

Ideas on the Edge

New Light On Diabetes, Cancer and Car Welds

RESEARCH WITH HIGH-TECH IMAGING TOOLS AT THE UNIVERSITY OF WINDSOR COULD LEAD TO NEW MEDICAL TREATMENTS AND NEW WAYS TO BUILD BETTER CARS.

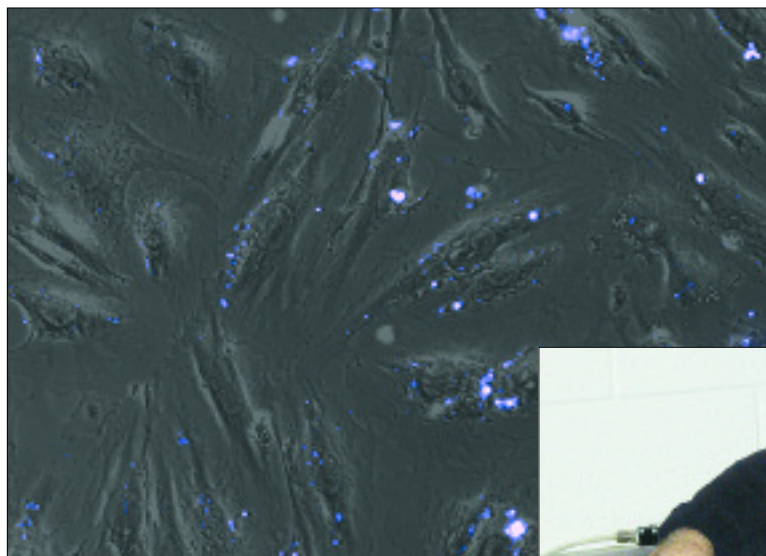
Researchers at the University of Windsor are casting new light on the early stages of diabetes. Literally.

Dr. Bulent Mutus, a chemist at Windsor, is exploring the use of light to test for the presence of nitric oxide in the lining of blood vessels. Insufficient levels of the substance can make vessel walls “sticky,” leading to a higher risk of blood clots—a condition that frequently precedes or accompanies diabetes. The test involves injecting a “fluorescent probe” of light-sensitive molecules into sample cells. The cells are then exposed to certain

establishing a potential new approach to treatment that could greatly reduce the risk of blood clot formation and arterial degeneration in diabetic patients. The approach involves the use of commonly-available anti-cholesterol drugs that enhance the production of nitric acid. “These are drugs that are currently in use and are readily available through any physician,” explains Dr. Mutus. “It’s a tremendously exciting prospect because we’re expecting that the benefit to these other patients will be significant.”

To create and detect the fluorescent response, Dr.

Mutus depends on sophisticated imaging equipment at the university’s Biomolecular Characterization and Dynamics Research Facility—equipment funded in part by the Ontario Innovation Trust. Dr. Mutus and his colleagues are also using the facility to explore other avenues of “photo-biology,” including cancer treatments that involve injecting an



Fluorescent probe DiEosG allows the monitoring of cell surface Protein Disulfide Isomerase activity (purple dots) in live endothelial cells.

wavelengths of light, and if nitric oxide is present, the probe molecules flash—“fluoresce”—in response.

Dr. Mutus’ research is a critical step in



BULENT MUTUS



then measuring the way the object reflects and transmits the sound to build a “picture” of what’s happening inside. Some of Dr. Mutus’s colleagues are using the Windsor facility to develop acoustic imaging techniques for both medicine and manufacturing.

The technique holds promise for the quick diagnosis of breast tumours. But since the same technology can be applied to steel as well as human tissue, Windsor researchers are also studying the potential of acoustic imaging to instantly assess the integrity of spot welds right on a car assembly line.

anti-cancer agent into a tumour, then activating it with light.

In another cancer-related strand of research, scientists are applying the facility’s high-tech imaging tools to the

RESEARCH THAT MATTERS
REAL-WORLD BENEFITS FOR ONTARIANS:

- potential new treatments for disease, including diabetes and cancer
- new medical diagnostic tools
- new tools for advanced manufacturing
- future jobs and prosperity, based on Ontario’s leadership in the key medical and manufacturing sectors

analysis of blood and tissue samples at the cellular level during chemotherapy. The approach potentially replaces more expensive spectrometry, and would allow physicians to track the early effectiveness of a chemotherapy treatment

and change the regimen if it’s not working.

Light isn’t the only kind of energy that can produce images; sound can as well. Acoustical imaging involves bombarding a target with high-frequency sound waves,

From cancer treatment to car manufacturing, imaging research at Windsor is illuminating new frontiers. And it’s helping to light the way forward to

Ontario’s future as a leader in the global economy of ideas.



Project: Biomolecular Characterization and Dynamics Research Facility
Institution: University of Windsor
Research Discipline: Health Sciences/Imaging Technology
Principal Investigator: Bulent Mutus
Trust Investment: \$700,694
CFI Investment: \$700,694
Total research investment from all sources: \$2,025,388



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Infrastructure for Innovation About the Ontario Innovation Trust

The Ontario Innovation Trust was created in 1999 by the Government of Ontario to invest in research equipment and facilities at Ontario’s universities, colleges, hospitals and other non-profit research institutions. The Trust is governed by a volunteer Board of Directors, according to the terms of a Trust agreement established by the Ontario government. A small permanent staff looks after day-to-day operations.

Since its inception, the Trust has committed almost \$843 million to strengthen Ontario’s position in the global marketplace of ideas. This represents more than a third of the \$2.44 billion in total funding that has been invested in Trust-supported projects.