

# Chemical Genomics Branch

## Toxicology in the 21st Century (Tox21)

Tox21 researchers aim to develop better toxicity assessment methods to quickly and efficiently test whether certain chemical compounds have the potential to disrupt processes in the human body that may lead to negative health effects. Specifically, the group:

- Identifies environmental chemicals that lead to biological responses and determines their mechanisms of action on biological systems.
- Prioritizes specific compounds for more extensive toxicological evaluation.
- Applies 3-D cell-culture models of human tissues to assess toxicant promotion of diseases, including skin, neurological and cardiovascular diseases.
- Develops novel transcriptomic methods and genome engineering for high-throughput screening.
- Creates computational models that predict chemicals' negative health effects in humans.

Visit <https://ncats.nih.gov/tox21> to learn more.

## Stem Cell Translation Laboratory

The goal of the Stem Cell Translation Laboratory (SCTL) is to bring induced pluripotent stem cell (iPSC) technology into clinical applications and drug development. Through a multidisciplinary collaborative team approach, NCATS' SCTL scientists aim to:

- Establish detailed quality control (QC) standards to define pluripotency and differentiated cell types.
- Establish methods to assess variations in cultured cells derived from iPSCs.
- Develop standard methods to produce mature cells meeting the QC standards above.
- Discover, validate and disseminate small-molecule reagents to replace expensive recombinant proteins, xenogenic material and undefined media components in cell differentiation protocols.
- Utilize iPSC translation and human-cell types for collaborative projects as part of the Helping to End Addiction Long-term<sup>SM</sup> Initiative, or NIH HEAL Initiative<sup>SM</sup>.

Visit <https://ncats.nih.gov/stemcell> to learn more.

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## Assay Development and Screening Technology

The Assay Development and Screening Technology program aims to advance the process of therapeutic development through research and development of innovative assay designs and chemical library screening methods in the context of disease biology. Specifically, the group aims to:

- Bridge the gap between breakthroughs in understanding disease mechanisms and the first stage of drug development.
- Create pre- and postdoctoral training opportunities in methods development and chemical biology research to advance the scope and efficiency of assays and screening paradigms.
- Develop collaborative relationships with disease foundations, NIH-funded intramural and extramural investigators, international consortia and the biopharmaceutical industry to devise strategies for early-stage translation and drug discovery.

Visit <https://ncats.nih.gov/adst> to learn more.

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## Functional Genomics Laboratory

The Functional Genomics Laboratory is designed to help NIH investigators use the latest functional genomics technology to advance drug discovery and scientific knowledge about health and disease. Specifically, the Functional Genomics Laboratory:

- Collaborates with NIH investigators to perform large-scale functional genomic screening projects. The screening platforms include, but are not limited to, chemogenomics, pooled and arrayed RNAi, CRISPR, and CRISPR interference and activation.
- Pursues new and complementary screening technologies for exploring gene function.
- Advances the science of functional genomics screening and informatics.

Visit <https://ncats.nih.gov/functional-genomics-lab> to learn more.

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## Chemistry Technologies

The aim of the Chemistry Technology program is to provide cutting-edge resources to enable the broader biomedical research community to pursue basic and translational studies in a faster and more in-depth manner. To achieve this, chemistry technology scientists at NCATS engage in a variety of innovative translational research activities. Specifically, scientists for the program:

- Develop novel biologically active and mechanistically defined small molecules.
- Organize and annotate small-molecule libraries for chemogenomic screening.
- Conduct chemogenomic drug screening in both single-agent and combination formats as a systems-biology experiment and for translational purposes.
- Design and characterize new disease models.

Visit <https://ncats.nih.gov/chemtech> to learn more.

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