MEDIA RELEASE

Using Gold Nanoprobes to Unlock Your Genetic Profile
For more accurate prescription for stroke and heart patients

Singapore, May 29, 2014 – A fast and cost-effective genetic test to determine the correct dosage of blood thinning drugs for the treatment of stroke, heart problems and deep vein thrombosis has been developed by researchers at the Institute of Bioengineering and Nanotechnology (IBN). Using gold nanoprobes, this new technology offers personalized healthcare based on the genetic profile of the patients.

IBN Executive Director Professor Jackie Y. Ying 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.

But current genetic tests are slow and expensive, often requiring over several days to generate results. This means that the initial dosage, which is the most important part of the treatment, may not be the optimal dosage.

Prof Ying and her group member, Principal Research Scientist Dr Yanbing Zu, have developed a faster and more cost-effective genetic test. 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.

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.

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.”

This finding was reported recently in the leading nanoscience and nanotechnology journal *Nano Today*.

IBN’s nanoprobe technology is currently on trial at Singapore’s KK Women’s and Children's Hospital in relation to carbamazepine, a different drug that is used for epilepsy treatment.

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**Reference:**


**Images Available on Request:**

![The IBN team, Dr Yanbing Zu, Prof Jackie Y. Ying and Dr Min-Han Tan (from right), which established the new genetic test to help doctors to determine the correct drug dosage for patients.](#)
The before and after images of the gold nanoprobe technology developed by IBN. The pink solution turned colorless within 10 minutes, when none of the genetic variations was present in the patient’s DNA sample.

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About the Institute of Bioengineering and Nanotechnology

Established in 2003, the Institute of Bioengineering and Nanotechnology (IBN) is the world’s first bioengineering and nanotechnology research institute. IBN’s mission is to conduct multidisciplinary research across science, engineering, and medicine for breakthroughs to improve healthcare and quality of life.

IBN’s research activities are focused in the following areas:

- **Nanomedicine**, where functionalized polymers, hydrogels and biologics are developed as therapeutics and carriers for the controlled release and targeted delivery of therapeutics to diseased cells and organs.

- **Cell and Tissue Engineering**, where biomimicking materials, stem cell technology, microfluidic systems and bioimaging tools are combined to develop novel approaches to regenerative medicine and artificial organs.

- **Biodevices and Diagnostics**, which involve nanotechnology and microfabricated platforms for high-throughput biomarker and drug screening, automated biologics synthesis, and rapid disease diagnosis.

- **Green Chemistry and Energy**, which encompass the green synthesis of chemicals and pharmaceuticals, catalytic conversion of biomass, utilization of carbon dioxide, and new nanocomposite materials for energy applications.
Scientific Impact

- More than 950 papers published in leading scientific journals
- Over 1,000 seminars and presentations at international conferences, including over 660 invited, keynote and plenary lectures
- Organized premier scientific meetings such as the International Conference on Bioengineering and Nanotechnology, *Nano Today* Conference, and the IBN International Symposium

Technological and Commercialization Impact

- Over 500 active patents and patent applications
- More than 80 licensed patents and patent applications
- 7 spin-off companies
- Over 150 active research collaborations with industrial, clinical and academic partners

Nurturing Future Research Talents

- Trained 107 PhD students
- More than 72,300 students and teachers from 290 local and overseas schools/universities have participated in IBN’s Youth Research Program
- Over 1,880 students and teachers have completed research attachments at IBN

For more information about IBN, please visit www.ibn.a-star.edu.sg.

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