2024-2025 Postbaccalaureate Fellow and 2024 Summer Scholar Placements:

Students who are selected for interviews, based on their application, will be contacted to rank their interest in the host lab placements. At this time, they will be able to express locational restrictions.

<table>
<thead>
<tr>
<th>PI</th>
<th>Affiliation</th>
<th>City</th>
<th>State</th>
<th>Associated SENS strand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amutha Boominathan*</td>
<td>SENS Research Foundation</td>
<td>Mountain View</td>
<td>California</td>
<td>MitoSENS</td>
</tr>
<tr>
<td>Hadi Rebbaa*</td>
<td>SENS Research Foundation</td>
<td>Mountain View</td>
<td>California</td>
<td>RepleniSENS</td>
</tr>
<tr>
<td>Amit Sharma*</td>
<td>SENS Research Foundation</td>
<td>Mountain View</td>
<td>California</td>
<td>ApoptoSENS and RepleniSENS</td>
</tr>
<tr>
<td>Danica Chen</td>
<td>University of California, Berkeley</td>
<td>Berkeley</td>
<td>California</td>
<td>MitoSENS</td>
</tr>
<tr>
<td>Cyclarity</td>
<td>Cyclarity</td>
<td>Novato</td>
<td>California</td>
<td>LysoSENS and ApoptoSENS</td>
</tr>
<tr>
<td>Jean Hebert</td>
<td>Albert Einstein, College of Medicine</td>
<td>Bronx</td>
<td>New York</td>
<td>RepleniSENS</td>
</tr>
<tr>
<td>Khalid Shah</td>
<td>Harvard University</td>
<td>Boston</td>
<td>Massachusetts</td>
<td>OncoSENS</td>
</tr>
<tr>
<td>Evan Snyder</td>
<td>Sanford Burnham Prebys (SBP) Medical Discovery Institute</td>
<td>La Jolla</td>
<td>California</td>
<td>RepleniSENS</td>
</tr>
<tr>
<td>Chris Wiley</td>
<td>Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University</td>
<td>Boston</td>
<td>Massachusetts</td>
<td>ApotoSENS</td>
</tr>
</tbody>
</table>

*= designates a PI who is also accepting Master's students through Dominican University of California, or PhD Students through the University of Toledo
Amutha Boominathan (SENS Research Foundation, Mountain View, CA): Mitochondria are power plants of the cell and are also the only cellular organelle that possess their own DNA in mammals. In humans, mitochondrial DNA (mtDNA) codes for 13 important proteins, all of which assemble into the oxidative phosphorylation relay. Mutations in mtDNA occur as a consequence of constant exposure to reactive oxygen species produced by the mitochondrial energy generation process as well as mistakes in mtDNA replication. These mutations accumulate over time due to inefficient repair mechanisms and compromise respiratory chain function. Inherited and acquired mutations in mtDNA result in impaired energy generation and are the cause for several pathologies such as Leber’s hereditary optic neuropathy (LHON), Myoclonic Epilepsy with Ragged Red Fibers (MERRF), Kearns-Sayre syndrome and Leigh syndrome. Age-associated mitochondrial dysfunction has been implicated in several neuromuscular diseases including sarcopenia, Alzheimer’s, and Parkinson’s disease.

The Boominathan lab at SENS Research Foundation is utilizing gene therapy approaches to develop translational avenues in treating inherited and acquired mutations in the mitochondrial DNA. Using the allotopic approach, we have identified specific targeting elements/sequences that can improve the expression of these essential genes from the nuclear DNA and their transport to the correct location in mitochondria. The summer scholar/Postbaccalaureate Fellow selected will use a computational approach to design and test a library of constructs in model patient cell lines with specific mutations in mtDNA. The ability of re-engineered genes to rescue function will be evaluated through various techniques, such as protein gels, qPCR, and activity assays, with the potential of extending the studies to animal models.

Amit Sharma (SENS Research Foundation, Mountain View, CA):
The research goals of my laboratory are to (A) investigate the cellular mechanisms that underlie age-mediated tissue decline caused by cellular senescence and (B) investigate how this may be prevented with pharmacological or immune-based interventions that reduce or eliminate senescent cells. We are studying the cellular and molecular pathways involved in aging, inflammation, and the immune system’s role in regulating cellular senescence. We intend to develop next generation senotherapeutic interventions and biomarkers of aging and age-related diseases like lung fibrosis.

https://www.sens.org/catalyzing-degradation-of-tau-aggregates/
Hadi Rebbaa (SENS Research Foundation, Mountain View, CA):

Research at the RepleniSENS program aims at developing new approaches to extend health span. Toward this goal, we are developing new agents (senolytics) that selectively eliminate senescent cells, optimized stem cells with improved potential for tissue regeneration, and biomarkers to assess the efficacy of senolytics and stem cells either alone or in combination.

https://www.sens.org/exploring-synergies-between-senolysis-and-stem-cell-therapy/
Danica Chen (University of California, Berkeley, Berkeley, CA):

