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Letter to the Editor

The Reliability of Measuring Muscle Mass Using Ultrasound must be Confirmed by Comparison with a Gold Standard

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Letter to the Editor

We read with interest the article by Kim *et al*. on a prospective study investigating differences in rectus femoris (RF) and total anterior thigh (TAT) muscle mass measurements using ultrasound, bioelectrical impedance analysis (BIA), and a wearable device in 53 patients on days 3, 7, and 14 after admission to the intensive care unit [1]. Muscle mass decreased within 7 days and continued to decrease until day 14, with comparable percentage decreases between ultrasound, BIA, and wearable device measurements [1]. Patients who experienced a failed weaning attempt, death, or transfer to a non-family facility showed a greater percentage decrease in muscle mass than those who successfully weaned, survived, or were discharged home [1]. The study is interesting, but some uncertainties remain.

The first point concerns the application of bioelectrical impedance analysis (BIA) to measure muscle mass [1]. BIA has several limitations [2]. BIA measurements are highly dependent on hydration status, as BIA measures the electrical resistance in body fluids. Furthermore, the algorithms used in different devices do not adequately represent different patient groups, such as athletes, older adults with sarcopenia, or patients with chronic diseases [2]. Another limitation is that while BIA can detect changes in muscle mass over time, it is less accurate when determining muscle mass at a single point in time. The accuracy of BIA also depends on whether a bipolar (hand-to-hand or foot-to-foot system) or a tetrapolar system is used, and whether a single frequency or multiple frequencies are applied [2].

The second point concerns the measurement of muscle mass, which was not compared to a gold standard [1]. Muscle mass is most reliably determined using imaging techniques such as magnetic resonance imaging (MRI), computed tomography (CT), or dual-energy X-ray absorptiometry (DXA) [3]. These methods offer high accuracy because they can distinguish muscle from fat and bone. The precision errors in repeated measurements are often less than 2–3% [3].

The third point concerns the discrepancy between the statement that muscle mass was measured within 48 hours and the statement that the measurement was taken on the third day after admission. Since these are two different time points, this discrepancy should be clarified.

The fourth point concerns why muscle mass was only measured on the 14th day of the intensive care unit stay, even though the minimum length of stay in the ICU was seven days and the average length of stay was only ten days [1]. Therefore, we should know how many of the 53 included patients actually had a measurement on day 7 and how many on day 14.

Before ultrasound can be recommended as a reliable method for monitoring muscle atrophy in critically ill patients, it must be compared with one of the gold standards. The prognosis of the disease course in intensive care patients should not be based solely on the measurement of muscle mass.

Declarations
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