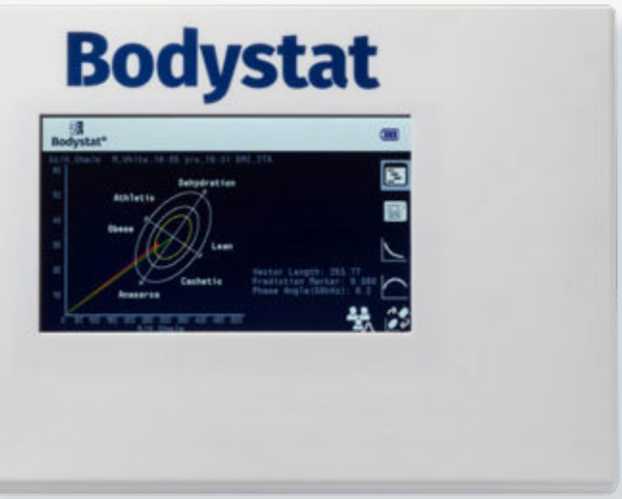
BIOIMPEDANCE SPECTROSCOPY IN CARDIOVASCULAR DISEASES

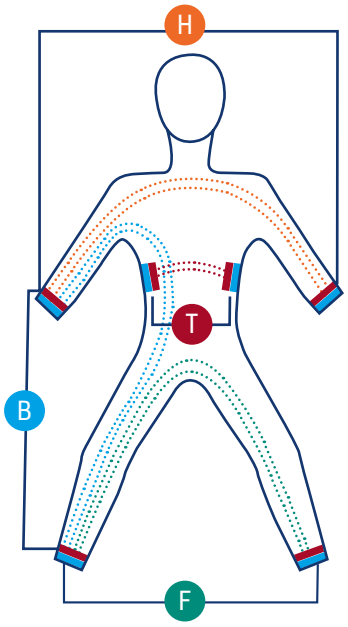
In acute new onset Heart Failure (HF) or acute decompensation of Chronic Heart Failure (CHF), renal function, weight and **Fluid Balance should be closely and accurately monitored**, to ensure appropriate diuretic therapy or **fluid management** (NICE 2014).

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

By measuring changes in thoracic impedance, bioimpedance techniques can detect fluid accumulation in the lungs, indicative of pulmonary edema. This condition is common in heart failure patients and requires prompt treatment [7].

Acute decompensated heart failure is characterised by fluid overload across various compartments of the body, and segmental assessments can provide valuable insights into the distribution and extent of this fluid accumulation.





- **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.

HOW FLUID BALANCE IS CURRENTLY MEASURED IN CLINICAL SETTINGS?

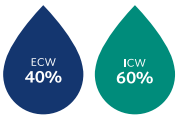
FLUID BALANCE CHARTS

PHYSICAL ASSESSMENT OF FLUID BALANCE

MONITORING OF BLOOD RESULTS

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.

Multiscan 5000 distinguishes ICW and ECW separately, helping to precisely estimate the fluid balance and the accurate TBW. The device 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.

This excess fluid is often found in the extracellular space and can lead to conditions like edema, where fluid accumulates in tissues. In patients with heart failure, where the heart's ability to pump blood is insufficient to meet the body's demands, managing fluid balance can be particularly challenging (NICE 2014).

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 or fluid overload.

IMPORTANT PARAMETERS

BIVA

BIVA is an accurate, non-invasive, accessible and cost effective tool that assess fluid balance and nutritional status in heart failure patients. It shows high specificity and positive predictive value for detecting peripheral edema and effectively predicts length of stay and all-cause mortality in these patients. By identifying cachexia early, BIVA can provide crucial prognostic insights, enabling timely interventions to improve patient outcomes [1,2]. BIVA provides detailed insights into both fluid balance and nutritional status, which are critical in managing heart failure patients who often struggle with fluid overload and malnutrition.

OHY

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.

The OHY parameter is a critical measure used to assess and quantify the excess fluid in the body, beyond what is physiologically necessary. High levels of overhydration, as indicated by the OHY parameter, are associated with a higher risk of adverse outcomes in heart failure patients, including hospitalisation and mortality [5]. This makes OHY a valuable prognostic marker for assessing the severity of the disease and the likelihood of complications.

PREDICTION MARKER INFINITY (TBW/ECW)

PM∞ is allowing the monitoring of the ratio between the TBW and ECW. For instance, the expansion of ECW and loss of ICW are typically features of systemic illness, arising from protein leakages into the extracellular space and loss of intracellular protein. Evidence of increased volume overload can be seen in heart failure patients. The PM∞ and extracellular water parameters are useful in monitoring fluid overload. Tracking these changes over time can help to identify when a patient is at risk. Elevated ECW levels have been associated with poor outcomes in heart failure patients. Higher ECW often correlates with more severe disease and a higher risk of adverse events, including hospitalisation and mortality [3].

PHASE ANGLE

Phase angle (The inclusion of PA into a validated multiparametric model for clinical and prognostic evaluation of heart failure should be preferred).

Phase Angle (PhA),which is directly measured has been explored as a potential marker for cardiovascular risk. This is because phase angle reflects cell membrane integrity and body cell mass, which are often compromised in individuals with cardiovascular disease [4].

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Resources can be found on our website

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