

### Inside this issue

Progress Report: Trudeau Findings Published in the *Journal of Immunology*, *Journal of Experimental Medicine* and *Vaccine*

- Dr. Stephen Smiley
- Dr. David Woodland
- Dr. Laura Haynes

New Faculty Member Welcomed to the Trudeau Institute

The Trudeau Institute Board of Trustees Elects Two New Members

## Progress Report: Trudeau Findings Published in the *Journal of Immunology*, *Journal of Experimental Medicine* and *Vaccine*



Stephen Smiley, Ph.D.

The August 15 issue of the *Journal of Immunology* reports on new research from the laboratory of **Dr. Stephen Smiley** that demonstrates the importance of fibrin in the protection against sepsis, a life-threatening illness responsible for more than 200,000 deaths in the United States each year.

Generalized infections can lead to sepsis (a syndrome in which the immune system unleashes so much infection-fighting inflammation that it causes more damage than good). Excessive inflammation causes blood clotting during sepsis, thereby starving tissues of oxygen. With the ever-growing presence of multiple-drug-resistant bacteria like MRSA (methicillin-resistant *Staphylococcus aureus*), the incidence of sepsis is increasing, even in state-of-the-art hospitals.

The study, led by Deyan Luo, a postdoctoral fellow in Dr. Smiley's lab, shows that fibrin, a key product of the blood-clotting process, is critical for host defense against a bacterium that causes sepsis in humans and experimental mice.

"After inoculating a variety of genetically engineered mice with this bacterium, the lab observed that mice lacking fibrin showed dramatically decreased survival and harbored greatly increased numbers of bacteria in their blood and tissues," said Dr. Smiley. "These findings add to a growing body of evidence that fibrin helps to protect our bodies during infection."

Ongoing studies aim to assess whether anticoagulant drugs that selectively block certain parts of the blood-clotting pathway will help prevent death from infections that lead to sepsis.

Researchers in **Dr. David Woodland's** laboratory have now identified a previously unknown link between the migration of white blood cells to infected tissues and the ability of these cells to survive and become long-lived memory cells after the infection has been cleared. The new data is featured as a cover story in the August edition of the *Journal of Experimental Medicine*.

"Defining the factors that regulate the generation of these long-lived memory cells is crucial, as these are the cells that provide protection from re-infection," said Dr. Woodland. "Our study focuses on influenza and tuberculosis infections, but a similar study from our colleagues in Japan that was published simultaneously in the *Journal of Experimental Medicine* shows this observation is relevant to other pathogens, suggesting these findings may be applicable to many infectious diseases. Hopefully, we can use this information to design vaccines that generate larger numbers of memory cells and can therefore provide better protective immunity."

Dr. Woodland's lab envisions the findings will lead to the development of additives that act to boost vaccine efficacy. This would be especially important for the elderly, who tend to be difficult to effectively vaccinate.



Laura Haynes, Ph.D.

Recent discoveries from the laboratory of **Dr. Laura Haynes** may help explain why live attenuated influenza vaccine (LAIV), commonly known as FluMist, elicits protection. The research, published in the August issue of the science journal *Vaccine*, was authored by Dr. Haynes and her colleagues.

"Our research specifically examines how the vaccine . . . elicits protection," said Dr. Haynes. "Influenza infection normally induces a massive inflammatory response in the lungs that leads to significant illness and increases the susceptibility to secondary bacterial infections. The most efficient way to prevent influenza infection is through vaccination. To date, the mechanism of how FluMist induces protection has been unclear. Our study demonstrates that this vaccine works by inducing a very early non-specific immune response in the lungs in a mouse model of influenza infection."



David Woodland, Ph.D.



# TRUDEAU INSTITUTE

IMPROVING HEALTH THROUGH MEDICAL RESEARCH

Progress Report (continued)

This novel finding provides insight into how this specific influenza vaccine functions and is important because inflammation is a major cause of lung damage and can set the stage for secondary bacterial infections, quite common following influenza infection.

