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Editorial

Revisiting RDW — Why RDW-SD deserves greater attention in routine hematology

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Red cell distribution width (RDW) is a routinely reported parameter in the complete blood count (CBC) and reflects the degree of anisocytosis, that is, the variability in size of circulating erythrocytes. Traditionally, laboratories and clinicians have relied on RDW-CV (coefficient of variation), which is expressed as a percentage and calculated using the formula that use MCV as denominator. However, modern hematology analyzers also provide RDW-SD (standard deviation), expressed in femtolitres (fL), which represents the absolute width of the red cell volume distribution curve at 20% of the histogram height.[1,2] Although both indices are derived from the same RBC volume distribution, they differ significantly in how they reflect anisocytosis, and RDW-SD offers several analytical advantages.

A key limitation of RDW-CV is its dependence on the mean corpuscular volume. When MCV changes significantly, as seen in microcytosis, macrocytosis, or mixed anemia, RDW-CV may under- or over-estimate the actual degree of anisocytosis. In microcytosis, a low MCV can falsely elevate RDW-CV because the denominator decreases, while in macrocytosis, RDW-CV may appear deceptively normal despite marked variation in cell size. RDW-SD, being an absolute measure, is independent of MCV and therefore a more faithful reflection of red cell size heterogeneity.[3]

RDW-CV is a relative parameter based on one standard deviation, effectively describing variation around the mean. In contrast, RDW-SD measures the true width of the RBC histogram at a fixed height and thereby captures the extreme populations of smaller and larger red cells that may have important diagnostic implications.[1] This allows RDW-SD to better detect early or mixed deficiency states such as combined iron and vitamin B12 deficiency, to identify transfused samples with dual populations, and to highlight anisocytosis in reticulocytosis or recovery phases of anemia. Several studies have shown that RDW-SD correlates more closely with microscopic anisocytosis on peripheral smear than RDW-CV, reinforcing its morphologic validity.[2,3]

Analytically, RDW-SD is less influenced by calibration shifts or MCV changes due to reagent variation, offering a more stable parameter across different hematology instruments. Each laboratory should therefore establish local reference ranges for RDW-SD using healthy populations and ensure routine quality checks of histogram patterns.[1,4] Typical reference intervals are approximately 11.5–14.5% for RDW-CV and 37–54 fL for RDW-SD, though the exact limits depend on the analyzer and population studied.

From a diagnostic standpoint, RDW-SD can provide additional insight in several hematologic contexts. It rises early in iron deficiency, often before significant hemoglobin or MCV changes occur.[3] In mixed deficiency anemias or transfusion cases, it helps distinguish dual populations, while in macrocytic anemia with reticulocytosis, it remains elevated despite high MCV values that may obscure RDW-CV changes. Because of these characteristics, RDW-SD complements and often surpasses RDW-CV in reflecting subtle red cell size variability. An increased RDW mirrors a profound deregulation of erythrocyte homeostasis involving both impaired erythropoiesis and abnormal red blood cell

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survival, which may be attributed to a variety of underlying metabolic abnormalities such as shortening of telomere length, oxidative stress, inflammation, poor nutritional status, dyslipidemia, hypertension, erythrocyte fragmentation and alteration of erythropoietin function.[5]

The routine inclusion of RDW-SD interpretation in CBC reports adds quantitative precision to the morphological assessment of anisocytosis. While RDW-CV remains useful for longitudinal comparison and trend analysis, RDW-SD provides a more direct, MCV-independent, and stable measure of anisocytosis. Laboratories should encourage reporting and interpretation of both parameters to improve diagnostic accuracy in anemia profiling and enhance the quality of hematology reporting. With no additional cost or change in workflow, incorporating RDW-SD interpretation can refine everyday hematologic evaluation and contribute to more meaningful interpretation of automated blood counts.

1. Conflict of Interest

None.

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