric restriction may lessen oxidative stress and inflammation while also enhancing brain function. Furthermore, exercise helps guard against a number of neurological conditions, including Alzheimer's disease, and slow down the rate at which age-related cognitive loss occurs. This is because it can enhance cerebral blood flow, raise neurotropic factor levels that encourage the development of new neurons, and raise antioxidant activity inside the brain. In CR, caloric intake is decreased below what is generally advised for a person's age and activity level. There are strategies for people to gradually reduce their calorie intake, even if this might be challenging to do.

For example, reducing on portion sizes or consuming lower-calorie snacks might help decreased on overall calorie intake without making they feel "deprived" or unduly constrained. CR has been proposed as a critical element in achieving neuroprotection in obesity generated by high-fat diet. Research has demonstrated that CR can enhance glucose tolerance and lessen inflammation brought on by obesity, two factors that are critical for preserving long-term brain health. Moreover, CR has been connected to enhanced hippocampal neuronal integrity, a key area of the brain for long-term memory development and storage. Put another way, by maintaining the integrity of the hippocampus over time, CR may aid in protecting the brain from degenerative disorders [6-8].

Careful calorie control and consistent exercise are key to achieve neuroprotection in obesity caused by high-fat diets. Reducing calories without becoming malnourished is known as calorie restriction, and it can assist control metabolic processes and guard against the risks associated with obesity. Frequent exercise is also advantageous since it enhances cognitive performance and lowers inflammation. When combined, these two tactics have been shown to be an effective means of reducing the harm to the nervous system that is usually inflicted by excessive consumption in high-fat foods.

Although the benefits of physical movement for general health and fitness have long been recognized, recent studies have also demonstrated that it can effectively lower inflammation and enhance cognitive abilities. Regular exercise has been shown in studies to lower systemic inflammation markers, or the body's general inflammatory response to certain stimuli. Furthermore, research indicates that exercise can enhance executive function, which includes memory, attention span, decision-making, and problem-solving skills. This is probably because the brain has more neural connections, which enhances neuronal transmission [9].

These two techniques have been shown to be highly successful in preventing brain damage induced by a high-fat diet when paired with calorie restriction. Studies show that calorie restriction lowers blood levels of triglycerides and cholesterol while raising

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good High-Density Lipoprotein (HDL) cholesterol, all of which help prevent obesity-related disorders like diabetes and heart disease. Additionally, research indicates that calorie restriction preserves neural structure, which lessens the neuron degeneration linked to obesity and the disorders that are associated with it [10].

In high-fat diet-induced obesity, neuroprotection is a critical first step toward preserving general health. It has been demonstrated that one of the best strategies for lowering neuro-inflammation and safeguarding memory functioning is Calorie Restriction (CR). Restricting food intake and overall energy consumption are two aspects of calorie restriction. This supports a healthy environment inside cells, strengthens cellular resilience, and lessens inflammation in the brain. Research has demonstrated that CR can enhance mitochondrial function, prevent cognitive decline, and lessen oxidative stress in neurons. Exercise enhances the benefits of CR, even if it is evident that CR has advantages on its own. Exercise promotes blood flow to the brain, which enhances brain function by increasing the amount of oxygen and nutrients that can reach the brain.

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