

DNA aptamer to transform malaria diagnosis

Christina Lau

Scientists at the University of Hong Kong (HKU) have discovered a DNA aptamer that may transform the point-of-care diagnosis of malaria. [*Proc Natl Acad Sci U S A* 2013, e-pub 16 Sep]

Rapid diagnostic tests for malaria typically use antibodies as the underpinning technology. "These tests have made a major positive impact on malaria management. However, they have several intrinsic limitations, including cost of production, batch-to-batch variation during manufacturing, stability in higher temperatures during storage, and shelf life," said co-author Dr. Julian Tanner of HKU's Department of Biochemistry.

"Compared with antibodies, DNA is a more stable molecule that can be directly chemically synthesized by cost-effective approaches," Tanner told Medical Tribune. "Our study showed how DNA can be used directly in molecular recognition of a malaria diagnostic target, similar to how an antibody recognizes molecules."

In the study, Tanner and researchers from HKU's Department of Physiology and Faculty of Dentistry discovered a DNA aptamer that can discriminate between the malaria biomarker, *Plasmodium falciparum* lactate dehydrogenase [LDH], and human LDH. Its specificity is achieved by discriminatory binding to a loop present only in the *Plasmodium falciparum* LDH.

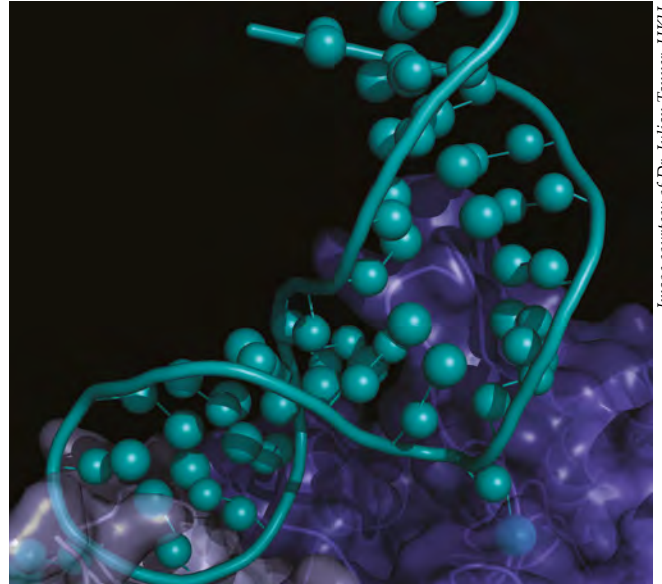


Image courtesy of Dr. Julian Tanner, HKU.

The DNA aptamer discovered in the study.

Aptamers are oligonucleotides selected for and evolved to bind tightly and specifically to molecular targets. Despite their potential as diagnostic and therapeutic agents, little was known about how they recognize or discriminate their targets.

"Our X-ray crystallography has provided an excellent understanding of how the DNA aptamer recognizes the *Plasmodium* protein," said Tanner. "The discovery opens up possibilities for a new generation of rapid point-of-care diagnostic tests for malaria."

"We have two directions from here. One is to incorporate the DNA aptamer into the actual diagnostic device, such as a dipstick or lateral flow device. Another is to redesign the DNA aptamer for better binding with the target," he continued. "Clinical testing of a DNA aptamer-based malaria test will hopefully start within the next 3 years."