The Art of **Endurance**

BY KALENE MCCORT

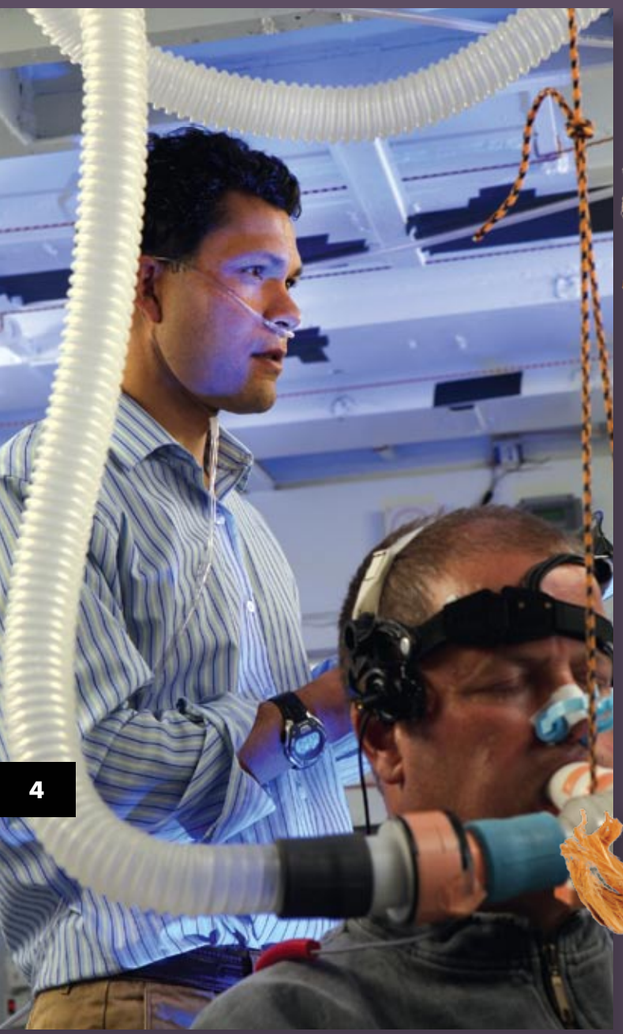

photo by Tom Kimmell

Keen athletes push their bodies to the extreme, redefining the very endurance limits associated with the human race. High altitude can often act as the enemy of a sport-enthusiasts, slowing them down in a blink-of-an eye and wreaking havoc on their bodies. UCCS professor of biology Andrew Subudhi is working to help athletes and soldiers reach their top stamina regardless of environmental factors.

"My father passed away when I was too young to fully comprehend the complex pathology involved. All I knew, or could remember, was that his 'heart stopped,'" said Subudhi, who completed post-doctoral training at the University of Colorado Health Science Center in the areas of altitude medicine and physiology.

"As I grew older, every male on my father's side of the family died of cardiovascular problems before the age of 60."

Recognizing his family's health history, Subudhi became committed to maintaining a healthy diet and exercise program for himself and he would eventually do the same for a set of world-class athletes.

In the late 1990s, when it was announced that Salt Lake City would host the 2002 Winter Olympics, Subudhi, an avid-sports lover, applied to a graduate program at the University of Utah. While there, he met a professor looking to set up a partnership with the Orthopedic Specialty Hospital and the US Ski Team. He jumped at the opportunity to join the research effort.

"My job was to run physiological testing sessions and research projects geared towards improving peak physical performance and as well as effective rehabilitation strategies," said Subudhi, who years later, in 2009, was recognized as a Fellow of the American College of Sports Medicine and elected to the regional ACSM board of directors.

After graduating in 2000 from the University of Utah with his Ph.D. for his work on exercise-induced oxidative stress, Subudhi landed a fulltime job working with the US Speedskaters. He provided them with supplemental oxygen while they worked out on treadmills, bikes and on ice, in order to simulate sea level to help increase their performance gains. Living at high altitudes and then training at lower ones has shown to dramatically strengthen the endurance of athletes.

"It was an extremely fun and exciting time in my life, which was highlighted by the outstanding success of the US teams in the Olympic Games," said Subudhi, who also worked with award-winning snowboarders and who now is doing altitude-related research to facilitate the strength of military troops.

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The pentagon has granted the Altitude Research Center, where Subudhi is a senior scientist, $4 million to combat the issues troops face when exposed to a towering elevation. At the Center, located in CU Denver's Anschutz Medical Campus, Subudhi studies the effects of lack of oxygen by placing subjects, and often himself, in a hypobaric chamber.

"The troops are facing three very important challenges. First, rapid deployment to high altitude, such as in Afghanistan, increases the risk for what is known as Acute Mountain Sickness—basically flu like symptoms. This is usually a self-limiting illness that resolves in a couple days, but soldiers do not have the liberty to simply wait it out: they must be firing on all cylinders as soon as they hit the ground."

The two other obstacles the troops have to take on are endurance and cognitive function. Subudhi expressed that simple physical actions at a high altitude can seem arduous and hinder brain function—even basic addition can become challenging.

"We believe that the low levels of oxygen cause specific regions of the brain to swell ultimately leading to headache and nausea. Much work is still needed to verify or disprove this hypothesis."

"I firmly believe the diet and exercise are the best medicines, but I know I can't help anyone who isn't willing to help themselves first. The people who come into the lab for physical testing have typically already made a commitment to get or stay fit. My work with them pushes them an extra notch."

Affectionately named the 'Urban Camper,' by friends, Subudhi, who still spends many a night on the floor of the hypobaric chamber, once spent a whole summer at Pike's Peak research base.

"In 2002, I was asked to collaborate on a study in which we brought sea level subjects from California to the summit of Pike's Peak for a two-week stay. I was living in Utah at the time and didn't own a car, so I rented a minivan, drove out to Palo Alto to conduct baseline studies. For a month or so I slept in the van, in the hospital, on various floors," he said. "We then packed up all the

equipment and moved the lab to the summit of Pikes Peak, where the US Army has a research facility. My Therm-a-rest and I were very happy up there for the rest of the summer."

This nomadic scientist, an avid marathon runner, praises Colorado Springs as the best place for trail running. Among his favorites are Palmer Park, Waldo Canyon and section 16 of Red Rocks Park.

While not exploring all the Colorado terrain has to offer, he loves to revel in the creative work of wordsmiths. "Give me a cabin, a mountain and a stack of books and I'm a happy man. However, if I had to pick just one thing as a favorite pastime, I'd say it would be cross country skiing."

Subudhi truly cherishes his time spent working with Olympic athletes, contributing to the great pastimes that link so many, yet he considers his work with students to be more significant on a greater scale.

"I feel I have a larger impact in the classroom. Call it a pyramid scheme, but the students I reach will cast a much larger net than I ever could on my own," said Subudhi. "That is an immensely satisfying feeling."