



**MALTRON**

*a new approach to lifestyle disease prevention*

# MALTRON BODY COMPOSITION ANALYSERS

PROFESSIONAL TOOLS FOR PROFESSIONAL PEOPLE  
WITH UNCOMPROMISING ACCURACY

BIOELECTRICAL IMPEDANCE

Highly accurate  
Non-invasive Non-intrusive



## BF-900 RESULTS DISPLAYED

- BODY FAT %
- TARGET FAT% (min/max)
- BASAL METABOLIC RATE (BMR) (KCal)
- BODY IMPEDANCE



## BF-906 RESULTS DISPLAYED

- BODY FAT %
- BODY FAT WEIGHT
- TARGET FAT% (min/max)
- BODY MASS INDEX (BMI)
- BODY IMPEDANCE
- BASAL METABOLIC RATE (BMR) (KCal)
- TARGET WEIGHT (min/max)
- LEAN WEIGHT
- LEAN %
- WATER LITERS
- WATER %
- TARGET WATER (min/max)



## BF-907 RESULTS DISPLAYED

- BODY FAT %
- BODY FAT WEIGHT
- TARGET FAT% (min/max)
- BODY MASS INDEX (BMI)
- BODY IMPEDANCE
- BASAL METABOLIC RATE (BMR) (KCal)
- TARGET WEIGHT (min/max)
- LEAN WEIGHT
- LEAN %
- WATER LITERS
- WATER %
- TARGET WATER (min/max)
- ENERGY EXPENDITURE (Daily / Weekly)

## The understanding of complex alterations using Maltron Analysers

Maltron Analysers provide us with important information regarding change in body composition during growth, ageing and disease.

Detailed information can be obtained in the areas of nutrition, intracellular and extracellular body fluids.

*Calibrated for children, adults, the older population, sports and professional athletes as well as the obese & lean population including ethnicity*



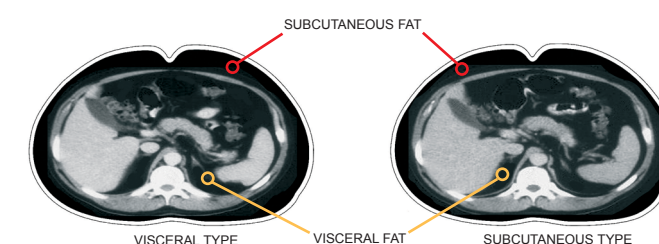
Extracellular water (ECW) increases in different diseases and oedema is often the most common sign of ECW expansion. Although these changes in fluid compartments have a clinical significance, no method has been put in place to detect and monitor these changes. More over, Intracellular water (ICW) also changes especially in early stages of heart failure, liver cirrhosis and chronic renal failure.

Body composition assessments have been performed in several clinical areas using BioScan on patients with fluid retention, malnutrition, Diabetes, eating disorders and Obesity. Other areas in which BioScan has been found to be an indispensable tool is in the estimation of Dry weight, Surgery, in Cardiovascular patients, Gastroenterology, HIV, Paediatrics, Endocrine and metabolic disorders, Cystic Fibrosis, during pregnancy, on the elderly and many more.

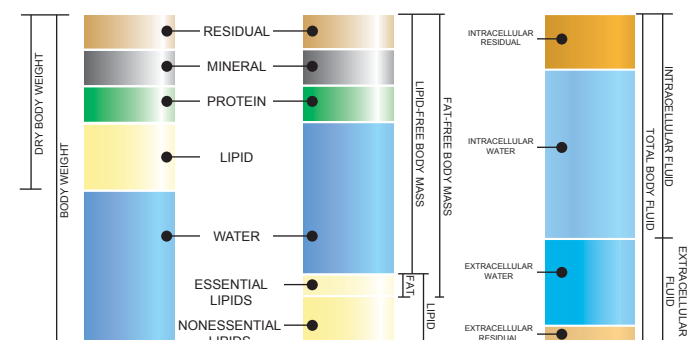
Cystic fibrosis patients tend to lose body weight and lean body tissues because of muscle wasting and depletion of bone mineral. Monitoring in this group of patients enables clinicians to provide nutritional support to counter these disease effects.

Assessing fat and regional fat distribution is important in patients with cardiopulmonary diseases such as chronic heart failure, pulmonary disease and chronic obstructive pulmonary disease.

## CT VIEW OF THE ABDOMEN



## THE HUMAN BODY COMPARTMENTS



Obesity has been identified as a risk factor which is associated with not only CAD but also related diseases like hypertension and many others.

