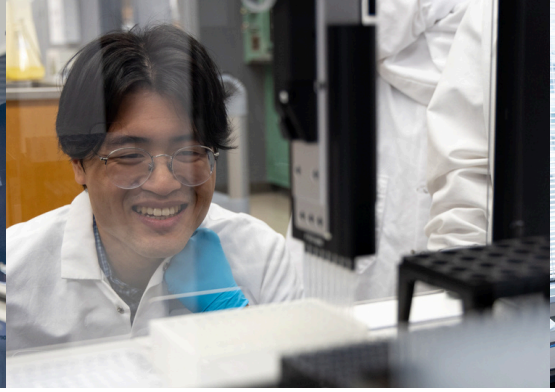




Institute for Protein Innovation

Media kit

About us

The Institute for Protein Innovation (IPI) is a nonprofit research institute located on the Harvard Medical School campus. The Institute is striving to overcome one of the most persistent bottlenecks in biomedical discovery and drug development: the lack of reliable protein tools and platforms for studying biological pathways and processes.

IPI takes a community-first approach, empowering researchers to meet this challenge by developing and sharing high-quality antibody tools, expertise and training.

Why proteins and why now?

Proteins are the workhorses of biology and the basis of growing, high-impact class modern-day therapeutics. After decades dominated by genomics, biomedicine is now reembracing proteins, which ultimately determine how cells behave and link our genetic blueprint to disease.

The benefit of this proteomic approach is evident when studying complex systems like the brain. Gene expression data can pinpoint neuronal cell types, for example. But it is the abundance, location and interactions of proteins that define how neurons communicate and circuits function.

Meanwhile, artificial intelligence (AI) and machine learning technologies are providing scientists with new insights into protein structure, sequencing and design. These technologies promise to shape a future replete with powerful reagents and novel protein drugs.

IPI is positioned to leverage state-of-the-art technologies and deep protein expertise; help train the next generation of protein scientists; and partner in a unique community-based model, to make its mark on biomedicine.

Addressing the antibody crisis

In 2017, immunologist and entrepreneur Tim Springer and structural biologist Andrew Kruse founded IPI on a simple yet consequential insight. While biology has been transformed by advances in genomics and RNA technologies, scientists still struggle to measure and manipulate proteins. A major reason is that antibodies, the primary tools for detecting proteins and tracking their activity, are often poorly validated, irreproducible or unavailable for many important or unexplored targets.

As part of its mission to advance protein science, IPI aims to harness the knowledge and craftsmanship of protein engineering to change the antibody landscape.

The Institute develops high-quality, renewable protein tools, especially synthetic recombinant antibodies, and makes them broadly available to the scientific community. IPI's mission-driven approach blends the exploratory methods of academia with the scalability and engineering mindset of industry, and a strong commitment to open science and transparency.

Building a new kind of nonprofit antibody platform

At the heart of IPI is a highly automated, high-throughput platform for antibody discovery and validation. The IPI platform employs state-of-the-art yeast display technology, which circumvents the need for animals and the many limitations of traditional animal-based antibody generation.

Relying on their protein expertise, IPI scientists build large "libraries" — or storehouses of DNA sequences that encode engineered antibodies — entirely in vitro. Genetic tinkering and iterative selection allow IPI scientists to precisely control the resulting antibody properties, such as specificity, stability and therapeutic developability. The yeast display approach also enables targeting of challenging targets, including highly conserved proteins shared between species, such as mouse and human, and proteins involved in brain function.

Additionally, IPI does not generate antibodies one target at a time. Instead, IPI develops entire panels of antibodies against related protein families. This strategy enables researchers to study entire biological interactomes, such as synaptic cleft signaling or neuronal migration, rather than isolated molecules. The family approach also allows IPI to screen its resulting antibodies against closely related proteins, thereby ensuring the selectivity of its protein tools.

The IPI team has also tapped many recent advances in AI and machine learning to help design better antibody libraries, analyze large-scale screening data and accelerate the discovery of high-performing binders. The result is a scalable system capable of producing thousands of well-characterized antibodies each year and supporting fruitful collaborations with both academic and industrial partners.

