Soft implantable drug delivery device integrated wirelessly with wearable devices to treat fatal seizures

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Recent technological advances in wearable and implantable bioelectronics have created new paradigms in personalized biomedical devices, such as sensor-assisted, point-of-care treatment systems. However, wearable devices oftentimes show insufficient efficacy due to the skin barrier, and implantable devices accompany high invasiveness due to rigid and bulky components. Here, we present soft implantable drug delivery device (SID) wirelessly powered and controlled by wearables, which takes advantages of both wearable and implantable devices, for neurological medical emergencies. The SID is wirelessly interconnected with wearables for EEG monitoring and on-demand drug-release through wireless voltage induction. Due to wireless integration, bulky rigid components such as sensors, batteries, and electronic circuits could be moved from SID to wearables, and thus mechanical softness and miniaturization could be achieved. The efficacy of prompt closed-loop treatment could be demonstrated with animal experiments *in vivo*, in which brain damages were reduced and survival rate was increased. Demonstrations using large-size SID and human EEG signals *ex vivo* hold promise for clinical translation.