

Development of a rapid and sensitive method to evaluate the ability of sunscreens for protection of the chronic skin genotoxicity by ultraviolet lights.

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Sunscreens are widely used to protect our skin from harmful chronic effects of the sunlight such as photoaging and cancer induction, which are known to result from oxidative and genotoxic effects of the ultraviolet light (UV) included in the sunlight. The ability of sunscreens to prevent those chronic UV toxicities has been assessed using their capacities to suppress sunburn (erythema) after sunlight or UV irradiation, and is evaluated by indices such as sun protection factor (SPF). However, any direct correlation has not been established between the skin inflammation (erythema) and those chronic UV skin toxicities. We developed a rapid and sensitive method to evaluate the protecting ability of sunscreens for those chronic UV effects by assaying mutation and/or DNA damage induction in the skin after UV irradiation, using a transgenic mouse line, Muta Mouse, developed specifically for mutation analysis. Here, we show that the newly developed method is highly useful to evaluate the protection ability of sunscreens against the skin genotoxicity of UV by assaying mutation induction, and can assess their capacity to prevent the photoaging by quantifying oxidative DNA damage. Moreover, we found an inconsistency between the SPF and the mutation-suppressing ability for some of the sunscreens we tested, and those sunscreens had formulations that UV scatterers, instead of absorbers, were main components of their UV protectors. These findings indicate that SPF is not the index appropriate to evaluate the ability of sunscreens to prevent the genotoxicity of UV. We introduced a new index of mutation protection factor (MPF), which can be determined by the method developed here, for the appropriate evaluation of sunscreen's protecting ability against the UV skin genotoxicity.