

Smart photonic contact lens for diabetic diagnosis and retinopathy treatment

January 10 2020

Diabetic patients need to measure their blood-sugar level by drawing blood before and after a meal, and it is easy to develop complications due to diabetes. Recently, a research team from POSTECH developed technology that allows diagnosis of diabetes and treatment of diabetic retinopathy just by wearing a 'smart light-emitting diode (LED) contact lens.' With this technology, it is anticipated that development of wearable diagnostic and therapeutic devices for diabetes will be realized.

Professor Sei Kwang Hahn and his research team including his Ph.D. student, Geon-Hui Lee, invented a smart photonic contact lens and a wearable medical device which can diagnose diabetes and treat diabetic [retinopathy](#). Their new research results on photonic diagnosis and photonic therapy of diabetes are published on-line in the world renowned journal, *Nature Reviews Materials*, January 7th, in collaboration with the research group led by Zhenan Bao from the Department of Chemical Engineering at Stanford University and David Myung from Stanford Medicine Ophthalmology.

The research team successfully developed a [smart contact lens](#) with integrated micro LED and a photodetector that can measure glucose concentration in the conjunctival blood vessels by analyzing NIR light. With this development, they succeeded in a new technology for diabetic diagnosis.

They put their new smart LED [contact lenses](#) on rabbit eyes with diabetic retinopathy and irradiated light repeatedly for a month. As a

result, they confirmed that there was significant reduction of angiogenesis (production of new blood vessels) in the retina, and verified clinical feasibility of the smart LED contact lens for diabetic retinopathy therapy.

This newly developed device will not only let [diabetic patients](#) monitor their blood-sugar level in real-time but also enable medical treatment for retinopathy which is caused by diabetic complications.

Meanwhile, Professor Hahn and his research team have attracted attention from academics by developing a smart contact [lens](#) that can diagnose diabetes by analyzing the glucose concentration in tears and deliver drugs to treat diabetic retinopathy for first time. Preliminary clinical tests for the developers are expected to be done in the first half of this year.

On the basis of these recent results, they also developed a smart wearable medical device that can do highly sensitive analysis on glucose concentration in sweat, and they verified that it would be clinically feasible for diabetic diagnosis. Also, with PHI Biomed company, they developed a Bluetooth system that can send data wirelessly, allowing patients to check their diabetic diagnosis results on their mobile phones.

Professor Hahn, who led the research mentioned about his future plan in his interview, commented "We developed a smart LED [contact lens](#) that can diagnose [diabetes](#) and treat [diabetic retinopathy](#) with light for the first time in the world. We are planning to commercialize these smart contact lenses and smart wearable medical devices in collaboration with Stanford Medicine."

More information: Geon-Hui Lee et al, Multifunctional materials for implantable and wearable photonic healthcare devices, *Nature Reviews Materials* (2020). [DOI: 10.1038/s41578-019-0167-3](https://doi.org/10.1038/s41578-019-0167-3)

Provided by Pohang University of Science & Technology (POSTECH)

Citation: Smart photonic contact lens for diabetic diagnosis and retinopathy treatment (2020, January 10) retrieved 10 April 2024 from <https://medicalxpress.com/news/2020-01-smart-photonic-contact-lens-diabetic.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.