Study confirms how the body regulates high levels of CO2 in the blood

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In a recently published study in the journal *Experimental Physiology*, Brazilian researchers have confirmed the importance of a specific group of neurons found in a region of the brain known as the retrotrapezoid nucleus (RTN) in detecting changes in carbon dioxide (CO_2) levels and in modulating the activity of the neuronal groups that control respiratory activity.

Scientists from the Biomedical Sciences Institute of the University of São Paulo (USP) and the School of Dentistry at the São Paulo State University (Unesp) participated in the study.

"CO_2 is important for regulating the acid-base balance of the blood. When the concentration of this gas becomes higher than normal, the blood tends to become more acidic, which promotes the activation of specialized sensors called chemoreceptors," said Eduardo Colombari, professor at the School of Dentistry at Unesp.

"Some of these chemoreceptors are located in the central nervous system ; more precisely, on the ventrolateral surface of the medulla oblongata [the region of the brain responsible for neurovegetative control that forms the interface between the spinal cord and the mesencephalon] in the RTN," he explained.

According to Colombari, the neurons in this region express a specific marker that allows them to be identified. This marker consists of a transcription factor called Phox2b, which is involved in the cell

differentiation of autonomic and respiratory neurons, that communicate with other neural groups responsible for controlling respiratory activity in order to keep CO_2 levels within the physiological range.

Previous studies in the scientific literature, said Colombari, have suggested that various neuronal groups, such as the nucleus of the solitary tract, the raphe nuclei (which secrete serotonin), and the pontine and hypothalamic areas, were involved in the control of chemoreception (in this case, the detection and modulation of CO_2 levels).

The group's work has demonstrated, however, that the respiratory changes caused by the increase in CO_2 levels are compromised during the occurrence of selective destruction of the RTN neurons that express Phox2b.

The researcher further explained that the work illustrated how a small region of the brain contains neurons with a classic biochemical signature (Phox2b) which are involved in detecting and maintaining adequate levels of CO_2, thus allowing the maintenance of homeostasis.

According to Colombari, advances in understanding the mechanisms involved in the perception of CO_2 levels in the central nervous system could help prevent cases of sudden death in infants and adults in the future.

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