Interpretation of Red Blood Cell Values

These comments concern the paper by Weigle et al. (5) describing the wonderful opportunity that allowed university students to experience how various altitudes affect the human body.

I would like to address their investigations of hematological measurements, among which were reticulocyte counts. Although on one occasion they correctly mentioned that they stained the cells with new methylene blue, both in that sentence and in the preceding one they referred to “methylene blue” as though the names were synonymous. That is erroneous because, despite their similarity, they are totally separate dyes. Furthermore, methylene blue is a poor reticulocyte stain, whereas new methylene blue (1) is an excellent one that has long been routinely used for light microscopic investigation of these immature red blood cells in the circulation (3) and is still employed for that purpose (4).

In discussing their Fig. 3, a graph of reticulocyte count and hematocrit values, the SE is drawn rather than the SD. This improper statistical choice is discussed in the same issue of Advances in Physiology Education (2). In regard to their Fig. 3, by saying that “the hematocrit started to decline between days 6 and 10” at high altitude, they missed the opportunity to point out that the appreciable error bars indicate there was no true difference between the two mean hematocrit values. If anything, the hematocrit would have continued to rise during that 4-day interval because the students remained subjected to the hypoxic stimulus of the high altitude. Their data showed a dramatic increase in the reticulocyte count. This is a sign of continuing hyperactive erythropoiesis occurring in the bone marrow and resulting from enhanced production of the hormone erythropoietin by the hypoxic kidney. Thus, that there was any drop in hematocrit is doubtful. Rather, during the students’ continuing acclimatization it would have gradually increased.

REFERENCES

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