

**The Allen Institute for Cell Science:  
Building a microscope pipeline to map the human cell.**

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The textbook sketch of the human cell we are familiar with is based more on imagination than on solid data. We believe that understanding the organizational structure of a healthy cell and its evolution over time is an essential starting point to understand changes caused by disease.

In late 2015, the Allen Institute for Cell Science (AICS) launched, developing a light microscopy pipeline to create large data sets that will help scientists in academia and industry to put their models into context and to generate new hypothesis. We use gene-edited hiPS cells, since they are diploid and relatively homogeneous. In the first iteration, we are identifying the major cellular machines and signaling pathways using genome-edited fluorescently tagged proteins. To orient ourselves within the cell, we will also visualize one or two referential markers. Using these live cells, we will acquire large numbers of 3D images and time series.

We use robotics to seed cells on Matrigel in glass bottom plates, feed them and grow them to colonies. We detect the colonies in an overview scan and image them in high resolution with multiple spinning disk systems. We plan to complement these measurements with data from Airy scan super-resolution or other light microscopy modalities. The pipeline will be able to acquire at least 50.000 3D time-lapse movies per year that will yield up to 1PB of data. To manage and process the data we are developing a dedicated IT infrastructure.

We are committed to open science. We will not only share all our data, tools, and other results with the scientific community but also will have an ongoing dialog on tools and questions to address. We depend on your input and feedback to build a pipeline that best complements the achievements and needs of the scientific community.