Versatile application with advanced BCA technology

InBody s10
THE PRECISION BODY COMPOSITION ANALYZER
InBody, the top domestic market brand, has produced S10 specialized for dialysis patients.

Helps to decide adequate dry weight, gives prescription of body water, and muscle mass state which are the key factors to lengthen the life span of dialysis patients.

For effective body water monitoring with the history function.

Get accurate result of body water level.
- Offers intracellular, extracellular water of each body part, total body water and ratio of ECW/TBW
- Easy to have a look at the accumulated result for intracellular, extracellular, total body water with history function.
- Body composition values are also offered to check whether the change of body water resulted from any other changes.

The improved history function to confirm the changes in dialysis patients
- Enables storage of 50,000 data that is accessible at any time
- Easy check for before/during/after dialysis state to confirm location of paralysis and related dialysis information
- See how the body water level changes before/during/after dialysis through a graph

Designed for practical and active use.
- Handy use with its own cart
- Convenient outdoor use with roving battery, portable bag, and thermal printer
- Ideally designed bag allowing convenient measurement without disassembling the entire machine
- Various optional equipments for active and convenient use.

Reasonable touch type electrode use
- Unlike disposable adhesive type, touch type electrode is used semi-permanently
- Comfortable and wearable
- Easy to use
- Also adhesive type is available depending on the patient’s situation.

Simply and intuitive design recognition of user interface
- Wide color LCD with touch screen
- Key pad also available for easy operation
- More functions, but easier use
Choose result report depending on your requirement
Available from standard result sheet to two more body water focused result sheets and thermal printer result sheet.

Standard result sheet: Body composition, nutrition evaluation and advice

Body water result sheet: Helps decide adequate dry weight based on body water balance and ratio (Information at Research Item part varies from body water result sheet 1 to 1L)

Thermal result sheet: Convenience for outdoor use
The main reason for the death of dialysis patients is due to excessive body water which has a very close relationship with hypertension and heart diseases. Many experts working with dialysis patients are seeking ways to accurately measure body water levels in order to minimize death of dialysis patients.\(^3\)

Bioelectrical Impedance Analysis (BIA) is non-invasive, convenient and accurate. This is why BIA has been actively studied and researched. However, single-frequency BIA uses experiential variables to correct the resulting values and cannot differentiate between intracellular water levels and extracellular water levels. Multi-frequency BIA on whole body also cannot accurately measure water levels because human body is not an exact cylinder form, therefore it is hard to use it on a clinical basis.\(^2\)

InBody’s Segmental Multi-frequency Bioelectrical Impedance Analysis (BIA) does not use experiential variables. It measures different parts of the body directly, thus results are accurate and reliable.\(^3\)

Since InBody minimizes errors, experts and scholars in 40 different countries have been using this solution.

InBody uses unique technology to measure intracellular and extracellular water level ratios as well as soft lean mass for different parts of the body.\(^4\) InBody offers an index that assesses the dialysis adequacy of patients to provide a safe and efficient treatment. In addition, InBody provides graphs to show intracellular/extracellular resistance ratio, dry weight assessment using the relationship between normal body water level and body weight as well as the relationship between intracellular and extracellular water level, and water level assessments using graphs of resistance value and reactance value.\(^5\)

According to the Korea Kidney Society, dialysis patients have increased 20.5x during the past 24 years from 2,534 in 1986, to 50,000 in 2009. The main causes for dialysis such as hypertension and diabetes are common in this modern society, it is predicted that even more patients will require dialysis.

Biospace has invented InBody S10 through the bioelectrical impedance analysis method to provide dialysis patients with a pleasant lifestyle and advancement of the quality of artificial kidneys.

In the future, InBody S10 will provide indices that accurately measure body water levels, nutrition levels and dry weight yield as well as other various measurements. InBody will revive superior dialysis treatment solution to help people with systematic and scientific dialysis management.
The trend of InBody users by Dialysis specialists’ in Japan

In 2008, 12 out of 13 studies from Japan Dialysis Society used InBody for their clinical trials. Japanese dialysis specialists are using InBody to decide patient’s body water balance, nutrition state and dry weight. InBody accurately measures total body water levels and extracellular water levels for different parts of the body and calculates ECW/TBW ratios. This result allows the dry weight to be utilized as a reference.

