Current Topics

Pathophysiologial and Pharmacological Research in Cardiology

Foreword

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The heart is a pump for blood circulation in the animal body. Since proper cardiac contractile/diastolic function is critically necessary for the development, growth, and survival of various animals including humans, heart diseases cause serious disorder to this function. Cardiac diseases including myocardial ischemia and heart failure are a common cause of death in the world. For a long time, numerous investigators have undertaken physiological, pathological, pharmacological, and biochemical studies to understand better cardiac structure and function. These studies have provided very interesting findings such as “ischemic preconditioning,” “cardiac energy metabolism,” and “cardiac remodeling,” which processes promote and enhance the progression of other scientific fields such as neurochemical, hepatic, and renal sciences. Recently, the heart has been focused on as a target organ for tissue engineering and regenerative medicine, because it is believed that cardiomyocytes do not reproduce after birth. Numerous investigators have sought to elucidate the mechanisms underlying the genesis and development of cardiac diseases, and their findings have enhanced pharmacological research directed toward therapy for cardiac diseases. Various drugs have been developed for treatment of cardiac patients and have improved to various degrees the quality of life for such patients. However, there are many patients with cardiac diseases; who do not benefit from drug therapy. Especially, the development of new drugs for cardiac arrhythmia and heart failure is required as soon as possible, because these conditions directly affect patient survival. To enhance the development of new drugs for these diseases, further pathophysiological and pharmacological research in cardiology is necessary.

As regards the topics for this research, four basic studies concerning myocardial pathophysiology and pharmacology are covered in this issue of the Biological and Pharmaceutical Bulletin. The first two studies are focused on arrhythmia. In the first, T-type Ca$^{2+}$ channels in the pulmonary vein are described as new possible targets for atrial fibrillation. It is expected that blockers of these channels will become a novel new antiarrhythmic agent. In the second, gender differences in the induction of arrhythmia are addressed, as it is unclear what role they play. The authors review how cardiac repolarization is regulated by sex hormones via a non-genomic pathway. The latter two studies examine heart failure. In the third study, cardiac p300/GATA4 pathway is suggested as a new possible target of drugs for the treatment of heart failure and the effects of curcumin on the development of heart failure are also introduced. The final study addressed dilated cardiomyopathy, which is the most prevalent of cardiomyopathies and the most common reason for cardiac transplantation in patients with heart failure. The relationship between genetic and sporadic mutations of cardiac proteins and the genesis of dilated cardiomyopathy is discussed. It is expected that these four reviews enhance the understanding of researchers in cardiology with respect to the pathogenesis and development of arrhythmia and heart failure.