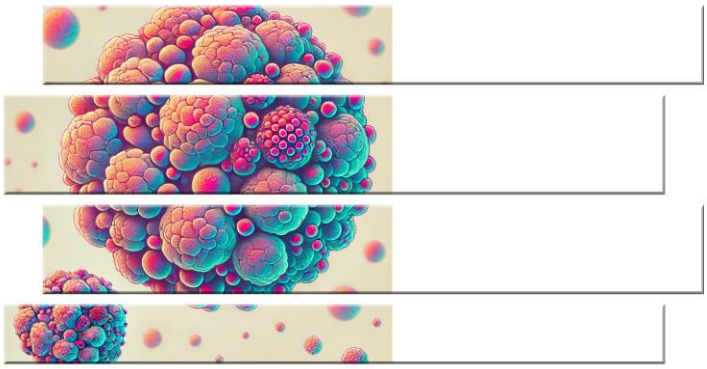

TriDix Bio
INNOVATING DRUG DISCOVERY

PRODUCT DATA SHEET

Recombinant Human alpha A Crystallin/CRYAA Protein

SKU: TDD-1001

Product Details

Catalog Number: TDD-1001

Organism: *Homo Sapiens,* Human

Protein Type: Recommbinant

Protein Construction: CRYAA (Uniprot: P02489) expressed with C-terminal 6xhis tags

Purity: >96% SDS-PAGE; ⩾ 98 % as determined by SEC

Expression System: Escherichia coli

Applications: WB, FuncS, SDS-PAGE

Biologically active: Yes

Endotoxin < 1.0 EU per μg protein as determined by the LAL method.

Storage buffer: 20 mM Tris-HCl, 150 mM NaCl, 1 mM EDTA.

Concentration: 1 mg/mL, The concentration of this product may be batch-dependent

Storage Conditions & Shipment

Storage: -80℃ for long term storage; avoid freeze / thaw cycle

Product Format/Shipped: Blue ice

Safety Precaution

PLEASE READ BEFORE HANDLING ANY FROZEN VIALS. *This product is an active protein and may elicit a biological response in vivo. Please wear appropriate Personal Protection Equipment (lab coat, thermal gloves, safety goggles and a face shield) when handling.*

Description

Human Alpha-Crystallin A Chain (CRYAA) is a small heat shock protein (sHSP) that plays a crucial role in maintaining the transparency and proper functioning of the lens in the human eye (PubMed:18302245). It is a member of the alpha-crystallin family, which includes two distinct chains: alpha-crystallin A chain (CRYAA) and alpha-crystallin B chain (CRYAB). These proteins are predominantly found in the lens of the eye but are also present in other tissues, where they function as molecular chaperones.

Alpha-crystallin A (CRYAA) is primarily known for its role in maintaining lens transparency by preventing the aggregation of denatured proteins and assisting in their proper folding. The protein functions in a manner similar to other chaperones, helping to stabilize proteins under stress conditions, such as heat or oxidative stress, which could otherwise lead to protein aggregation and the formation of cataracts.

Sequence Infomation

Amino acid sequence

MDVTIQHPWFKRTLGPFYPSRLFDQFFGEGLFEYDLLPFLSSTISPYYRQSLFR
TVLDSGISEVRSDRDKFVIFLDVKHFSPEDLTVKVQDDFVEIHGKHNERQDDH
GYISREFHRRYRLPSNVDQSALSCSLSADGMLTFCGPKIQTGLDATHAERAIP
VSREEKPTSAPSSHHHHHH*

