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Korea creates smart LED contact lens to diagnose diabetes

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Sei Kwang Hahn and his research team from POSTECH have developed a smart LED contact lens



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 South Korea based Pohang University of Science and Technology (POSTECH) has developed technology that allows diagnosis of diabetes and treatment of diabetic retinopathy just by wearing '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 vitalized.

Professor Sei Kwang Hahn and his research team including his PhD 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's renowned journal, Nature Reviews Materials, as of January 7th in collaboration with the research group led by Zhenan Bao from 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 photodetector which can measure glucose concentration in the conjunctival blood vessels by analyzing the NIR light. With this development, they succeeded in diabetic diagnosis.

Furthermore, they put their new smart LED contact lenses on rabbit eyes with diabetic retinopathy disease 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 retina and verified clinical feasibility of the smart LED contact lens for the 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 gained great attention from the 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 in the world. Preliminary clinical tests for the developers are expected to be done in the first half of

this year.

On the basis of these results, recently, they also developed a smart wearable medical device that can do highly sensitive analysis on the glucose concentration in sweat and they verified that it could be clinically feasible for diabetic diagnosis. Also, with PHI Biomed company, they developed a blue-tooth 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, “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.”