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Researchers cut years from drug development with nanoscopic bead technology

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New research accepted by the *Journal of Molecular Recognition* confirms that a revolutionary technology developed at Wake Forest University will slash years off the time it takes to develop drugs - bringing vital new treatments to patients much more quickly.

Lab-on-Bead uses tiny beads studded with "pins" that match a drug to a disease marker in a single step, so researchers can test an infinite number of possibilities for treatments all at once. When Lab-on-Bead makes a match, it has found a viable treatment for a specific disease - speeding up drug discovery by as much as 10,000 times and cutting out years of testing and re-testing in the laboratory.

"It helps the most interesting new drugs work together to stick their heads up above the crowd," said Jed C. Macosko, Ph.D., an associate professor of Physics at Wake Forest and primary inventor of the Lab-on-Bead technology. "Each type of drug has its own molecular barcode. Then, with the help of matching DNA barcodes on each nanoscopic bead, all the drugs of a certain type find their own 'home' bead and work together to make themselves known in our drug discovery process. It's kind of like when Dr. Seuss's Whos down in Whoville all yelled together so that Horton the elephant and all of his friends could hear them."

Macosko and Martin Guthold, Ph.D., an associate professor of physics at Wake Forest and the co-inventor of Lab-on-Bead, will work with the

biotechnology startup NanoMedica Inc. to test how drug companies will use the new tool. The company has relocated to Winston-Salem from New Jersey; Macosko serves as the company's chief innovation officer and Guthold is its chief science officer. The company has one year to work with the technology to bring it to market or relinquish the rights to the

Lab-on-Bead screens millions of chemicals simultaneously using plastic beads so small that 1,000 of them would fit across a human hair. Pharmaceutical companies would use the technology to identify treatments and diagnostics for conditions ranging from cancer to Alzheimer's.

One of the targets the research team has focused on is a breast cancer cell called HER2.

"We want to find a molecule that detects that cancer cell," Guthold said. "In that circumstance, you could use Lab-on-Bead as a diagnostic tool."

The North Carolina Biotechnology Center, a private, nonprofit corporation funded by the N.C. General Assembly, provided $75,000 in funding for the project. Harvard University in Boston and Université de Strasbourg in Strasbourg, France, are providing the chemicals being screened in the Lab-on-Bead process.

"There are an infinite number of possibilities for combining carbon, nitrogen, hydrogen and other elements into different shapes that interact differently in the cells," Macosko said. "Those shapes could block cancer - they could block all kinds of things.

"If there's some cure to a disease or way to diagnose it, we're going to find it faster."

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Provided by Wake Forest University

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