

On-the-job help for those with bad backs

ERGONOMICS LAB
INVENTION PROVIDES
A LIFT TO INJURED
WORKERS

By NANCY DORRANCE
News and Media Services

Returning to work after a debilitating back injury may soon become easier and safer, thanks to a new invention developed in the Ergonomics Research Laboratory.

The prototype device, which assists people in lifting objects, will provide on-the-job protection for workers recovering from lower back injury, and may also help reduce the time required to return to work. It could also save an estimated \$260 million annually in North American insurance claims.

Called PLAD (personal lift augmentation device), it acts parallel to the back muscles as an external force generator that allows people to lift using less of their own muscle force. Energy is stored as workers lower their bodies, and then returned during the up-phase of the lift.

"Although forces can't be eliminated, PLAD absorbs and transfers them from one place in the body to another, reducing the force requirements on the lower back muscles during lifting tasks," says project leader Joan Stevenson, a professor of occupational biomechanics. "It's the kind of concept that seems obvious once you see it – but no one has actually done it before!"

Working with Dr. Stevenson, from the Ergonomics Research Group, are Mechanical Engineering professor Tim Bryant, Rehabilitation Therapy professor Linda McLean, and inventor Mohammad Abdoli, a doctoral student in occupational biomechanics.

The team recently received \$100,000 from the Canadian Institutes of Health Research Proof of Principle (PoP) program, which provides early-stage funding to advance promising inventions and discoveries along the commercial pipeline. They are



Joan Stevenson (Physical Education) adjusts settings on the PLAD (personal lift augmentation device) worn by PhD student Mohammad Abdoli, in Queen's Ergonomics Research Laboratory.

being assisted in this process by Queen's technology transfer arm, PARTEQ.

"We've created an example of what the system can do with anchor points at the shoulders, knees, and waist, using a frame built from a modified backpack," says Dr. Stevenson. "We now need to refine this prototype into something that workers will be comfortable wearing on the job."

Focus groups are being held with physiotherapists, doctors, and occupational physicians to provide feedback on the concept and implementation of this device. The team then plans to

introduce the "next generation PLAD" to workers themselves, in a pilot study of volunteer patients with back injuries.

Preliminary testing, conducted on 10 males without back pain, shows a 12 per cent decrease in compressive force and a 26 per cent decrease in shear force on the spine at the start of a lift when wearing the PLAD. Over the lifting phase, there was up to 15 per cent reduction in muscle activity required to lift a test load.

"Computer simulation will really help us to make modifications and refinements at this

stage," says Mr. Abdoli. Data collected from human subjects is entered into a computer model, which allows the selection of dimensions and element stiffness to measure predicted back forces and reaction forces at the shoulders, knees, and hips, he explains.

Position sensors on the body tell the researchers what part of a lift the person is doing, while strap sensors show how much force the PLAD is taking up, and EMG electrodes pick up muscle signals with and without the device, showing its effect.

The team will be looking for industrial partners by the end of

the summer, says Dr. Stevenson, emphasizing that scientific proof will be required in all the steps leading to commercialization.

"That's why we want to see it used first as a prescribed treatment for people returning to work from an injury, either allowing them to go back earlier or to help them at work when they first return," she says. "We want to place it in the hands of health professionals who will judge its effectiveness at returning injured workers to their jobs."

Queen's patented PLAD last December. www.phe.queensu.ca/ergbio

Building democracy in post-Communist Ukraine

By NANCY DORRANCE
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A Queen's-based project to support democratic development in Ukraine has received a \$2.5-million funding contribution from the federal government.

George Perlin (Policy Studies), founding Director of the Centre for the Study of Democracy, directs The Building Democracy Project. It is intended to consolidate and extend the achievements of an earlier project that introduced a curriculum in the study of democracy in Ukrainian universities.

The four-year project will provide resources to help Ukraine establish a nationwide program aimed at building commitment to democracy and human rights among current and future leaders, public servants, law enforcement personnel, and citizens.

Funding is provided by the Canadian International Development Agency (CIDA) under an agreement with the School of Policy Studies. In-kind contributions from Canadian and Ukrainian partners will bring total investment in the project to \$3.4-million.

When the first initiative, Canada-Ukraine Democracy Education Project, was launched in 1997,

there was no general course on democracy in the Ukrainian post-secondary system, few professors had any training that would equip them to teach a program of studies about democracy, and there were few Ukrainian-language resources to support studies about democracy.

By the time it had concluded last year, the project had:

- created a foundation course on democracy for Ukrainian universities
- provided professional development courses to equip 215 Ukrainian professors to teach the course and produced a 680-page Ukrainian-language textbook on the fundamentals of democracy
- published a series of Ukrainian-language monographs and collections of articles about experience with democracy in other countries
- helped Ukrainian researchers produce and publish 130 articles of original research about democratic development in Ukraine.

Dr. Perlin ascribes the success of the project to two factors. One is the commitment of Ukrainian educators and researchers who are determined to transform the former Communist country into a



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functioning democracy. The other is the approach of the project.

"The new curriculum was designed by Ukrainian professors themselves. We have told them about our experience but we haven't tried to tell them what to do. Our role has been to provide them resources to support their work and give them access to the knowledge they need to make their own choices about what is most appropriate to their situation."

Ukraine's Minister of Education

and Science, Vasyl Kremen, has described the project as "the product of a genuine partnership between Ukrainian and Canadian professors (that has been) a demonstration of the best kind of collaboration under international technical assistance agreements." In a letter to Canada's Ambassador in Ukraine, the Minister said he intends to use the achievements of the project as the "central building block" in a comprehensive program to strengthen commitment to the democratic

transformation of Ukraine.

The new "Building Democracy" project is designed to support this program. It will provide resources to:

- establish democratic studies as part of the curriculum in 198 universities and colleges
- create an Internet-based course on accountability in a system of democratic governance for delivery to Ukrainian public servants
- introduce a training program on democracy and human rights for law enforcement personnel
- create a training program to equip Ukrainian teachers to deliver a civic education curriculum in Ukrainian secondary schools
- support annual conferences to encourage research that will help improve democratic governance and help promote the development of civil society in Ukraine.

The federal government agency CIDA supports sustainable development in developing countries in order to reduce poverty and to contribute to a more secure, equitable and prosperous world.

For details on the Canada-Ukraine Democracy Education Project, visit qsilver.queensu.ca/csd/dep/front_page.html