UNCseq: Next generation of cancer treatment

With the creation of a new endeavor called UNCseqTM, UNC Lineberger is now opening new doors into cancer genetics by creating a way to bring translational research to patient care faster than ever imagined.

What will 2014 hold for cancer treatment? At UNC Lineberger, researchers and physicians are focusing on one of the next generations of cancer treatment — cancer genetics. A better understanding of this rapidly changing field — how the presence and mutation of certain genes play a role in cancer diagnosis and treatment — will help UNC Lineberger develop highly targeted therapies for cancer patients."We needed to find a way to bring cutting edge research directly to our patients sooner, but still maintain the ethical, regulatory and safety needs surrounding patient care," said Neil Hayes, co-director of UNCseq and of the Data Analysis Sub-Group for The Cancer Genome Atlas (TCGA) Project at UNC. "UNCSeq allows us to do this on so many levels."

UNCseq is a new genetic sequencing protocol that analyzes tumor samples obtained from a biopsy or surgery using next generation sequencing, comparing them to normal tissue samples. This comparison allows researchers to pinpoint the genetic changes that may influence treatment.

Here's how it works. Think of a cancer cell's DNA as its instruction manual. This instruction manual determines how the cancer will behave and specifically determines if it will grow slowly or quickly, if it will respond to one type of therapy or another, and if it will be cured or come back. Being able to read this instruction manual is critical in treating the cancer.

"With UNCseq, our researchers are able to open that manual, read the instructions and better understand what's driving the tumor's behavior, as compared to the 'normal' DNA gathered," said Hayes. After sequencing, researchers are able to identify all of the mutations present in the cancer cell that aren't present in thenormal DNA.

Once the list of mutations has been identified, a group of doctors constituting the Molecular Pathology Tumor Board

meets weekly to review mutations found that week. While some mutations are innocent, others signal a certain prognosis or a new therapy for the patient. Once those mutations have been identified and confirmed, the patient's care may change. "If we can identify the mutations, there may be a drug or clinical trial available that can address that mutation," said Hayes. To date, over 930 patients have been consented for UNCseq and that number grows every day.

Expanding beyond sequencing of DNA, UNCseq also allows researchers to analyze RNA, blood and other samples. "With UNCseq, we now have the vehicle that enables us to significantly expand our work beyond DNA sequencing to more cutting edge sequencing work using RNA," said Hayes. "UNC Lineberger is one of the few, if any, places in the world with this much experience in using clinical samples for RNA sequencing."

UNCseq especially serves as a resource for patients with difficult to treat tumors, identifying and targeting the molecular weaknesses specific to the patient's cancer. Beyond the individual benefits to patients, UNCseq will help provide the genetic data needed to pursue new research into novel treatments and to test the effects of clinical therapies currently being investigated. Looking forward, UNCseq aims to provide every patient with tumor analyses that will allow their physicians to prescribe targeted and efficient therapies on an individualized basis.