

Is Red Cell Distribution Width a Marker for Hypertension?

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Red cell distribution width (RDW) is an index of the variability in the size of circulating erythrocytes (anisocytosis). RDW is increased in many conditions, including hemolysis, pregnancy, thrombotic thrombocytopenic purpura, inflammatory bowel disease, ineffective red cell production (such as that seen with deficiencies of iron, vitamin B₁₂, and/or folate), and after blood transfusions. Until relatively recently, RDW was ignored unless anemia was present. Recently, several studies have reported that RDW is directly associated with adverse events in both acute and chronic cardiovascular conditions [1–3], even after adjustment for multiple potential confounders, including anemia. Also, it has been shown that RDW may predict cardiovascular diseases [4].

Hypertension, especially non-dipper hypertension (defined as a reduction in the average nighttime blood pressure of less than 10% of the average daytime blood pressure), is a risk factor for adverse cardiovascular events [5, 6]. In the literature there is limited data about the relation of RDW to hypertension and the prognostic value of RDW in hypertensive patients. To our knowledge, two studies have investigated this relation. In one, Tanindi et al. [7] reported that RDW is higher in prehypertensive and hypertensive patients compared with healthy controls. They also found a positive correlation

between RDW and both systolic and diastolic blood pressures [7]. In this issue of *Cardiology*, Gunebakmaz et al. [8] investigated the predictive value of RDW in dipper and non-dipper hypertension. They compared 123 hypertensive patients with 65 age- and gender-matched healthy, normotensive subjects in a prospective single-center study. Hypertensive patients were divided into two groups: dippers (n = 56) and non-dippers (n = 67). They reported not only higher RDW levels in hypertensive patients compared to controls but also elevated RDW levels in the non-dippers compared to the dippers [8]. This study has some limitations. Firstly, the sample size was small and it was conducted in a single center. Secondly, although the relation between hypertension and RDW has been hypothesized to depend on the inflammatory status, no inflammatory markers were assessed. Thirdly, the relation between RDW and clinical outcomes was not assessed. Despite limitations, the finding suggests that RDW may be a useful biomarker in hypertension (especially in non-dipper hypertension).

The mechanistic links between RDW and hypertension are not yet fully understood. The relation of increased RDW and hypertension is probably not a cause-effect relation. It is more likely that both conditions may

be two different manifestations of the same physiological impairments. Previous studies have demonstrated that inflammatory status (as reflected by high-sensitivity C-reactive protein), neurohumoral activity (as measured by pro B-type natriuretic peptide), and oxidative stress are closely related to hypertension, especially non-dipper hypertension [9–11]. Increased inflammation, neurohumoral activity, and oxidative stress cause endothelial dysfunction. It is generally believed that endothelial dysfunction has an important role in the pathogenesis of hypertension, especially non-dipper hypertension [11–13]. In addition, many studies have reported abnormal RDW values to be associated with inflammation [14], neurohumoral activation [15] markers and low anti-oxidative indices (such as selenium) [16]. By mitigating normal iron metabolism, inhibiting the response to erythropoietin, and shortening red blood cell survival, in-

flammation probably leads to increased RDW [17]. Also, in previous studies, inflammatory cytokines have been shown to suppress the maturation of erythrocytes. As a result, immature erythrocytes enter the circulation and may stimulate erythropoiesis [18]. Oxidative stress has also been proposed as a basis for the prognostic value of RDW [19]. Erythrocytes have a strong antioxidant capacity and serve as a primary oxidative reserve. The oxidative stress reduces cell survival and causes the increased release of premature erythrocytes to circulation.

RDW is an inexpensive index and is routinely reported as part of a complete blood count. It is associated with hypertension, especially non-dipper hypertension. Whether RDW has a prognostic value in hypertension is not known and requires further study. The current report of Gunebakmaz et al. [8] suggests the appropriateness of these studies.

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