Protecting athletes’ immune systems
Some have said that universities are the engines behind regional and statewide growth. We believe that to be true. Not only do we educate the next generation, we add new knowledge and provide much-needed expertise and services to today’s economy. As you look across our great university, you will see faculty and students in the fine arts, humanities, social sciences and natural sciences actively engaged in scholarship and the creation of new knowledge. This is essential if we are to be successful in our mission.

Appalachian State University is one of the nation’s premier comprehensive universities. As such, we take great pride in our ability to successfully integrate our core missions of teaching, research and service. This success is the result of several factors. Among them are: (1) an outstanding faculty who are knowledgeable in their fields, (2) a recognition of the opportunities for and benefits of interdisciplinary and inter-institutional collaboration, (3) a recognition of the importance of outreach; using our collective knowledge and expertise to benefit the citizens of North Carolina, and (4) a pool of quality undergraduate and graduate students who are eager to learn.

None of this could have been accomplished without adequate funding from government and other sources. Over the last two years, we have seen significant increases in submitted requests for research funding and dollars that are awarded. In fact, as of now, we are approximately 25 percent ahead of last year in both submissions and awards.

Take a moment to read about the important work being done by our faculty. In this issue of Explorations, you will read about exercise and immune function, improving safety and efficiency in the workplace, and experimental economics. Not only are these valuable scholarly works, but the research by these Appalachian State University faculty members contributes to the betterment of our citizenry.

Appalachian State University looks forward to serving you.

Sincerely,

Stan R. Aeschleman
Provost and Executive Vice Chancellor
David C. Nieman used to run marathons until his own research proved the practice could be unhealthy. As a long-distance runner, Nieman often became sick with cold or flu-like symptoms after competing. Other runners expressed similar complaints. So when he read a research article disputing negative effects on the immune system following extreme exercise, he decided to find out for himself.

And so began a research career of more than 20 years studying the effects of exercise on the immune system.

Nieman is a professor in Appalachian’s Department of Health, Leisure and Exercise Science. He has more than 200 peer-reviewed publications in journals and books, 75 articles in health/fitness magazines, and is the author of nine books. His body of research has been derived, in part, from his own observations as an athlete.

Some might call it a preoccupation. But, his work really is a lifelong devotion to improving the health of others.

Early beginnings

Nieman’s interest in diet and exercise began as a teenager. From ages 16 to 26, he was a member of an acrobatic gymnastics team that performed across the United States, Canada and South Africa. “That whole experience of being a gymnast really keyed my interest in health and exercise,” he said. “Getting good sleep, eating well and maintaining a training regimen all had an impact on how I performed.”

Nieman’s interest in exercise further developed at Pacific Union College in California’s Napa Valley where he majored in physical education. He continued to perform as an acrobatic gymnast and also coached the traveling team from 1971-77. “When you coach young people, you see how rest, good diet and physical condition are all related,” he said.

With a college diploma in hand, Nieman returned to South Africa to teach physical education to elementary and high school students, but he found that he didn’t enjoy “helping people learn how to hold a tennis racket or shoot a basketball,” he said. “I wanted more of a connection with health.”

After a year, Nieman returned to the United States and enrolled in the master of public health program at Loma Linda University. After earning a master’s degree in public health, he taught health for four years at Pacific Union College in the Napa Valley. Nieman loved teaching college students at his alma mater, but to make college teaching a career, Nieman knew he needed a doctoral degree.

It was during his time in Loma Linda’s doctoral program in public health that his career path began to jell. Nieman was busy writing, researching and managing the university’s fitness lab. “I really started liking everything to do with exercise and health,” he said.

After he earned his doctorate in public health in 1984, Loma Linda’s School of Health, Leisure and Exercise Science.
Building a team to solve the puzzle

Nieman’s first major research into the effects of exercise on the immune system came in the summer of 1987 at the Los Angeles Marathon. Instead of competing, Nieman and a research team were on the sidelines surveying 2,300 runners before and after the race. “It’s still the largest epidemiologic study ever conducted,” he said. The research showed that the odds of getting sick after the race were six times greater than normal.

The next step was showing what physiological changes occurred to the immune system. After arriving at Appalachian in 1990, Nieman continued his collaboration with Sandra Nehlsen-Cannarella, chief immunologist at Loma Linda University, and enlisted numerous colleagues in other departments at Appalachian to assist in his research.

One constant over the past 16 years has been Dru A. Henson, professor and assistant chair in the Department of Biology. With a specialty in immunology, Henson measures immune cell activity as well as changes to inflammatory markers as a result of extreme exercise. Henson has seen a variety of benefits to being part of a cross-disciplinary research team.

