키토산 기반 아세틸콜린 바이오센서의 제작 및 특성화

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Fabrication and Characterization of a Chitosan-Based Acetylcholine Biosensor

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요 약

The brain is a very sensitive organ among of human body. So that the research is still sluggish on how directly to diagnose and treat specific areas of the brain. This study proposes a biosensor to detect Acetylcholine that can be applied to Alzheimer's patients. The proposed sensor was able to detect acetylcholine at sufficiently low concentrations. This result shows that performance is enough to detect Acetylcholine in the brain.

Ⅰ. 서 론

Alzheimer's disease is a complex, multifactorial disorder. This study focuses on the cholinergic hypothesis, which associates the disease with disruptions in acetylcholine secretion and loss of neuronal function, leading to cognitive and memory impairment. Currently, acetylcholinesterase inhibitors (ACEIs) are the primary drug therapy for Alzheimer's, aimed at maintaining acetylcholine levels within synapses. However, ACEIs can result in adverse long-term side effects. Given the high failure rate in Alzheimer's drug development, an implantable neural probe presents a promising alternative for more accurate diagnosis and treatment.

Ⅱ. 본론

This research introduces a acetylcholine sensor, detailing its fabrication and performance evaluation. Chitosan was employed to create a porous structure on the sensor surface, which was subsequently cross-linked with enzymes using glutaraldehyde. The performance of the sensor was assessed through chronoamperometry, linearity tests, and the evaluation of chitosan porous damage.

Ⅲ. 결론

In this study, a biosensor to detect Acetylcholine was developed and evaluated the performance. The porous structure was formed- well and the porous structure was not any damage after insertion to the agarose gel. Notably, the 1% chitosan porous structure exhibited the highest sensitivity, with a limit of detection (LOD) measured at 0.14 μM. In the CA test, the chitosan porous structure exhibited approximately 40 times higher sensitivity compared to the non-porous thin film. It can be seen that the porous structures formed on biosensor has sufficient performance to be detected to Acetylcholine.