Effect of Proteolysis in Erythrocyte Damage of Diabetic Complications

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Dear Editor:

Diabetes is a complex metabolic disorder characterized by defects in the body’s ability to control glucose and insulin homeostasis, and it is estimated that in the future, the annual incidence rate of diabetes will continue to increase worldwide. Currently, it is believed that various complications of diabetes mellitus result from oxidative stress wherein increased free radical production is coupled with low levels of cellular antioxidants (1). Because the human erythrocyte plays a role as an O2 and CO2 transporter, it is constantly exposed to reactive oxygen species (ROS) and oxidative stress. Oxidative stress occurs in cells or tissues when ROS concentration exceeds antioxidant concentration (2). Oxidant damage to proteins makes them more vulnerable to proteolytic degradation by enzymes that recognize modifications like conformational changes and fragmentation. A combination of increased oxidant production and decreased antioxidant levels in the erythrocytes in a diabetes mellitus patient contributes to the vulnerability of glycated hemoglobin to oxidant damage and subsequent proteolytic degradation. Oxidant-damaged hemoglobin is a potential substrate for certain proteolytic enzymes in reticulocytes and erythrocytes (3). Moreover, this vulnerability of erythrocytes in diabetic patients may lead to a loss of red blood cell (RBC) function and increased rate of apoptosis of erythrocytes and the removal of erythrocytes from circulation through macrophage phagocytosis. First, we would like to congratulate the authors, Varashree and Gopalskrishna, for their recently published study in the International Journal of Endocrinology and Metabolism; their study highlighted an important complication of diabetes mellitus and provided new evidence for proteolytic degradation in the erythrocytes of diabetic patients (4).

In the Discussion section, the authors contemplate that oxidative stress might account for the alteration in protein structure and function in the erythrocytes of diabetic patients. We agree with the authors’ findings that oxidative stress is the factor that mediates proteolytic degradation in the erythrocytes of diabetic patients. In this manuscript, it is well outlined how oxidative stress fits their current understanding of proteolytic degradation in erythrocytes, and how it might explain the observations done by Raghothama and Rao (5). These authors pointed out that the erythrocytes in diabetic patients are more susceptible to oxidant-mediated damage, and hence, the antioxidant defenses are decreased in the RBCs of diabetic patients. Glucose oxidation in the presence of transition metals could result in excessive generation of ROS, which could in turn affect the biomembrane struc-
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References


Financial Disclosure

None declared.