Can the Longevity Compound Rapamycin Rescue Brain Tissue in Age-Related Diseases in Old Mice?

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Rapamycin is an immunosuppressant that inhibits mTOR (the mammalian target of rapamycin) and extends lifespan in organisms such as worms, flies, and mice. While it is known that rapamycin's effects on cardiac and skeletal muscle contribute to lifespan extension, it is unknown if rapamycin's effects on the brain extend lifespan. Several proteins associated with rapamycin have decreased while other proteins have increased in the brain tissue of old mice. Moreover, these proteins have been implicated in various age-related diseases, but they have not been jointly studied with rapamycin treatment in the diseases. In this experiment, I investigated the proteins glial fibrillary acidic protein (GFAP), peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PGC-1a), fibroblast growth factor 21 (FGF21), and zinc metallopeptidase STE24 (ZMPSTE24) in the brain tissue of old mice treated with rapamycin to see if rapamycin could rescue the proteins by affecting the protein expression. Brain tissue samples from male old mice were obtained; six samples were from vehicle (control, untreated) mice while six samples were from mice that received 8 mg/kg of rapamycin I.P. (high dose) injections every other day. Wet laboratory techniques, including tissue cryohomogenization and Western blots (gel electrophoresis, protein transfer, chemiluminescent detection, and film development), were used to obtain data. Rapamycin rescued PGC-1a in the brain tissue of the old mice, which suggests that rapamycin could be used in treatment for Alzheimer's disease, Huntington's disease, or ALS. Rapamycin may have rescued FGF21 in the brain tissue, and this suggests that rapamycin could be used in treatment for metabolic disease. Rapamycin did not rescue ZMPSTE24 or GFAP in the brain tissue.

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