Hydroxyethyl Starch (HES) 130/0.4 During Acute Normovolemic Hemodilution Increases Tissue Oxygen Tension Larger and Faster than HES 70/0.5 or HES 200/0.5

To the Editor:

Standl et al. (1) contribute new values for muscle oxygen tension (pO₂; mm Hg), which challenge their published scope of baseline ranges, i.e., 21–50 mm Hg (1–12). Inevitably, hyperoxia either increased (from 25 to 99 mm Hg (3,12) or decreased pO₂ (from 43 to 26 mm Hg (11). Hemodilution by administration of crystalloids (hematocrit 25 %) either did not influence pO₂ (10,11) or caused an increase from 32 to 38 mm Hg (8,9). Using HES resulted in pO₂ increases [6% HES 40, hematocrit 32% from 16 to 23 mm Hg (4); HES 200/0.5, hematocrit 20%, from 35 to 45 mm Hg (5)]. A pO₂ decrease (hematocrit 10%) was related to the diluent [HES 200/0.5: from 29/34 to 14/18 mm Hg (6); crystalloid or crystalloid/HES 70/0.5: from 32 to 18 mm Hg (8,9)]. Presently (1), hemodilution (6% HES 130/0.4, 70/0.5, and 200/0.5) caused increases in the 50th percentile of pO₂ (from 44/49 to 56/60 mm Hg). Notably, the relative changes in the 10th percentile of pO₂ (6 % HES 130/0.4) are advocated for a “larger and faster pO₂ increase” (1), although clearly caused by the varying pO₂ baseline values [18 mm Hg with HES 130/0.4 vs 21.5 or 27 mm Hg (1)]. In addition, pO₂ proved clinically irrelevant due to the lack of normal values.

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References
1. Standl T, Burmeister MA, Schroeder F, et al. Hydroxyethyl starch (HES) 130/0.4 provides larger and faster increases in tissue oxygen tension in comparison with prehemodilution values than HES 70/0.5 or HES 200/0.5 in volunteers undergoing acute normovolemic hemodilution. Anesth Analg 2003;96:936–43.
2. Horn EP, Standl T, Wilhelm S, Schulte am Esch J. Bovine hemoglobin solution (HBOC-201) improves skeletal muscle pO₂ during arterial stenosis of 95% compared to hydroxyethyl starch (HES 200/0.5) [in German]. Anaesthesist 1995;44:902–3.