

UF and Moffitt Cancer Center researchers try to teach the body's defenses to seek and destroy cancer

By Ann Griswold

# BODY

heal thy self

**S**hock and awe. For most of the last century, the predominant cancer treatment involved bombarding tumors into submission with radiation and chemicals.

But there was always a lot of collateral damage with this strategy, and even as the X-ray and chemotherapy bombs got smarter, the potential for enemy cells to escape increased.

“Targeted therapies are sometimes too targeted, and there are rescue mechanisms that allow the cancer to bypass a pathway that has been successfully eliminated by a drug,” says Johannes Vieweg, the Wayne and Marti Huizenga Eminent Scholar Chair in Urology at UF’s College of Medicine.

In many ways, Vieweg says, cancer is like a cat with nine lives.

“If you take one life, they still have eight more to go. It’s really an endurance game of figuring out how we can eliminate all these nine lives at the same time. You have to figure out, for each life, the right compound or the right therapy to stop these cancers from growing.”

But much like modern soldiers use lasers to target enemy strongholds, researchers from UF and the H. Lee Moffitt Cancer Center and Research Institute in Tampa are at the forefront of a new approach that uses vaccines to target cancer cells for the body’s own immune system.

This research is one of the major thrusts of a new partnership between UF, Shands HealthCare and Moffitt. Each of the three partner institutions excel in certain areas of cancer research, but their combined expertise lends new perspectives





Johannes Vieweg (left) and James Mulé.

“Early on, we recognized that a single therapy doesn’t always cut it,” Vieweg says. “We have to broaden our repertoire.”

### Search And Destroy

One of the hottest new strategies is immunotherapy, in which the patient’s own immune cells are harvested and turned into vaccines capable of embarking on search-and-destroy missions against abnormal cancer cells in the body. Never before have patients with cancer had access to such personalized treatments.

For the past several years, teams at both UF and Moffitt have been working on immunotherapies to fight cancer. Vieweg, who came to UF in 2006 from Duke University, is currently testing experimental vaccines for prostate cancer in phase 1 and phase 2 clinical trials.

Florida has the second-highest rate of prostate cancer in the United States. Every year, almost 16,000 new cases are detected and 2,000 men die from the disease.

Vieweg’s immunotherapies for prostate cancer aim to lower those numbers by harnessing the power of patients’ own immune cells. For one type of vaccine, Vieweg’s team harvests blood cells from individual patients and tags them with a small molecule from the surface of a cancer cell. Once the cells are injected back into the patient, they migrate to the lymph nodes, where the surface molecule acts as a homing device to guide other immune cells in the body to similar tumor cells.

Scientists want to know whether the strategy will elicit a strong enough immune response to help clear the body of the cancerous cells.

Vieweg is already collaborating with colleagues at Moffitt on this strategy, and he sees these relationships growing stronger with the new partnership.

and offers novel strategies for stopping cancer at its source.

When President Richard Nixon signed the National Cancer Act in 1971, he vowed to make the “conquest of cancer a national crusade.” During the 1970s and ’80s, much of the research revolved around just understanding the basic biology of cancer cells. It has only been in the last 20 years, as new imaging and genetic technologies have emerged, that scientists have been able to take advantage of that biological understanding.

While radiation and chemotherapy are still valuable weapons in the cancer treatment arsenal, medical scientists have long been trying to get away from treatments where the side effects were almost as devastating as the disease itself.

As scientists have learned more about the biology of cancer, they have been able to develop more precise drugs that can hone in on cancerous cells and leave healthy tissues intact.

The challenge, say Vieweg and Moffitt researcher James Mulé, is to develop treatments that are neither too general nor too targeted.

“Overall, the combined Moffitt-Shands-UF program offers much more firepower to make an impact on cancer in the state of Florida and beyond than what we had before,” Vieweg says. “There is a natural synergy here that makes our programs better.”

## Skin Solution

Vieweg’s Tampa counterpart — the man at the forefront of efforts to prevent melanoma recurrence — is Mulé, the Michael McGillicuddy Endowed Chair for melanoma research and executive vice president for applied research at Moffitt.

Beginning in the 1990s at the National Cancer Institute, Mulé has devoted much of his career to basic and translational research on the development of cancer vaccines.

