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Next-generation genome screening is step toward precision cancer medicine for lung cancer

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Precision cancer medicine has taken a strong step forward at the Ohio State University Comprehensive Cancer Center – Arthur G. James Cancer Hospital and Richard J. Solove Research Institute (OSUCCC – James) with the addition of genome screening for lung cancer.

The technology, known as next generation "multiplex" gene sequencing, analyzes 50-plus genes in DNA extracted from a tumor biopsy for particular genetic mutations. Previous technology required pathologists to analyze one mutation per tissue sample. This second-generation genome sequencing assesses more than 2,500 mutations in a single reaction.

Knowing which mutations are present in lung tumors can help oncologists tailor a patient's treatment to the unique genetic features present in his or her cancer cells. The knowledge can also help in the development of new drugs that target previously unrecognized gene mutations in lung tumors.

Precision Cancer Medicine Driven By DNA

Information from these tests is now critical for determining the most effect therapies, says medical oncologist David Carbone, MD, director of the OSUCCC – James Thoracic Oncology Program. "Tumors that bear certain genetic mutations often respond better to drugs designed to

target those mutations than to standard chemotherapy."

"Each patient's cancer is genetically distinct, so we must customize our treatments as well," says Greg Otterson, MD, co-director of the OSUCCC – James Thoracic Oncology Program. "Genomic testing of tumor cells in many cases helps us match a specific patient with the therapy or clinical trial most likely to have a positive effect on his or her cancer."

"For example, a patient could be given a standard chemotherapy and expect a 35 percent response rate/shrinkage of tumor. But if we know that patient has a mutation in a gene called EGFR, we can offer him a pill (erlotinib), which has a 75 percent response rate—and fewer side effects," he adds.

Gene sequencing is now considered the standard of care for stage-4 lung cancer patients at The OSUCCC – James and a handful of other centers across the United States. Several clinical trials evaluating molecular targeted therapies for patients with stage-3 lung cancers will soon at The OSUCCC – James.

"In addition to doing a far better job of finding mutations, this technology is faster, uses patients' tumor samples efficiently and reduces the cost of genomic testing, making it accessible to more patients," adds Weiqiang Zhao, MD, PhD, assistant professor of pathology and a member of the OSUCCC – James Molecular Biology and Cancer Genetics Program. Zhao directs the molecular pathology laboratory at The Ohio State University Wexner Medical Center where clinical genome sequencing is performed and analyzed. The lab is accredited by Clinical Laboratory Improvement Amendments (CLIA) for quality.

Lung cancer is the No. 1 cause of cancer death in the United States and the world among both men and women. More than 200,000 cases are

diagnosed annually in the United States, and approximately 50 percent of these have metastatic disease at diagnosis, which is generally considered incurable. Although the majority of people with lung cancer have a history of smoking, 15-20 percent of people affected by the disease in the United States have never smoked, and another 40-45 percent have successfully quit smoking.

Provided by Ohio State University Medical Center