“It removes perceived barriers across the academic disciplines,” she said. “Clearly, the impact of exercise and physical stress on the immune system is an interesting and credible question. The research team represents a variety of specialties that are critical in looking at the different facets of immune function, physical performance and fitness. Everyone has a significant role in making these projects successful. Dr. Nieman has done a remarkable job in building and maintaining such a strong collaborative team.”

Important components of the team are undergraduates and graduate students who have assisted in a range of studies. “When you have a strong team conducting research, it benefits students,” Henson said. “They have the opportunity to observe and participate in significant research that is nationally recognized.”

One of those who benefited from her faculty members’ research is exercise science graduate Melanie Austin ’97 ’99, who now manages Appalachian’s Human Performance Lab in the Holmes Convocation Center. Other students have gone on to earn a Ph.D. in immunology and other disciplines and now teach at universities across the country.

“Nieman echoes Henson’s comments. “Modern research today is being conducted by teams or institutions working together,” he said. “Collaborative teams are becoming essential to producing data that will be published in the top academic journals and attract grants.”

Nieman and his fellow Appalachian faculty began studying ultra-athletes in the lab or in the field at races such as the Iron Triathlon, the Western States 100-mile race, and the Charlotte Observer Marathon. They have even conducted research on the U.S. Women’s rowing team at the ARCO Olympic Training Center in California.

Through a series of tests of blood, saliva and muscle tissue, the team documented the changes occurring to stress hormones and to cytokine and leukocyte cell counts in athletes during heavy exercise, among other measures. “We have shown repeatedly that the immune system does suffer suppression during heavy exertion bouts,” Nieman said.

But even with this knowledge, athletes said they were going to compete regardless of the health outcomes. This spurred a new research angle: “Is there something we can do, as athletes, to protect our immune systems?” Nieman asked.

Solving that puzzle has been the primary focus of Nieman’s research for the past 10 years. Nieman and his research team at Appalachian have looked at the effects of carbohydrate sports drinks, large doses of vitamins and herbal anti-inflammatory drugs (NSAIDs), like ibuprofen or Advil. They have found that mega doses of NSAIDs and the vitamins actually harm the immune system, while carbohydrate sports drinks reduce some of the negative inflammatory effects.

Exercise benefits for the nonathlete

While Nieman’s recent research has focused on extreme athletes, he also is known for research on the benefits of exercise to the average person.

“People who didn’t exercise for three to four hours at a time wanted to know about the benefits of moderate exercise,” Nieman said. “And, runners who were training 30-35 miles a week kept telling me they had lower infection rates than other people.”

That prompted a series of studies in which people walked 45 minutes a day for five days over a 12-week period. When compared to a group that was sedentary, the walkers had half the days of sickness than nonwalkers.

More recent research showed the favorable changes occurring to the immune system as a result of the daily walk.

“All of the preventive measures for the common cold, regular exercise has emerged as one of the strongest,” he said.

Nieman says his studies showing the health benefit of walking have been the most rewarding.

“The fact that we were able to show this huge public health benefit to walking was the key to keeping me going with this line of research,” he said. “When you look at percentages of Americans, nearly everybody can walk and gain benefit to their immune system. When it comes to showing that heavy exertion causes immune suppression and that here is something you can take to counter that’s applicable to the war fighter or athlete who may represent 5 percent of the population.”

But research costs money, whether it’s studying the effects of daily walks or supplements for the extreme athlete or soldier. “I find more satisfaction in the walking research than the athletic research, but most of the money is in the spectrum that we are in right now, which is athletes and war fighters,” Nieman said.

Appalachian and the U.S. Army

Impressed with his research on extreme athletes, the U.S. Army contacted Nieman about researching a substance that might help maintain soldiers’ immune systems.

The Army and its Defense Advanced Research Projects Agency (DARPA) awarded Nieman $1.1 million for a two-year study of the effects of quercetin, a naturally occurring substance found in red grapes, red onions and other fruits and vegetables. The findings may lead to strategies that will help maintain soldiers’ immune systems when they are on long missions without sleep or food.

Like his other studies, the DARPA project will involve an interdisciplinary team of researchers with assistance from graduate and undergraduate students.

The team is comprised of faculty from the academic areas of health promotion, exercise science, nutrition, biology and psychology.

Nieman also expects to receive a $90,000 grant from the Gatorade Sports Science Institute to study beta glucan, a substance in the cell wall of oats that also may help boost the immune systems of athletes.

“This is one of the most exciting areas of research – that there are actually substances within the plant kingdom that may have benefits to the immune system to people who are under a lot of physical stress. That’s what we are chasing right now,” Nieman said.

