Groundbreaking Research Discoveries, Accomplishments, and Insights into Cancer at the UCSF Helen Diller Family Comprehensive Cancer Center

Center Leadership

Alan Ashworth, PhD, FRS, has been appointed director of the UCSF Helen Diller Family Comprehensive Cancer Center. He will formally assume his new position in January 2015. Currently, he is chief executive of The Institute of Cancer Research, London, one of the world’s most influential cancer research organizations.

Dr. Ashworth, whose major contribution to cancer research has been his work on genes involved in cancer risk, was a central part of the team that in 1995 discovered the gene BRCA2, which is linked to a heightened risk of some types of cancer. A decade later, Dr. Ashworth identified a way to exploit genetic weaknesses in cancer cells, including mutated BRCA2, leading to a new approach to cancer therapy. In 2008, he was elected as a Fellow of the Royal Society (FRS).

He succeeds founding director Frank McCormick, PhD, FRS, an internationally renowned molecular biologist who helped pave the way toward the development of targeted cancer therapies. Dr. McCormick launched the cancer center in 1997, building an internationally elite team of researchers and clinicians focused on translational research, and led the center to receive the highly competitive designation as the first National Cancer Institute (NCI) comprehensive cancer center in Northern California. Today, it is one of the foremost cancer centers in the nation.

Research and Accomplishments

- Ranks consistently among the top cancer care centers in the nation, according to the “America’s Best Hospitals” survey from U.S. News & World Report. In 2013, UCSF placed seventh among the top 18 cancer hospitals, it’s ninth consecutive year on the short list—and first among Northern California cancer-care providers. Additionally, UCSF Medical Center placed on the Honor Roll, an exclusive list of 18 centers nationally which excelled across a broad spectrum of patient care, scoring at or near the top this year in at least seven of the 15 Best Hospitals medical specialties.

- Receives the highest level of research funding from the National Cancer Institute (NCI) among cancer centers in California; fifth among all 67 NCI-designated cancer centers nationwide based upon its Cancer Center Support Grant.

- Discovered the existence of cancer-causing oncogenes, which led in 1989 to a Nobel Prize in Physiology or Medicine for J. Michael Bishop, MD, and Harold Varmus, MD, and opened new doors for exploring genetic mistakes that cause cancer. The landmark work formed the basis for some of the most important cancer research happening today.

- Discovered the molecular nature of telomeres — parts of chromosomes that critically affect the life span of cells — and the enzyme telomerase that regulates them. Telomeres and telomerase play a key role in cell aging and cancer, and telomerase is now a therapeutic target for cancer and other diseases. Groundbreaking work on telomeres and telomerase led to a 2009 Nobel Prize in Physiology or Medicine for UCSF investigator Elizabeth Blackburn, PhD.

- Chosen to lead a multi-center Stand Up to Cancer (SU2C) Prostate Cancer Dream Team to identify causes of therapeutic resistance and deliver personalized treatment for patients with advanced prostate cancer.

- Collaborates in the ATHENA Breast Health Network, the groundbreaking project to improve survival and reduce suffering from breast cancer, to accelerate research and compress the time to implement innovations in clinical practice.

- Accepted into the Children’s Oncology Group (COG) Phase 1 Consortium, an elite National Cancer Institute consortium of institutions selected to lead Phase 1 studies of potential pediatric cancer drugs. UCSF is one of only two COG Phase 1 institutions in California, and one of only 21 centers in the United States and Canada.

- Served as a national model for the involvement of patient advocates in research. Active involvement of advocates promotes research awareness and relevance, guide program planning, provide input on clinical data use, and help to overcome recurrent barriers to clinical trial enrollment.

- Published the first identification of variations in the human genome associated with brain tumor susceptibility.

- Developed a new class of targeted chemotherapy drugs — immunoliposomes — designed to reduce toxicity and increase effectiveness, which employ molecularly tethered antibodies that recognize tumor cells and deliver a lethal package of chemotherapy without introducing the agent to noncancerous tissues.
Invented a laboratory technique, called Comparative Genomic Hybridization, for detecting and analyzing genetic abnormalities in cancer cells, and extended this technology to microarrays, enabling precise, high-resolution searches for DNA abnormalities across the genome.

Pioneered and proved the effectiveness of a mapping technique that allows for the safe removal of tumors near language pathways in the brain. The technique minimizes brain exposure and reduces the time a patient must be awake during surgery.