At the other extreme, Coronary Artery Disease (CAD) patients tend to be overweight or obese.

Heart lung transplant patients taking immunosuppressant drugs after surgery, typically gain weight due to an increase in Fat Mass (FM).

Measuring these changes in clinical settings is of significant importance.

# THE FUTURE OF PATIENT MONITORING

## A COMPLETE CLINICAL ASSESSMENT

### BIOSCAN 916 RESULTS DISPLAYED

#### ABSOLUTE MEASUREMENTS

Absolute measurements have been highly correlated to changes in the human body and have been shown to be good indicators in predicting mortality.

#### DRY WEIGHT

Under and over estimation of dry weight is important and has been shown to impair the survival and quality of life of haemodialysis patients.

#### BODY COMPOSITION

Nutritional assessment of children and adults in clinical and field settings is important in order to identify potential causes of inadequate nutrition status, including the risk of malnutrition. Performing nutritional assessments in diseased patients enable medics to identify related disorders and to monitor the effects of any treatment.

#### GFR

An important indicator of Kidney function. A rate at which waste is removed from our kidneys. High correlation was found using BioScan 916 in the estimation of GFR, avoiding the necessity of 24 hour urine collection or calculating using CC or MDRD formulas.

#### MINERALS AND PROTEIN

Bone, soft tissue and protein content of the body. Inorganic compounds containing an abundance of metals. In clinical patients the assessment of the loss of minerals is important.

#### GLYCOGEN MASS

The primary storage form of carbohydrates found in the cytoplasm of most cells.

#### FLUID STATUS

Intracellular & Extracellular body fluids in both healthy and diseased patients is of significant importance. Extracellular Water (ECW) increases in different diseases and oedema is the most common sign of ECW expansion. Monitoring these changes in patients can provide us with detailed information and understanding of changes as a result of disease.

#### CREATININE

Creatinine estimations can be performed using the BioScan 916, avoiding 24 hour urine collections.

#### BCM

Body Cell Mass is an accurate method of establishing a healthy subjects nutritional status or a patients degree of malnutrition. BCM is used for normalisation of energy expenditure and other metabolic measures.

- Impedance
- Phase Angle
- Resistance
- Reactance
- Capacitance
- Dry Weight
- Fat %
- Fat Mass
- Fat Free Mass
- Fat Free Mass %
- Body Volume
- Body Density
- Body Mass Index
- Resting Metabolic Rate
- Target Fat (min / max) %
- Target Weight (min / max)
- Target Water (min / max) %
- Glomerular Filtration Rate
- Total Body Potassium
- Total Body Calcium
- Protein Mass
- Mineral Mass
- Glycogen Mass
- Extracellular Fluid
- Intracellular Water Volume
- Extracellular Water Volume
- Extracellular Water Lt
- Total Body Water Volume
- Intracellular Water Lt
- Intracellular Water %
- Extracellular Water %
- Total Body Water Lt
- Total Body Water %
- Extracellular Mass
- Extracellular Solids
- Extracellular / Intracellular Water
- Extracellular Water / Total Body Water
- Intracellular Water / Total Body Water
- Interstitial-Fluid Extravascular
- Plasma-Fluid (Intravascular)
- Creatinine
- Body Cell Mass
- Muscle Mass

## BIOSCAN

### SCREENING TOOLS PROVIDING

### AN INSIGHT INTO HEALTH



Maltron Instruments use scientific method of measuring Bioelectrical Impedance. A total of four electrodes are used (tetrapolar). 2 electrodes are applied to the hand and two to the foot. A low-level battery current is passed through the body and the absolute measurement of impedance, phase, resistance, reactance and capacitance are made.

**BioScan 916 stores 100 patients' results and the USB interface enables downloading of the measured data directly into the PC using the fast high speed USB**

Using the measured raw data, Maltron Instruments perform a complete analysis in less than 5 seconds.

Displaying parameters such as Extracellular and Intracellular fluids, Total Body Water, Fat and Fat Free Mass, Dry Weight and many others including mineral composition (BioScan 916 range only).

The patient information is provided without the need of complex clinical techniques like radioisotope dilution.

Maltron is the world's leading manufacturer in the field of Bioelectrical Impedance Analysis (BIA) offering a complete range of portable, bedside, diagnostic monitoring instruments.

As the need for non-invasive, non-intrusive diagnostic systems has increased in recent years, and regular monitoring becomes even more important, clinicians are seeking quick, simple solutions to monitor these changes.

