

Under pressure: Student's research aims to help patients conquer dangerous ulcers

Part of a series profiling undergraduate researchers provided by University of Pittsburgh Office of the Provost.

By Niki Kapsambelis

As far back as high school, Greg Meloy demonstrated his keen interest in puzzling medical conditions during a field trip to a wound clinic in his hometown of Altoona, Pa.

Then a high school senior, Meloy was fascinated by the challenge of keeping patients from acquiring pressure ulcers, a common and potentially lethal complication of many medical conditions. He asked the physician on duty if he could come back and volunteer—and a curiosity was born that might someday change a condition that has baffled scientists for years.

Often known as bed sores, the ulcers occur in many different patient populations: diabetics, spinal cord injuries, or elderly or bedridden people, for example. The facts are sobering: If infected, pressure ulcers can lead to serious complications, including death. In fact, such an infection was responsible for the death of actor Christopher Reeve in 2004.

"It's a very interesting field; it's very challenging," says Meloy, who is majoring in rehabilitation science with a concentration in athletic training. He plans to enroll in medical school after graduating in 2007.

When Meloy came to Pitt, the Honors College put him in touch with David Brienza, a professor of rehabilitation science and technology, whose research interests include pressure ulcers. Starting in September 2005, Meloy began studying factors contributing to the condition through Brienza's laboratory on Pittsburgh's South Side.

"This is the first study of its kind in the literature," says Meloy, who spent the summer of 2006 working full time on his research through the Brackenridge Fellowship.

Though his current work uses neurologically intact human subjects, Meloy's eventual goal is to reduce pressure ulcers in people with spinal cord injuries. His work seeks to better understand the relationship between blood flow and oxygenation in response to the stresses that normally cause the sores.

"He has been involved in all aspects of the project, from the research design to developing the instrumentation and soon to be collecting and analyzing the data," Brienza says. "Intellectually, he's very good. His attitude is fantastic. He wants to learn, he's intellectually curious. He's just a good person to have in the lab."

Notoriously difficult to prevent, pressure

ulcers are also stubbornly common, affecting as much as 10 to 20 percent of the people in some settings, Brienza says.

"It's a very difficult problem," he says. "There are lots of factors that contribute to pressure ulcers, and it's hard to sort them all out."

That's why the work that Meloy is doing is so important. If they can establish the foundation of knowledge that explains how pressure ulcers occur in people who are mobile, researchers could theoretically then move on to the additional risk factors of people whose movement is limited.

"He's involved in generating new knowledge," Brienza says of Meloy. "The relationships he's studying, between tissue oxygenation and blood flow, are just simply not known."

Many facets of the bigger picture drive Meloy, not the least of which is the toll that pressure ulcers take on the health care system. Up to a quarter of the cost of treating a spinal cord patient is related to pressure ulcers, he notes—"which is incredible, if you think about it ... It's a tremendous health care cost, so obviously the best treatment for it is to prevent it. And that's the long-term goal of all this."

But the smaller picture interests him, too: "You're studying microcirculation and how blood moves. It's just something [that] even when you take generalized classes, you briefly touch on it, but you don't go into such depth. It's very rewarding when you're challenged to know a topic very thoroughly."

It's that kind of intellectual inquiry that Brienza will miss when Meloy moves on to medical school.

"It's unusual to have someone so good," Brienza says. "He's performing on par with some of my better graduate students."

In addition to his research, Meloy has also worked as a student-athletic trainer with the Pitt football, track, and swimming and diving teams as part of his clinical rotation. During the spring term, he will work as a trainer for the South Fayette High School team on several spring sports. That means he spends four to five hours each day in school, then five or six hours of clinical work, leaving only the odd free day or nights for his lab work.

Still, he feels privileged to have had the opportunity to engage in high levels of research at such a young age.

"I think it's an incredible opportunity," he says. "I'm an undergraduate student doing human subject research — it's absolutely phenomenal. And to have the University support you in the summer financially, it shows how much Pitt actually supports this endeavor."



Photo by Mike Drazdzinski/CIDDE

Dr. David Brienza and undergraduate researcher Greg Meloy study pressure ulcers, commonly known as bed sores, in at Pitt laboratory.

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