Discovered that subsets of malignant melanoma are driven by an oncogene that is already the target of an approved drug for other tumor types. The unexpected discovery has led to dramatic responses for patients with this type of melanoma.

Played a leadership role in developing better treatment guidelines for early-stage prostate cancer, which will help reduce inappropriate treatment for men whose cancers may never progress. Developed CAPRA score (to predict prostate cancer recurrence based on pretreatment clinical data) as well as the latest CAPRA-S.

Developed a robust strategy for identifying genes and pathways that modulate how primary cancer cells respond to targeted therapeutics, and for probing mechanisms of de novo and acquired resistance.

Pioneered an adaptive clinical trial design to accelerate the translation of research into breast cancer care which involves repeated MR imaging and tissue analyses to direct changes during the course of the trial and aims to quickly gauge the effectiveness for each patient of experimental therapies as additions to standard chemotherapy.

Spearheaded the development of immunotherapy for prostate cancer, which uses patients’ own immune cells to help fight the disease. UCSF led the clinical testing of a vaccine that has demonstrated improved survival and was the first immunotherapy to gain FDA approval.

Discovered that a human protein called AXL drives resistance to Tarceva, which suggests that blocking the protein may prevent resistance to the cancer drug.

Led an international clinical trial indicating that a vaccine to prevent anal cancer is safe and effective.

Developed a new brain cancer vaccine tailored to individual patients by using material from their own tumors has proven effective in a multicenter phase 2 clinical trial at extending their lives by several months or longer.

Led national breast cancer research effort in finding new approaches for accelerated approval would hasten the pace through the research pipeline to bring medications to patients at far lower costs.

Developed a suite of tools to support quality patient decision making as part of the Decision Services Program, which have been shown to increase patient knowledge, decision self-efficacy, satisfaction with services, and to reduce decisional conflict.

Discovered the molecular basis for tamoxifen resistance which may lead quickly to new, more effective treatment strategies and may help to identify biomarkers to help patient response.

Pioneered the use of novel radiotherapy techniques, such as intraoperative radiation and a drug called 131I-MIBG that both targets cancer cells and aids in visualizing tumor tissue on scans, which are helping to boost survival in children with neuroblastoma, a leading childhood cancer.

Launched the largest hereditary cancer clinic in Northern California, which counsels individuals and families at high risk for colorectal, breast, ovarian, and prostate cancers that arise due to inherited gene mutations. Hereditary cancer represents some 10-20 percent of all cancers.

Developed a new diagnostic test using genetic markers that can help distinguish benign moles from malignant melanomas. The test is the first to demonstrate both the diagnostic accuracy and the practicality of a multi-biomarker approach to diagnosing melanoma.

Contributed to the discovery that initial success by a new generation of drugs designed to starve tumors of their blood supply — angiogenesis inhibitors — is followed by a resurgence of invasive cancer growth, in an adaptive response by the tumor. The discovery sheds new light on why such drugs may fail to increase survival for many patients.

Discovered the molecular reasons why drugs that target breast cancers driven by the HER2 protein — about one out of every four cases — become ineffective over time, which has led to new strategies for overcoming such drug resistance.

Pioneered the use of genetic network analysis, producing a map of how key genes interact, to study inherited susceptibility for cancer. Due to the numerical complexity of gene-expression networks, such analysis previously required the use of supercomputers, but the new tools can run on a desktop computer, which will allow adoption by scientists worldwide.
• Discovered the existence of neural stem cells in the brain and found evidence that they may be implicated in malignant glioma, the most common form of brain tumor.

• Initiated a Breast Cancer and the Environment Research Center to investigate the role of environmental chemicals, obesity, and other factors on development of the female breast and the age of puberty — factors that may have consequences for breast cancer in adult life.

• Perfected and adopted within routine practice the use of minimally invasive, robotic-assisted surgical procedures for some prostate, kidney, and bladder cancers, which can be more effective in removing all cancerous tissue and producing more rapid restoration of normal bodily function.

• Discovered that certain chromosome translocations that cause childhood leukemias can be detected prenatally, a dramatic result that might offer the possibility of early detection and screening.

• Built an advanced imaging laboratory that is home to a 7 Tesla superconducting magnet, among the most powerful ever built. Used for magnetic resonance imaging, the instrument can evaluate blood vessels 100-200 microns in diameter, detect new evidence of cancer invasion in tissue, and analyze chemical signals associated with tumor types and structures.

• Created the Asian American Research Center on Health (ARCH) in 2012.

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