

Stanford



Ajay Kumar

Postdoctoral Scholar, Ophthalmology

Bio

BIO

Dr. Ajay Kumar is currently working as a Postdoctoral Researcher at the Department of Ophthalmology, School of Medicine, Stanford University. Dr. Kumar is a stem cell biologist by training and has been working in the stem cell field for more than a decade. His primary interest is to devise novel stem cell-based and cell-free therapies for the treatment of glaucoma, other neurodegenerative diseases, and aging. He devised a new method to mimic the development of the human retina in a dish and a new treatment strategy for glaucoma using stem cell secretome. Dr. Kumar is the recipient of multiple awards and has published more than 25 peer-reviewed papers in esteemed journals. He wishes to establish regenerative medicine-based therapies for different diseases which can benefit patients.

HONORS AND AWARDS

- ISER/BrightFocus Travel award, Bright Focus Foundation, USA (Aug 2021)
- Amir Chand Gold medal, PGIMER, Chandigarh, India (2021)
- Weigand Fellowship in Regenerative Ophthalmology, University of Pittsburgh, USA (2018-19)
- Amir Chand Silver medal, PGIMER, Chandigarh, India (2018)
- R Srinivasan award, Indian Biophysical Society (2017)
- Young Innovator Award in medicine, ABMS, PGIMER, Chandigarh, India (2016)
- First Rank PhD Entrance Exam, PGIMER, Chandigarh, India (2012)
- Research Fellowship, CSIR, India (2010-2015)
- First Rank MSc Entrance Exam, Kurukshetra University, India (2007)

PROFESSIONAL EDUCATION

- Master of Science, Kurukshetra University (2009)
- Bachelor of Science, Kurukshetra University (2007)
- Doctor of Philosophy, Postgraduate Institute of Medical Education (2017)
- Postdoc, Stanford University , Designing therapy for optic neuropathy (2021)
- Postdoc, University of Pittsburgh , Treatment of vision loss using stem cell-based and cell-free therapy (2021)
- PhD, PGIMER, Chandigarh, India , Stem Cell Biology (2017)

STANFORD ADVISORS

- Yaping Liao, Postdoctoral Faculty Sponsor

PATENTS

- Yiqin Du, Ajay Kumar. "United States Patent WO2021178977 COMPOSITIONS AND METHODS FOR TREATING OCULAR DISORDERS", University of Pittsburgh, Sep 10, 2021

LINKS

- My Research Gate profile: https://www.researchgate.net/profile/Ajay_Kumar224
- My LinkedIn profile: <https://www.linkedin.com/in/ajay-kumar-4918381b/>
- My Google Scholar profile: <https://scholar.google.com/citations?user=HvWC2ZkAAAAJ&hl=en>
- My ORCID profile: <https://orcid.org/0000-0003-3412-1823>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

My main project is based on devising a treatment for Anterior ischemic optic neuropathy (AION) by using skin biopsies from AION patients and differentiating fibroblast to retinal ganglion cells ultimately. I am also working on strategies to regenerate retinal ganglion cells in optic nerve crush model.

LAB AFFILIATIONS

- Yaping Liao, Liao Eye-Brain lab (8/2/2021)

Publications

PUBLICATIONS

- **Regenerative therapy for the Cornea.** *Progress in retinal and eye research*
Kumar, A., Yun, H., Funderburgh, M. L., Du, Y.
2021; 101011
- **Human stem cells home to and repair laser-damaged trabecular meshwork in a mouse model (vol 6, 216, 2018)** *COMMUNICATIONS BIOLOGY*
Yun, H., Wang, Y., Zhou, Y., Kumar, A., Wang, K., Sun, M., Stolz, D. B., Xia, X., Ethier, C., Du, Y.
2021; 4 (1): 456
- **Stem cell transplantation rescued a primary open-angle glaucoma mouse model** *ELIFE*
Xiong, S., Kumar, A., Tian, S., Taher, E. E., Yang, E., Kinchington, P. R., Xia, X., Du, Y.
2021; 10
- **Cell-Based Therapies for Trabecular Meshwork Regeneration to Treat Glaucoma.** *Biomolecules*
Mallick, S., Sharma, M., Kumar, A., Du, Y.
2021; 11 (9)
- **Two-step induction of trabecular meshwork cells from induced pluripotent stem cells for glaucoma** *BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS*
Kumar, A., Cheng, T., Song, W., Cheuk, B., Yang, E., Yang, L., Xie, Y., Du, Y.
2020; 529 (2): 411-417
- **Assessment of Post-thaw Quality of Dental Mesenchymal Stromal Cells After Long-Term Cryopreservation by Uncontrolled Freezing** *APPLIED BIOCHEMISTRY AND BIOTECHNOLOGY*
Raik, S., Kumar, A., Rattan, V., Seth, S., Kaur, A., Bhatta Charyya, S.
2020; 191 (2): 728-743
- **Differentiation of Trabecular Meshwork Stem Cells into Retinal Ganglion Cells**
Gandhi, K., Kumar, A., Du, Y.
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2020
- **BRAF V600E mutation in childhood Langerhans cell histiocytosis correlates with multisystem disease and poor survival** *BLOOD CELLS MOLECULES AND DISEASES*

Bhatia, P., Singh, M., Sharma, M., Sharma, A., Kakkar, N., Radhika, S., Trehan, A., Bansal, D.