“We’re no longer held hostage by what Mother Nature has given us,” Mulé says. “By using clever approaches of genetic manipulation of cells, we can create more powerful vaccines. We can generate stronger immune systems in patients using the recombinant drugs that are now available.”

Like the prostate cancer vaccine, the melanoma vaccine produces an immune reaction against cancer — just in a slightly different way. After collecting patients’ immune cells and tagging them with “red flags” from cancer cells, Mulé’s team genetically engineers the cells to produce a type of signaling molecule, called a chemokine. The cells are then injected into the patient as a vaccine.

But rather than waiting for the newly injected cells to migrate to the lymph nodes, as is the case with the prostate vaccine, the chemokines induce new lymph node formation right at the site of injection.

“We found that we could create lymph nodes at will, at the site of the vaccine,” Mulé says. “Remarkably, it translates into a much more powerful vaccine.”

Within seven to nine days, the immune cells leave the site of injection and travel throughout the body, targeting cancer cells that have spread to distant locations. The melanoma vaccine is set to enter early clinical trials later this year.

As research into the causes and cures of cancer becomes ever more complex, so does the importance of sharing ideas and resources.

“This partnership allows us to formalize a real connection, a real bond, through shared video conferences, shared meetings and by learning more about the researchers at each site,” Mulé says.

“It is hard to find a single institution that has all the necessary resources,” adds Vieweg. “In this union

with Moffitt, we can definitely leverage all of our resources into a common cause.”

Partnering with Moffitt — one of only 39 comprehensive cancer care centers in the U.S., as designated by the National Cancer Institute — promises to boost the ability of investigators at UF to secure federal grant funding.

“The chances of funding are increased when one shows a team effort and when one shows a multidisciplinary approach to the problem,” Mulé says. “Bringing the best investigators, the best clinicians, to work as a team will increase the chances of funding.”

Cancer patients will have access to a wider variety of clinical trials in progress at all three institutions.

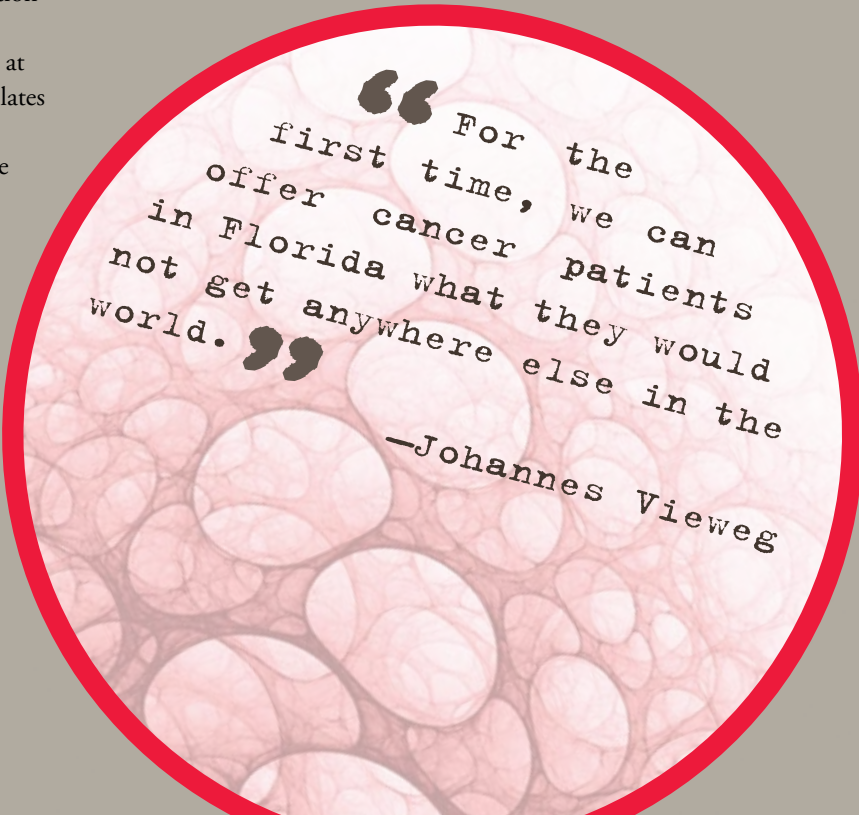
“With the partnership, we have much better research collaborations because we can take advantage of our strengths,” Vieweg says. “For the first time, we can offer cancer patients in Florida what they would not get anywhere else in the world.” ✕

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