Faculty members
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Outline and research fields
Major research projects in the pathophysiology division have focused on following three fields.

1) In recent years, significant advances have been made in understanding pathophysiological functions of skeletal muscle and involvement of functional abnormalities of skeletal muscle in various disorders. One of the laboratory targets is the discovery of skeletal muscle contributions to cardiovascular diseases, including hypertension and congestive heart failure.

2) Stress events activate the sympathetic nervous system and result in secretion of adrenaline and noradrenaline. Stress-induced secretion of these catecholamines is responsible for the “fight-or-flight” response. However, extreme stress can be harmful for biological functions. In fact, stress events are involved in the pathogenesis and progression of various diseases. In the immune system, several stressors induce immune suppression and thereby affect the susceptibility to or the severity of immune disorders such as infection. On the contrary, stress may promote inflammation and influence the development and severity of immune-mediated inflammatory disorders such as inflammatory bowel disease, rheumatoid arthritis, and psoriasis. Our aim of study is to verify mechanisms underlying stress-mediated exacerbation of immune disorders by focusing on interaction between the immune system and nervous system via stress-associated transmitters such as adrenaline.

In this context, we found that adrenaline and noradrenaline enhance interleukin (IL)-33 production by dendritic cells and macrophages (Fig. 1). IL-33, a member of the IL-1 cytokine family, has been suggested to play pathogenic roles in various disorders, such as allergic diseases, rheumatoid arthritis, and inflammatory bowel disease. Therefore, stress events and the subsequent secretion of catecholamines might be associated with the pathogenesis of various disorders involving IL-33. Accordingly, further elucidation of the complex pathway through IL-33 production might lead to development of a new therapeutic strategy for IL-33-related disorders.

3) Brain function is being elucidated, but it is not fully understood. One of the laboratory targets is the influence of neurodevelopment on the emotional circuit.
Current publications


【 Education Field 】
Pharmacotherapeutics
Pharmacology
Pathophysiology

【 Research Field 】
Pathophysiology
Neuropsychopharmacology
Immunopharmacology
Neuroimmunology
Cardiology