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Reply to "Packed Red Blood Cells Accumulate Oxidative Stress With Increased Storage Duration"

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Reply:

We read with interest the letter to the editor concerning our recent manuscript (1). In this series of experiments, we examined the effect of previous cryopreservation of packed red blood cells (pRBCs) on the subsequent development of several aspects of the red blood cell storage lesion in units thawed and prepared for transfusion. We examined several parameters, including erythrocyte counts, pH, red blood cell count, potassium concentration, free hemoglobin, osmotic fragility, phosphatidylserine exposure, and microparticle accumulation. Our results indicate that the post-thaw characteristics of previously frozen pRBCs differ from those units stored under standard conditions and that strategies to attenuate the red blood cell storage lesion in these units may allow prolonged post-thaw storage and transfusion.

In the preceding letter, Preston et al note that we did not measure oxidation reduction potential in our study. They emphasize that one major mechanism of the red blood cell storage lesion is the accumulation of oxidative stress. They present data demonstrating that the oxidation-reduction potential of plasma is increased with the duration of pRBC unit storage under standard conditions.

We agree and applaud the author's application of a novel platform for measuring oxidation-reduction potential to evaluate aspects of the red blood cell storage lesion. An understanding of this parameter would add additional insight into the potential harm that may result from transfusing stored pRBC units. We agree with the authors that further exploration of this platform's utility to evaluate the oxidation-reduction potential under various pRBC storage periods and conditions is warranted. One concern is that the data they present evaluated the oxidation-reduction potential in plasma only and did not include the erythrocyte component of pRBCs. In practice, the entire unit is transfused and there could be a discrepancy between the supernatant alone as compared with the supernatant plus erythrocytes due to intracellular glutathione regulation. In addition, oxidation-reduction potential may vary with pH. As we have recently demonstrated, pH decreases during pRBC storage (2).

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The authors report no conflicts of interest.

We look forward to further studies examining the oxidation-reduction potential in stored pRBC units as well as the impact of these factors upon the inflammatory response in transfusion recipients.

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