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약물심장독성 이해를 위한 SU-8 기반의 기능성 캔틸레버

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SU-8 based Functional Cantilevers for Drug-induced Cardiac Toxicity Analysis

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Some of the leading causes of untimely deaths in the world are heart related problems. Extensive research is going on to understand the mechanical and electrophysiological characteristics of cardiomyocytes. Recently, our team had developed a novel cantilever-based device that can simultaneously measure electrophysiology and contraction force of cardiac cells. Here, we report the results of the contraction force and electrophysiology. Contraction force has been measured with the help of SU-8 based cantilever and electrical impedance has been recorded by fabricating interdigitated electrode arrays (IDEs) on the cantilever. IDEs have been used to measure the impedance of the cells and their culture, that enables us to understand the growth and adhesion of cardiac cells. This is a non-invasive technique and real-time information of the cell can be obtained for a range of frequencies. Verapamil drug, a calcium ion channel blocker, was added in the cardiac cell culture medium, in order to understand response of our device to drug toxicity. 50 nM Verapamil was added and impedance and displacement data were measured for up to 6 hours and then samples were washed out. Figure 1 (a) shows the impedance result and Figure 1 (b) shows cantilever displacement result. Impedance started to reduce with time, as did the cantilever displacement. Cardiac beating rate also decreased. However, after 6 hours, impedance started to increase and also the beating rate. We can say that effect of 50nM Verapamil started to diminish in 6 hours. Hence, this study demonstrates the device capability to measure cardiac toxicity.

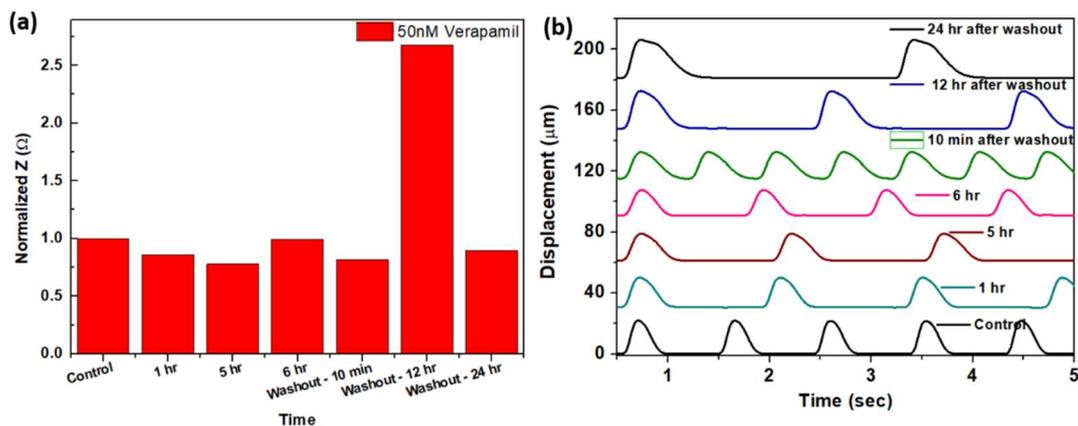


Figure 1. (a) Impedance data (50kHz) and (b) cantilever displacement data on addition of Verapamil drug

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