Correlation of In vivo and In vitro Measurements of Sun Protection Factor

何秀娥;許明照
Sheu MT;Lin CW;Huang MC;Shen CH and Ho HO

Abstract

In this study, the correlation of measuring sun protection factor (SPF) values between in vivo and in vitro tests was investigated for the purpose of monitoring the in vivo efficacy of sunscreen products using in vitro tests instead of in vivo tests to lessen the labor burden. Eight products, including standard product of the US FDA (SPF 4) and COLIPA (SPF 15) and six commercial products, were included for comparison. For the in vivo test, the test sample was evenly applied to the skin at a concentration of 2 mg/cm2 using a finger stall. The lag time between application and UV irradiation was about 15 min. A Multiport UV Solar Simulator with six outputs was used as the UV source. Six test sites were exposed to UV irradiation with a progression of UV doses of 25% from output to output. The minimal erythemal dose (MED) was assessed visually after 24 hr of UV exposure. During the in vitro test, each sunscreen was evenly spread on 3M Transpore® tape and the transmittance was measured with a UV transmittance analyzer equipped with a singleflash xenon lamp. The results demonstrated that the SPF values of the in vivo tests were close to the claimed value, indicating that SPF values measured in this study were reliable. However, statistical analysis by t-test or ANOVA showed that significant difference in SPF values existed between in vivo and in vitro tests for most products. Thus, a correlation of SPF measurement between in vitro and in vivo tests could not be constructed. According to these results, using a UV transmittance analyzer to measure SPF values is not a reliable method to correlate with the results of in vivo tests, and so this is not a practical way to monitor the effectiveness of sunscreen products.