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Cheaper diagnostic tests nature's way

BY mimicking nature's own sensing mechanisms, bioengineers at 'UC Santa Barbara and University of Rome Tor Vergata have designed inexpensive medical diagnostic tests that take only a few minutes to perform. Their findings may aid efforts to build point-of-care devices for quick medical diagnosis of sexually transmitted diseases (STDs), allergies, autoimmune diseases, and a number of other diseases. The new technology could dramatically impact world health, according to the research team.

The rapid and easy-to-use diagnostic test consists of a nanometer-scale DNA "switch" that can quickly detect antibodies specific to a wide range of diseases. The research is described in an article published this month in the *Journal of the American Chemical Society.*

The design was created by the research group of Kevin W Plaxco, a professor in UCSB's Department of Chemistry and Biochemistry. He noted that, despite the power of current diagnostic tests, a significant limitation is that they still require complex laboratory procedures. "Patients typically must wait for days or even weeks to receive the results of most STD tests," said Plaxco. "The blood sample has to be transported to the lab, its content analysed by trained personnel, and the results sent back to the doctor's office. If we can move testing to the point of care, it eliminates the lag between testing and treatment, which would enhance the effectiveness of medical interventions, and, for infectious diseases like STDs, reduce transmission."

The key breakthrough underlying this new technology came from observing nature. "All creatures, from bacteria to humans, monitor their environments using amazing 'molecular nanoswitches' that signal the presence of a specific target by changing their structure," said Alexis Vallée-Bélisle, a postdoctoral scholar and co-first author of the study. "For example, on the surface of our cells, there are millions of receptor proteins that detect various molecules by switching from an 'off state' to an 'on state.' The beauty of these switches is that they are able to work directly in very complex environments such as whole blood."

Plaxco's research group teamed with Francesco Ricci, professor at University of Rome Tor Vergata and co-first author of the paper, to build synthetic molecular switches that signal their state via a change in electric current. This change in current can be measured using inexpensive electronics similar to those in the home glucose test meter used by diabetics to check their blood sugar. Using these "nature-inspired" nanoswitches, the researchers were able to detect anti-HIV antibodies directly in whole blood in less than five minutes.

"A great advantage of these electrochemical nanoswitches is that their sensing principle can be generalised to many different targets, allowing us to build inexpensive devices that could detect dozens of disease markers in less than five minutes in the doctor's office or even at home," said Ricci.

The authors noted that it may take several years to bring the devices to the market.

Surgical tools focus

TOKYO: Sony's (pic) new alliance with scandal-tarnished Olympus will focus on producing endoscopes and other surgical tools packed with the Japanese electronic maker's three-dimensional imaging and super-clear "4K" display technologies.

Sony Corp President Kazuo Hirai said it's not clear when the alliance's first products will become available. He acknowledged that medical equipment requires special regulatory approval that will take longer and be a learning curve for Sony whose expertise is in gadgets and movies.

"This is a challenge in a new sector," Hirai told reporters at the Tokyo Chamber of Commerce in a joint press conference with Olympus Corp President Hiroyuki Sasa. "There was a lot of talk on whether we could go at it alone."

But Sony decided it couldn't and felt that risks could be lowered if the two Japanese companies joined forces in the effort to turn medical equipment into one of the pillars of Sony's sprawling business, Hirai said.

Sony's empire includes consumer electronics, movies, music, games and banking. The company's sheer size and its apparent inability to produce long promised "synergies" among its divisions have often been criticised.

Technology such as 3D and the futuristic displays known as 4K have not yet produced big results in consumer electronics products such as TVs. TV sets with 3D images require viewers to wear special glasses and haven't caught on. Sony has shown a 4K TV image, which is more fine and dazzling than high-definition TV, but it is unclear whether such an expensive product will catch on.

The alliance, announced recently, calls for Sony to invest 50 billion yen (USD640 million) to become the top shareholder in Olympus, with an 11 per cent stake.

Olympus needs to shore up its finances after covering up massive losses dating back to the 1990s. The scandal surfaced only after its British chief executive Michael Woodford turned whistleblower and raised questions about dubious investments. Woodford was later fired. – AP