

Dermal Irritancy of Aliphatic Hydrocarbons (C9-C14) Using in vitro EpiDerm™ Full Thickness (EFT-300) Skin Model

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Introduction: EpiDerm Full Thickness 300 culture (EFT-300) consists of Normal Human-derived Epidermal Keratinocytes (NHEK) and Dermal Fibroblasts (NHFB).

Objective: The objective of the present study was to systematically evaluate a tissue engineered Epiderm full thickness (EFT-300) as a human skin equivalent and to study the dermal irritancy of nonane, decane, undecane, dodecane, tridecane and tetradecane.

Methods: The EFT-300 tissues were cultured in 6 well plates and treated with 2.5µl of chemical, After the treatment, cultures were incubated at 37°C for subsequent time points such as 6, 24 and 48 hours. MTT assay was performed for tissue viability for 24 and 48 hours. Histological sections of EFT-300 were observed for any morphological changes after treatment with aliphatic hydrocarbons. ELISA was performed for the release of biomarkers such as IL-1a, IL-6 and IL-8 in the culture medium for 6, 24 and 48 hours. EFT-300 treated cultures were further analyzed for the release of biomarkers such as IL-1a, IL-6, IL-8, and TNF-a in the skin.

Results: As a result of treatment with 2.5µl of all chemicals, there was no significant alteration in the morphology of EFT-300 cultures after 24 and 48 hours but (C13) tridecane and (C14) tetradecane showed disruption of stratum corneum at 48 hours. Aliphatic hydrocarbons (C9-C14) released significant amounts of IL-1a, IL-6 and IL-8 after 24 hours in the culture medium. All the chemicals mentioned above released IL-1a, IL-6, IL-8 significantly compared to control (P<0.05) after 48 hours in the order of tetradecane>tridecane>dodecane>undecane>decane>nonane in the culture medium.

Conclusion: As the chain length increased from C9 to C14, all the chemicals released IL-1alpha, IL-6 and IL-8 significantly after 48 hours. These results indicate that EFT-300 could be a good invitro model to study the skin irritation of aliphatic hydrocarbons. Furthermore, EFT -300 skin cultures could able to discriminate the skin irritation potential of various aliphatic chemicals based on the various biomarkers release.

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