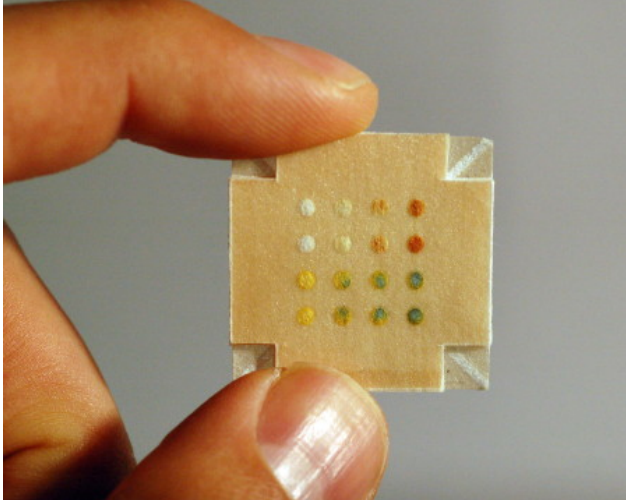


Researchers develop low-cost microfluidic diagnostic chip

December 12, 2008: Using a combination of paper and double-sided adhesive tape, Harvard University researchers have designed a microfluidic analytical device that could be used as a cost-effective and safe method to diagnose disease in developing countries.



Many current diagnostic devices used in the developing world rely on simple, but limited techniques, such as dipsticks that measure the movement of fluids across paper. By combining layers of paper with double-sided adhesive tape -- all of which are commercially available and inexpensive -- [George Whitesides](#) and colleagues created paper-based three-dimensional microfluidic devices that could provide the same function as glass or polymer materials.

This 3D paper-based microfluidic device can test four samples for up to four different analytes. The samples are wicked into the device from the corners of the device, then distributed into the test zones on the front face. The glucose assay changes color from white to brown in the presence of glucose. The protein assay changes color from yellow to blue in the presence of protein. The device was used to test four solutions with increasing concentrations of glucose and protein. (Photo courtesy of the Whitesides Research Group)

The researchers used a laser cutter to create a pattern in double-sided tape and layered the etched tape with paper treated with a light-sensitive compound. This method created a material with a series of channels and chambers, each containing waterproof walls through which liquid could flow without leaking into the other layers.

Each device cost approximately \$0.03 and could be analyzed without costly detection equipment, according to the authors. The researchers said that the paper detection "chips" could be used to provide health care diagnoses as well as environmental monitoring and water analysis.

