

Nansen Neuroscience Lecture 2023 Abstract

“Roles of the lactate shuttle: focus on brain physiology and pathologies”.

In recent times, researchers have been delving deeply into how the brain manages its energy. Pioneering studies have pinpointed the different types of cells responsible for generating and using this energy. Recent findings have highlighted the significant role of the substance L-lactate in the brain's energy processes. The discovery has caused a big shift in how we understand the brain cells' work.

At the heart of this shift is the recognition that astrocytes, a type of brain cell, play a central role in managing energy. These cells have unique shapes and placement that help them absorb glucose from the blood and provide energy to neurons, the brain's signalling cells. According to the Astrocyte Neuron Lactate Shuttle (ANLS) model, astrocytes primarily supply L-lactate to neurons as their main energy source, which help neurons function effectively. L-lactate can also be produced from a stored form of glucose called glycogen, which is found exclusively in astrocytes. When glycogen metabolism is blocked and L-lactate production is hindered, it can lead to impaired memory and cognition. Scientific studies show that L-lactate plays a crucial role in brain function. It is not just a source of energy for neurons, but also a type of signal that helps neurons communicate and adapt. Interestingly, a similar process seems to happen in other parts of the body, where glucose contribution to the production of L-lactate powers cellular function.