Our mission at the Allen Institute for Brain Science is to accelerate the understanding of how the human brain works in health and disease. Using a big science approach, we generate useful public resources, drive technological and analytical advances, and discover fundamental brain properties through integration of experiments, modeling and theory.

The Research Associate I - Imaging is responsible for conducting experiments and completing protocols in a high-throughput production environment, following Standard Operating Procedures (SOPs). Problem solving skills are required for troubleshooting during process development. The Research Associate I - Imaging will be part of a team that uses multiple microscopy systems to acquire high quality images from histological slides, whole brain specimens, and other custom applications. The incumbent will also contribute to image quality control and analysis, as well as fulfill support functions within the team. The successful candidate will be a dedicated worker with attention to detail and an interest in collaborative science.

Job Responsibilities

* Operate multiple imaging instruments (brightfield, epi-fluorescence and one-photon laser scanning microscopes)
* Perform routine laboratory work, including specimen and slide preparation
* Compile, process and analyze data; evaluate and communicate research results
* Follow Standard Operating Procedures, good laboratory practices, and comply with all regulatory requirements
* Evaluate, calibrate and troubleshoot experiment quality and instrument functionality
* Maintain accurate laboratory documentation using established methods, which may include Microsoft Office, Microsoft Access, custom Laboratory Information Management System (LIMS), Atlassian JIRA and others
* Contribute to and audit SOPs, as requested by departmental Manager/Director. Assist and train other staff as necessary
* Contribute to a rigorously scientific, cohesive and efficient team environment
* Other duties as assigned

Zachary Ip  
5553 28th Avenue NE  
Seattle, WA, 98105

January 26th, 2019

To whom it may concern;

I am applying for the position of Research Associate I because I believe the Allen Institute for Brain Science is working on some of the most ambitious and exciting research in the world. The scale of the Brainspan Atlas of the human developing brain and the Allen mouse brain connectivity atlas left me in awe. I have been interested in unpacking the complex connections and communication in the brain that make up who we are for as long as I can remember, and to be able to contribute to the mission of the Allen Institute to generate these massive public resources to fast-forward the development of neuroscience as a whole is the best way to explore my passion and make meaningful contributions to the field to advance humanity’s understand of the brain.

As you will see in my resume, I have studied neural systems in both a bottom up, developmental approach as well as more recently a top down, functional approach. In my undergraduate research, I studied the development of the peripheral nervous system by interrogating gene regulatory networks. I gained valuable laboratory skills there, but as I moved on to graduate school, I wanted to ask the question, what communications were happening between neurons to make us who we are? So, I became interested in studying functional connectivity. My current work looks at changes in connectivity between the hippocampus and cortex before and after stroke, utilizing signal processing and data analysis techniques.

My two laboratory experiences intersect working with the Allen institute. I would like to apply my experience using molecular assays and fluorescent imaging to further my understanding of connectivity within the brain, while learning more deeply about how neurons connect with each other and the variations that can make them similar or distinct. I would love to discuss more about my past research, or to learn more about the specifics of this position. Thank you for taking the time to consider me as a candidate for Research Associate I.

Sincerely,

Zachary Ip

-i heard about this thing from blah

-i am interested in this because x,y,z (include values shared by institute)

-this is my past experience that is relevant to things you care about

-this is what i can do for you

-this is what i hope to do in this position

-thank you for your time

**First paragraph (Purpose):**  
State why you are writing and the type of position or field of work in which you are interested.  Indicate how you learned of this position. If there is not a specific position available, indicate how your interest originated.  Demonstrate briefly your knowledge of the company.

**Second paragraph (Background and Qualifications):**  
Refer the employer to an enclosed resume. If you have had related experience or specialized training, elaborate on the details that would be of special interest to the employer.  Be as specific as you can about your qualifications and skills.  Provide examples on how you obtained/honed these skills. Your goal here is to match your skills to the employer's needs. Explain how you would fit into the position and the organization. This paragraph can get lengthy; break it into two paragraphs to make it more readable.

**Third paragraph (Request for Action):**  
Close your letter by briefly restating how your qualifications match the position.  Express your interest in further discussing your background and the position with the employer.  Write when you will be contacting them to ensure your application materials were received. Finally, include a statement expressing your appreciation for the employer's consideration.

Sincerely,

(signature)  
Name To understand how our cortex works, it is crucial to understand how its components communicate with each other to generate useful network functions especially between identified cell types. The Institute has devoted a major effort to classifying cell types in human cortex, using multiple large-scale single cell analysis techniques, including transcriptomics, cellular morphology and intrinsic membrane properties. In parallel, we are also able to identify local synaptic connectivity between human cortical neurons with their cell type identity. In this project, we will investigate the morphological properties of connected pairs of human cortical neurons.

1. Do the number of putative synaptic contacts depend upon pre- and postsynaptic cell class/type identities?
2. Are there morphological feature differences between uni-directionally connected pairs compared to bi-directionally (reciprocally) connected pairs within the same cell class/type?
3. Does dendritic spine density and local presynaptic axonal arborization predict synaptic connection when compared between connected and non-connected pairs of neurons?
4. Do gap-junctionally connected interneuron pairs have distinct morphological features compared to non-gap-junctionally connected neurons?

We will use these data to extract morphological features to support and/or predict connectivity rules between defined cell types of human columnar microcircuits

**Educational Objectives:**

Human cellular morphology data from our Cell Types database (<http://celltypes.brain-map.org/>) will be used to compare cortical cell morphology between neurons assayed by multi-patch synaptic connectivity recordings (e.g. dendritic arborization, spines density, axonal morphology, and so on).

Students will be matched with mentors and projects based on degree of experience and mutual interests. In addition to working on a specific project, Allen Institute interns will meet regularly as a group in sessions designed to augment their research experience. These meetings could include sessions aimed at improving communication skills, opportunities to share their projects with peers, and discussions with Allen Institute scientists and staff representing different disciplines within the organization. At the end of the program, each intern will write up a project summary and give a presentation summarizing their work.

**Project Summary:**

How can we identify ‘similar’ cells, and distinguish them from ‘different’ ones? Can we design ways to group cells into biologically meaningful categories? Could such a categorization help us understand more about how the brain works? We are seeking a thoughtful intern to address these questions in a data-driven manner.

Recent advances in experimental techniques have enabled neuroscientists to characterize individual brain cells based on their genetic, electrophysiological, and morphological properties at unprecedented resolution and scale. A key challenge is to devise computational methods to discover statistical patterns in such rich, high-dimensional, and multimodal datasets. To this end, we are developing machine learning models to parse gene expression data, electrophysiological time-series, and light microscopy images at the single cell level for large samples of brain cells. The intern will have the opportunity to work with unique datasets produced at the Allen Institute, and contribute to computational research as part of our team.

**Educational Objectives:**

* Contribute to feature and representation learning research
* Analyze transcriptomic/electrophysiological/light microscopy datasets
* Use cloud computing resources to develop and tune machine learning models