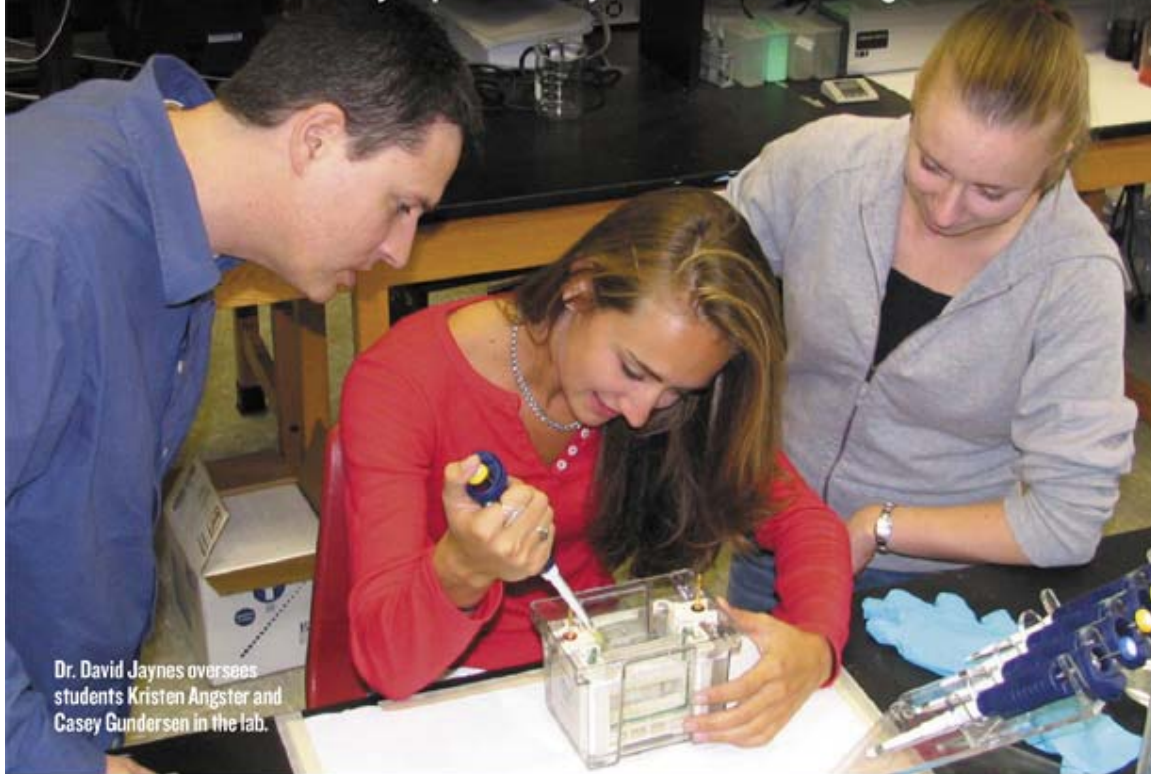


the Madison Scholar

The Journal of Research at James Madison University

HOPE *for* HEALING

A JMU researcher's study of proteins may be a salve for treating chronic wounds.



Dr. David Jaynes oversees students Kristen Angster and Casey Gundersen in the lab.

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Just What The Doctor Ordered

Research could lead to breakthrough for treating diabetic ulcers, bedsores

By Eric Gorton

A gaping wound suddenly appears on the sole of a patient's foot. It's deep, almost to the bone, having formed from the inside out. But, because the patient is diabetic, she might not even be able to feel it — her problems with blood flow that caused the wound also lead to nerve malfunction and loss of sensation.

The doctor looks closely and ponders the many treatment options. Which one is best for this patient? Will any of them work? In a worst-case scenario, the foot will have to be amputated, but it could take weeks, months or even a year to make that determination — time enough for the infection to spread and cause more severe problems.