Our bodies undergo changes with age, monitoring these alterations is important, even though assessing them is often more difficult and problematic.

Body weight and BMI have been shown to be inadequate indicators for monitoring these changes.

These variables do not show the amount of Fat Mass (FM) or Fat Free Mass (FFM).

Therefore Nutritional assessment of children and adults in hospital and field settings is essential in order to identify potential causes of inadequate nutrition status, including the risk of malnutrition.

Performing these measurements in diseased patients enables medics to identify related disorders and to monitor the effects of any treatment.



*The future of impedance analysis used in monitoring body composition, nutrition, hydration and mineral assessments in diverse clinical settings*

# BioScan Absolute Measurement

ONE OF THE MOST IMPORTANT INDICATORS OF OUR HEALTH

The most advanced all in one system ...

## Body Capacitance, an indicator of Body Potassium (TBK) and Body Cell Mass (BCM)

Measurements of Body capacitance using Maltron BioScan has been found to be a good indicator of Body Potassium. BioScan is a simple, non-invasive, inexpensive technique which can easily be applied in everyday clinical assessment. The use of laboratory techniques such as  $^{40}\text{K}$  and  $^{42}\text{K}$  are not practical for everyday bedside monitoring.

Capacitance, in electrical terms, is the storage of an electrical charge by a condenser for a short moment in time. Capacitance measurements in a living substance, are an indicator of healthy cell membrane. Depending on the health and the number of cells, the electrical capacitance will increase or decrease. Each person consists of many cells, which are integrated to perform complex functions necessary for life.

Body Cell Mass (BCM) is the most active metabolizing portion of the body and from clinical perspective, one of the most important components of body composition. TBK has been found to be linearly correlated with BCM, therefore BCM can be derived from direct body capacitance using BioScan.

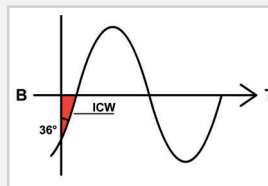
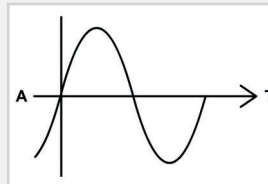
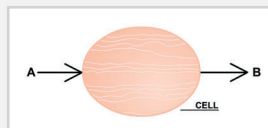
## Phase Angle

BioScan Phase measurement has been found to be an important indicator of mortality and modality. Phase angle is the relationship between resistance and reactance. 0 degrees is an indicator of no cell membranes and 90 degrees is a capacitive circuit which consists of all membranes with no fluid.

A healthy individual will have a phase angle of 4 to 15 degrees. A lower phase angle is associated with cell death or breakdown in the selective permeability of the cell membrane. High phase is consistent with high reactance and a large amount of waste cell membrane and body cell mass (BCM).

... displaying in excess of 42 parameters including Intracellular and extracellular fluids status, Body Cell Mass, Dry weight, Mineral composition, GFR and Body composition.

## Electrical path through a cell membrane

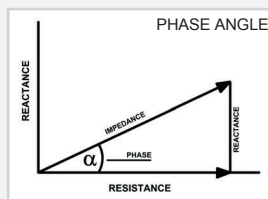


Cell membranes cause time delays compared to time taken passing through extracellular water.

The greater the number of cell membranes the signal has to pass through, the longer the time delay.

This time delay can be compared to the period of the signal frequency.

The higher the phase angle, the greater the proportion of ICW compared to ECW



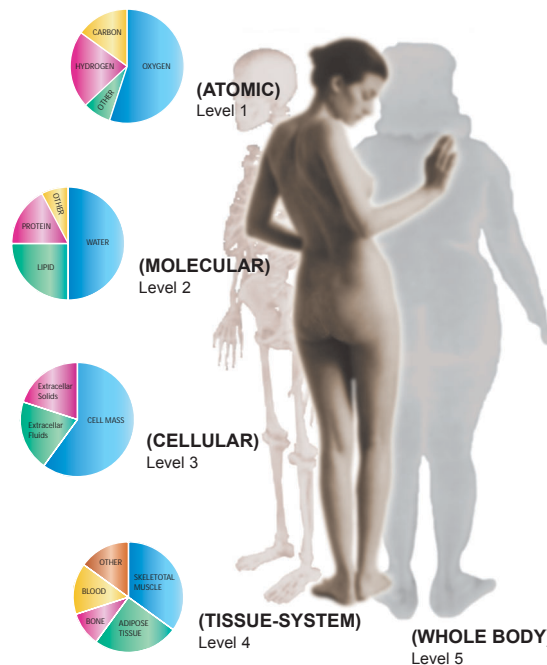
## Fluid compartments and methods to determine body composition

