Investigating Gamma S Crystallin Degradation in Normal and Cataract Lenses

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Although cataract is the leading cause of blindness, there remains no treatment besides surgical removal. Identification of specific differences between normal and cataract lenses is essential to discover treatments. The Gamma S Crystallin is an abundant protein in lenses. Recently, researchers detected the C-terminal fragment (145-178) of this protein in cataract lenses but not normal lenses. My research sought to analyze why this fragment was only detected in cataract lenses. Quantifications of peptides from various regions of the Gamma S Crystallin protein using existing proteomic data were attained. These quantifications were done through Skyline and Xcalibur software, and t-tests were used for statistical analysis. Results showed that besides the distal N-terminal region, intensities of residues 1-144 did not decrease in cataract lenses. Therefore, the formation of the C-terminal fragment was not due to degradation of the rest of the protein, but rather due to truncation at Asn 144, a known protein cleavage mechanism. Cleavage at Asn 144 in both normal and cataract lenses was then confirmed. However, results showed that other than increasing cleavage at Asn144 in the insoluble fraction, the level of cleavage normalized by residues 132-146 was not increased in cataract lenses, but increased in normal lenses if normalized by residues 159-174. These results suggest that the C-terminal fragment can be formed in normal lenses; however, its not being detected in normal lenses by previous researchers could be due to further degradation. This degradation process may be damaged in cataract lenses, resulting in accumulation of this fragment.