

〈原 著〉

光音響分光法を利用した実用的な *in vivo* 経皮吸収測定装置の開発 およびヒト皮膚に対する測定の試み

塩 屋 靖^{*、†}, 小久保洋*, 佐 藤 誠*, 藤倉 芳明*

***In Vivo* Evaluation of Percutaneous Absorption by Photoacoustic Method**

—Development of practical apparatus and its application to human skin—

Yasushi SHIOYA,^{*、†} Kunihiro KOKUBO,* Makoto SATO,* Yoshiaki FUJIKURA*

Abstract

A photoacoustic (PA) method to human skin made possible to obtain important information about percutaneous absorption. But it was difficult to measure PA signals *in vivo* at any wavelength or at any modulation frequency we need. We built a practical apparatus with a high-sensitivity open-ended PA cell and an appropriate optical design. Using this apparatus, we could detect high-S/N PA signals in the 270 to 700 nm wavelength range and in the 50 to 1,000 Hz modulation-frequency range. Applying β -carotene of concentration 0.04 wt% in acetone to human forearms, PA signals were measured for 10 s at an irradiant power below 2.2 mW. Excellent S/N and reproducibility were obtained over 5 repeated measurements; S/N was above 70 and the coefficient of variation was less than 8%. As the application of this method, the difference of time-domain decay characteristics of PA signals between untreated and stratum-corneum-stripped human forearms was demonstrated. This practical apparatus would be a very useful tool for the evaluation of percutaneous absorption through the further discussion on the thermal diffusion coefficient of human skin.

Key words: photoacoustic, percutaneous absorption, open-ended cell, *in vivo*, human skin.