Abstract

This is a thesis that investigates whether InBody S20 can be used to measure body water levels before and after dialysis and compare with the results to see if body water level assessments are useful and whether it can be an index for dry weight. Normal status ECW/TBW weights become BIA-DW. Take clinical dry weight established by CTR, hANP, IVC to observe the relationships. We were able to find out that there was a strong relationship between BIA-DW and cDW after dialysis. (r=0.99, p<0.001). Therefore, InBody S20's body water level measurement is accurate and reproducible.

Ref. Research that confirms BIA method as DW reference index
Using InBody S20 to measure body water levels in a dialysis patient: Can Bioelectrical Impedance Analysis (BIA) be a index for dry weight? (Sasaki Nobuhiro and others, Japan Dialysis Bulletin 40(7): 581-588, 2007)
RESULT SHEET

InBody

I.D. BIO_208
HEIGHT 42
AGE 164cm
GENDER Male
DATE 2010.01.11
TIME 11:28:17

Body Water Analysis

<table>
<thead>
<tr>
<th>Element</th>
<th>Unit</th>
<th>Measured</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intracellular</td>
<td>l</td>
<td>23.3</td>
<td>20.6 – 25.2</td>
</tr>
<tr>
<td>Extracellular</td>
<td>l</td>
<td>15.1</td>
<td>12.6 – 15.4</td>
</tr>
<tr>
<td>Total Body Water</td>
<td>l</td>
<td>38.4</td>
<td>33.3 – 40.7</td>
</tr>
</tbody>
</table>

Segmental Water Analysis

<table>
<thead>
<tr>
<th>Segment</th>
<th>Unit</th>
<th>Measured</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Arm</td>
<td>l</td>
<td>2.40</td>
<td>1.99 – 2.43</td>
</tr>
<tr>
<td>Left Arm*</td>
<td>l</td>
<td>2.42</td>
<td>1.99 – 2.43</td>
</tr>
<tr>
<td>Trunk</td>
<td>l</td>
<td>18.8</td>
<td>15.8 – 19.4</td>
</tr>
<tr>
<td>Right Leg*</td>
<td>l</td>
<td>6.25</td>
<td>5.52 – 6.74</td>
</tr>
<tr>
<td>Left Leg</td>
<td>l</td>
<td>6.27</td>
<td>5.52 – 6.74</td>
</tr>
</tbody>
</table>

ECW/TBW

<table>
<thead>
<tr>
<th>Segment</th>
<th>Unit</th>
<th>Measured</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td>0.392</td>
<td>0.36 – 0.39</td>
</tr>
<tr>
<td>Right Arm</td>
<td></td>
<td>0.381</td>
<td>0.36 – 0.39</td>
</tr>
<tr>
<td>Left Arm</td>
<td></td>
<td>0.388</td>
<td>0.36 – 0.39</td>
</tr>
<tr>
<td>Trunk</td>
<td></td>
<td>0.393</td>
<td>0.36 – 0.39</td>
</tr>
<tr>
<td>Right Leg</td>
<td></td>
<td>0.393</td>
<td>0.36 – 0.39</td>
</tr>
<tr>
<td>Left Leg</td>
<td></td>
<td>0.396</td>
<td>0.36 – 0.39</td>
</tr>
</tbody>
</table>

Research Item

Muscle-Fat Analysis

<table>
<thead>
<tr>
<th>Measure</th>
<th>Weight</th>
<th>Skeletal Muscle</th>
<th>Body Fat</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured</td>
<td>61.3 kg</td>
<td>28.4 kg</td>
<td>9.5 kg</td>
<td>22.8 kg/m²</td>
</tr>
<tr>
<td>Normal Range</td>
<td>50.3 – 68.1</td>
<td>25.1 – 30.7</td>
<td>7.1 – 14.2</td>
<td>18.5 – 25.0</td>
</tr>
</tbody>
</table>

Fat Free Mass 51.8 kg

Segmental Lean Analysis

<table>
<thead>
<tr>
<th>Segment</th>
<th>Measured</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Arm</td>
<td>3.08 kg</td>
<td>2.40 – 3.24</td>
</tr>
<tr>
<td>Left Arm</td>
<td>3.09 kg</td>
<td>2.40 – 3.24</td>
</tr>
<tr>
<td>Trunk</td>
<td>24.0 kg</td>
<td>20.3 – 24.8</td>
</tr>
<tr>
<td>Right Leg</td>
<td>7.99 kg</td>
<td>7.05 – 8.61</td>
</tr>
<tr>
<td>Left Leg</td>
<td>8.01 kg</td>
<td>7.05 – 8.61</td>
</tr>
</tbody>
</table>

