Why Can't Grandma See? It's Probably AMD: The Effects of A2E and Zeaxanthin on Age-Related Macular Degeneration

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Age-related Macular Degeneration (AMD) is a devastating eye disease affecting more than 10 million Americans like my great-grandmother. AMD is a neurodegenerative disease that affects the macular region of the retina – the light sensing part of the eye. Over time, the disease can lead to total blindness. As we age, chemicals begin to build up in the retina leading to cell death. One of these chemicals is the vitamin A derivative A2E. Zeaxanthin, another compound found in the retina, is protective unlike A2E; however, the body does not make it. Therefore, we must get zeaxanthin from our diet. Because many cases of AMD do not yet have treatment options, I wanted to explore the possibility of zeaxanthin as a therapeutic for AMD. I decided to see if zeaxanthin would protect people with AMD and improve their vision. I chose to test this hypothesis using zebrafish, a common model for neurodegenerative studies. I induced an AMD-like condition by injecting the zebrafish eyes with A2E. In effect, this process accelerated the accumulation similar to what happens in aging humans. One of the eyes was also injected with zeaxanthin. I tested the visual function in both eyes independently before administering the injections and again at weekly intervals to see if zeaxanthin would preserve their vision. I found that A2E caused the visual acuity to decrease, whereas zeaxanthin protected the retina from the A2E damage. The development of a preventative treatment for AMD could help millions of people, like my great-grandmother. My results indicate that zeaxanthin may be protecting the retina from A2E damage. Further research on AMD could provide therapeutic options for those predisposed to AMD and prevent millions from experiencing the long and painful road to blindness.