Twists and Turns in Cardio-metabolic Diseases and Related Complications

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Cardiovascular disease remains an important clinical problem with huge socio-economic burden to healthcare systems [1, 2]. In spite of the advances in early management and longer-term therapy, cardiovascular-related diseases still carry an undesirably high rate of morbidity and mortality. The global economic burden of cardiovascular disease was estimated to reach US$863 billion in 2010 and is projected to exceed US$1 trillion by 2030 [3]. Thus, cardiovascular disorders still pose a huge socio-economic burden. A significant component of the healthcare burden of chronic cardiovascular disorders arises from an insufficient knowledge of their origins, the persistent dependence on costly and ineffective treatments, and an almost complete lack of preventative interventions for high-risk or predisposed individuals. As a result, more research is needed into the etiological factors and underlying the pathophysiology of cardiovascular disorders.

Although many cardiovascular diseases are caused by dysfunctional metabolism [4-8], it is becoming increasingly clear that cardio-metabolic complications are multifactorial diseases with different facets. However, the distinct facets of cardio-metabolic complications are still poorly understood, although evidence in literature suggest that genetics, epigenetics, humoral, habitual and environmental factors may be involved [4, 9-11]. Although the twist and turns of the different facets of cardio-metabolic metabolic complications cannot be over emphasized in this editorial, I will briefly comment on the salient features of the articles published in a special issue I edited entitled: “The different facets of cardio-metabolic diseases and related complications: current perspective and future developments”. Among the articles published in this special issue, there was a paper underscoring the role of pigment epithelium-derived factor (PEDF) in cardiometabolic disease. PEDF is a multifunctional glycoprotein that belongs to the serine protease inhibitor superfamily. PEDF has been shown to possess a wide range of biological functions including anti-thrombosis, anti-fibrosis, anti-angiogenesis, anti-oxidant, anti-inflammation, retina protection, neurogenesis and neuroprotection. Accordingly, in a related article in the special issue, Yamagishi & Matsui gave their insights on the cytoprotective effects of PEDF in cardiometabolic diseases [12]. The authors gave a comprehensive insight about the protective role of PEDF in the pathophysiology of disorders affecting the male and female reproductive organs, diabetic retinopathy, liver dysfunction, renal insufficiency, and highlighted the potential clinical relevance of modulating PEDF as a strategy for prevention and management of these pathophysiology of disorders. Although PEDF could be explored in the design of novel drugs against renal insufficiency, however, a clearer understanding of kidney structure is needed. In another article featuring in this special issue, Ndisang underscored the putative cross-talk amongst the major components of the glomerular filtration barrier such as endothelial cells, podocytes and the glomerular basement membrane, and how the dynamic interplay and interaction among these components may be critical for effective filtration that allows ions to filter but not massive excretion of proteins, hence proteinuria [13]. In addition, the author highlighted a few challenging issues concerning the interaction multifaceted between: (i) glomerular basement membrane and glomerular endothelial cells, (ii) podocytes and glomerular endothelial cells, (iii) glomerular basement membrane and podocytes, (iv) the concomitant interaction among the three components, and suggested that future studies that decipher these complex interactions will pave the way for greater understanding of the factors implicated in the perturbation of renal filtration in diseased conditions and such findings may ultimately lead to the formulation of novel therapies for kidney disease.

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The kidney is an important organ for the regulation of extracellular volume and thus blood pressure. Accordingly, renal dysfunction is associated with hypertension and heart disease. To reiterate the problem of heart disease, Tarquini et al wrote an article about diabetic cardiomyopathy, suggesting that during the early stages of the disease, diastolic dysfunction is the major problem although at later stages systolic dysfunction and impaired left ventricular ejection fraction appears [14]. In addition, the authors correlated the manifestation of diabetes to the pathophysiology of cardiomyopathy, and suggested that this correlation is consistent with the duration and severity of hyperglycemia, especially in diabetic patients co-morbid with microvascular complications. Similarly, in another related article, Shinalapawittayatorn et al. underscored the role of obese insulin-insensitivity, a common risk factor for ischemic heart disease on cardiac ischemic injury [15]. Amongst the salient points raised by the authors, one of them is whether improving insulin sensitivity pharmacologically by drugs would attenuate ischemic cardiac injury.

To alleviate cardiometabolic disease, several drugs are currently used. These include proprotein convertase subtilisin/kexin 9 (PCSK9) inhibitors, a drug prescribed by many physicians to reduce lower low-density lipoprotein cholesterol in patients with dyslipidemia, hypercholesterolemia or atherosclerosis. However, PCSK9 and other drugs related to it are constantly being reviewed by different experts. In this light, Schremla & Gouni-Berthold gave a comprehensive insight about the use of monoclonal antibodies against PCSK9 to attenuate hypercholesterolemia [16]. Furthermore, the authors suggested that antibody-derived PCSK9 drugs such as alirocumab (Praluent®) and evolocumab (Repatha®) are equally very effective as these drugs are capable of reducing low-density lipoprotein cholesterol by 70% [16], and particularly recommended anti-PCSK9 antibodies in the treatment of patients with statin intolerance. In another article featuring in this special issue, Eleftheriadou and co-workers discussed the cardiovascular benefits of several anti-diabetic drugs including metformin, pioglitazone, empagliflozin, liraglutide, semaglutide, Saxagliptin, alogliptin, sitagliptin, lixisenate, alogliptin and sulfonylureas [17]. Besides, drugs, dietary fibres and polyphenols are known to be cyto-protective. To reiterate this notion, Pittala and co-workers gave an in-dept analysis of the antioxidant and anti-inflammatory properties of polyphenols such as curcumin, quercetin, genistein and caffeic acid phenethyl ester in the management of metabolic dysfunctions [18]. Finally, Schmitz & Gouni-Berthold gave a comprehensive insight on the efficacy and safety of volanesorsen for the treatment of hypertriglyceridemia [19], while Krämer & Frank Weidemann wrote a review article describing biomarkers for diagnosing and staging of Fabry disease [20], a genetic disease is associated with X-linked lysosomal storage due to the deficient activity of α-galactosidase A.

Collectively, this special issue assembles a collection of in-dept analyses and viewpoints by leading experts in cardio-metabolic research who have critically appraised the current state of knowledge, the recent developments and the scientific accomplishments in this area.

CONSENT FOR PUBLICATION

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CONFLICT OF INTEREST

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REFERENCES