Protein 10.1 kg

Mineral 3.29 kg

Nutrition Index

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Measured</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCM</td>
<td>33.4 kg</td>
<td>29.5 – 36.1</td>
</tr>
<tr>
<td>BMC</td>
<td>2.67 kg</td>
<td>2.54 – 3.10</td>
</tr>
<tr>
<td>Arm Cir.</td>
<td>29.6 cm</td>
<td>-</td>
</tr>
<tr>
<td>Arm Muscle Cir.</td>
<td>26.7 cm</td>
<td>-</td>
</tr>
<tr>
<td>Waist Cir.</td>
<td>75.1 cm</td>
<td>Under 94.0</td>
</tr>
<tr>
<td>Visceral Fat Area</td>
<td>63.9 cm³</td>
<td>Under 100.1</td>
</tr>
<tr>
<td>BMR</td>
<td>1488 kcal</td>
<td>-</td>
</tr>
</tbody>
</table>

TBW/FFM 74.1%

Body Water History

- Date: November 10, 2010
- Time: 11:28:17

Impedance

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Resistance (Ohm)</th>
<th>Impedance (kohm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kHz</td>
<td>272.7</td>
<td>257.7</td>
</tr>
<tr>
<td>5 kHz</td>
<td>268.2</td>
<td>264.8</td>
</tr>
<tr>
<td>10 kHz</td>
<td>246.2</td>
<td>241.2</td>
</tr>
<tr>
<td>25 kHz</td>
<td>215.1</td>
<td>217.2</td>
</tr>
<tr>
<td>50 kHz</td>
<td>204.2</td>
<td>209.0</td>
</tr>
<tr>
<td>100 kHz</td>
<td>194.0</td>
<td>206.7</td>
</tr>
<tr>
<td>250 kHz</td>
<td>95.9</td>
<td>91.1</td>
</tr>
<tr>
<td>500 kHz</td>
<td>25.6</td>
<td>21.9</td>
</tr>
<tr>
<td>1 MHz</td>
<td>191.0</td>
<td>207.3</td>
</tr>
</tbody>
</table>

Phase Angle 5 kHz 2.5°

- Note: The data reflects the body's water content and composition, with normal ranges provided for comparison. The results indicate a healthy water balance and composition for the individual.
**For a scientific and accurate dialysis results for dialysis patients**

First, total body water analysis can be used to determine the body water balance. Second, the body water ratio can be used to determine the dry weight of the patient.

### How can we use the total body water analysis?

- Through body water analysis and sectional body water, determine the accumulation of body water.
- Inbody Direct Multi-frequency Measurement can separate the extracellular and intracellular water by body parts to accurately measure the body water. It can check for abnormal increase of the extracellular water due to renal deficiency.
- With the accurate body part measurement, it can also check for the impact of the blood vessel access on the accumulation of body water.

### How can we use the body water ratio?

- By accurately measuring the total body water and the extracellular body water, it provides the ratio of body water (extracellular water/total body water) for the entire body as well for each part of the body.
- The total body water of the patient can be compared to the normal body water ratio (0.380) to be used in determining the dry weight.
- It offers an objective data, not an estimate, so that the physician in implement objective decisions on further therapy.

### What can we know through the changes of body water?

- It offers key information from the previous measurements up to 12 times.
- The past results objectify the trends of the dialysis patient, so it can be used to determine the dry weight.

### For the healthy life of dialysis patients

First, it can be a convincing educational material for the patients with poor adherence. Second, it can be used as status guidelines for the patients who need to control their diet.

#### How can we use the body water analysis?

- It offers the body water percentage in our body and allows it to be compared to the average values. Especially, the proteins form the muscles in our body are directly related to the body water. Therefore, protein deficiency implies a body water deficiency, which means that the cells are undernourished.
- Depending on the changes in body fat, the dry weight can also change; therefore, the changes in body fat also needs to be monitored.

#### How can we use the skeletal muscles and fat?

- To estimate the accurate nutritional status, it offers various nutritional information, such as Body Cell Mass (BCM), Arm Circumference or Arm Muscle Circumference (AC or AMC), Visceral Fat Area (VFA), Total Body Water/Fat-free Mass (TBW/FFM).
- For a normal person, the nutritional levels can be estimated with Body Mass Index (BMI) or the body fat percentage, but for the dialysis patients with symptoms, such as abdominal dropsy or edema, it is hard to determine the accurate nutritional status. Therefore, many indicators are needed for the determination of the nutritional status.