David C. Nieman can be reached at nieman@wsu.appstate.edu or (828) 262-6318. See related link: www.hls.appstate.edu.

Teaching Appalachian students continues to be one of Nieman’s passions.
Making industry safer and more productive

By William Purcell ’94

Eighty percent of American employees say they enjoy their work more when they have the right tools to do the job. This psychologist’s research helps workers and their employers have a better day.
Making industry safer and more productive

The little things get Timothy Ludwig out of bed every morning: stopping a 40-ton tractor trailer from wrecking, keeping a warehouse worker safe from a falling pallet of Cheerios and adding a million or two dollars to the bottom line of major corporations.

Describing Ludwig as a problem solver is too simple. An industrial and organizational psychologist by title, Ludwig is a sleuth supported by an investiga
tive team of Appalachian State University students.

He tackles the problems of corporations like Pepsi, Radio Shack, Lowes Foods and food distributors MDI and Institution Food House (IFH).

Whether he and his students help truckers make more on-time deliveries, reduce the number of packing errors in a warehouse or keep pizza delivery drivers safe, the work all boils down to a question Ludwig first pondered as an undergraduate student at Lenoir-Rhyne College.

"Why does anyone get out of bed in the morning?" Ludwig said.

"That is the question that made me choose psychology as a career. I've been trying to answer that question ever since."

A complex process

Most people get out of bed in the morning to go to work. For a researcher who studies the behavior of people in the workplace, finding out what motivates workers to drive safely or perform well is a complex process.

Ten years ago, Ludwig sat with his students in parking lots watching pizza delivery drivers to monitor their safety habits.

"It wasn't high tech back then," said Ludwig, a professor in Appalachian's Department of Psychology since 1994. "We had clipboards, pens and crude poster board charts made with magic markers that we took into meetings."

Today, the theoretical concepts remain the same, but the process is all about technology.

Ludwig and his students receive thousands of computerized records from billion-dollar companies. They crunch numbers, analyze data and make professional presentations in company boardrooms – all toward helping integrate technology into the workplace to increase safety and productivity.

At Merchants Distributors Inc. (MDI), a wholesale grocery distributor based in Hickory, Ludwig and his students have helped cut late deliveries, streamline the customer complaint process and reduce employee errors in the warehouse by nearly 90 percent.

"MDI is a $1.5 billion company with nearly one million square feet of warehouse space, and they move more than 65 million cases of food and food-related products in and out of there a year," Ludwig said.

"The company experienced four errors per 1,000 cases. We worked with them as they implemented a new system for picking products in the warehouse, and now the error rate is one per 4,000 cases."

The reduced error rate saves the company a lot of money, he said.

On the warehouse floor

Ludwig and undergraduate Sam Berger worked with MDI as the company implemented a $1 million computerized, voice-directed headphone system called Vocollect®.

To fill orders, workers at MDI used to carry around a long stream of paper detailing what items to select and where to find them in the warehouse.

"If a worker picked Fruit Loops instead of Wheaties, that cost MDI a good bit of money in lost time and reimbursements to the grocery store," Ludwig said.

The new Vocollect® system eliminates paper and uses voice prompts over a headset, connected to a computer server via radio frequency, to tell the worker exactly where to locate the correct product.

But, MDI still wanted to ensure reduced errors. So, they created a system of eye-level numbers on each product bin to compliment the voice system. The worker states the number into the headset and, if he or she is in the right place, gets confirmation. If they are in the wrong place, they get the immediate feedback "incorrect slot."

The system is so reliable and efficient that MDI gives grocery stores automatic credit for one error per 5,000 cases, eliminating the need for time-consuming inspections of shipments and costly reimbursements for errors.

Other projects with MDI included docking warehouse workers' pay $1 for each error they make unless they met a preset goal, and decreasing late deliveries by telling truckers how they compare to their peers.

One of Ludwig's graduate classes worked with MDI to manage an issue involving customer complaints and suggestions.
Ludwig hopes to work with the National Institute for Occupational Safety and Health to help make truck drivers safer on the roads. MDI is part of the larger company Alex Lee Inc. Ludwig partners with Alex Lee’s other units: Lowes Foods and IFH.

“Alex Lee teaming with us is a real win-win relationship,” Ludwig said. “They are opening up proprietary information and letting our students use their multi-million dollar facility. “If what we suggest doesn’t work, it could cost them millions.”

But Ludwig’s solutions have worked. Though Alex Lee Inc. remains a primary partner for Ludwig’s research, he is branching out to other regional and national chains.