While Total Body Water (TBW) provides some information about changes, additional important information can be obtained from the measurement of Fat Free Mass hydration (FFMH =  $\text{TBW} / \text{FFM}$ ). TBW is divided into Extracellular (ECW) and Intracellular water (ICW). Extracellular can be further subdivided into interstitial (IW), Lymphatic (LW), trans-cellular (TCW) and Blood (BIW). Although BIW can be measured directly, comparatively it provides very little information to the clinician other than extracellular hydration.

**Water, the most abundant component of the body.**

ECW% and ICW % increase in a variety of diseases but this may not be detected by clinical means. For example, an increase in ICW% is common in heart failure, liver cirrhosis and chronic renal failure patients, especially in early stage. Decrease in intracellular water is generally due to osmotic factors which is an increase in ECW%, and a shift from intra to extracellular space.

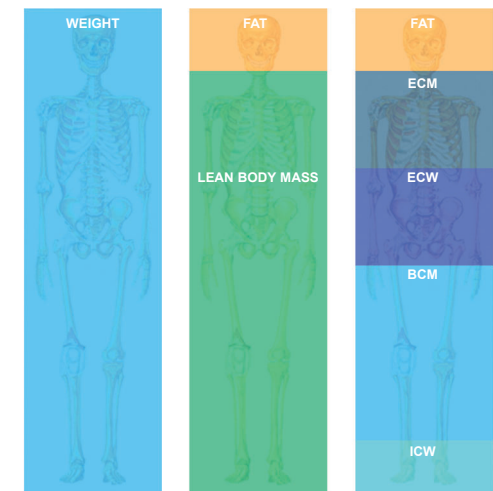
## 5 LEVELS OF HUMAN BODY COMPOSITION



## One compartment measurement

Usually refers to the measurement of body weight. Although a good indicator of change in total body weight, we are unable to identify the cause of the change with this method of assessment.

1-COMPARTMENT MODEL 2-COMPARTMENT MODEL 3-COMPARTMENT MODEL WITH ECW AND ICW



## Two compartment measurement

Using the hydrodensitometry (underwater weighing) the human body is divided into fat and fat free mass. Densitometry is mainly suitable for research and not for bedside or everyday use. Other techniques such as infra-red interactance and anthropometry, although not identical methods, are similar.

## Three compartment measurement

Due to the intraindividual variability of fluids, a three compartment model was developed which divides the body into fat, water and solids (protein and mineral are a fraction of fat free body mass).

## Four compartment measurement

Divides the body into fat, water, mineral and protein components. BioScan absolute measurement of phase allows the Impedance (Z) element to be separated into an additional 2 compartments, Resistance (R) (water) and Reactance (Xc) (cells).

This enables assessment to be made between body cell mass, extracellular and intracellular mass.

## PERCENTAGE BODY FAT LEVELS FOR CHILDREN AND ADULTS

MALES	MID	MAX
6-17	11-25	26-31
18-34	13	22
35-55	18	25
55 +	16	23

FEMALES	MID	MAX
6-17	16-30	31-36
18-34	28	35
35-55	32	38
55 +	30	35

AIDS / Wasting  
Anorexia Nervosa / Bulimia

Assessment in  
Pre / Postmenopausal Women

Assessment of Body Composition  
in Over Weight Patients

Body Composition Assessments

Body Composition Assessment  
during Pregnancy

Burns Units

Cardiovascular Disease

Community Nursing

Critically Ill

Crohn's Disease

Cystic Fibrosis

Diabetics

Dieticians

Eating Disorders

Endocrinology

Epidemiological Studies

Gastroenterology

Haemodialysis

ICU

Liver Disease

Lungs

Malnutrition Treatment / Research

Medical Research

Nephrology / Dialysis

Nutritionists

Obesity

Oedema

Paediatric

Parenter Enteral

Postoperative Fluid Status

Renal Failure

Rheumatoid Arthritis

The Elderly

Tissue Characterisation

Tropical Disease

Scientific Research

Stroke

Weight Reduction

# Market Sectors

**Complex changes occur in body composition during illness, monitoring these biological changes can provide us clear insight for early diagnosis and treatment.**