Protein length: Full Length

Amino acids: 1 to 173

Product Data

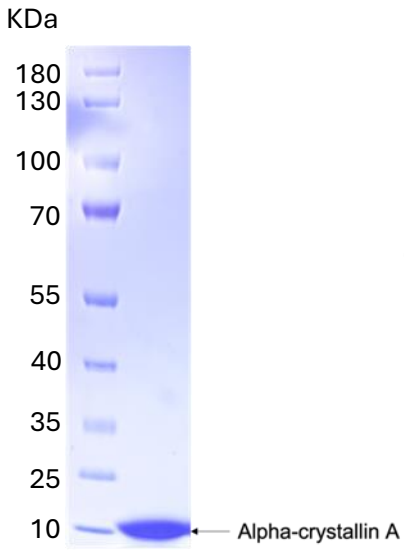

Figure 1, SDS-PAGE - Recombinant human alpha A Crystallin/CRYAA protein: 2ug by SDS-PAGE under reducing condition and visualized by coomassie blue stain.

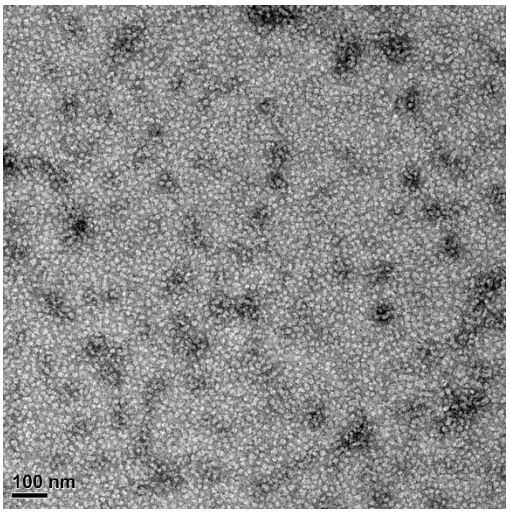

Figure 2, Transmission Electron Microscopy (TEM) of Human Alpha A Crystallin (CRYAA) Protein:
TEM micrograph shows the structure of human alpha A crystallin (CRYAA) protein, highlighting its characteristic oligomeric arrangement. The protein forms a spherical, globular structure with varying sizes of aggregates, typical of its molecular chaperone function, consistent with previously reported CRYAA oligomeric structures. Scale bar: 100 nm.

Applications

1. **Cataract Research and Therapy**

Gene Therapy: CRYAA is a target for gene therapy in treating congenital cataracts and other genetic disorders related to lens opacity. Gene therapy strategies aim to correct mutations in the CRYAA gene or to restore CRYAA function in individuals with impaired protein function to prevent or treat cataracts.
Protein Replacement Therapy: In cases where CRYAA is misfolded or dysfunctional due to genetic mutations, protein replacement therapies may be developed to provide functional CRYAA to the lens, potentially preventing the aggregation of proteins and cataract formation.
Cataractogenesis Studies: CRYAA is a central protein in cataract formation and is extensively studied to understand the underlying pathophysiology of cataracts and how mutations or dysfunctions in CRYAA contribute to protein aggregation in the lens.

2. **Molecular Chaperone Studies**

Protein Stability Research: CRYAA is an important small heat shock protein (sHSP) and is widely used in studies of protein stability, especially those focused on preventing protein misfolding and aggregation in various conditions. It helps in refolding denatured proteins and preventing aggregation under stress conditions, making it a key molecule in protein folding research.
Chaperone Activity Assays: Researchers use CRYAA in assays to assess molecular chaperone activity, as it helps to prevent the aggregation of other proteins, especially under conditions of heat or oxidative stress. It is often used as a model for studying the functions of other small heat shock proteins.

3. **Neurodegenerative Disease Research**

Alzheimer's and Parkinson's Disease: The properties of CRYAA as a chaperone protein are studied in the context of neurodegenerative diseases, where protein aggregation is a hallmark (e.g., amyloid-beta in Alzheimer's and alpha-synuclein in Parkinson's disease). CRYAA may be investigated for its potential to prevent protein aggregation in neuronal cells, offering possible therapeutic insights for diseases associated with protein misfolding.
Protein Misfolding Disorders: CRYAA's molecular chaperone properties are also studied for their potential in the treatment of various protein misfolding disorders beyond cataracts, including diseases such as Huntington's disease, prion diseases, and amyotrophic lateral sclerosis (ALS).

