Developing a Preventative Treatment for Age-Related Macular Degeneration

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Age-related macular degeneration (AMD) is a devastating neurodegenerative eye disease that affects the macular region of the retina. Two carotenoids–astaxanthin and lutein–were examined, hypothesizing that they would prove effective at protecting the retina against AMD. The hypothesis was tested using zebrafish which share similar eye structures and functions with humans. A2E, a vitamin A derivative and one of the primary molecules that contributes to AMD, was used to mimic AMD. A baseline vision test was performed on each fish using a standard acuity assessment method. Individually, fish were placed on a stationary platform while a cylinder with black and white stripes rotated around the base. If a fish was able to successfully track movement, cylinders with narrower stripes were substituted until the threshold was determined. After establishing baseline acuity, both eyes of each fish were injected with A2E to replicate AMD and then one eye of each fish was injected with either lutein or astaxanthin. The fish's vision was retested at weekly intervals. The results show that the carotenoids protect and improve vision with astaxanthin improving visual acuity by 10% and lutein by 33%. Currently, varying quantities of lutein and zeaxanthin mixed with additional ingredients are commonly found in oral vision supplements; research exploring the ideal quantity and combination conducted by independent, non-manufacturers is limited. Human clinical trials that test ocular carotenoid injections, like my study, should be considered. The development of therapeutic and preventative treatments for AMD would help the approximately 170 million people worldwide suffering from AMD.

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