Physicians target the genes of lung, colon cancers

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(Medical Xpress)—University of Florida physicians and researchers are collaborating to map the genes of different types of cancer, and then deliver medication to attack cancer at its source.

In late January, researchers in the new UF Health Precision Cancer Care Program began sequencing the genes of lung and colon cancer tumors, forming the first center in the state to perform this testing for solid tumors. Program members include researchers and physicians from multiple UF departments, encompassing the UF Health Cancer Center and UF Health Pathology Laboratories. By identifying particular gene mutations that drive lung and colon cancers, physicians can deliver better, more targeted treatments to those cancers.

When a patient receives traditional, intravenous chemotherapy, the chemotherapy targets all growing cells. It kills stomach cells, which is why some patients are nauseated. It attacks hair follicles, which is why patients often lose their hair. Pinning down what's genetically distinct about a particular type of cancer allows physicians to deliver targeted therapy to the genes causing that cancer rather than target all living cells. This can reduce the side effects of what UF researcher Thomas George Jr., M.D., calls "indiscriminate" chemotherapy.

"Many of these new targeted therapies are pills and not liquid, intravenous medicines. They tend to be much less toxic or dangerous than traditional chemotherapy and are used with a much higher degree of certainty that it's working," said George, who is research director of the

joint oncology program at the UF Health Cancer Center at Orlando Health.

The UF researchers' work builds upon previous discoveries in breast cancer research, George said. Scientists now know that breast cancer is actually composed of at least three genetically different types of cancer. Each type has particular genetic quirks that have changed the way doctors treat patients with one of these certain sub-types of breast cancer.

The UF team wants to apply the same kind of scrutiny to lung and colon cancer tumors. Different types of cancer require different kinds of treatment because each cancer's genetic mutations are unique. These genes are even unique within each individual's cancer, even if he or she has the same type of lung cancer, for example, as another person.

"Under the microscope, every patient's cancer looks pretty much the same, so we treat it based on what it looks like. If it looks like lung cancer, we treat the patient for lung cancer; if it looks like colon cancer—you get the idea," George said. "But we realized you can't judge a book by its cover. We took that principle from breast cancer and we started looking under the hood."

For example, recent research suggests that although we have thousands of genes, there are only about a dozen genes primarily involved in colorectal cancer, George said. Knowing this, researchers can determine the problematic genes in a patient's colorectal cancer case.

"Certain patients' cancers have a different series of on and off switches stuck in the on or off position, which is what makes their cancer distinct," George said. "Knowing which of the switches are stuck can help us target medication or treatment in a very precise manner."

These genes are sequenced using a new kind of testing called next generation sequencing. Robert Allan, M.D., medical director of the UF Health Pathology Laboratories, said the team began performing next generation sequencing for cancer testing in late January, in collaboration with the UF Health Precision Cancer Care Program. This kind of sequencing allows the team to test for multiple gene mutations in one group of tests. Allan said the results seen by physicians in the molecular diagnostics laboratory are very interesting.

"Approximately 50 percent of these tumors have potentially actionable mutations, which means there's some kind of drug therapy in the pipeline, either in clinical trial or currently available and in use, that can target that particular mutation," Allan said.

George said these kinds of drug therapies tend to be less toxic than traditional chemotherapies.

"When we prescribe these to a particular patient with a particular genetic fingerprint of their cancer, we're doing so with a very high certainty that it will work," George said. "It's still not 100 percent, but it's so much better than we've ever had before."

George said the team of UF researchers and physicians hopes to soon extend the sequencing to more types of cancer, including ovarian, melanoma, pancreatic and immune system cancers.

"There's tremendous urgency for our patients. None of us are comfortable with the status quo," George said.

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