Ludwig, who is also an editor for the Journal of Organizational Behavior Management that publishes behavior change research, partners with Texas researcher Dave Goomis to help automotive retailer Pep Boys. They are writing a book about human performance technology, such as the Vococollect® system used by MDI, and a hand-held scanner system used by Pep Boys.

Pep Boys’ warehouse workers find products with a hand-held scanner that confirms if the right product is picked. Ludwig and Goomas want to add a goal system in the warehouse. He also plans to work with MDI truckers to reduce the need for hard braking, which is a primary indicator of wrecks and near misses. MDI trucks have been outfitted with on-board computers that monitor numerous safety issues such as speed and hard braking. Ludwig has research planned to use the touch screen monitors in the truckers’ cab to deliver real time prompts and feedback about their driving safety, give routing info, and offer warnings in accident prone areas.

McDaniel believes switching to a free market system would allow electric and natural gas rates to decrease as utility companies compete for customers. She’s still not sure whether nationwide deregulation is best for consumers, though. “If the companies compete on quality, then there would be better customer service, fewer outages and more green energy available,” she said. “However, if companies compete only on price, they could cut corners on quality—meaning more brownouts, blackouts and less environment-friendly energy sources.”

The many changes facing the energy industry are perfect fodder for experimental economics. Some decisions must be made where data does not exist. That’s when experimental economists like McDaniel step in to design experiments in controlled environments to isolate effects and test hypotheses in areas where empirical evidence or economic theory are lacking.

Economists from around the world came to Appalachian last April for a conference on experimental economics. Hosting the conference put Appalachian on the experimental economics map, said McDaniel, who helped organize the event.

She also has been instrumental in developing the department’s modern experimental economics computer laboratory. “We are using interactive lab experiments to complement traditional classroom lectures. It opens up a whole new avenue for learning,” McDaniel said.

Before coming to Appalachian in 2003, McDaniel worked in Europe using experimental economics to predict the effects of auctioning capacity on gas networks. She also worked to maximize profits in Dutch flower auction houses using experimental economics as a predictor of how buyers would behave in different scenarios.

Tanga McDaniel can be reached at (828) 262-2037 or mcdanieltm@appstate.edu. See related link: www.eco.appstate.edu.
Research Notes

An Environmental History of the Mitchell and the Black Mountains: into his popular and award-winning wove entries from his personal journal

To make history more accessible, he says, "History is a real spirit of the place."

Historians write: Rather than penning highest peaks of Eastern America" has been a hit with readers and his academic peers, even for the native speaker, Hutchins believes it's important to bring Arabic literature to the English-speaking world. His translation of al-Koni's "Amnus: A Desert Novel" was released last April by the American University in Cairo Press.

Hutchins's translation of the novel "Dar al-basha" by Tunisian Hassan Nasr will be released this year by Syracuse University Press. AUC Press has also scheduled a 2006 release of his translation of "Ten Again" by the late Egyptian author Ibrahim Abd al-Qadir al-Mazini. Hutchins, who has taught at Appalachian since 1980, began learning Arabic in 1964 while teaching at a prep school in Lebanon.

Arabic is a complicated language, even for the native speaker, Hutchins said. "Arabic has an absolutely huge vocabulary. It's like Latin, Spanish and Italian all rolled together. There is a literary form of the language, and a form most people speak," he said.

Hutchins believes it's important to bring Arabic literature to the English-speaking world. His colleagues agree. "In a world where misunderstanding can promote hatred and understanding can promote peace, the work of the translator takes on even greater significance," said Ozzie Ostwalt, chair of the Department of Philosophy and Religion.

Hutchins brings Arabic lit to English readers

William M. Hutchins has translated more than a dozen books from Arabic to English. His translation of al-Koni's "Amnus: A Desert Novel" was released last April by the American University in Cairo Press.

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William M. Hutchins has translated more than a dozen books from Arabic to English.
“The ordinary is quite extraordinary,” ceramist Lynn Duryea says of her art. Duryea, a nationally known studio artist for more than 20 years, joined Appalachian’s Department of Art in 2004. Among her recent works, “Wedge” was exhibited in the 2004 International Emerging Ceramic Artists Invitational Exhibition at FuLe International Ceramic Art Museum, Fuping, Xian, China and is now part of the museum’s permanent collection. “BlueGreen Oval” was included in a group show at Baltimore Clayworks in 2003.

Duryea’s ceramics have been represented in numerous publications including “The Best of Pottery” edited by Jonathan Fairbanks and Angela Fina, and “Discovery: Fifty Years of Craft and Transformation at Haystack,” edited by Carl Little. She received an Emerging Artist Award from the National Council on Education in the Ceramic Arts in 2004.