The translational experiments were carried out in collaboration with the Respiratory Diseases Research Department at the Naval Health Research Center in San Diego and were the result of a joint contract between the Trudeau Institute and the U.S. Department of Defense.

**You can read more about these findings on the Press Room webpage at [trudeauinstitute.org](http://trudeauinstitute.org).**

## New Faculty Member Welcomed to the Trudeau Institute



Alexei Tumanov, M.D., Ph.D.

Dr. Alexei Tumanov has joined the Trudeau Institute as its newest assistant faculty member. Dr. Tumanov, who studies the regulation of immune responses to bacterial infections, received his M.D. from the Russian State Medical University in Moscow. He did his Ph.D. work in several leading research Institutes in Europe and the U.S., including the Institute of Experimental Immunology in Zurich, the National Institutes of Health and the Jackson laboratory.

Dr. Tumanov is the recipient of several scientific awards, including a scientist development grant from the American Heart Association and a career development award from the Crohn's and Colitis Foundation of America. He comes to Trudeau from the University of Chicago, where he was most recently employed as a research associate (assistant professor) in the department of pathology.

"I am very excited to join the Trudeau Institute and to develop strong research programs and collaborations here," said Dr. Tumanov at the time of his appointment. "My goal is to combine molecular data with genetic models for understanding the underlying mechanisms of infectious and autoimmune diseases leading to development of new therapies. I see many opportunities to advance my research here at Trudeau."

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**Kim Godreau**  
Institutional Advancement  
Administrator



## The Trudeau Institute Board of Trustees Elects Two New Members

David A. Beach and Joseph M. Fernandez have been elected trustees of the Trudeau Institute, following the August 6 meeting of the board. Regarding the elections, Benjamin Brewster, Chairman of the Board, said: "On behalf of the entire board and staff of the Trudeau Institute, we are very pleased to welcome David and Joe to the Board of Trustees. Their invaluable business experience and knowledge in scientific fields will offer outstanding direction to the Institute as we move forward."



David A. Beach

### David A. Beach

A resident of Charlottesville, Virginia, Mr. Beach founded National Optronics, a manufacturer of precision lens processing equipment, in 1979. In 2005 the company was sold to Essilor International, although Mr. Beach continued with the company until his retirement in 2008 in order to assist in the changeover to new management.

Originally from Dallas, Mr. Beach is a 1967 graduate of Southern Methodist University and received his M.B.A. from the University of Virginia's Darden School of Business. In addition to maintaining close ties with Darden, he has been active in many charitable organizations since moving to Charlottesville, including the Boys and Girls Club, the Thomas Jefferson Foundation (which runs Monticello), and the Ash Lawn Opera.



Joseph M. Fernandez

### Joseph M. Fernandez

Mr. Fernandez is president and CEO of Active Motif, a biotech company specializing in novel tools and platform technologies for genomics-driven cell biology and pathway elucidation. The company, which Mr. Fernandez started in 1999, ranked on the *Inc.* magazine's "500 fastest growing private companies in America" in 2007. Headquartered in California, Active Motif has international offices in

Tokyo, Brussels, and Regensburg (Germany).

Mr. Fernandez was previously one of two co-founders of Invitrogen Inc. and a senior member of the company's management team for over 10 years. He and his colleagues built Invitrogen into the leading supplier worldwide of molecular biology tools for cloning and expression. Prior to founding Invitrogen, Mr. Fernandez worked at Stratagene, where he helped develop and commercialize novel products for the then-infant field of molecular biology.

A trustee of Hiram College since 2004, Mr. Fernandez received his undergraduate degree from the school in 1982 and pursued post-graduate work at Bowling Green University in Ohio. Gov. Schwarzenegger appointed Mr. Fernandez to the California Economic Panel to two four-year terms, in 2005 and 2009. Mr. Fernandez is also a member of the board of Expedeon Corporation and an angel investor in numerous biotech-related ventures.