## Some of the different effects of diseases on body composition

- Loss or low Body Fat
- Excessive weight gain
- Loss of body weight
- Loss of Fat Free Mass
- Low muscle tissue
- Loss or low Bone mineral
- Loss of Body Cell Mass
- Malnourished
- Stunted growth
- Delay onset of puberty
- High Body density
- Fluid in balance
- Oedema
- Altered fluid status - Total body water, Extracellular and Intracellular fluids
- Decrease in Intracellular (associated with Body Cell Mass and Potassium)
- Increase in Extracellular Water symptomatic of oedema
- Plasma volume increases and fluid accumulates in the lungs, abdominal organs and peripheral tissues.
- Changes in Water, Mineral and Protein contents
- Muscle wasting in clinical patients (Cachexia wasting syndrome)
- Higher Bone Mass and Mineral density
- Reduce Lean Trunk mass



*Assessment of body composition enables us to provide adequate nutritional support in countering the effects of disease*



## Some of the clinical benefits:

Cardiopulmonary diseased patients with Cystic fibrosis, Chronic Obstructive pulmonary disease and Chronic heart failure lose body weight, and lean tissue due to muscle wasting and depletion of bone mineral, this effects body composition.

Body Cell Mass has been found to be a better indicator of survival than weight loss, in patients with wasting diseases and disorders like Cancer, Kidney and Dialysis, Liver diseases and Cirrhosis, Anorexia Nervosa, Muscular dystrophy, Multiple sclerosis, Spinal cord injury, HIV and Aids. Assessment can help clinicians identify BCM loss and monitor the efficiency of clinical intervention.

In patients with metabolic diseases such as Diabetes, Obesity and Thyroid diseases, there is a direct effect on fat, protein, minerals and carbohydrate thus increasing or decreasing body weight, resulting in an alteration of body composition.

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Technical Specifications BF-900 - BF-906 & BF-907	
Technique:	Bioelectrical Impedance Analyser
Frequency:	50Khz
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Accuracy:	Resistance to within 1.00% +/- 4Ω across 350-1000Ω
Ambient Temperature Environment:	+10°C to 40°C
Relative Humidity:	30% to 75% non-condensing
Atmospheric Pressure:	700hPa to 1060hPa
Test Current:	0.7mA
Power:	BF-900 / 906 1 - 9V PP3 Battery IEC No. 6LR6L BF-907 4 x 1.5AA Batteries IEC No. LR6
Battery Current:	20mA (approx)
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Dimensions:	BF-900 / 906 145 x 80 x 34mm (53/4 x 31/8 x 15/16 ins) BF-907 228 x 70/117 x 47mm (8.98 x 2.76/4.61 x 1.85 ins)
Service:	No serviceable parts other than replacement of battery
Guarantee:	12 months Parts and Labour (excluding disposables)

Technical Specifications BioScan 915 - 916 - 916S	
Technique:	Bioelectrical Impedance Analyser
Frequency:	50Khz Impedance, Phase, Resistance, Reactance
Resolution:	Measures in increments of 0.1%
Impedance Range:	100-1000 Ohms
Resolution:	1 Ohm
Accuracy:	Impedance to within 0.5% +/- 3Ω across 300-1000Ω
Phase range:	1.5 - 30.0 Degree
Resolution:	0.1 Degree
Accuracy:	+/- 0.1 Degree across 1.5 - 15 Degrees +/- 0.2 Degree across 15 - 30 Degrees
Resistance range:	100R - 1000R
Resolution:	1 Ohms
Reactance Range:	8R - 200R
Resolution:	0.1 ohms
BioScan 916 Estimation of	DATA OUTPUT RESOLUTION TBW - ECW - ICW in increments of 0.1 litres (0.1pints) FFM - FM in increments of 0.1Kg (0.1lbs) BCM 0.1Kg (0.1lb)
Printer Interface	Medically Isolated USB2
Ambient Temperature Environment:	+10°C to 40°C
Relative Humidity:	30% to 75% non-condensing
Atmospheric Pressure:	700hPa to 1060hPa
Test Current:	0.7mA
Power:	915 / 916 4 x 1.5AA Batteries IEC No. LR6
Battery Current:	50mA (approx)
Weight:	915 / 916 .575 kgs (1.268 lbs) with batteries .450 kgs (0.992 lbs) without batteries & Battery Compartment
Dimensions:	915 / 916 266 x 90/144 x 60mm (10.47 x 3.54/5.67 x 2.36 ins)
Service:	No serviceable parts other than replacement of batteries
Guarantee:	12 months Parts and Labour (excluding disposable items Batteries, Cables & Electrodes)

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