4. **Diagnostic Applications**

Biomarker for Cataracts: CRYAA expression levels or its mutation profile can serve as a biomarker for cataract diagnosis and for identifying individuals at high risk of cataract development, particularly in congenital or early-onset cases.
Genetic Screening: CRYAA mutations are associated with specific types of congenital cataracts. Therefore, genetic screening for CRYAA mutations can be used for early diagnosis and genetic counseling in families with a history of cataracts or other lens-related disorders.
Ocular Disease Research: CRYAA is also used in diagnostic assays to assess protein aggregation and lens health in the study of various ocular diseases beyond cataracts, such as lens opacification and presenile cataracts.

5. **Protein Aggregation and Folding Studies**

In Vitro Studies: CRYAA is frequently used in in vitro studies to investigate how proteins aggregate under stress conditions and how chaperones like CRYAA can assist in protein

folding. This has important applications not only in cataract research but also in the broader field of protein chemistry.
Chaperone-Substrate Interactions: CRYAA's interaction with unfolded or partially folded proteins makes it a critical tool in studying protein-substrate interactions. Researchers use CRYAA to examine the specificity and efficiency of chaperone-protein interactions.

6. Cryopreservation and Cell Preservation
Cryoprotectant Studies: CRYAA is involved in the maintenance of protein stability under stress, making it a candidate for research into cryopreservation and the preservation of cells, tissues, and organs. It is particularly useful in studies on freeze-thawing and other preservation techniques.
Cell Culture: CRYAA is used in cell culture models to help protect cells from oxidative stress and protein damage during experimental conditions that mimic stressful environments (e.g., hypoxia, hyperthermia).

7. Regenerative Medicine and Stem Cell Research
Stem Cell Protection: In stem cell therapies, CRYAA is used to protect stem cells from stress conditions, such as oxidative damage or thermal stress, during expansion or differentiation. Its molecular chaperone properties help in maintaining the integrity of stem cell proteins, ensuring that they maintain their pluripotency or differentiation potential.
Tissue Engineering: CRYAA is investigated in the context of tissue engineering and regenerative medicine, particularly for applications involving the lens, where its role in protein aggregation prevention can be critical for the regeneration of lens tissue.

8. Pharmaceutical and Biotechnology Applications
Therapeutic Development: As a molecular chaperone, CRYAA could potentially be used in the development of pharmaceuticals aimed at treating diseases related to protein aggregation or misfolding. Its ability to prevent protein aggregation makes it a potential therapeutic protein for diseases where protein misfolding is a key pathogenic mechanism.
Therapeutic Protein Formulations: CRYAA is also studied for use in biopharmaceutical formulations where it could be employed as an excipient or adjunct to prevent the aggregation of therapeutic proteins, especially in protein-based biologics.

9. Eye Tissue Engineering and Lens Regeneration
Lens Regeneration: CRYAA is of significant interest in ocular regenerative medicine for its potential to aid in the regeneration of lens tissue in conditions such as cataracts or lens damage due to trauma or disease. Research is ongoing to understand how CRYAA and other crystallins may contribute to the regeneration of lens cells and the restoration of lens transparency.

Reference:

1. Derham BK, Harding JJ. Alpha-crystallin as a molecular chaperone. Prog Retin Eye Res. 1999;18(4):463-509. doi:10.1016/s1350-9462(98)00030-5
2. de Jong WW, Terwindt EC, Bloemendal H. The amino acid sequence of the A chain of human alpha-crystallin. FEBS Lett. 1975;58(1):310-313. doi:10.1016/0014-5793(75)80286-9

Disclaimers

This product is intended for laboratory research use only. It is not intended for any animal or human therapeutic use, any human or animal consumption, or any diagnostic use.

Product Promise

At TriDix Bio, we are dedicated to supporting your work with high quality products. In the unlikely event of one of our products not working as expected, you are covered by our product promise.