BIOIMPEDANCE SPECTROSCOPY (BIS) IN GERIATRICS

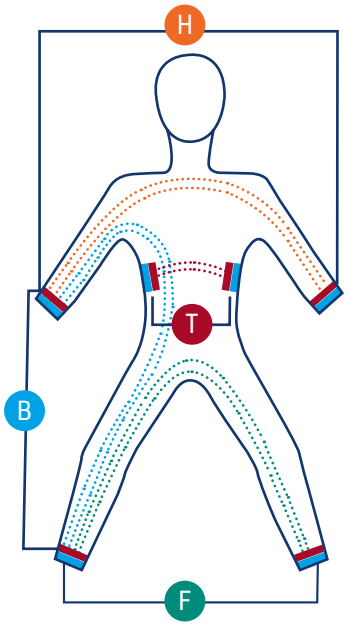
The aging process is marked by a rise in total body fat mass along with a decrease in lean mass, also referred to as fat-free mass (FFM), which occurs independently of overall weight and fluctuations in body mass index (BMI) [1,2].

The decline in lean mass is a significant change in body composition associated with aging and is termed 'sarcopenia' [2]. The depletion of muscle mass leads to increased risk of disabilities, functional impairments, and diminished muscle strength and physical function [2,3].

Addressing sarcopenia and malnutrition in older adults is essential for promoting their overall health and well-being. Sarcopenia, the age-related loss of muscle mass and strength, significantly impacts functional ability and quality of life in geriatrics. Regular assessment and monitoring of muscle mass are crucial, as identified by current guidelines, to prevent and manage sarcopenia effectively [2]. Malnutrition frequently coexists with sarcopenia, which increases the risk of disabilities and impairments. This combination further leads to a decrease in both body mass and muscle activity, while heightening the risk of immune dysfunction [2]. The International Clinical Practice Guidelines for Sarcopenia (ICFSR) recommend utilising Bioimpedance Analysis (BIA), along with DEXA scans and anthropometric measurements, as effective methods for monitoring and diagnosing patients at risk for sarcopenia [4].

Implementing nutritional screening tools in clinical settings can help identify at-risk individuals, allowing for timely interventions tailored to their needs, ultimately reducing healthcare burdens associated with complications from sarcopenia and malnutrition [4].

BIS can be applied as an early warning system and a monitoring tool with the potential to improve patient care and outcomes.



- **B - Electrodes placed on foot and hand:** Measures whole body.
- **T - Electrodes placed on ribs:** Transthoracic measurement (central oedema).
- **F - Electrodes placed on two legs:** Measures lower limbs only.
- **H - Electrodes placed on two hands:** Measures upper limbs.

The Prediction Marker, Phase Angle, and Characteristic Frequency are highly reliable indicators of fluid overload and should function effectively even in the context of segmental measurements.

Perform a diagnostic assessment (muscle strength, performance, body composition) for sarcopenic obesity if clinical symptoms or relevant risk factors are present (ESPEN 2024).

MUSCLE STRENGTH

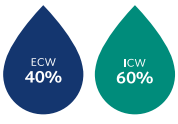
BODY COMPOSITION

PERFORMANCE

Bodystat can provide valuable information about Dry Lean Mass, SMM, and ALM, which can be very useful for the assessments mentioned.

HOW CAN CLINICIANS ENHANCE FLUID BALANCE MONITORING WITH MULTISCAN 5000?

TBW



ICW ECW

OHY

PREDICTION MARKER INFINITY

NUTRITIONAL INDEX

Bodystat®
BODY COMPOSITION TECHNOLOGY

THE MULTISCAN 5000 IS NON-INVASIVE, PORTABLE, HANDHELD AND CAN PROVIDE FREQUENT MONITORING.

The Multiscan 5000 distinguishes ICW (Intracellular Water) and ECW (extracellular Water) separately, helping to build an accurate Total Body Water (TBW). Monitoring TBW is essential for assessing overall hydration status. The analyser is capable of detecting fluid shifts between these compartments (e.g., from ICW to ECW) and evaluating the equilibrium between fluid intake and output.

The OHY (Overhydration) parameter is a critical measure used to assess and quantify the excess fluid in the body, beyond what is physiologically necessary. This parameter plays a significant role in evaluating fluid balance in clinical settings where fluid overload can be a concern. The OHY parameter estimates the volume of excess fluid retained in the body by comparing the measured Total Body Water (TBW) with the expected normal hydration level for an individual, based on their body composition.

Bodystat's BIS Multiscan 5000 can assist the adjustment of nutritional, physical and medical intervention. This approach can aid in preventing complications such as oedema, fluid overload and malnutrition, thereby enhancing overall patient outcomes.

IMPORTANT PARAMETERS

PHASE ANGLE

Phase angle, which is directly measured correlates significantly with overhydrated status, serving as an indicator of cell membrane integrity and hydration levels [11].

PhA could serve as a valuable indicator of sarcopenia, malnutrition, and cachexia in hospitalised patients and may be an effective substitute for nutritional assessment, assisting healthcare providers in diagnosing malnutrition in patients [7].

Evidence shows PhA can be used for monitoring treatment of patients with disease-related fluid imbalance and malnutrition.

BIVA

BIVA is an accurate, non-invasive, accessible and cost-effective tool that assesses fluid balance.

BIVA is a rapid, noninvasive, and cost-effective method for assessing hydration status[12]. Hydration status in the elderly can change significantly. While age-related dehydration is increasingly recognised, lean tissue hydration typically remains normal in healthy, independent older adults. However, monitoring and intervention are often necessary for many frail elderly individuals [2,8].

BIVA provides detailed insights into both fluid balance and nutritional status, that can supplement managing patients with fluid imbalances and malnutrition.

FAT-FREE MASS FFM

Bodystats Multiscan FFM is composed of skeletal muscle, bone mass, water, intracellular and extracellular fluids, organs, and connective tissues. These components collectively reflect the body's metabolic health and physical performance.

Fat-free mass (FFM) is vital for the elderly as it primarily consists of muscle tissue, which supports strength, mobility, and overall physical function. Adequate FFM enhances metabolic health, improves immune function, and contributes to better bone density, thereby reducing the risk of frailty and falls [8,10].

PREDICTION MARKER INFINITY (TBW/ECW)

PM∞ allows the monitoring of the TBW and ECW ratio, based off raw data.

Elevated ECW levels have been associated with poor outcomes in patients. Higher ECW often correlates with more severe disease and a higher risk of adverse events, including hospitalisation and mortality [9].

Ageing is associated with a decline in total body water (TBW), intracellular water (ICW), muscle mass, and muscle strength. The reduction in ICW may indicate a loss of muscle cell quantity, as well as contribute to decreased hydration of muscle cells[10].

APPENDICULAR LEAN MASS (ALM)

Appendicular Lean Mass offers a precise evaluation of muscle mass in the limbs, which is essential for assessing overall physical function, strength, and mobility. ALM is particularly important for diagnosing and managing conditions such as sarcopenia (age-related muscle loss), muscle loss due to disease, frailty, and other muscle-wasting disorders. By tracking ALM, healthcare providers can more effectively evaluate a patient's risk of falls, fractures, and disabilities, leading to more targeted interventions aimed at preserving muscle mass and enhancing quality of life.

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