

【Grant-in-Aid for Scientific Research (S)】

Biological Sciences (Medicine, Dentistry, and Pharmacy)



Title of Project : Previously Unappreciated Roles for Basophils in Health and Disease

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Research Project Number : 15H05786 Researcher Number : 60195013

Research Area : Experimental pathology, Immunology

Keyword : Inflammation, Allergy and immune-related disorders, Infection, Animal models

【Purpose and Background of the Research】

Basophils are the least common granulocytes and share some features with tissue-resident mast cells. Therefore, they have often erroneously been considered as precursors or blood-circulating subsets of mast cells, and their functional significance remained uncertain for a long time. We have recently developed novel tools for functional analysis of basophils, and demonstrated that basophils play important roles, distinct from those by mast cells, in parasitic infections, allergic and inflammatory responses. However, molecular mechanisms by which basophils elicit reactions remain to be determined. In this study, by using novel analytical tools, we clarify mechanisms underlying migration and activation of basophils as well as effector molecules produced by basophils under physiological and pathological conditions, and seek possible application of our findings to the treatment of inflammatory and infectious diseases.

【Research Methods】

1. Elucidation of mechanisms by which basophils elicit and regulate inflammation: We identify pro- and anti-inflammatory mediators derived from basophils and their target cells and molecules.
2. Elucidation of mechanisms by which basophils contribute to protection against parasitic infections: We examine which molecules produced by basophils are involved in parasite expulsion and how they work.
3. Elucidation of mechanisms underlying basophil migration to and accumulation in peripheral tissues: We examine what triggers basophil migration from peripheral blood into tissues.
4. Elucidation of mechanisms underlying basophil activation: We seek a ligand(s) of CD200R3, an activating receptor selectively expressed by basophils and mast cells, and examine the activation pathway through this receptor.

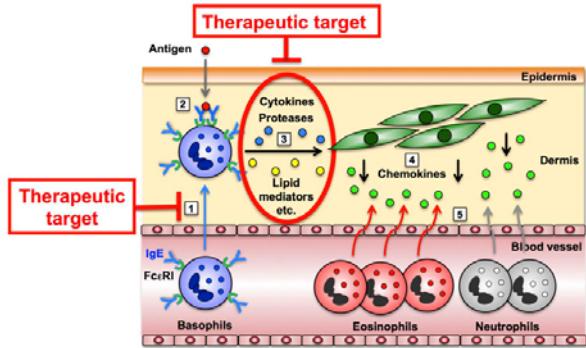


Fig. 1 Basophils and their products as possible therapeutic targets

【Expected Research Achievements and Scientific Significance】

As many as one-thirds of people living in developed countries, including Japan, suffer from allergic disorders whereas many parasitic infections are still dominant in tropical areas. We hope that our study on basophils helps develop new drugs for allergy treatment and vaccines against parasitic infections.

【Publications Relevant to the Project】

1. Karasuyama, H., and Yamanishi, Y.: Basophils have emerged as a key player in immunity. *Curr. Opin. Immunol.* 31: 1-7, 2014.
2. Egawa, M., Mukai, K., Yoshikawa, S., Iki, M., Mukaida, N., Kawano, Y., and Minegishi, Y., and Karasuyama, H.: Inflammatory monocytes recruited to allergic skin acquire an anti-inflammatory M2 phenotype via basophil-derived interleukin-4. *Immunity* 38: 570-580, 2013.

【Term of Project】 FY2015-2018

【Budget Allocation】 154,000 Thousand Yen

【Homepage Address and Other Contact Information】

<http://immune-regulation.org/index.php?id=27>