Editorial

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Sun Young Cho, M.D.[1] and Mina Hur, M.D.[2]

[1]Department of Laboratory Medicine, Kyung Hee University Hospital, Seoul, Korea; [2]Department of Laboratory Medicine, Konkuk University School of Medicine, Seoul, Korea

Expanded Impacts of Platelet Functions: Beyond Hemostasis and Thrombosis

Platelets are very small (2 μm) anucleate hematologic effector cells [1] with a lifespan of approximately 8–10 days [2]. Platelets are traditionally well known for their primary functions in thrombosis and hemostasis [3]. The hemostasis function was first identified by Osler in 1873, who described platelets as a "blood plaque" in the white thrombus [1]. In physiologic states, platelets are not accessible to subendothelial structures such as collagen fibers or von-Willebrand factor [4]. However, when the vessel wall is injured, the subendothelial structures are exposed, resulting in the initiation of platelet adhesion [3, 4]. This interaction consequently triggers signal cascades in platelets to seal the thrombus leak at the site of vascular injury [4]. Thus, platelets have long been simply regarded as the main components of bleeding control [3, 4]. In addition to this primary role of preventing blood loss from an injured vessel, the thrombus prevents the dissemination of foreign pathogens into the organism [4].

Beyond their fundamental roles in primary hemostasis, platelets serve as essential elements of the immune system and proinflammatory reaction [4, 5]. Recent evidence has been accumulated to support the crucial functions of platelets in various diseases, including inflammation, infection, and malignancy [2, 6, 7]. Owing to their surface adhesion molecules and receptors that can recognize and bind to the endothelium, leukocytes, or circulating pathogens [3, 4], platelets also play important roles in vasomotor function and chemotaxis [3] by activating circulating leukocytes to perform their immunologic functions [4].

Activated platelets release highly active microparticles and form pseudopods on their surfaces that promote their interactions with neutrophils, lymphocytes, and other immune cells, as well as platelet–platelet bonds [6]. Among these interactions, the circulating neutrophils are largely responsible for potentiating the thromboinflammatory ability of activated platelets [8]. This phenomenon has been widely reported in high-grade inflammatory diseases such as rheumatoid arthritis [2, 6]. Moreover, various kinds of tumor-related cytokines have been shown to influence megakaryopoiesis and thrombopoiesis in malignancies [1]. Platelet reactivity is mainly determined by megakaryopoiesis through the action of thrombopoietin (TPO) [6], and a TPO-dependent mechanism was suggested as one of the key links between platelets and cancer [1, 9, 10]. For example, TPO may be produced by ovarian and hepatocellular cancer cells, and elevated TPO levels enhance the production of platelets and their differentiation [9-11].

In this issue of *Ann Lab Med*, Gasparyan *et al*. [7] review the literature on the platelet-to-lymphocyte ratio in a broad spectrum of diseases. They highlight the wide application of the platelet-to-lymphocyte ratio as a useful index of the shifts in platelet and lymphocyte counts due to inflammatory, prothrombotic, and neoplastic conditions [7]. They also summarize recent studies dealing with this parameter in prothrombotic, metabolic, neoplastic, and inflammatory rheumatic diseases. We hope that this review will highlight the clinical utility of this parameter for cutting-edge practical applications as well as the current limitations that remain to be resolved.

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Corresponding author: Sun Young Cho
https://orcid.org/0000-0002-3208-5446
Department of Laboratory Medicine, School of Medicine, Kyung Hee University Hospital, 23 Kyungheedae-ro, Dongdaemun-gu, Seoul 02447, Korea
Tel: +82-2-958-8671, Fax: +82-2-958-8609
E-mail: untoyou@hanmail.net

Co-corresponding author: Mina Hur
https://orcid.org/0000-0002-4429-9978
Department of Laboratory Medicine, Konkuk University School of Medicine, Konkuk University Medical Center, 120-1 Neungdong-ro, Gwangjin-gu, Seoul 05030, Korea
Tel: +82-2-2030-5581, Fax: +82-2-2636-6764
E-mail: dearmina@hanmail.net

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