

Pharmaceutical research on prediction of drug-induced phototoxic risk for aiding the drug discovery

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Phototoxic skin responses, after topical and systemic administration of drugs, have been identified as one of the significant side effects. Several classes of drugs exhibit this type of side effect, such as antibacterials and thiazide diuretics. Drug-induced phototoxicity can be categorized as photoirritant, photogenotoxic or photoallergic, and some drugs can cause all three types of reactions. To predict this side effect, a reactive oxygen species (ROS) assay had been developed and large amounts of drugs were evaluated using the ROS assay.

Recently, the interests in functional foods have been raised, and many people have used them for health maintenance and enhancement. Although the functional foods are good for health maintenance and enhancement, they also have adverse effects as well as drugs. Some functional foods, including St. John's Wort (SJW) and aloe, were reported to cause phototoxicity, however, the information of which has never been fully obtained. In this research, SJW was used as a model functional food, and the research aimed to clarify the usefulness of in vitro phototoxic evaluation system for predicting phototoxicity on functional foods.

Based on the data obtained, SJW extract generated ROS, especially singlet oxygen after exposure to UVA/B. Its main inclusion (17 components) has been also assessed using ROS assay and 5 inclusions, such as hypericin and hyperforin, seemed to mainly relate to the phototoxicity of SJW. To elucidate the detailed mechanism of SJW-induced phototoxicity, the 5 components were assessed photogenotoxic potential using agarose gel electrophoresis-based DNA photocleavage assay, whereas the components have not exhibited photogenotoxic potential.

In conclusion, SJW and some of its components had phototoxic potential, however, the photogenotoxic potential of 5 photoreactive components were negligible. For further study, photoirritant potential of the components will be examined, so that the way to avoid SJW-induced phototoxicity would be suggested.