My lab studies various topics related to aging, including stem cell aging (hematopoietic stem cells and neural stem cells), cognitive aging, aging-related metabolic diseases such as fatty liver disease and insulin resistance, and aging-related inflammation.

https://nst.berkeley.edu/users/danica-chen

Selected Publications:


See also In Brief, *Nature Reviews Drug Discovery*. 20(2) doi:10.1038/s41596-020-00091-8

See also Editor’s Choice, *Science Translational Medicine*. 12(59) eaax08321


Amelia Anderson and Prerna Bhargava at Cyclarity Therapeutics (Novato, CA):

Cyclarity Therapeutics (CTx), a startup-level pharmaceutical company which spun out of SENS Research Foundation, is looking for a motivated summer intern to join our team. CTx is engineering drugs that can bind and reverse the pathological effects of certain oxidized forms of cholesterol implicated in atherosclerosis as well as several other diseases of aging. The laboratory techniques involved include isolation of PBMCs and macrophages from human blood; flow cytometry to characterize macrophages in various states of differentiation, polarization, and disease; semi-automated (robotic liquid handler) biochemical binding and toxicity assays; ELISA; and other common molecular biology and biochemistry techniques. We also have ongoing computational research projects, which involve using various computational methods (molecular dynamics, PMF calculations) to predict how our drug molecules interact with target molecules. If the student is interested in the computational perspective, they would be tasked with automating simple simulations and analysis using code in Python/BASH. The goal would be to learn some of the underlying principles of computational modeling while helping the computational department find more potential hits with our newly functional high-throughput, AI/ML enabled screening technology. The choice of a specific project will depend on the skillset and preferences of the trainee. Interested applicants do not need to know all the techniques required to run these assays but should be familiar with routine lab protocols and should not be uncomfortable working with human or animal blood and tissues. If the student wants to work on a computational project, an entry level understanding of computational methods as well as Linux OS and Python is ideal.
Jean Hérbert (Albert Einstein College of Medicine, New York, NY): The neocortex is the part of our brain that performs our highest cognitive functions. In recent years, the mechanisms underlying how stem cells in the embryo generate the neocortex have become better understood. Armed with this knowledge, the Hébert Lab is developing approaches to replace and repair adult neocortical tissue after age-related degeneration.

This is a highly collaborative project requiring multidisciplinary methods, which include molecular genetics, human embryonic stem cell biology, omics analyses, surgery, electrophysiology, live brain imaging, and behavioral tests, among others. Thus the Hébert Lab offers its members excellent opportunities for acquiring diverse and cutting-edge skill sets in an up-and-coming research area.

https://www.einsteinmed.edu/faculty/9069/jean-hebert/
Khalid Shah (Harvard University, Boston, MA): Cell based therapies are emerging as a promising strategy for cancer. We have developed cell surface receptor targeted adult stem cells, cancer cells and T cells expressing novel bi-functional immunomodulatory proteins. Using our recently established tumor models that mimic clinical settings, we have explored the fate and efficacy of different engineered cell based therapies. Our findings demonstrate the strength of using innovative approaches and clinically relevant preclinical models that pave a path for clinical translation. Recent projects in the Dr. Shah’s Center are focused on combined stem cell and T cell based therapies for the treatment of solid tumors

https://hsci.harvard.edu/people/khalid-shah-phd
https://pubmed.ncbi.nlm.nih.gov/?term="Shah%20K"%5BAuthor%5D%20Harvard%5BAffiliation%5D
Evan Snyder (Sanford Burnham Prebys (SBP) Medical Discovery Institute, La Jolla, CA): The Snyder Lab specializes in the use of induced pluripotent stem cells (iPSCs) for disease modeling and drug discovery. We utilize derived from patience with different diseases and disorders including but not limited to Alzheimer’s, Parkinsons, and bipolar disorder to better understand the mechanisms behind diseases and find more suitable treatments for a more diverse genetic field. In order to do this, we utilize methods of differentiation to create cerebral and/or cortical neurons. As well as researching neurophysiological and neuropsychiatric disorders, Snyder lab investigates the effects of different respiratory diseases and infections utilizing iPSC derived lung organoids.

https://www.sbpdiscovery.org/our-scientists/evan-snyder-md-phd
https://pubmed.ncbi.nlm.nih.gov/?term=%28evan+snyder%5BAuthor%5D%29+AND+%28Sanford+Burnham+Prebys+%5BAffiliation%5D%29&sort=date
Christopher Wiley (Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, Boston, MA): The Wiley Lab studies the intersection of metabolism and cellular senescence and uses its discoveries to identify pathways for intervention in aging and its associated diseases. Current projects in the lab include 1) study of lipid signaling and senescent cell clearance, 2) investigations into the regulation of purine metabolism as a mechanism for targeting senescent cells and/or their secretions, and 3) studying the role of mitochondria in driving senescence and the secretions of senescent cells.

https://hnrca.tufts.edu/people/faculty/christopher-wiley-phd