Personalized chemotherapy, cheaper medicine, affordable health care -- they may be closer than you think

March 13 2012, By Tom Butler

(Medical Xpress) -- New technology being developed at Florida State University could significantly decrease the cost of drug discovery, potentially leading to increased access to high-quality health care and cancer patients receiving personalized chemotherapy treatments.

The details, which are spelled out in a recent publication of the journal *Biomaterials*, outline the work of Steven Lenhert, a Florida State biology assistant professor and principal investigator on the research effort.

“Right now, cancer patients receive chemotherapy treatments that are based on the accumulated knowledge of what has worked best for people with similar cancers,” Lenhert said. “This is the case because hospitals don’t have the technology to test thousands of different chemotherapy mixtures on the tumor cells of an individual patient. This technology could give them access to that capability, making the treatments truly personalized and much more effective.”

The key to Lenhert’s invention is miniaturizing the first phase of a process used by pharmaceutical companies to discover new drugs. Right now, these companies use large, specialized laboratories to test hundreds of thousands of compounds on different cell cultures in a process known as high throughput screening. The equipment and manpower cost is substantial, even though only a tiny fraction of the compounds will ever make it to the next phase of testing.

Lenhert's technology miniaturizes that process by printing all of the compounds on a single glass surface and testing them on cells using an innovative technique involving liposome microarrays, which are basicallycollections of drug-containing oil drops on a surface. If fully employed in the pharmaceutical industry, this technology would make the cost of this expensive process a thousand times cheaper, creating the potential for personalized cancer treatments, lower-cost medicine and more affordable, higher-quality health care options.

"In looking at the first phase of the drug-discovery process, it struck me how, in this age of extreme miniaturization, we are still using rooms full of robots and equipment to test drug compounds," Lenhert said. "It reminded me of the early days of computers where you needed huge,room-spanning pieces of hardware to do the most mundane tasks. I said, 'There has to be a better way.'"

Lenhert's nanotechnology has been demonstrated as a proof of concept on a small scale with cells commonly grown in university laboratories. His research group is now working on scaling their technology up to the high levels needed to achieve medically relevant benefits. For personalized medicine applications, the "lab on a chip" technology could then be applied to cells obtained from patients through biopsies so doctors can determine which drugs will work on a particular patient. Depending on funding, Lenhert expects that the technology could be made commercially available after two years of development.

"We have taken an important first step in making liposome microarray technology viable for the pharmaceutical and medical industries," said Aubrey Kusi-Appiah, a graduate student in Lenhert's research group and first author on the published work. "We have established that it can be done."

More information: To read the research publication in the journal

Biomaterials, visit dx.doi.org/10.1016/j.biomaterials.2012.02.023 . To learn more about Lenhert and his research group, visit www.bio.fsu.edu/lenhertgroup/ .

Provided by Florida State University