Response

Dear Editor-in-Chief,

We thank Dr. Siebenmann for the interest in our study. He wrote that one should be careful to interpret the increase in hemoglobin mass (Hb_{mass}) unambiguously as a response to altitude. We agree with this point, as several studies have shown that Hb_{mass} can be slightly increased after a training camp, especially when subjects are not at top-elite level (7). Our current results support this, as there was a tendency ($P = 0.08$) but not a significant effect of Hb_{mass} to be 1.9% "elevated" after 18 d endurance training in our control group (4). However, our main goal was not to distinguish between the altitude and training effect, but between the effect of normobaric and hypobaric "live high–train low" (LHTL). Further, Dr. Siebenmann expressed the opinion that three aspects of the hematological results differ from those typically observed at altitude.

First, he noted a "relatively high" increase in Hb_{mass} (4.4%) already at day 13 (230 h) in the HH group (2250 m). In our opinion, these results do not differ from typical LHTL altitude training studies that have indicated similar increases in Hb_{mass} after 14 d. For example, Garvican-Lewis et al. (2) reported Hb_{mass} increases between 3.7% and 4.5% after LHTL blocks lasting as short as 9 to 11 d. Gore et al. (3) suggest in their comprehensive meta-analysis that an increase of 1.1%/100 h of adequate altitude exposure can be expected. This would result in a 2.5% increase after 230 h; however, the "upper 95% response limit" for 230 h in this study was around 5%. Interestingly, Dr. Siebenmann himself reported increased Hb_{mass} (+3.5%) already at day 12 at altitude (8). Our individual Hb_{mass} increase after 13 d varied between 0% and +10%. It can therefore be reasoned that group composition (i.e., Hb_{mass}-responder vs Hb_{mass}-nonresponder) can noticeably influence the mean Hb_{mass} response.

Second, Dr. Siebenmann pointed out that erythropoietin was not elevated at day 13. In our opinion, our results also align well with other studies, where erythropoietin values increase during the first days at altitude and then return to pre values after around 10–14 d. For example, Chapman et al. (1) demonstrated in four different LHTL altitude training groups (living altitudes 1780, 2085, 2454, and 2800 m) that erythropoietin returned to prealtitude levels at 7, 14, and 21 d in all the four LHTL groups.

Third, Dr. Siebenmann noted the slightly reduced hematocrit values compared with baseline. It is well known that plasma volume is easily changed by a variety of short-term factors (6). As already indicated (4), we think that these data should not be overinterpreted because hematocrit values at pretests were potentially elevated due to the long travel and suboptimal fluid intake.

In summary, we emphasize that all Hb_{mass} measurements were made in duplicate (5) and with a high level of documented reproducibility (4). Furthermore, we wish to reinforce that our hematological values compare favorably with those typically observed within LHTL studies. Finally, an interesting aspect for future research is the varied individual Hb_{mass} responses detected in triathletes.

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