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Professor Min-Gon Kim's research team developed all-in-one molecular diagnosis technology to measure mosquito-borne virus infection

- Molecular diagnostic technology, which is currently mainly used for diagnosis of COVID-19, is an essential technique for coping with infectious diseases by examining various molecular level changes and genes occurring in cells to diagnose diseases. However, molecular diagnosis takes about 6 hours to perform multi-step processes, such as gene separation, amplification, and measurement by using equipment after sample injection, and has the disadvantage of being difficult to use in the field.
- GIST (Gwangju Institute of Science and Technology, President Kiseon Kim) Department of Chemistry Professor Min-Gon Kim's research team succeeded in developing an all-in-one molecular diagnostic technology that implemented a complex molecular diagnostic process onto a single lab-on-paper* chip using a strip-like structure, which is similar to common home pregnancy diagnostic tests. Accordingly, on-site diagnosis is possible, and it is expected to bring about significant improvement, such as cost reduction and analysis time reduction.

* lab-on-paper: It can automatically perform multi-step (bio)chemical reactions by combining various materials similar to paper, and it has the advantage of allowing liquid to flow without power and can be mass produced.

- The research team has developed an all-in-one molecular diagnostic chip in which these functions are implemented on a single chip by combining existing research

results, such as rapid gene extraction and multi-molecular diagnosis based on lab-on-paper technology.

- The molecular diagnostic chip developed by this research team is a technology that allows RNAs of viruses in the blood to be gathered in one place when a drop of blood and buffer solution are injected, and this moves to a place where isothermal gene amplification* can occur, so that three types of mosquito-borne viruses (Zika, Dengue, and Chikungunia) can be checked for viral infection within an hour.

* isothermal gene amplification: Isothermal gene amplification is a technique that enables gene amplification at a constant temperature. In this study, Loop-mediated isothermal amplification (LAMP) technology was used with the isothermal gene amplification technique.

- Professor Min-Gon Kim said, "The newly developed all-in-one molecular diagnostic chip is a platform technology that can be used for most molecular diagnostics, and we plan to create faster and more reproducible prototypes by the end of this year through follow-up research. This research can be applied not only to mosquito-borne viruses, but also to areas that require on-site diagnosis, such as COVID-19 and influenza."
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