The Seattle Times

Monday, April 23, 2007 - Page updated at 02:01 AM

UW doctors zeroing in on oxygen

By Sandi Doughton
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For a trip to Mount Everest, most people pack warm clothes and climbing gear.

Dr. Andrew Luks is bringing a portable ultrasound machine.

The University of Washington lung specialist is part of the largest and most ambitious medical expedition ever mounted to the 29,035-foot peak. Along with 40 other doctors and more than 200 volunteers, Luks will be exploring the human body's response to the thin air near the top of the world.

"This project is absolutely huge," he said last week before departing for Nepal.

Among the volunteers offering themselves up for science is another local resident: Darla Norris, chief financial officer for the Pacific Science Center. The center has a small exhibit on the expedition and will be posting messages from Norris online.

BINOD JOSHI / AP

About 10 team members will try to summit Mount Everest.

COURTESY OF DR. ANDREW LUKS

Dr. Andrew Luks is shown using a portable ultrasound machine to examine the lungs of volunteers in London. He'll repeat the measurements as the volunteers trek to Everest base camp.

Information

Caudwell Xtreme Everest: www.xtreme-everest.co.uk/index.php

BBC reports on expedition: www.bbc.co.uk/blogs/everest

Track Darla Norris' progress: www.pacsci.org/everest

The British organizers of the $3 million Caudwell Xtreme Everest expedition say results from their experiments may help improve treatment of people with lung disease and other illnesses who can't get enough oxygen — much like mountain climbers. The project also will explore the role of genes in making some people more vulnerable to altitude sickness.

"The research is very significant and could help people in intensive care around the world," project leader Dr. Mike Grocott of University College, London, told the BBC.

With his 25-pound machine — which will be carried by porters and yaks — Luks will examine the lungs of volunteer trekkers over several days as they make the 10,000-foot ascent to Everest base camp. He's trying to figure out why some people develop high-altitude pulmonary edema, a life-threatening condition that clogs the lungs with fluid.

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It may be possible one day to develop a blood test that will predict which people are most likely to be at risk, said Dr. Erik Swenson, a professor in the UW Medical School's Division of Pulmonary and Critical Care Medicine who designed the experiment with Luks.

"Then those people would know they need to climb a bit more slowly ... or take drugs that can prevent the problems," he said.

About 10 scientists will try to reach the summit. As they climb, they will sample each other's blood and take other measurements to gauge their reactions to low oxygen. They hope to be the first to collect blood samples and snippets of muscle from people atop the world's highest peak, where low atmospheric pressure significantly reduces the amount of oxygen that climbers inhale with each breath.

The volunteers will give up blood along their trek and allow themselves to be subjected to more than 30 different tests and measurements.

All were first evaluated in London, where they peddled on exercise bikes until they gave out, Norris said. Doctors monitored their pulse, respiration rate, oxygen levels and blood pressure to get baseline data.

Ranging in age from 18 to 73, the volunteers also took a battery of tests to gauge brain function at sea level.

"You have to put pegs in the right holes, and repeat back a list of words," Norris said. Simple tasks, but lack of oxygen at high altitude can make them seem like advanced calculus.

Norris, 57, won't go higher than Everest base camp. At about 17,500 feet, that far outstrips the only mountain she's climbed: 14,411-foot Mount Rainier.

Luks, 38, is an experienced mountaineer but will also stay at base camp.

Swenson, who has studied high-altitude biology on Alaska's Mount McKinley and in the Alps, wasn't able to make the Everest trip.

Pulmonary edema starts when blood vessels inside the lungs constrict in response to low oxygen, Swenson explained. It's a normal response that increases blood pressure in the lungs and probably evolved to shunt blood away from damaged lung tissue. But in some people the response is exaggerated. Pressures soar, forcing fluid out of capillaries and flooding the lung's air sacs.

Victims cough and feel short of breath and their fingertips turn blue. Eventually, they can collapse.

"It doesn't matter how fit you are," Luks said. "An elite athlete is just as likely to get sick as a couch potato at high altitude."

In people who take several days to reach high elevation, blood vessels seem to toughen up, reducing fluid leakage, Swenson said. People whose breathing rates naturally increase at high altitude also seem to do better.

There's new evidence that genes may regulate many of these responses.

People who never climb mountains can suffer from similar oxygen deprivation when their lungs are damaged by emphysema, cystic fibrosis or other diseases.

A better understanding of how the body adapts to high altitude and why some people tolerate low oxygen levels better than others may lead to new treatments for these patients, Swenson said.

"There's a lot of good and serious science here."

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