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Korea develops wireless brain neurochemical system to study Parkinson's disease

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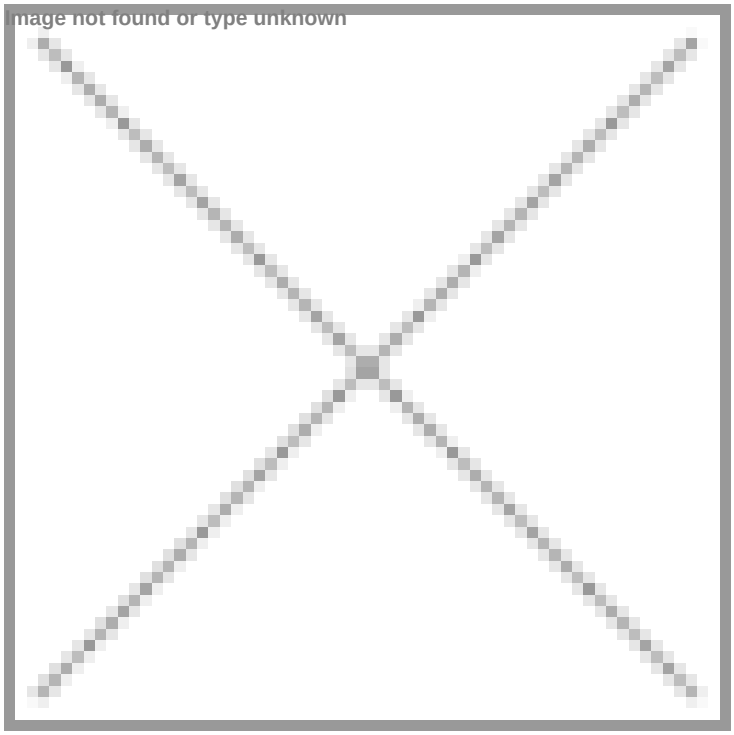
The technology allows for the real-time monitoring of the neurochemical reactions in the brain



A group of researchers at Korea University have developed an electronic medical system that can be inserted into deep regions of the brain to measure neurochemical information and spontaneously resorbed after use. The results of the present study may play critical roles in the understanding and treatment of brain diseases related to neurotransmitters, such as Parkinson's disease.

A new 2D 'transition metal chalcogenide catalyst' was developed to measure the real-time variations in brain dopamine concentration. The research group focused on the phase transition of the 2D catalyst from semiconductor to metal. The metallic 2D catalyst based on molybdenum disulfide (MoS_2) and tungsten disulfide (WS_2) exhibits high surface negative potential and excellent chemical reactivity and effectively converts dopamine molecules into electric signals. In addition, since it can be degraded by the metabolic process after use, it is appropriate for applications in medical systems.

The research group inserted a sensor system, fabricated from the 2D catalyst and silicon nanomembranes, to wirelessly monitor the real-time variation in neurotransmitters for over 4 weeks and successfully collected information about pH and temperature changes and the electrical signals related to brain activity. After insertion into the brain, the monitoring system is spontaneously degraded and resorbed by the metabolic process of the body, meaning that no additional surgery is needed for its removal. Therefore, the newly developed system can be effectively applied to monitoring and rehabilitation during recovery from brain surgery.