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Singapore embeds gold nanoparticle in genetic test kit

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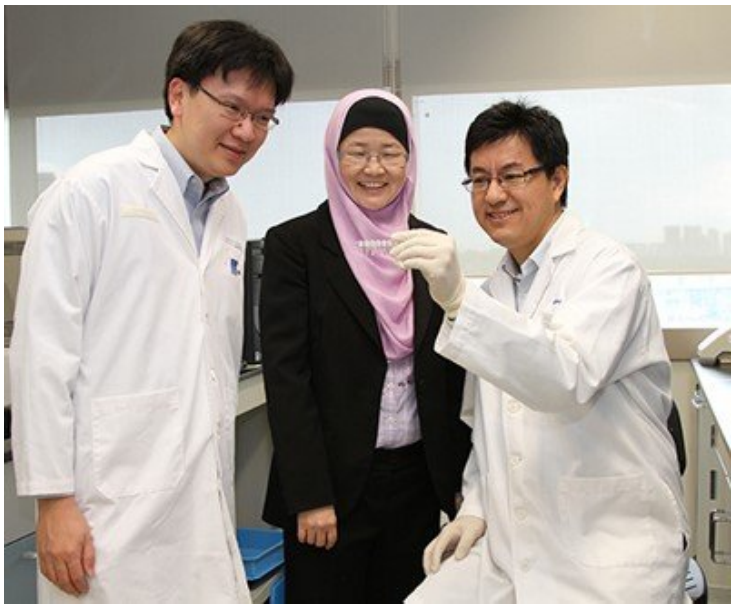

Singapore: Researchers at Institute of Bioengineering and Nanotechnology (IBN), Singapore have developed a genetic test kit using gold nanoprobe to determine the correct dosage of blood thinning drugs for the treatment of stroke, heart problems and deep vein thrombosis, paving way to personalized healthcare based on the genetic profile of the patients.

Professor Jackie Y. Ying, Executive Director, IBN said, "Diseases caused by blood clots can be potentially fatal. Genetic testing can improve the treatment of such medical conditions. By combining our expertise in molecular diagnostics and nanotechnology, we have developed a new genetic test that can determine the appropriate drug dosage to be administered for each patient."

Blood thinning drugs or anticoagulant medication prevent clots from forming in the blood. They are used to treat stroke, irregular heartbeat and deep vein thrombosis.

Warfarin is the most widely prescribed oral anticoagulant drug. But the dosage for each individual is highly variable, and the wrong dosage can cause an adverse reaction. Doctors currently determine the right dosage by monitoring the patients' reactions and adjusting the dosage accordingly.

Studies have shown that the variability in warfarin dosage is linked to genes. Knowing a patient's genetic profile can therefore help doctors to decide the correct dosage for the patient. This minimizes side effects and improves treatment outcomes.

In the test, DNA is extracted from blood or saliva of patients. After the DNA is amplified, it is then added to a pink solution of gold nanoparticles. If any of the three genetic variations is present, the solution will remain pink. But if none of the variations is present, the solution will turn colorless. The color change takes place within 10 minutes. This test can be done using standard laboratory equipment.

IBN's test has been validated by the National Cancer Centre Singapore, the National University Cancer Institute Singapore, and the Institute of Biomedical Sciences in Taiwan.

By using gold nanoprobes, IBN's test kit can recognize three of the most common genetic variations, or single-nucleotide polymorphisms, associated with warfarin response.Prof Ying added, "This nanoprobe technology is highly flexible and can be extended to detect other genetic variations. By making molecular diagnostics information more readily available, doctors will be able to provide personalized treatment that is safer and more effective."