Commentary

Metabolic Signatures of Oxidative Stress in the Red Blood Cells: Editorial Commentary

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This issue of the journal contains an interesting article—"Metabolic Signatures of Oxidative Stress and their Relationship with Erythrocyte Membrane Surface Roughness among Workers of Manual Material Handling (MMH)". Oxidative stress has been a longtime research interest that is yet to be assessed by a clinical laboratory for evidence-based practice, because it is perceived to be implicated in virtually every disease or condition. The report surely has backing from the literature. For instance, oxidative stress has known metabolic signatures,[1,2] which is hallmarked by glutathione (GSH), as well as reactive oxygen species.[3]

The concept of erythrocyte oxidative stress (EOS) further denotes that the biomarkers *vis-à-vis* metabolic signatures are detectable in red blood cells. Indeed, cardiovascular complications in diabetes represent a major health problem worldwide, but knowledge of progression and degree of risk in prediabetes is limited. Significant changes in biomarkers of EOS and indicators of related macrovascular events that may underlie the development of diabetic macrovascular complications, have been consistently reported. The biomarkers are speculated to be emerging risk indicators, namely, (1) indices of EOS, including erythrocyte-reduced GSH, malondialdehyde, and associated enzymes; (2) indices of vasculopathy, including plasma D-dimer, homocysteine, and whole blood viscosity; and (3) indices of dyslipidemia, namely, total cholesterol (TC), high-density lipoprotein (HDL), and TC/HDL ratio. Thus, there has been the recognition of a spectrum of metabolic profile[3] that should be narrowed down to a useful panel of tests to improve early identification and intervention.[4]

The present article highlights the significant impact of EOS on the surface of the blood cell membranes. While this effect may be known,[5] it is probably yet to be appreciated that apparently healthy individuals may suffer oxidative damage as occupational hazard. The authors have attempted to develop a linear model to demonstrate how individual oxidative stress marker is related to surface roughness of the erythrocyte membrane. It will be interesting to see corroborative reports that will exemplify and validate the speculated model.

Further, the authors have, albeit passively, also mentioned a phenomenon that the carriage of oxygen inside the blood and/or body must be assessed by means of biochemical parameters and the nanoscale levels of changes in the surface roughness of the erythrocyte membrane. This may follow the concept of EOS being associated with hypoxia — e.g., oxidative stress can induce hyperviscosity that in turn leads to the sequence of reduced blood flow, less oxygen supply, and tissue hypoxia. The phenomenon may follow the concept

Access this article online

Quick Response Code:

Website: www.najms.org

DOI: 10.4103/1947-2714.172847

How to cite this article: Nwose EU. Metabolic signatures of oxidative stress in the red blood cells: Editorial commentary. North Am J Med Sci 2015;7:567-8.

of oxidative stress-inducing anemia or exacerbating iron-deficiency anemia as well. It would be interesting to see corroborative reports that will expatiate on this phenomenon.

References

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