Emerging technologies to assess body composition in malnourished patients in clinical practice: bioelectrical impedance analysis and ultrasound techniques.

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Abstract

The Global Leadership Initiative on Malnutrition (GLIM) emphasizes the importance of human body composition (BC) in the nutrition assessment of various patient populations[1]. Classic imaging techniques such as dual-photon X-ray absorptiometry (DXA), computed tomography and resonance are considered "gold standards" to assess BC but their clinical application is difficult under routine conditions[2,3].

Bioelectrical impedance analysis (BIA) and ultrasound techniques are methods to assess BC and are being validity for persons with acute or chronic illness[1]. Both are readily available to most clinicians, and are low-risk, non-invasive, fast, safe, relatively cheap, and portable techniques with wide applications in the clinical setting to assess BC and nutritional status[,5]. The correlation between the resistance (R) and reactance (Xc) vectors given by BIA creates the phase angle (PhA), a good indicator of cell integrity, which role has been investigated as a nutritional status marker and prognostic marker for mortality in many clinical conditions, such as cancer, and kidney and cardiovascular diseases. PhA cutoffs would provide an excellent tool for clinicians to assess and monitor patients´risk[5]. In general, lower levels of PhA suggest a worse prognosis and a greater possibility of morbidity and mortality[5,6].

The use of ultrasound determines the surface of the muscle tissue[2]. The measurement of the rectus femoris muscle of the quadriceps is one of the most widely used. Femur muscle area below 5.2 is associated with a frailty than leave to worse survival prognosis[7]. Ultrasound differentiate between the abdominal visceral fat and subcutaneous fat and it´s important for the assessment of a risk of major chronic diseases[8,9]. There are studies for the nutritional assessment of different pathologies[10,11,12].

It is necessary to expand those studies in both methods, seeking uniform applications of measurement in clinical practice in order to evaluate the nutritional status and obtain their validity in clinical populations.

Images





Image 1: BIA. **Image 2 and 3**: Ultrasound. Source: own elaboration.

Recent Publications (minimum 5)

1. Sheean P, Gonzalez MC, Prado CM, McKeever L, Hall AM, Braunschweig CA. American Society for Parenteral and Enteral Nutrition Clinical Guidelines: The Validity of Body Composition Assessment in Clinical Populations. JPEN J Parenter Enteral Nutr. 2020;44(1):12-43.
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3. Galindo Martín CA, Ubeda Zelaya RDC, Monares Zepeda E, Lescas Méndez OA. ROUNDS Studies: Relation of OUtcomes with Nutrition Despite Severity-Round One: Ultrasound Muscle Measurements in Critically Ill Adult Patients. J Nutr Metab. 2018;2018:7142325
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8. Hamagawa K, Matsumura Y, Kubo T, Hayato K, Okawa M, Tanioka K, et al. Abdominal visceral fat thickness measured by ultrasonography predicts the presence and severity of coronary artery disease. Ultrasound Med Biol. 2010; 36: 1769–1775. DOI: https://doi.org/10.1016/j.ultrasmedbio.2010.08.004
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11. Hernández-Socorro CR, Saavedra P, López-Fernández JC, Ruiz-Santana S. Assessment of Muscle Wasting in Long-Stay ICU Patients Using a New Ultrasound Protocol. Nutrients. 2018;10(12):1849. DOI: https://doi.org/10.3390/nu10121849
12. Herrick I, Brown S, Agyapong-Badu S, Warner M, Ewings S, Samuel D et al. Anterior Thigh Tissue Thickness Measured Using Ultrasound Imaging in Older Recreational Female Golfers and Sedentary Controls. *Geriatrics (Basel, Switzerland)*, 2017; *2*(1), 10. https://doi.org/10.3390/geriatrics2010010

Biography (150 word limit)

Cristina García García has more than 10 years of experience in Clinical Nutrition, mainly focused on therapeutic areas such as Endocrinology, Oncology, Surgery and Gerontology. She is developing her doctoral thesis in the field of nutritional status in cancer patients at the Department of Biomedicine, Translational Research and New Technologies at Malaga University. She is currently the MSL Manager at Persan Farma, a global health company that leads the development and use of advanced medical nutrition for specialized care. She won “MSL Manager of the year outside US 2019”, one of the MSL Society Awards that recognize excellence. She has driven the development of investigator-initiated trials and clinical trials and she is providing innovation and investigation and promoting the publication of clinical trials in prestigious journals. She always demonstrates a strong interest in providing research in the field of science and in improving the quality of life of malnourished patients.