

# Breathing easy

Created at Dalhousie and developed with private and public sector partners, the oscillation spirometer is a textbook example of commercialized research

**B**reathing, that simple life-sustaining activity, can sometimes be a struggle for the estimated 10% of the population with asthma. Yet because of asthma's highly variable nature, it's a constant challenge for clinicians to determine who actually has the disease and the effectiveness of potential therapies.

That's why Dalhousie University biomedical engineer Dr. Geoffrey Maksym has invented an easy-to-use and more comprehensive measurement device called the oscillation spirometer, to help build the nascent medical-device industry in Atlantic Canada. "The oscillation spirometer is a more sensitive measure of who has asthma and how well their bronchodilator works than other measures out there," he says.

In traditional spirometry, the current standard for measuring lung function in respiratory disease, patients inhale deeply, then breathe into a tube as hard and fast as they can. The spirometer measures how much air they can blow out in one second. However, this process can be difficult to perform, particularly for children.

The oscillation spirometer, on the other hand, allows patients of all ages to breathe normally during testing. The device delivers small puffs of air while measuring how much pressure it takes to establish a defined amount of airflow in and out of the lungs over 60 seconds. "What's new is that this device tracks changes in airway diameter over time—one minute as opposed to one second—showing variation in airway resistance," says Dr. Maksym. "It's also a compact device going after a growing market."

Dr. Maksym hopes to sell the device first in North America and Europe, then later to Japan and Australia. He says that Dalhousie's Industry, Liaison and Innovation office has helped him manage patent applications, secure investments, and co-ordinate business development. The office's executive director, Dr. Ronald Layden, sourced government and community funding partners to help get the idea "off the ground, out of the lab, and hopefully shortly into the hands of patients and physicians."

Halifax's Thoracic Medical Systems Incorporated (Thorasys Inc.) will design and manufacture the oscillation spirometer. Dr. Maksym will be chief scientific officer, and his old friend and colleague, Dr. Thomas Schuessler, the CEO of a Montreal company called SCIREQ, which develops new scientific instruments for research, will be president. Thorasys is currently assembling a core staff of project managers, engineers, software developers, and marketing and distribution professionals.

The project's total investment to date is more than \$2.8 million. The Atlantic Innovation Fund, an initiative of the

Atlantic Canada Opportunities Agency that provides funding for research and development, has contributed more than \$2 million in grant funding to Dalhousie so Dr. Maksym can complete experimental, developmental, and clinical work on the device. Additional research funding has come from the Natural Science and Engineering Council of Canada and Springboard Atlantic. In addition, Thorasys will raise capital from investors to complete the commercialization and worldwide-market entry.

Dr. Maksym has also benefited from partnerships with groups such as the Lung Association, Nova Scotia's Capital Health district, and organizations that provide scholarships and grants for his biomedical engineering students. "Developing medical devices and building new companies provides a very good training



Dr. Geoff Maksym (far left) and Thomas Schuessler (second from left) are working to bring new asthma technologies to researchers at hospitals in Halifax and around the world.

environment for engineering students at the school of biomedical engineering at Dalhousie," he says. "They gain real-world medical-device development experience. These partnerships and the industry-academic collaboration have allowed the technology to be developed here in Halifax."

In 2009 the oscillation spirometer will be tested on asthma patients at Halifax's Queen Elizabeth II Health Sciences Centre and the IWK Health Centre, as well as at the Mayo Clinic in Rochester, Minn. Thorasys intends to enter the market first through hospitals, then target doctors' offices and patients. Others who could also benefit from the device may include those with chronic obstructive pulmonary disease or on ventilators.

"The Thorasys model for the development of this device, the commercialization with a private sector partner, and the spinout of a university-backed venture has the potential for high-impact economic development," says Dr. Layden, "and it underscores the value of the world-class basic research being carried out at Dalhousie." — Alison DeLory