

# HARNESSING THE IMMUNE SYSTEM TO IMPROVE HUMAN HEALTH

## *The Center for Innate Immunity and Immune Disease*



**M**ILLIONS OF PEOPLE AROUND THE GLOBE are ill today because their immune system has reacted too strongly — or not strongly enough — to toxins, bacteria, viruses, pathogens and injury. People worldwide could benefit if we understood the immune system more fully and if we could develop therapies that worked with the immune system to combat disease.

With the creation of the new Center for Innate Immunity and Immune Disease (CIID), researchers at UW Medicine intend to harness the immune system: to make it even more powerful and responsive, or to control it. In turn, we hope to help millions of people with conditions ranging from cancer, to rheumatoid arthritis, to HIV. We invite you to help us understand the immune system — and to make revolutionary changes in medical care.

### The Implications of Innate Immunity

The CIID aims to help millions by:

- Combatting infectious diseases (like Ebola, flu, malaria and HIV) by augmenting the immune system;
- Defeating autoimmune diseases (like lupus, multiple sclerosis and rheumatoid arthritis);
- Taking aim at diabetes and other inflammatory conditions;
- Discovering new ways to fight cancer; and
- Improving vaccines and recovery from surgery, burns and wounds.

### *Immune Response: The Good, The Bad, The Controlled*

The immune system protects the body from disease. Over the past decade, however, researchers have come to understand that the innate immune system — the part of the immune system that serves as the body's first line of defense — is implicated in an enormous number of disease processes that affect many millions of people around the world.

Sometimes the immune system runs too hot, erroneously attacking the body. Sometimes, it runs too cold — its defenses insufficient to defend against invaders. We now know that the tipping point between running too hot or too cold often depends on the innate immune response, but we don't know how to prevent it from going off course. The CIID's goal is to determine how to fine-tune the innate immune system (so that it knows exactly when to turn on and how to protect the body), and then how to turn it off before it causes any collateral damage.

### The Two Halves of the Immune System

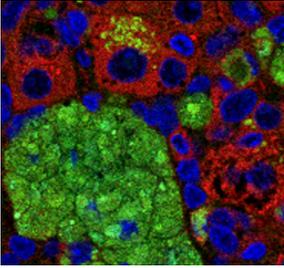
Manipulating immune function — enhancing it or suppressing it — will rest on our ability to control the two aspects of the immune system: innate immunity, mentioned above, and adaptive immunity.

#### **The innate immune system: the first line of defense**

The innate immune system is the first part of the body to detect invaders such as viruses, bacteria, parasites and toxins, or to sense wounds or trauma. Upon detection of these agents or events, the innate immune system activates cells to attack and destroy the outsider, or to initiate repair, while also informing and modulating the *adaptive* immune response that follows this first line of defense.

#### **The adaptive immune system: the second, specific response**

Adaptive immune cells are the second and specific line of defense, and they are called to action by the innate immune system. After recognizing the invader, the cells can multiply and combat it, leading to recovery from disease and protection against its return.



Immune staining of a liver section from humanized mice infected with hepatitis C virus. Green marks the innate immune response in the liver.

*“We are poised to be the institute on innate immunity. And we need our community’s support to help it reach its potential.”*

Joan Goverman, Ph.D.  
UW Professor and Chair  
Department of Immunology

### Harnessing the Innate Immune System

The idea of using the immune system to help the body fight disease has been in existence for some time; vaccines, which allow the body to remember disease-causing pathogens, provide an excellent example. There are many diseases, though, in which the desired outcome is not to *enhance* the immune system, but to *suppress* its unwanted effects. Lupus, rheumatoid arthritis and multiple sclerosis, for instance, are autoimmune diseases in which the immune system erroneously attacks the body. Chronic inflammation, connected with wound trauma, diabetes, cardiovascular disease and neurodegenerative disease, is another example of immune-system overreaction.

**The idea of using innate immunity to either enhance or suppress overall immunity is a new concept.** In striving to understand the innate immune system, the CIID’s ultimate goal is to regulate overall immune response to distinct disease processes, thus using the power of immunity to improve human health. In doing so, we will improve the body’s ability to fight pathogens and to control the immune response when it goes off track — **and we will change medicine forever.**

### Investing in the Center’s Goals

The Center for Innate Immunity and Immune Disease will:

- **Conduct ground-breaking research** on how the innate immune system functions and how to manipulate immune response;
- **Discover and develop new treatments** for the millions of people with diseases related to immune function and dysfunction; and
- **Train the next generation** of scientists to use expert knowledge of innate immunity to combat infectious diseases, cancer and immune disease.

In order to be successful, we are seeking philanthropic investment from our community. In turn, your investment will allow us to fund:

**Four research “cores” or areas of emphasis.** These cores will allow us to define innate immune signaling pathways, conduct genetic testing, use computers to assemble and evaluate enormous amounts of research data, test potential treatments and work with local biotech to bring promising treatments to market.

**Leadership.** Your partnership will allow us to invest in the scientific and administrative expertise necessary to run the CIID: research, day-to-day operations and outreach. Investments in this area will be especially helpful in creating endowments to recruit superb faculty.

**Education.** In addition to creating a fellowship program focused on innate immunity, your support will continue to expand programs that inspire young people’s interest in science: from early education opportunities in preschool through advanced learning in college and beyond.

### Join Us

We would appreciate your investment in the Center for Innate Immunity and Immune Disease, a collaboration that promises to have a profound impact on advancing human health. If you would like to support the center’s goals, or simply to learn more about our work, please contact Stephanie Pietromonaco, assistant director for philanthropy, at 206.616.1252 or [spietro@uw.edu](mailto:spietro@uw.edu), or Renee Ireton, Ph.D., the CIID’s assistant director, at 206.543.8514 or [CIID@uw.edu](mailto:CIID@uw.edu). Thank you very much for your consideration.