The Anti-inflammatory and Regenerative Effects of Interleukin-1 Receptor Antagonist on Ischemic Strokes

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Ischemic strokes, caused by limited blood flow to the brain due to clotted arteries, account for 88% of all strokes, and are one of the leading causes of death worldwide. Although a cure has not been found, treatments for cerebral ischemia range from preventive to therapeutic, with few to none reversing the stroke's effects. One of the most damaging aspects of this medical occurrence is the cerebral inflammation that goes with it. Past studies have shown the use of a protein, interleukin-1 receptor antagonist (IL-1RA), as an anti-inflammatory treatment for strokes. Though restricting future reparative measures, it also provides the possibility of neurogenesis, regenerating tissue affected by the cerebral ischemia. This newly found drug, nevertheless, has only been tested on rodents, resulting in positive outcomes. However, to confirm the possibility using IL-1RA as an effective stroke treatment, it must be tested on simulations resembling the human brain. Its anti-inflammatory and regenerative effects are expected to prevent brain damage caused by inflammation, and also offer long-term cerebral reparative measures. Using a simulation program called Simbrain, a neurological body was built and a cerebral ischemic recreation was implemented upon it. Subsequently, an input resembling the behaviors of interleukin-1 receptor antagonist was inserted, all while documenting the reactions taking place within the simulation. After performing said simulation, it was found that IL-1RA's effects can most clearly be seen at decay level 0.95. The treatment was effective, subsiding inflammation and regenerating a few neurons in the ischemic core

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