Looking for new source of cancer markers in blood

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The future of cancer diagnosis may lie in just a few milliliters of blood, according to a research team led by Professor Arie Admon of the Technion-Israel Institute of Technology.

In a study released this week in the Proceedings of the National Academy of Sciences, the scientists report on a new source of blood-derived biomarkers that could soon help doctors determine whether a recovering cancer patient has relapsed, and may someday aid in the early detection of a variety of cancers. The technique may also "provide a large enough source of information to enable personalized treatment for the disease," Admon said.

The biomarkers consist of immune molecules called HLA and their cargo of peptides, which are degraded bits of protein that they haul to the surface of tumor cells. Since cancer cells release larger amounts of the HLA molecules, "we may be able to diagnose different disease, including cancer, by analyzing the repertoires of peptides carried by these soluble HLA," said Admon.

Most of the time, the HLA ferry these peptides to the cell surface for inspection by immune T cells and small amounts of these HLA molecules are also released by the cells to the blood. Admon and his colleagues now show that the HLA molecules that are released to the blood continue to carry their peptide cargo.

So far, the method has been tested in blood from patients with multiple

myeloma and leukemia, as well as healthy people and cancer cells grown in the lab. If their process holds up under further intensive testing, the researchers say, it could form “a foundation for development of a simple and universal blood-based cancer diagnosis.”

“We aim at early detection, leading to a better prognosis, relapse detection, and better information for personalized treatment,” said Admon. “All of these are long term goals. We think that relapse detection may be the first achievable goal.”

Some researchers have suggested that the flood of HLA-peptide complexes released by tumor cells helps the cancer evade immune detection, by “blocking and confusing the anti-cancer T cells,” Admon said.

There are only a handful of peptides known to be associated with particular types of cancer, so the new technique could not be used yet to determine whether a person has a certain type of cancer, Admon explained. But researchers could study the soluble HLA-peptide repertoires to learn more about the proteins that each kind of tumor produces.

HLA come in a wide variety of their own, and differ between individuals. The different subtypes of HLA differ from each other in the repertoires of peptides they carry and present. By analyzing these differences in “many people of diverse ethnic origin,” Admon said, “we will be able to come up with better diagnoses for larger parts of the human population.”

Someday, a person’s “healthy” HLA profile may join blood pressure and cholesterol readings as part of the person’s medical record, the researchers suggest in their PNAS report. Any changes in the HLA profile, they note, could be used for “detecting the telltale changes

associated with the onset of diseases."

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