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**Title:** Homocysteinylation of lens Crystallins: From Protein Aggregation to Possible Risk Factor in Development of Cataract Disorders.

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**Abstract:** There are several evidences suggesting a relationship between hyperhomocysteinemia and various ocular disorders such as cataract, ectopic lenses, open-angle glaucoma, pseudoexfoliation glaucoma, central retinal vein occlusion, maculopathy, optic atrophy and diabetic retinopathy. Since the side chains of Lys residues are modified not only by non-enzymatic glycation, but also by homocysteinylation; the two modifications may have similar structural and functional consequences. In this study, different spectroscopic techniques, gel electrophoresis under reducing and non-reducing conditions, and western blot analysis were applied to evaluate role of homocysteinylation on structure and function of eye lens crystallins. Homocysteinylation of crystallin proteins causes significant structural alterations, leading to aggregation and fibrillation of these proteins. The chaperone activity of α-crystallin which is important for transparency and refractive power of eye lens was reduced after this modification. Also homocysteinylated α-crystallin demonstrates significant propensity for aggregation and precipitation in the test tube. The aggregation of homocysteinylated crystallins is of medical importance because it is believed that slow aggregation and precipitation of these proteins as result of various modifications which accumulate over years is the molecular basis of some types of cataract. Overall this study may suggest lens protein homocysteinylation as a possible risk factor in the development of the cataract disorders.

**Eye lens crystallins, Homocysteinylation, Fibrillation, Cataract disorders.**

**Presentation:** Oral