Scientists Develop Nonsurgical Prevention of Cataract

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A team of scientists from the **Institute of Nano Science & Technology (INST) an autonomous institute under the Department of Science & Technology** has developed nanorods from the nonsteroidal anti-inflammatory drug (NSAID) Aspirin, a popular medication used to reduce pain, fever, or inflammation and found it to be an **effective non invasive small molecule-based nanotherapeutics against cataract.**

Nonsurgical Prevention of Cataract

Cataract is a major form of blindness that occurs when the **structure of crystallin proteins that make up the lens in our eyes deteriorates, causing damaged or disorganised proteins to aggregate and form a milky blue or brown layer, which ultimately affects lens transparency.** Thus, prevention of the formation of these aggregates as well as their destruction in the early stage of disease progression is a major treatment strategy for cataracts, and materials that can carry out this task could make cataract prevention affordable and accessible.

The research could help prevent cataracts in an economical and less complicated way. They have used the **anti-aggregation ability of self-build aspirin nanorods** as an effective non–invasive small molecule-based nanotherapeutics against cataract. Aspirin nanorods prevent the aggregation of crystallin protein and various peptides derived from its fragmentation, which play a crucial role in cataract formation. They **prevent the protein/ peptide aggregation through biomolecular interactions, which convert beta-turn like the structure of the crystalline peptides, responsible**

for amyloid formation into coils and helices, those fail to aggregate. These were found to prevent cataract formation by inhibiting aggregation of crystallin, and crystallin derived peptide aggregates. As with aging and under various conditions, the lens protein crystallin aggregates to form opaque structures in the eye lens, which impairs vision and causes cataract.

The targeted disaggregation of the accumulated alpha-crystallin protein and crystallin derived peptide aggregates in aged and cataractous human lenses are considered as a viable therapeutic strategy for the prevention of cataract formation. The aspirin nanorods are produced using the **process of molecular self-assembly, which is a low cost and high – yield technique to generate the aspirin nanorods** as compared to the high cost and laborious physical methods generally used for the synthesis of nanoparticles.

Many natural compounds have already been reported as potential aggregation inhibitors for crystallin aggregation, but the utility of nonsteroidal anti-inflammatory drugs (NSAIDs) like aspirin in this direction will open a new paradigm. In addition, aspirin nanorods **due to their nano-size will enhance bioavailability, improve drug loading, lower toxicity**, etc. Hence, the delivery of the aspirin nanorods as eye drops is going to serve as an effective and viable option to treat cataract non-invasively. This easy to use and low-cost alternative nonsurgical treatment method will benefit patients in developing countries who cannot access expensive cataract treatments and surgeries.