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Endogenous n-3 Polyunsaturated Fatty Acids Protect Against Imiquimod-Induced Psoriasis-Like Inflammation via the IL-17/IL-23 Axis

Si Qin ¹, Ju Wen ¹, Xiao-Chun Bai ², Tian-Yu Chen ³, Rong-Chang Zheng ¹, Gui-Bin Zhou ¹, Jing Ma ¹, Jie-Ying Feng ¹, Bi-Ling Zhong ⁴, Yi-Ming Li ⁴

Affiliations

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Abstract

The beneficial effects of n-3 polyunsaturated fatty acids (PUFAs) on psoriasis have been reported in rats, mice and humans, but the specific mechanisms involved have not been well defined. The present study utilized the fat-1 mouse, a transgenic model that can endogenously convert n-6 FAs into n-3 PUFAs, to directly determine if the outcomes of psoriasis were correlated with n-3 PUFAs. Wild-type (WT) and fat-1 mice, which were treated daily with imiquimod (IMQ) cream or control cream on the shaved right ear and dorsal skin, were fed the same diet. The severity of inflammation of the ear and dorsal skin was scored according to the clinical Psoriasis Area and Severity Index (PASI) and epidermal hyperplasia was measured by H&E staining. The expression of inflammatory factors in the epidermis was analyzed by immunohistochemical analysis. Flow cytometry and an enzyme-linked immunosorbent assay were used to measure the differences in the content of inflammatory factors in the blood serum and to determine which of CD4⁺ T cells were present in the spleen between IMQ-induced fat-1 mice and WT mice. Fat-1 IMQ-induced mice exhibited significantly lower levels of inflammatory cell-like T helper 17 cells (Th17 cells) and higher levels of regulatory T cells (Treg cells) in the spleen as compared with the WT IMQ-induced mice. n-3 fatty acids stimulated Th17 cells to produce lower levels of inflammatory factors, including interleukin (IL)-17, IL-22, IL-23 and stimulated Treg cells to produce higher anti-inflammatory factors, such as Foxp3. In conclusion, the present study provides further insight into the mechanisms involved in preventing inflammation in psoriasis-like mice by n-3 PUFAs using a fat-1 transgenic mouse model.

Figures

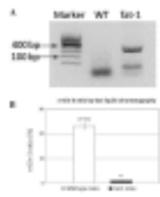


Figure 1 5 (A)
Identification of the fat-1...

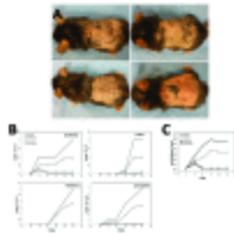


Figure 2 5 Skin
inflammation in C57BL/6
mice...

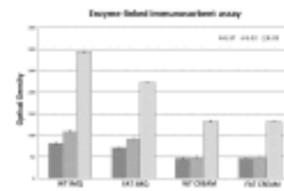


Figure 3 5 Mice were
sacrificed and the...

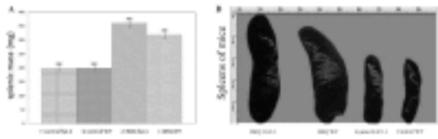


Figure 4 5 Changes in
the mass and...

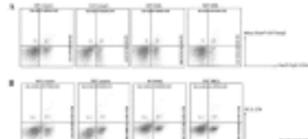


Figure 5 5 Changes in
cellular composition of...

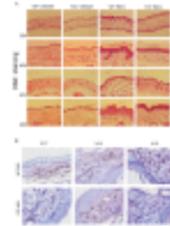


Figure 6 5 Topical IMQ
alters keratinocyte
differentiation...

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