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An 'HIV-test' equivalent for the early detection of lung cancer

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A team of researchers led by Fred Hutchinson Cancer Research Center reports online today in the *Journal of Clinical Oncology* the validation of a potential "HIV-test" equivalent for the early detection of lung cancer. The test, which relies on immune-system signals, much like an HIV test, can detect the presence of lung cancer a year prior to diagnosis, long before symptoms appear.

Samir M. Hanash, M.D., Ph.D., and colleagues at the Hutchinson Center and University of Michigan found that just as the immune system reacts to the presence of HIV by producing an antibody response, which indicates a person is HIV positive, it also mounts a response against specific antigens, or proteins, produced by cancerous lung tumors in their early stages of development.

"This kind of immune response won't necessarily kill the tumor, but it can act as a canary in a coal mine, signaling lung cancer at an early stage, before actual symptoms emerge," said Hanash, head of the Molecular Diagnostic Program in the Public Health Sciences Division at the Hutchinson Center. "It is an important step toward developing a biomarker-based blood test for the early detection of lung cancer."

The validation study tested the sensitivity and specificity of three biomarkers linked to early stage, pre-symptomatic disease: two previously identified antigens, known as annexin1 and 14-3-3 theta; as well as a newly identified lung-cancer antigen called LAMR1.

For the study, the researchers conducted a blinded analysis of blood samples from 85 current or former smokers collected within a year of lung-cancer diagnosis and blood samples from 85 current or former smokers who did not go on to develop lung cancer.

When combined, the sensitivity of the three-biomarker panel was 51 percent, meaning that autoantibodies to these antigens were present in the blood of more than half of the people who later developed lung cancer. The specificity, or "false-positive," rate of the biomarker panel was 18 percent, meaning that about one-fifth of the comparison group tested positive for the autoantibodies, even though they did not develop the disease.

"The fact that we got a signal like this with just three biomarkers is very significant. If we can enlarge this panel by adding a few more, we could develop a blood test with sufficient sensitivity and specificity for detecting lung cancer much earlier than current screening methods allow," Hanash said.

The initial goal is to use such a blood test in conjunction with imaging techniques, such as CT scans, to improve the early detection of lung cancer in those at high risk. Hanash envisions such a test could be in clinical use within five years.

To this end, Hanash and colleagues next hope to further validate this biomarker panel by securing funding for a retrospective multi-center study of patients who undergo lung CT scanning. "We want to see how much we could improve the sensitivity and specificity of CT scans with the addition of the blood test. For example, could the blood test detect early lung cancer in someone who tested negative on a CT scan? Or, could we use it to shed light on a suspicious lesion to help determine whether it may be cancer?"

Ultimately, Hanash foresees extending this approach to improve the early detection of other common forms of cancer.

"If we could identify those antigens that provide the best signature for not only lung cancer, but also for cancers of the colon, breast, prostate, ovary and the like, then with the tiniest drop of blood we could have a screening test for all the common types of cancer to catch them at their earliest stages, when cure rates are high," he said. "That would be phenomenal."

Source: Fred Hutchinson Cancer Research Center