2020; 82: 102356

- **#5#1 Integrin Promotes Anchoring and Integration of Transplanted Stem Cells to the Trabecular Meshwork in the Eye for Regeneration.** *Stem cells and development*
Xiong, S., Xu, Y., Wang, Y., Kumar, A., Peters, D. M., Du, Y.
2020; 29 (5): 290-300
- **Stem Cells from Human Trabecular Meshwork Hold the Potential to Develop into Ocular and Non-Ocular Lineages After Long-Term Storage** *STEM CELLS AND DEVELOPMENT*
Kumar, A., Xu, Y., Du, Y.
2020; 29 (1): 49-61
- **Human Embryonic Stem Cells Differentiate into Trabecular Meshwork Cells**
Du, Y., Song, W., Kumar, A.
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **Audit of Quality and Quantity of Nucleic Acid Yield from Pediatric Acute Leukemia Cases Following a Bio-banking Initiative** *INDIAN JOURNAL OF HEMATOLOGY AND BLOOD TRANSFUSION*
Kumar, A., Singh, M., Bhatia, P., Singh, A.
2019; 35 (1): 77-82
- **Secretome proteins regulate comparative osteogenic and adipogenic potential in bone marrow and dental stem cells** *BIOCHIMIE*
Kumar, A., Kumar, V., Rattan, V., Jha, V., Bhattacharyya, S.
2018; 155: 129-139
- **Stemness and Regenerative Potential of Corneal Stromal Stem Cells and Their Secretome After Long-Term Storage: Implications for Ocular Regeneration** *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE*
Kumar, A., Xu, Y., Yang, E., Du, Y.
2018; 59 (8): 3728-3738
- **Stemness and regenerative effects of trabecular meshwork stem cells/secretome after long-term storage**
Kumar, A., Du, Y.
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2018
- **Possible Autologous Stem Cell Resources for Trabecular Meshwork Regeneration**
Yang, E., Kumar, A., Du, Y.
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2018
- **Epithelial to mesenchymal transition induces stem cell like phenotype in renal cell carcinoma cells** *CANCER CELL INTERNATIONAL*
Singla, M., Kumar, A., Bal, A., Sarkar, S., Bhattacharyya, S.
2018; 18: 57
- **Insights into cell-free therapeutic approach: Role of stem cell "soup-ernatant".** *Biotechnology and applied biochemistry*
Raik, S., Kumar, A., Bhattacharyya, S.
2018; 65 (2): 104-118
- **Human stem cells home to and repair laser-damaged trabecular meshwork in a mouse model** *COMMUNICATIONS BIOLOGY*
Yun, H., Wang, Y., Zhou, Y., Wang, K., Sun, M., Stolz, D. B., Xia, X., Ethier, C., Du, Y.
2018; 1
- **Molecular spectrum of secretome regulates the relative hepatogenic potential of mesenchymal stem cells from bone marrow and dental tissue** *SCIENTIFIC REPORTS*
Kumar, A., Kumar, V., Rattan, V., Jha, V., Pal, A., Bhattacharyya, S.
2017; 7: 15015
- **Secretome Cues Modulate the Neurogenic Potential of Bone Marrow and Dental Stem Cells** *MOLECULAR NEUROBIOLOGY*
Kumar, A., Kumar, V., Rattan, V., Jha, V., Bhattacharyya, S.
2017; 54 (6): 4672-4682

- **Emergence through delicate balance between the steric factor and molecular orientation: a highly bright and photostable DNA marker for real-time monitoring of cell growth dynamics** *CHEMICAL COMMUNICATIONS*
Gaur, P., Kumar, A., Dalal, R., Bhattacharyya, S., Ghosh, S.
2017; 53 (17): 2571-2574
- **Quinazoline derivatives as cathepsins B, H and L inhibitors and cell proliferating agents** *INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES*
Raghav, N., Jangra, S., Kumar, A., Bhattacharyya, S.
2017; 94: 719-727
- **Selenium Incorporated Cationic Organochalcogen: Live Cell Compatible and Highly Photostable Molecular Stain for Imaging and Localization of Intracellular DNA** *ACS APPLIED MATERIALS & INTERFACES*
Gaur, P., Kumar, A., Dey, G., Kumar, R., Bhattacharyya, S., Ghosh, S.
2016; 8 (17): 10690-10699
- **Biomolecular recognition at the cellular level: geometrical and chemical functionality dependence of a low phototoxic cationic probe for DNA imaging** *JOURNAL OF MATERIALS CHEMISTRY B*
Gaur, P., Kumar, A., Bhattacharyya, S., Ghosh, S.
2016; 4 (28): 4895-4900
- **Cathepsin B, H and L inhibitors as cell proliferating agents: design, synthesis, computational and pharmacological studies of some novel 2-(2-naphthoyl)-6,6-dimethyl-3-aryl-2,3,6,7-tetrahydrobenzofuran-4(5H)-ones** *RSC ADVANCES*
Raghav, N., Jangra, S., Kumar, A., Bhattacharyya, S., Wadhwa, D., Sindhu, J.
2016; 6 (41): 34588-34599
- **Effect of uncontrolled freezing on biological characteristics of human dental pulp stem cells** *CELL AND TISSUE BANKING*
Kumar, A., Bhattacharyya, S., Rattan, V.
2015; 16 (4): 513-522
- **The voyage of stem cell toward terminal differentiation: a brief overview** *ACTA BIOCHIMICA ET BIOPHYSICA SINICA*
Bhattacharyya, S., Kumar, A., Khanduja, K.
2012; 44 (6): 463-475