If only there was a way to predict what treatment would work best, or whether any available treatment would work, the patient could be saved much pain and anxiety, not to mention thousands of dollars.

Dr. David Jaynes might just be on the path to easing this dilemma for both doctors and the millions of patients who suffer from chronic wounds. For the past five years, the last two at James Madison University, Jaynes and his students have been working on a procedure that involves observing proteins collected from such wounds — diabetic ulcers and pressure ulcers (commonly called bedsores) — to determine treatment effectiveness. The results have been encouraging thus far, and Jaynes, an assistant professor in biology, thinks he might even have a procedure to patent in the near future.

Jaynes was working on eye research at Daemen College near Buffalo, N.Y., when physical-therapist colleagues asked him to join their team researching chronic wounds.

"As we began talking about it, I realized that very little had been done with chronic wounds like diabetic ulcers, other than case studies: 'OK, studies describe the application of a topical agent, and the person responds or doesn't respond.' And it's just a lot of anecdotal stuff," Jaynes said. "Currently, when a physician treats a patient, he or she doesn't have any way of knowing whether their preferred treatment is appropriate for the patient they are working with."

Answers in the proteins

"Intuitively, the first thing I thought is that if you have a chronic wound and it's not healing, you're not going to see changes (in the protein concentrations)," Jaynes said. "The biochemical environment is not changing. And so I thought that a changing profile might indicate that the patient is healing."

Running tests on proteins taken from the wounds of two nursing home patients, it took just four days to prove his assumption correct. Jaynes first observed proteins from the untreated wounds. A second round of tests from a wound showing signs of healing revealed a change in the protein concentrations.



Protein bands, such as those shown on the cards above, are the key indicators of whether a chronic wound is responding to treatment. Jaynes' research has shown that healing is taking place when the bands start changing.

But that left a second, and equally important question, unanswered: Do protein concentrations fluctuate during treatment of wounds that are not healing? Jaynes got his answer when samples were analyzed from a wound that did not appear to be responding to treatment: The protein concentrations remained the same.

Saving patients pain and money



This diabetic ulcer is the type of wound Jaynes hopes to find treatment answers for.

What he developed was a way to compare protein concentrations collected from wounds before and during treatment.

Jaynes, who has received \$105,000 in grants the past two years from the Commonwealth Health Research Board, said he has replicated the test on five or six additional patients since and has received the same results each time, boosting his confidence that the procedure is valid for quickly showing whether a treatment is working.

"Now whether or not you can successfully treat the patient cannot be determined with technique; however, you would save the individual a lot of money and aggravation having to go through numerous procedures by simply knowing what the outcome will be," he said.

Jaynes said it costs about \$100,000 to treat a wound from beginning to end, and some patients have several. One patient he studied "had to deal with those wounds for weeks and weeks and weeks because they kept trying to treat her. And if there's a way to know that

you're not going to be able to treat a wound, then you can move on" — even if that means amputation.

"With a lot patients, there may not even be a treatment, there may not be a way to promote healing. But what you could do is amputate a foot instead of a leg — those are worst-case scenarios. The best-case scenarios is whether you can identify that a treatment is working or not. You can change treatments or you can continue with a treatment if you've got the proper results."

From the lab to the clinic

Jaynes said the next step of the research, which students are now involved in, is identifying the proteins and finding out which proteins respond to which treatments. This information would further assist doctors in deciding what treatment method would work best for wounds that can be treated.

The most common treatments in use are dressings, gels, whirlpool, hyperbaric oxygen and electrical stimulation. Maggots also are used on particularly recalcitrant wounds in the early stages of healing, he said.

Perhaps by the end of this school year, Jaynes said, the process "could be a long way toward a patent."

The final step would involve creating a rapid procedure that doctors could use in their clinics or in hospitals rather than sending samples off to laboratories.

http://www.jmu.edu/madison/scholar/wm_preview/CurrentFeature.shtml