Accelerating the pace of medical discovery
University medical researchers make life-changing breakthroughs

I
f the heart of the medical academic enter-
prise is research, the lifeblood is the answer
that solves the challenges of disease and offers
the promise of new cures and therapies. The
School of Medicine’s research ranges from
treating anthrax victims to helping the 76 mil-
lion Americans afflicted by gastrointestinal
diseases, from fighting heart disease at the cel-
lar level to giving those wounded in combat
a better chance to live. The following vignettes
describe medical breakthroughs that are
changing lives. No matter where you live on
this earth your life will be affected by research
being done at the University of Nevada, Reno
School of Medicine.

Anthrax research

When you think about conducting research
to help wage the war against terror, Reno
seems an unlikely place. However, that’s
exactly the type of research taking place in the
school’s Department of Microbiology and Im-
munology. Thomas Kozel, department chair,
is pioneering methods to prevent and treat
anthrax and quicker, more accurate means of
diagnosing the disease.

In addition to significant bio-defense
research, Kozel is well known for his ability to
obtain research funding. One of his National
Institutes of Health grants is now in its 29th
year, making it the longest standing NIH
grant in Nevada.

Digestive diseases

More than 70 million Americans suffer
from some type of gastrointestinal disease.
Kent Sanders, who heads the physiology and
cell biology department, is helping lead the
effort to give patients much needed relief.

Sanders is one of a select group of research-
ers named to the National Institutes of Health
Commission on Digestive Diseases. Sanders
is world-renowned for his research on smooth
muscle plasticity—that is, what happens to
smooth muscles in diseases such as athero-
sclerosis, diabetes, asthma and digestive
disorders.

Heart attack

It comes as no surprise that heart disease is
the leading cause of death both in Nevada and
the country. What may be surprising is that
research being conducted by Joseph Hume,
chair of pharmacology, is helping to reduce
that statistic. For the past 20 years, Hume’s
research has focused on an electrophysiological
study of how the cardiovascular system
functions.

Hume’s work focuses on heart disease at the
cellular level, since it is electrical disorders in
the heart after cardiac arrest that kill. The goal
is to gain a better understanding of the electro-
rical properties of the heart and how these can
be modified with drugs. He is also investigat-
ing the electrical activity of smooth muscle
cells and the regulation of calcium channels
in these cells, as well as the relationship of
smooth muscle cells to cardiovascular disease.

Brain

Are you quick on your feet? Good at Jeop-
dardy? Can you name that tune in less than
a second? Are you good at making intuitive
decisions?

Pondering these questions is the life work
of Phil Goodman. The internal medicine pro-
fessor wants to know how your brain works,
how it responds to sight, sound and touch,
and how it improves with learning.

According to Goodman, the next challenge
is to decipher the brain’s neural code. “This
may result in breakthroughs in technology—
ventilated, could provide new treatments for preterm labor. With funding from the March of Dimes and the National Institutes of Health, Buxton’s team has discovered a uterine gene that may be linked to preterm labor. Understanding how the gene is regulated is likely to offer new ways to prevent premature birth.

Bone marrow

The School of Medicine is home to one of the state’s leading cancer researchers. William Murphy, professor of microbiology and immunology, is working with department colleagues to increase the effectiveness of immunotherapy in treating cancer, particularly bone marrow transplantation.

Murphy and his team have focused their investigation on the role of natural killer cells, which can kill tumor cells directly, and using them in bone marrow transplantation. His laboratory recently received a $1.5 million grant from the National Institutes of Health to examine these cells. His team is also part of a multi-million dollar Program Project Grant with M.D. Anderson Cancer Center in Texas, which is conducting clinical trials on the approaches developed in Murphy’s laboratory.

Herpes

Bet you didn’t know that chances are pretty good you’re infected with a herpes virus.

Greg Pari, professor of microbiology and immunology, says, “Most people are carriers of latent human cytomegalovirus, or HCMV. It’s unlikely they would know it unless tested for it.”

The microbiology and immunology professor warns that for individuals with compromised immune systems like AIDS or bone marrow and organ transplant patients, HCMV can be deadly, causing retinitis, pneumonia and other dangerous conditions.

Pari is working on the molecular mechanism of herpes virus DNA replication. HCMV is a large DNA virus with the potential to encode more than 200 proteins. Pari and his team hope to disrupt key proteins involved in its DNA replication and use the new “mutant” virus to infect human cells in the laboratory. “Observing the behavior of the virus with the replication gene missing will give us a better understanding of how we can combat HCMV,” Pari says.

Blood

Very often wounded soldiers fall prey to hypothermia on the battlefield. The School of Medicine and Rocky Research, an engineering firm, have partnered to develop a unique fluid-heating technology. The project brought together Nevada’s top trauma experts and one of the most advanced thermal engineering firms in the country.

Without a dependable, reliable source of electrical power, the job of medical specialists in battlefield conditions is made more difficult. Developing thermal battery technology is critical in the race against time to treat injured soldiers experiencing significant blood loss and in need of rapid replenishment.

“Blood and blood-related fluids require refrigerated storage at about 34 degrees Fahrenheit, but need to be induced into the body at or close to 98.6 degrees to avoid hypothermia,” G. Tom Shires, professor of surgery, says. “The speed at which fluids and blood can be pumped into the body is often limited by the temperature conditioning capabilities of the fluid.”

The partnership is developing a fluid-heating device that can operate with or without electricity, allowing combat medics to make faster blood infusions and transfusions. “The uniqueness of the thermal battery technology of this device allows for mobile flow-through heating, a life-saving tool for battleground and frontline medical unit use in war scenarios,” Uwe Rockenfeller, chief executive officer at Rocky Research, adds.

“This technology will help deliver blood faster and more reliably to troops who are injured on the battlefield,” Sen. Harry Reid notes. “Once again, the School of Medicine is leading the way in medical research.”

Dr. Kent Sanders is world-renowned for his research on smooth muscle plasticity, which impacts diseases such as atherosclerosis, diabetes, asthma and digestive disorders.