Novel enzyme treatment to reduce brain edema

Although 1.7 million people in the United States sustain a traumatic brain injury (TBI) every year, there are currently no FDA-approved pharmacologic treatments for the acute management of cerebral injury. Brain edema (swelling) is a complex and dynamic complication that often occurs after brain injury. Present treatments for these patients focus on lowering the elevated intracranial pressure (ICP), but they are frequently ineffective or too aggressive and risky. Thus, there is a need for alternative treatments for brain-injured patients.

A new pharmacologic treatment for injury-induced brain edema

This technology provides a novel pharmacologic treatment for injury-induced brain edema. It aims to reduce swelling by targeting a specific group of negatively-charged molecules in the brain. The scientific foundation for this technology is a theory describing the physiochemical forces that underlie brain edema and large increases in ICP. Negatively-charged molecules fixed within cells create an environment conducive to swelling by water due to the Donnan effect, whereby the fixed, negative molecules attract positively-charged molecules, leading to increased osmolarity. Water naturally migrates to this area of increased osmolarity in an attempt to equalize osmotic pressure throughout the region. The net effect is tissue swelling which, inside the rigid skull, leads to increased ICP. This technology is a specific cocktail of enzymes designed to free the negatively-charged molecules via degradation, allowing them to migrate away from the area of injury. This leads to a reduction in osmolarity and in turn a reduction in swelling.

The cocktail can be used for both localized and global brain edema, and can be introduced into the body away from the site of injury. In experiments with mice, it has been shown to reduce swelling by half relative to controls.

Lead Inventor:
Barclay Morrison III, Ph.D.
**Applications:**

- Treatment of cerebral edema induced by injury to the brain or spinal cord
- Treatment for localized and global brain edema
- Treatment for sequelae of stroke, transient ischemic attack, and other conditions
- Treatment for complications following neurosurgery
- Research tool to investigate biological mechanisms relating to edema and osmolarity

**Advantages:**

- Enzymatic degradation can reduce brain swelling without damaging surrounding healthy tissue
- Enzymatic approach does not interfere with other natural biological processes
- May be given as a prophylactic to high-risk individuals

**Patent Information:**

Patent Issued (US 9,040,040)

Tech Ventures Reference: IR M11-032, IR CU14201

**Related Publications:**


**Inventors**

Barclay Morrison III