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FISH on a chip offers quicker, less costly cancer diagnosis

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For the first time an important diagnostic test for cancer has been miniaturized and automated onto a microfluidic chip by a team of University of Alberta researchers in Edmonton, Canada.

This new technology opens up the possibility of better, faster cancer treatment and greater accessibility to the test, thanks to quicker and more cost-efficient diagnosis.

Chris Backhouse, professor of electrical engineering and cancer scientist Dr. Linda Pilarski have developed a microfluidic chip the size of a microscope slide that can perform fluorescent in situ hybridization (FISH) on a handheld diagnostic device.

FISH is an important and complex test that detects mutations in chromosomes for a number of different types of cancer. The test involves attaching coloured dyes to chromosomes as a way to visualize and count them as well as to detect cancer-promoting breaks and rejoinings of chromosomes. These abnormalities provide clinically valuable information about disease outcomes and response to therapy. This new system will allow FISH to be rapidly performed for a fraction of the cost of current analysis methods. Compared to conventional methods for FISH, which can take days to perform, the on-chip FISH test can be done in less than a day with a ten-fold higher rate of processing and a reduction in costs from hundreds to tens of dollars.

Because of the complexity and expense of current technology, FISH is

infrequently used in clinical situations. FISH on a chip will allow widespread use of the tests because of its higher speed and lower costs. The rapid detection of chromosomal mutations will significantly increase a physician's ability to tailor treatment strategies to target individual cancers.

"The ability to design 'personalized' therapies means that patients will be able to receive more effective treatments sooner and avoid exposure to side effects from treatments that will not help them," Pilarski said.

"This is representative of how miniaturization can make our health care more accessible while creating new economic opportunities here in Alberta," Backhouse added.

"The work of Dr. Pilarski and her associates will have great impact, and quite quickly - on the diagnosis of patients with a broad spectrum of diseases," said Dr. Roderick McInnes, Scientific Director of the Canadian Institutes of Health Research Institute of Genetics. "Their FISH and chip technology should allow rapid and inexpensive diagnosis of important genetic changes that can underlie cancer and many developmental and neurological disorders. The type of product that these scientists have produced is a major example of the kind of innovation that Canada needs, innovation that grew out of the government's support of fundamental research in medicine and engineering."

Source: University of Alberta

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