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Editorial
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Red Blood Cells Distribution Width as Biomarker of Worsening in Atherosclerosis

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Editorial

Red blood cell Distribution Width (RDW) is a parameter of the circulating erythrocytes' size that it has reported to be associated with Cardiovascular Diseases (CVDs) [1-7]. The related mechanism of this association is not fully understood. However, RDW is an indicator of inflammation related to early inflammatory biomarkers, such as C-reactive protein (CRP), interleukin-6 (IL-6) and tumor necrosis factor-α (TNF-α) [8,9]. Accordingly, systemic chronic inflammation leads to dysfunctional bone marrow with unsuccessful production of red blood cells [10]. As a result, it determines the migration of reticulocytes into the peripheral circulation, followed by an increase in circulating levels of immature Red Blood Cells (RBCs), as well as in higher RDW levels [9]. Moreover, inflammation up-regulates the expression of complement proteins and Toll-Like Receptors (TLRs) in platelets. This contributes to platelet activation, by accelerating the onset of atherosclerosis disease [10]. Thus, inflammation is the principal pathophysiological inducer in the development of atherosclerosis, but also of other CVDs [11-14]. In addition, an increase in RDW levels also is related to augmented oxidative damage in blood circulation [15], which associates with exacerbation of pathophysiological conditions linked to the worsening of atherosclerosis [16]. This leads to hypothesize, that interplay between RDW and atherosclerosis might to be related to the inflammatory state, which can inhibit erythropoiesis both directly through the action of cytokines able to increase resistance to the effect of erythropoietin, and indirectly by the reduction of iron levels [17]. Inflammatory state determines a reduction of iron levels, which reduces the capacity of the bone marrow to generate new erythrocytes. This is due to lower absorption of iron and its largest storage [18]. In addition to inflammation, the cholesterol content in the erythrocyte membrane has been suggested to be the link between RDW and atherosclerosis. Pathological elevations of cholesterolemia lead to an excessive increase in membrane cholesterol content [19,20] and decreased erythrocyte stability and deformability. A decrease in deformability should be detrimental to the return to the trivial forms of the erythrocyte in the face of morphological changes resulting from the application of the mechanical forces of the blood circulation itself, which would generate a great multiplicity of forms. But certainly the decrease in deformability makes erythrocytes more susceptible to lysis and thus the population of younger erythrocytes would tend to suffer not only relative but also absolute increase [21], with a consequent alteration in the distribution of volumes, since the younger erythrocytes have greater volume when compared to the older ones [22]. Indeed, in a recent study with healthy volunteers, RDW showed a negative correlation with red blood cell count and blood hemoglobin levels, although no association was found between RDW and lipid levels [23-27]. The important role of RDW in the atherosclerotic process might explain the strong association between this new biomarker and the increased risk of acute coronary syndrome [28-33], ischemic cerebrovascular disease [34-38] and peripheral artery disease as recent and interesting studies have reported [39-41].

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