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Continuous glucose monitoring sensors modified with nitric oxide-releasing nanofiber for improving biocompatibility: A freely-moving rat model

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The blood glucose levels of patients with diabetes mellitus should be tightly monitored. In general, diabetic patients have used the strip-type glucose sensors. Because such strip-type sensors provide the instantaneous value, however, patients cannot immediately respond to hyperglycemic or hypoglycemic events. On the other hand, *in vivo* glucose biosensors are able to determine the glucose levels in real-time, allowing to effectively warn hyperglycemic or hypoglycemic conditions. Indeed, a continuous glucose monitoring sensor provides maximal information about varying blood glucose levels throughout the day, and is able to facilitate the making of optimal treatment decisions for diabetic patients. However, upon implantation of a sensor into a body, a cascade of inflammatory response is initiated, ultimately making *in vivo* glucose measurement erratic. Therefore, the appropriate fusion of biocompatible coating materials and glucose sensing devices has been one of the most critical issues. With discovery of nitric oxide (NO) as a potent antithrombotic and anti-inflammatory agent, a variety of NO storage/release nanomaterials have been reported to improve the biocompatibility of indwelled medical devices, including metal/metal oxide clusters, silica nanoparticles, dendrimers, and polymeric nanofibers. Herein an implantable glucose microsensor modified with NO-releasing silica/polymer *hybrid* nanofibers is demonstrated. By controlling NO release properties (e.g., total NO storage amount, half-life time of NO release, and maximum flux), the sensor performance *in vivo* (using a freely-moving rat model equipped with a wireless signal transmitter/receiver device) will is evaluated, in terms of sensor lifetime, accuracy, and stability.

Biography

Minji Park received her B.S. degree in Department of Chemistry at Kwangwoon University in 2015. Currently, she is studying for her M.S. degree in analytical chemistry at the same University. Her research interest is mainly in the develpoment of glucose biosensor using electrochemical methods.

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