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Oxidative injury to erythrocytes, cell rigidity, and splenic hemolysis in hemodialyzed uremic patients.

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Abstract

In 23 hemodialyzed patients the metabolic defect of erythrocytes related to uremia and potentiated by dialysis was studied to establish a possible link with the shortened erythrocyte survival. A highly significant correlation was found between sulfhemoglobin provoked by oxidative stress and erythrocyte rigidity measured by filterability. Impaired filterability also correlated with the degree of splenic sequestration. Both sulfhemoglobin and impaired filterability correlated with the degree of hemolysis. Finally, erythrocyte survival showed a highly significant correlation with the degree of anemia. From osmotic fragility, plasma trapping, erythrocyte ATP and 2,3-diphosphoglycerate (DPG), and serum phosphorus, calcium, and magnesium measurements it seems unlikely that either spheric transformation or sol-gel transformation of the membrane is causing the increased erythrocyte rigidity. In view of the impaired erythrocyte defense capacity against oxidative injury, cell content rigidity as mediated by reduced hemoglobin solubility is a more likely explanation. Our results give a rational basis for a trial of splenectomy in severely anemia hemodialyzed patients.