

The Establishment of New Lymphology: Overview

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In the 75 year-old history of the Gordon Research Conference, a conference on the theme of the lymphatic system was held for the first time in March 2004, and the 3rd conference was held in March 2008 in Ventura City, California, USA. Such trends of lymphatic studies from an international perspective are considered to reflect the rapid progress of lymphology inspired by the discovery of new markers of lymph vessel endothelial cells and the development of new research on the mechanisms of lymphangiogenesis and lymphogenous metastasis of cancer.

Regarding the history of lymphologic studies and their background and significance, lymphology was first treated as a field of cardiology or angiology. Indeed, a large number of achievements have been accumulated in anatomy of the lymphatic system through medical research over more than 100 years, as researchers of the Kihara Group in Japan are considered to have made the greatest contributions to these achievements. However, while the functions of the lymphatic system have been studied by many investigators of microcirculation, including Courtice,¹⁾ Földi,²⁾ and Casley-Smith,³⁾ little thought has been given to its significance beyond its physiologic function as a material transport and drainage system. Certainly, the essential function of the circulation is to maintain the homeostasis of the internal environment of the living body and sustain its biological functions. These functions are essentially accomplished by the exchange of materials in the capillary-venula region and transport and drainage of materials through the lymphatic system. For this reason, initial symptoms of diseases, typically, inflammation, tumor, and circulatory disorders, appear

as functional abnormalities of this internal environment. When the internal environment is seen from the viewpoint of biological defense, these functions are considered to be monitored by immune functions of the body with the lymphatic system in the center. When lymphology is viewed again from the perspectives of physiologic functions and pathophysiology, lymphology is considered to be the royal road of immunology, consisting primarily of natural immunity and oncology aimed to clarify the mechanism of lymphogenic metastasis of cancer, and is expected to appear at the front line of research of biological and pathological functions. From this perspective, the transport and drainage functions of the lymphatic system may be interpreted as supporting these major functions.

In this special issue, concerning the possibility of establishing lymphology as a new scientific discipline integrating microcirculation studies, immunology, and oncology,⁴⁻⁶⁾ we invited specialists to present their latest knowledge, hoping to prompt the readers to evaluate this possibility. However, some of the following problems must be overcome before the establishment of lymphology as a new field of science, and we anticipate the development of new lymphological studies for the future. In the field of immunology, the lymphatic system has been known to cooperate with lymph nodes and support the biological defense mechanisms, but it has not emerged to the forefront of immunology or inflammation. This is partly because molecular biology and molecular genetics primarily dealing with lymphocytes, cytokines, and immunoglobulins have been regarded as the mainstay of immunological research, and the kinetics of lymphocytes and lymph have been overlooked in immunology. In addition, the technical difficulty of quantitative evaluation of the lymph flow is also considered to have contributed to the lack of attention on the lymphatic system.

Moreover, in the field of oncology, it is well known that carcinoma, which is an epithelial tumor, is likely to metastasize lymphogenously and that sarcoma, a non-epithelial tumor, is likely to metastasize hematogenously. However, there has been little systematic research to

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clarify the mechanism of lymphogenous metastasis of cancer focusing on the functional characteristics of tissue spaces (internal environment), relationship between the membrane characteristics of tumor cells and metastasis, interactions between lymphatic vessel endothelial and cancer cells, or lymphokinetic analysis of tumor cells. Furthermore, the expression of sentinel lymph nodes, the clinical significance of which is recently being established in patients with breast cancer, malignant melanoma, etc., analysis of the relationship between micrometastasis of cancer and lymphokinetic characteristics of lymph nodes, and analysis of biological characteristics from immunological viewpoints, are expected to be the most important research subjects for the future. These subjects are considered to include buds of research themes that will contribute to the establishment of new lymphology. It is our hope that the readers find this special issue, which touches on some of these budding themes, inspiring and useful.

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