First-in-nation program focuses on anti-cancer stem cell therapies

Colorado researchers, doctors want to raise solid-tumor cure rate above 75%

AURORA, Colo. (June 18, 2010) — Cancer and stem cell biology researchers at the University of Colorado are launching the nation’s first program focused on identifying and testing drugs that target and destroy cells thought to be at the root of cancer—cancer stem cells (CSCs).

The Cancer Stem Cell-Directed Clinical Trials Program (CCTP) is a collaboration between the University of Colorado Cancer Center and the Charles C. Gates Center for Regenerative Medicine and Stem Cell Biology, both located at the University of Colorado School of Medicine.

“Through the CCTP, we believe we can change the way most cancers are treated by targeting tumor-initiating cells as opposed to conventional therapies that address the bulk of the tumor,” said Antonio Jimeno, MD, PhD, program director and head and neck cancer specialist. “We hope that by targeting the cancer stem cells, we can bring solid tumor cure rates in line with those for some blood cancers—upwards of 75 percent, although our ultimate goal is 100 percent.”

Jimeno will direct the new program with senior co-directors Dennis Roop, PhD, Gates Stem Cell Center director and professor of dermatology at the medical school, and S. Gail Eckhardt, MD, UCCC deputy director, head of medical oncology at the medical school and leader of UCCC’s renowned early-phase cancer clinical trials program.

Although CSCs may make up less than 0.1% of the tumor, they have a big effect. They’re the ones that accumulate DNA damage from sun exposure, tobacco use and other carcinogens, Roop said. Many cancer scientists believe CSCs initiate and maintain cancers, just as normal stem cells maintain normal tissues.
CSCs are different than the cells that make up a tumor’s bulk. They are generally impervious to chemotherapy and radiation, and perhaps even new “targeted” therapies. And, because CSCs can weather the storm of traditional cancer treatment, many cancer scientists believe they are primarily responsible for cancer recurrence.

“We’ve already had success in early clinical trials with some drugs that happen to be cancer stem cell-targeting drugs,” Jimeno said. “I have patients who are essentially in remission after a year with few side effects.”

New treatments the program identifies will likely be complex because they will combine conventional therapies and CSC-targeted drugs. That complexity will require new tools for assessing tumors and blood samples, as well as scaled-down genetic tests that are analyzed by modern bioinformatics tools—none of which are available for clinical trials at most centers.

“I hope that in the near future, we can take a tiny sample of a patient’s tumor, do a quick test to see which stem cell targets are active, and quickly come up with a cocktail of drugs that will kill the root of the tumor with fewer side effects to the patient,” Jimeno said. “We think this process will truly address the complexities of cancer.”

The CCTP, which includes experts in basic cancer research, imaging and bioinformatics, will also design these tests and tools.

“We have the incredible talent and infrastructure in place to build a program around an entirely new way of treating cancer,” Roop said. “We have all the required scientific and clinical investigators and extraordinary new technologies in place to do the basic science research and move new treatments quickly to patients.”

The program will concentrate on running clinical trials of anti-CSC drugs, and assessing the impact on CSCs—one of the hottest areas in development, Jimeno said.

“Many pharmaceutical companies are developing anti-CSC drugs right now,” he said, “and our program is a platform that will offer possibilities they may not yet be aware exist for clinical applications. We have the patients, tools and infrastructure that no other center in the United States has.”

Roop said that creating a hub of cancer stem cell research in Colorado will bring big economic dividends to the state, just as the Gates Stem Cell Center has. Since 2007, that center has grown to 62 full-time employees and received $29 million in research funding with an additional $20 million pending—a rate of about 20 percent annual growth in terms of research dollars, faculty members and staff.

“Just by building this program, we will be able to attract top talent to our campus, and they will bring their millions of research dollars and new high-paying jobs with them,” he said. “This will also have an immediate impact on the University of Colorado Hospital, where patients are treated, as we bring new anti-CSC drugs into testing. But the best
news is that through doing this, we believe we will find treatments that kill the cancer without almost killing the patient.”

What’s different about the CCTP:

- A clinical trials program focused on developing tools for quickly understanding the impact of candidate anti-cancer stem cell drugs and incorporating them into a clinical setting.
- A collaboration between a National Cancer Institute-designated comprehensive cancer center and a well-funded stem cell center, both of which have rich scientific and technological infrastructure in place to take this new approach to clinical trials.
- An integrated, multidisciplinary faculty roster that includes clinical and research experts from medical oncology, surgery, radiation oncology, dermatology, cancer biology and bioinformatics, among others. This team composition will prove to be the fastest route to bring successful treatments to patients.
- Dedicated to collaboration over competition, UCCC and the Gates Stem Cell Center are known for forging successful partnerships with others regardless of what school, program or particular medical area they may work in.
- Pairs of advanced animal models of three major cancer types—melanoma, squamous skin cancer and head and neck cancer—developed by teams of Colorado scientists and other advanced technologies will give scientists and doctors cutting-edge tools to rapidly understand how new drugs selectively target CSCs for destruction.

About the University of Colorado Cancer Center

The University of Colorado Cancer Center is the Rocky Mountain region’s only National Cancer Institute-designated comprehensive cancer center. NCI has given only 40 cancer centers this designation, deeming membership as “the best of the best.” Headquartered on the University of Colorado Denver Anschutz Medical Campus, UCCC is a consortium of three state universities (Colorado State University, University of Colorado at Boulder and University of Colorado Denver) and five institutions (The Children’s Hospital, Denver Health, Denver VA Medical Center, National Jewish Health and University of Colorado Hospital). Together, our 440+ members are working to ease the cancer burden through cancer care, research, education and prevention and control. Learn more at www.uccc.info.

About the Charles C. Gates Center for Regenerative Medicine and Stem Cell Biology.

The Charles C. Gates Center for Regenerative Medicine and Stem Cell Biology is a comprehensive center open to all investigators within the Rocky Mountain region who are interested in stem cell research. Its goal is to understand the biology of stem cells in
order to develop new therapies for debilitating diseases such as cancer, pediatric diseases, heart diseases, juvenile diabetes, vascular diseases, liver diseases, blood diseases, neuronal diseases and skin diseases. Learn more at http://www.uchsc.edu/stemcell/