Hematoma resorption

Chronic subdural hematoma (CSDH) remains a neurosurgical condition and a healthy burden especially in elderly patients. A study of Shen et al. focuses on the functions of rapamycin and its related molecular mechanisms in CSDH management. A rat model of CSDH was induced, which developed significant hematoma on day 5 after operation. The rats were treated with rapamycin or atorvastatin, a drug with known effect on hematoma alleviation, or treated with rapamycin and atorvastatin in combination. The atorvastatin or rapamycin treatment reduced the hematoma development, blood-brain barrier permeability, neurological dysfunction in CSDH rats, and the combination treatment showed more pronounced effects. Human brain microvascular endothelial cells hCMEC/D3 were stimulated by hematoma samples to mimic the CSDH condition in vitro. The drug treatments elevated the cell junction-related factors and reduced the pro-inflammatory cytokines both in rat hematoma tissues and in hCMEC/D3 cells. Rapamycin suppressed the mTOR and STAT3 signaling pathways. Overexpression of mTOR or the STAT3 agonist suppressed the alleviating effects of rapamycin on CSDH. This study demonstrates that rapamycin promotes hematoma resorption and enhances endothelial cell function by suppressing the mTOR/STAT3 signaling [1].

The research provides important insights into the molecular mechanisms involved and the potential for combination therapy. However, it is essential to acknowledge the limitations of the study, particularly regarding the transition from animal models to human patients. Further research, including clinical trials, is necessary to determine the true efficacy and safety of rapamycin as a treatment for CSDH. This study represents a promising initial step in understanding the role of rapamycin in CSDH management but should be interpreted with caution until more evidence is available.

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Shen J, Zhang Y, Wu X. Rapamycin promotes hematoma resorption and enhances endothelial cell function by suppressing the mTOR/STAT3 signaling in chronic subdural hematoma. Exp Cell Res. 2023 Oct 23:113829. doi: 10.1016/j.yexcr.2023.113829. Epub ahead of print. PMID: 37879548.