

Measurement of subcutaneous biological substances using microperfusion needle

Health management is easy if we can monitor biological substances such as lactate, blood sugar, and stress substances in daily life. We aim to develop a sensor that is minimally invasive, wearable, and does not disturb users in everyday life by MEMS. In this study, biological substances are extracted through a microperfusion system, inserting microneedle under the skin (Fig.1). This device can monitor biological substances continuously because it has a sensor unit outside the body. The perfusion needle is 0.2 mm in diameter and fabricated a flow channel with perforated membrane by non-planar microfabrication technology (Fig.2). It was confirmed that biological substances (lactate, glucose) was collected from under the skin by microperfusion experiments in the back skin of the mice (Fig.3, 4).

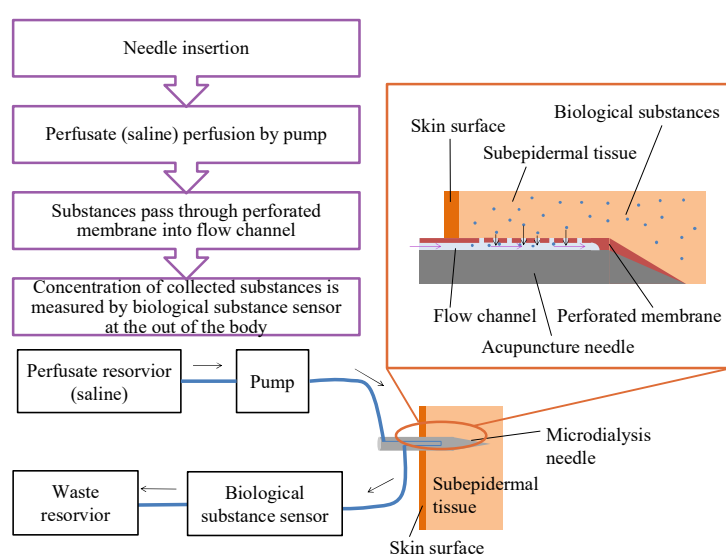
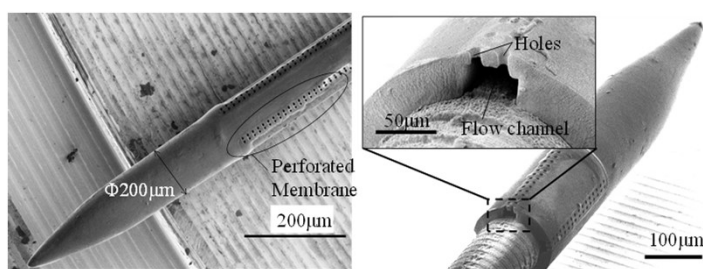


Fig.1 System of measurement of subcutaneous biological substances.



(a) Side view

(b) Cross-section view

Fig.2 Photograph of fabricated microperfusion needle.

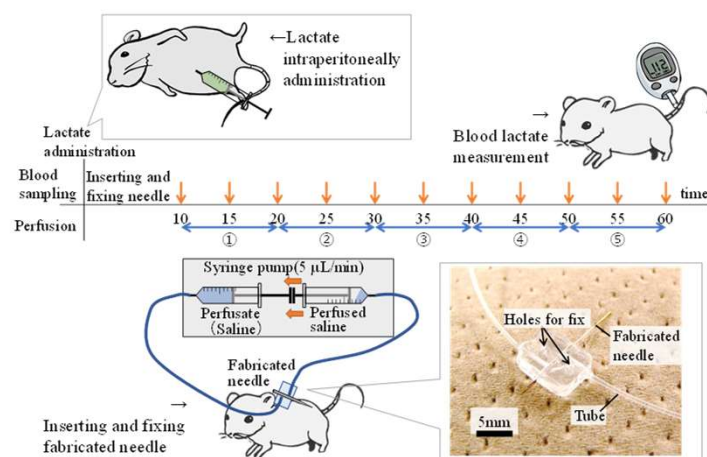


Fig.3 Experimental setup.

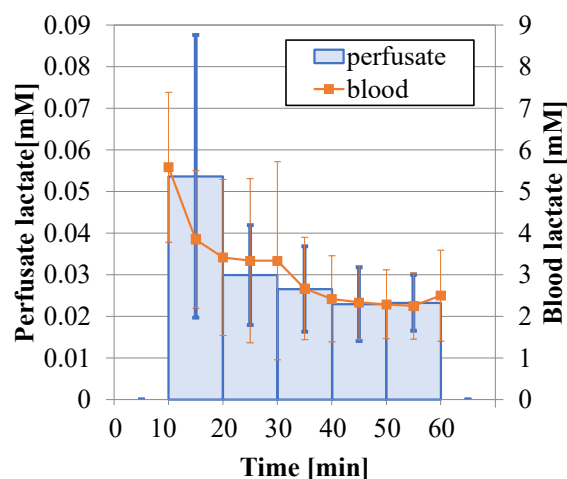


Fig.4 Time change of lactate concentration in blood and perfused solution.

<Reference>

N. Tsuruoka, K. Ishii, T. Matsunaga, R. Nagatomi, Y. Haga, "Lactate and glucose measurement in subepidermal tissue using minimally invasive microperfusion needle," Biomed Microdevices. 2016 Feb;18(1):19. doi: 10.1007/s10544-016-0049-z.

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