Dr. Pompei as the most scientifically relevant evidence included only 60 intensive care unit patients in whom the majority of patients (57) were euthermic (2). In this study, 20% of the paired temperature measurements had a difference of >0.5°C between the pulmonary artery temperature and the TAT. We do not believe that this is sufficient to recommend the TAT.

Although our guideline cannot cite every study done on TATs, there are many other studies that have shown the TAT to be inferior to more invasive methods of measuring temperature. Although they are not all done in intensive care unit patients or in patients with fever, we can draw some conclusions about the accuracy of the device. A recent study in perioperative patients found the TAT to be unreliable compared with bladder thermometers (3), whereas a study in marathon runners suffering heat stroke found little association between the TAT and the rectal temperature (4).

An accurate and reliable noninvasive method to measure core temperature would be a major advance in patient care, and we hope Dr. Pompei will continue his efforts to develop one.

But based on the fact that the measurement of temperature in intensive care unit patients has a major impact on evaluation and treatment decisions, we stand by our assertion that the science does not yet support an endorsement of the TAT.

The authors have not disclosed any potential conflicts of interest.

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Near infrared spectroscopy

To the Editor:

Over the last years, tissue microcirculatory and regional perfusion and oxygenation have made an important entry into the functional hemodynamic monitoring of critically ill patients (1). Clinical assessment of these parameters has become possible by the introduction of optical spectroscopic technologies such as near-infrared spectroscopy. This technique is based on the oxygen-dependent optical absorption of blood in the near-infrared spectrum. There are three prime factors which distinguish the currently available devices: 1) the algorithm used to calculate regional/microcirculatory hemoglobin saturation; 2) the spatial separation of the illumination and detection fiber, which determines the measurement depth; and 3) the location of the probe.

In a recent issue of *Critical Care Medicine*, Soller et al (2) presented a study in volunteers where a decrease in venous return (as a model of hypovolemia) was induced by lower limb negative pressure. In the model, they compared a self-developed near-infrared spectroscopy device, which measures a parameter called muscle oxygen tension, to a commercially available device from Hutchinson Technology (HT), which measures a parameter called tissue oxygen saturation and has been studied clinically (3–5). The authors concluded that their device has "superior sensitivity" to detect acute hypovolemia when compared with the HT device. However, in their study design, two of the above-mentioned factors were not under experimental control resulting in a faulty conclusion. This may lead to confusion in the field of those using the near-infrared spectroscopy technique and needs to be addressed.

The first shortcoming concerns the probe distance. Their device has a 30-mm probe distance and they compared it with the HT device using a 15-mm probe distance. Second, a more serious shortcoming in their study design is of a physiologic nature. The authors put their probe on the forearm, whereas they put the HT probe on the thenar. However, the effect of the measurement site, i.e., forearm vs. thenar, was not validated. Surprisingly, the authors neglected to add a simple experiment by switching the probes around and repeating the experiment. To investigate the influence of the measurement site, we performed a similar experiment in two volunteers twice (n = 4) using a tilt table to that by simulate hypovolemia. We used two HT devices applying a 15-mm probe, similar to Soller et al, on the thenar and on the forearm. We found that the forearm was more sensitive to acute changes in venous return than is the thenar, where thenar tissue oxygen saturation decreased from 90 ± 5% to 88 ± 7% and forearm tissue oxygen saturation decreased from 83 ± 5% to 75 ± 4%. This simple experiment demonstrated that the conclusion of Soller et al is incorrect and was based on an inadequate study design.

In conclusion, validation studies such as those presented by Soller et al should be performed with more methodologic rigor and a clear sense of objective where basic physiologic considerations should form the core component.

Dr. Ince is a consultant and chief scientific officer of MicroVision Medical and has received educational grants from Hutchinson Technology. Mr. Bezemer and Dr. Lima have not disclosed any potential conflicts of interest.

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The authors reply:

We thank Dr. Ince and his colleagues for the opportunity to clarify some of the major points in our article. The stated purpose of our study was to evaluate two different near-infrared spectroscopic tissue oxygen monitors during the earliest stages of central hypovolemia in a controlled setting (1).

The commercially available Hutchinson Technology (HT) oximeter is marketed specifically for use on the thenar muscle. We therefore used the thenar site for the HT sensor because this would provide the relevant diagnostic information for clinicians using the device as currently marketed. The novel University of Massachusetts Medical School (UMMS) device was designed specifically to be used to assess deep muscle such as the forearm, deltoid, calf, or thigh. The forearm was used in this study. In our article, we discuss the possibility that the response to hypovolemia may be different between thenar and forearm muscles. We also explained why it may be inappropriate to use the commercially available HT thenar sensor on the forearm; namely, the 15-mm HT sensor may not have the optical penetration to assess muscle tissue on the forearm, where the overlying fat is thicker than on the thenar. If used in this way, the HT sensor could be measuring tissue oxygen saturation of the skin and fat only rather than the underlying muscle.

Dr. Ince correctly describes three factors that distinguish available near-infrared spectroscopic devices: 1) the algorithm used to calculate microcirculatory hemoglobin saturation; 2) spatial separation of the illumination source and the detector; and, 3) the anatomical location of the probe. Dr. Ince neglected to include a critical fourth factor which differentiates near-infrared spectroscopic tissue monitors—the design of the spectroscopic system. There are multiple methods for performing near-infrared spectroscopy to determine tissue oxygen saturation including frequency domain techniques, spatially resolved and continuous wave spectroscopy (2). Although both the HT and the UMMS system use the continuous wave spectroscopic method, the UMMS system is distinguished from the HT system by having a second illumination source close to the spectral detector. This sensor collects light that is reflected only from the skin and the fat. This arrangement, along with the associated spectral processing algorithms, removes the confounding influence of skin pigment and skin blood flow from the calculation of tissue oxygen saturation (3). This difference in design is fully explained in our article.

Thus, the UMMS and the HT monitors are very different from each other in ways beyond the anatomical location of sensor placement. Both were evaluated on the same physiologic model of early, compensated hypovolemia. Again, our intent was not to compare operational characteristics of these monitors directly, but to evaluate the performance of each of these systems in their recommended (UMMS) and marketed (HT) configurations. Although we did not state that either device had "superior sensitivity," we demonstrated that the HT monitor failed to track progressive hypovolemia.

Dr. Soller is a cofounder of Reflectance Medical Inc., which intends to commercialize the UMMS SmO2 monitor. Drs. Soller, Yang, and Soyemi are co-inventors of the technology and could gain financially from its commercial development, in agreement with the University of Massachusetts policy on sharing of its license income with inventors. The remaining authors have not disclosed any potential conflicts of interest.

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Is the cortrosyn test necessary in high basal corticoid patients with septic shock?

To the Editor:

Some of the most important experts published a consensus about corticoids use in critical care in the most recent issue of *Critical Care Medicine* (1). The discussion generated a comprehensive review of the best evidence about critical illness-related corticosteroid insufficiency (CIRCI) and steroids use in critical care patients.

Although our group agrees with most of the recommendations, we believe that the recommendation about diagnosis of CIRCI could be restricted.

The authors generated the following recommendation: "Recommendation 3: At this time, adrenal insufficiency in critical illness is best diagnosed by a delta cortisol (after 250 μg cosyntropin) of <9 μg/dL or a random total cortisol of <10 μg/dL."

Despite all the critics to high dose (250 μg) cortrosyn test, there is strong evidence in the literature that low (<9 μg/dL) delta cortisol after this test in critical care patients is associated with worse outcome, and this outcome owes to adrenal dysfunction (2, 3).