

Basophils Infiltrate Skin Lesions of Eosinophilic Pustular Folliculitis (Ofuji's Disease)

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Basophils are blood leukocytes that constitute less than 0.5% of total leukocytes. Basophils have been shown to infiltrate in cutaneous hypersensitivity responses in guinea pigs (cutaneous basophil hypersensitivity) (1, 2). Basophil infiltration is also observed in allergen-induced late-phase cutaneous responses in human atopic subjects (3) and has been implicated in allergic human diseases (4). Recent findings in mice have demonstrated clearly that basophils are essential initiator cells of immunoglobulin (Ig)E-mediated chronic allergic inflammation (5), and they are capable of functioning as a source of interleukin (IL)-4 and contributing to Th2-type immunity (6).

Eosinophilic pustular folliculitis (EPF) is an inflammatory skin disease characterized by pruritic follicular papulopustules of unknown aetiology. Histologically, a number of eosinophils infiltrate around and into hair follicles in the dermis, whereby it is suggested that the Th2-type immune response is involved in this pathological mechanism (7). However, basophils in skin lesions have not been studied in detail because these cells, unlike eosinophils, cannot be detected by routine histological staining techniques. To address this, we performed immunohistochemical staining to detect tissue basophils in EPF lesions.

MATERIALS AND METHODS

Formalin-fixed, paraffin-embedded sections from three cases of classical type EPF (Ofuji's disease) were subjected to trypsin treatment followed by incubation with a human basophil-specific antibody (BB1: a mouse monoclonal antibody provided by Dr A. F. Walls, Immunopharmacology Group, Southampton General Hospital, UK) (8). Reaction steps using alkaline phosphatase-conjugated polymers were processed with Histofine® Simple Satin AP (M) Kit (Nichirei Biosciences Inc., Tokyo, Japan).

Cell densities were determined by Image Pro®Plus (Media Cybernetics, Inc., MD, USA). At least three fields were examined by microscopy.

RESULTS AND DISCUSSION

Skin biopsies from three patients with EPF (male: 2, female: 1, mean age: 33 years) were examined by immunostaining. Interestingly, a number of basophils were found around hair follicles and perivascular regions together with numerous eosinophils (Fig. 1). Dermal basophil numbers from three cases were 268 ± 31.1 , 289 ± 52.0 , and 210 ± 19.5 cells/mm² ± standard deviation (SD), respectively. The ratio of basophils/eosinophils were 1.00, 1.04, and 1.02, respectively. Basophils were completely absent in skin lesions of psoriasis ($n=4$, data not shown).

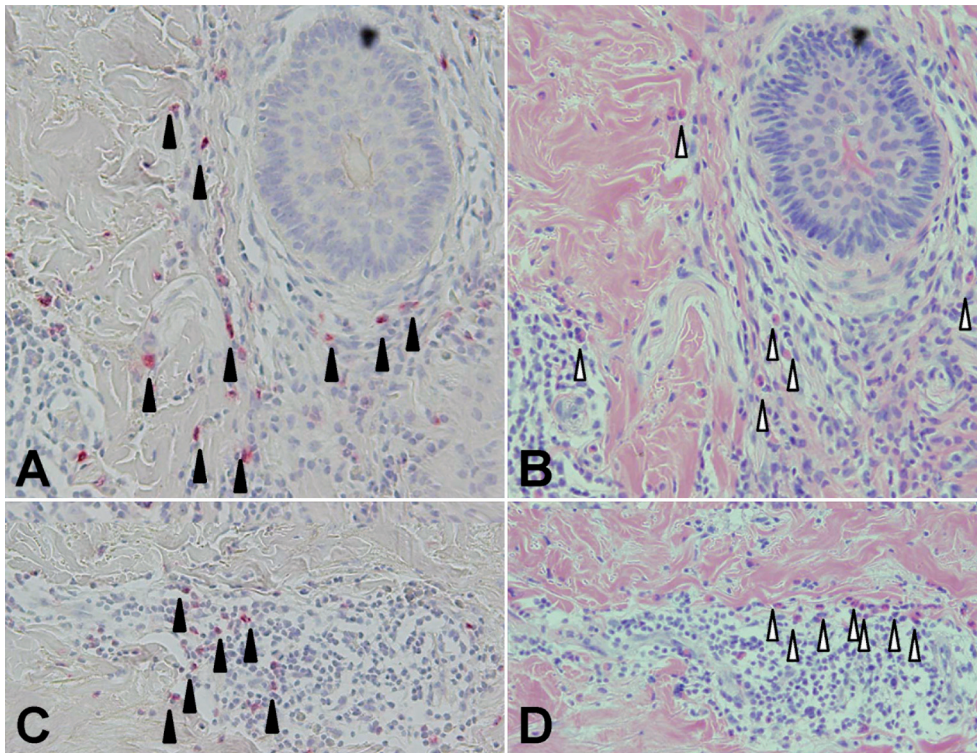


Fig. 1. Representative figures of basophil staining in lesions of eosinophilic pustular folliculitis. (A and C) Basophils positive for BB1 (closed arrowheads) are detected around hair follicles and dermal vessels (Reaction products were visualized by Newfucsin, original magnification $\times 200$). (B and D) haematoxylin and eosin (H&E) staining. Open arrowheads: eosinophils (original magnification $\times 200$).

An explanation for the concomitant recruitment of basophils and eosinophils might be because of the common expression of the chemokine receptor CCR3. Eotaxin 1 and 3, which are ligands of CCR3, are produced by dermal fibroblasts in response to Th2-type cytokines such as IL-4 and IL-13. We recently identified the presence of a number of cells expressing hematopoietic-type prostaglandin D synthetase in the EPF, thus suggesting that prostaglandin D2 (PGD2) is generated in skin lesions of this condition (9). Basophils, eosinophils, and Th2 cells are known to express CRTH2, a PGD2 receptor. CRTH2-signalling induces activation and chemotaxis in these cells. Thus, PGD2-CRTH2-signalling might contribute to the eosinophil and basophil infiltration in cooperation with the CCR3-mediated chemokine pathway.

The pathological significance of basophils in EPF is unknown. Basophils may sustain Th2-type inflammation via releasing IL-4 and IL-13 (6), and Th2-type chemokines, such as MDC/CCL22 and TARC/CCL17 (10).

The findings presented here may be important for understanding the aetiological mechanisms of EPF.

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