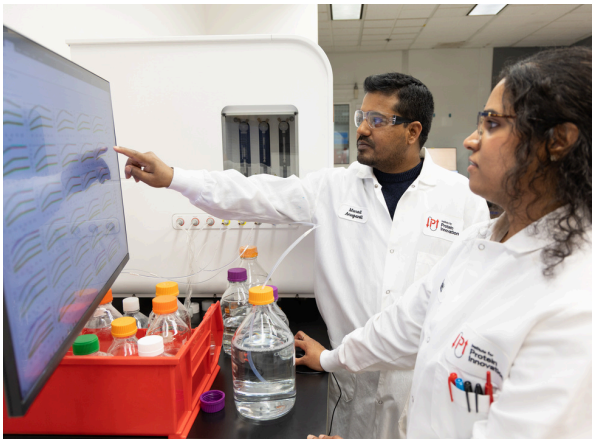
A focus on neuroscience

Neuroscience is one of the most complex and technically demanding areas of biology. Neuroscientists have mapped the diversity of cell types in the brain primarily using large-scale RNA-based technologies, but RNA alone tells only part of the story. Neuronal proteins, which guide how neurons function and communicate, need to be studied. However, the field is plagued by a shortage of high-quality protein tools capable of interacting in dynamic neural contexts.

IPI is tackling this problem by building comprehensive antibody panels for key neuroscience domains, including synaptic proteins, neuronal migration/axon guidance systems and glial cell markers. These efforts are designed not just to label proteins but to answer deeper questions, such as how neuronal circuits are organized, how signals are transmitted and how these processes break down in disease. The results have significant implications in neurodegenerative conditions such as Alzheimer's Disease and developmental disorders such as autism.

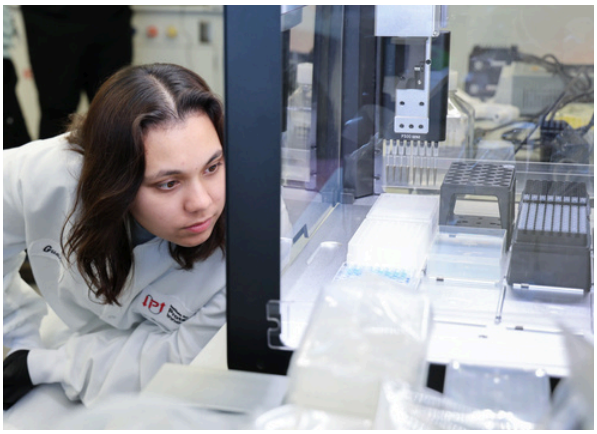
Teaching the next generation

In addition to deploying cutting-edge protein technology, IPI is also translating it into practice to equip the next generation of researchers with the knowledge to work with proteins. IPI has created a program of hands-on courses that teach the principles of yeast display, automation and antibody validation. The Institute also hosts regular workshops and one-on-one training activities. In addition, the IPI team has crafted a series of explainers, book chapters, and multimedia experiences to convey knowledge key to understanding antibodies and other proteins.



Looking ahead

Founded upon philanthropic funding, IPI is now establishing a sustainable, scalable model for protein tool development — one that combines open science, collaboration and broad accessibility. By making proteins reliable, accessible and easier to study, IPI strives to accelerate the pipeline from basic research to drug development and ultimately improve human health.



IPI fast facts

What is IPI? The Institute for Protein Innovation (IPI) is a nonprofit 501(c)3 research institute based on the Harvard Medical School campus that develops high-quality, renewable protein tools—especially antibodies—to accelerate biomedical research and enable drug discovery.

Mission: To advance protein science to accelerate research and improve human health.

Founded: In 2017 by Timothy Springer, PhD (Harvard Medical School, Boston Children's Hospital) and Andrew Kruse, PhD (Harvard University).

Core problem: Many antibodies used in research are unreliable, irreproducible or unavailable, limiting the ability to study proteins, the molecules that drive biological function.

Long-term goal: To build a scalable, sustainable platform that makes high-quality protein tools widely accessible and accelerates discovery across biology.

What makes IPI different?

- Systematic, panel-based antibody discovery (targeting entire protein families, not single proteins)
- Use of yeast display and synthetic libraries instead of animal immunization
- Integration of AI and machine learning in antibody design and selection
- Rigorous validation (biophysical, cellular and community-based)
- Commitment to open science and transparency, exemplified through accessible antibody distribution, public validation data and shared protein sequences

Scale of operations:

- 20,000+ recombinant antibody candidates generated
- 400+ protein targets explored
- Thousands of antibodies produced annually for distribution
- Dozens of global collaborating research labs
- 50+ proteins commercialized through partnering nonprofit repository Addgene

Major focus area:

- Neuroscience: Proteins—not genes—control how brain cells function, but tools to study them are limited, especially in complex neural systems.

Key technologies:

- Yeast display platform for high-throughput antibody discovery
- Automated, end-to-end pipeline from antigen design to validation

Antibody initiatives include:

- Synaptic cleft proteins
- Axon guidance and receptor–ligand systems
- Glial cell-type markers
- Adhesion GPCR proteins