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**The application of InBody in body water balance assessment**

1. The study measures the difference in water ratio between normal people and dialysis patients. Evaluation of Ideal Body Weight in Dialysis Patients through Bioelectrical Impedance Analysis, Weng-Sheng TSAI et al., Acta Nephrologica 16:119-124, 2002


3. The study confirmed that the intracellular water level remained constant but extracellular water level had a significant drop in comparison to before the dialysis. Evaluation of body water with hemodialysis patients by multifrequency BIA machine. Jeayoung Jang. Korea Kidney Society 23(3): 446-452, 2004


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**Report from Ajinkai Hospital, Japan**

The study says that AMC of left arm and BCM value of InBody is accurate, thus it is very useful to evaluate the nutrition level of dialysis patients. Evaluate nutrition level of dialysis patients 3 times per month.
**Specifications**

**Bioelectrical Impedance Analysis**

**Measurement items**

- **Input Impedance (Z)**
- **Re-actance (Xc)**
- **Phase angle (θ)**

**Outputs**


**Electrode Method**

- Tetrapolar 8-Point tactile/adhesive electrode system

**Measurement Method**

- Direct Segmental Multi-frequency Bioelectrical Impedance Analysis Method, DSM-BIA method

**Body Composition Calculation Method**

- No use of Empirical Estimation

**Functional specifications**

- **Logo Display**: Possible to input name of the user’s place, address and contact number.
- **Type of Result Sheet**: Body composition result sheet, Body water result sheet, Lying Posture, Seated Posture, Standing Posture
- **Portability**: Indoor - with own cart(optional), outdoor - with own portable bag
- **Posture**: Lying, Lying Posture, Seated Posture, Standing Posture
- **Electrode Type**: Touch Type, Adhesive Type
- **Setting of Dialysis Mode**: Measurement time(before/during/after dialysis), Access position, Paralyzed position set available
- **Data Storage**: Possible to save the result when inputting ID(up to 100,000)
- **User’s Interface**: Touch screen and key pad
- **Use of USB Storage Device**: Touch screen and key pad
- **Data Back-Up**: Possible to save data to USB Storage Device (compatible with Excel and Lookin’Body software)
- **Printer Connection**: Possible to back up data through USB Storage Device and to restore the data to the InBody
- **Applied Rating Current**: Under100μA(tattoo), 500μA(over 1kHz)
- **Power Input**: AC100-240V, 50/60Hz, 1.2A
- **Power Output**: DC 12V, 3.4A
- **Display Type**: 800 x 480 Touch Color LCD
- **External Interface**: RS-232C 1EA, USB Slave 1EA, USB Host 1EA
- **Compatible Printer**: Laser/inkjet PCL 3 or above and SPL (Printer recommended by BIOSPACE), Thermal Printer (Optional)
- **Dimensions**: 224 (L), 102 (W), 210 (H) mm
- **Machine Weight**: 5.3 kg
- **Measurement Duration**: 1 min. 50 sec.
- **Operation Environment**: Under100, 250 (L), 202 (W), 1000 (H) mm
- **Weight Range**: 800 ~ 202 (W)
- **Height Range**: 202 (L), 1000 (H)
- **Temperature**: 5 ~ 99 years

**Other specifications**

- **Logo Display**: Possible to input name of the user’s place, address and contact number.
- **Type of Result Sheet**: Body composition result sheet, Body water result sheet (Printed Paper/Blank Paper)
- **Portability**: Indoor - with own cart(optional), outdoor - with own portable bag
- **Posture**: Lying, Lying Posture, Seated Posture, Standing Posture
- **Electrode Type**: Touch Type, Adhesive Type
- **Setting of Dialysis Mode**: Measurement time(before/during/after dialysis), Access position, Paralyzed position set available
- **Data Storage**: Possible to save the result when inputting ID(up to 100,000)
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- **Height Range**: 202 (L), 1000 (H)
- **Temperature**: 5 ~ 99 years

**Specifications**

- Power Output DC 12V, 3.4A
- Should use the USB Storage Device provided by BIOSPACE
- Possible to input name of the user’s place, address and contact number.
- Possible to save the result when inputting ID(up to 100,000)
- Touch screen and key pad
- Possible to save data to USB Storage Device (compatible with Excel and Lookin’Body software)
- Possible to back up data through USB Storage Device and to restore the data to the InBody

* Specifications are examinee to be changed without prior notice.

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**Certifications and patents obtained by Biospace**

- FDA
- CE-0128
- OPIC
- CIPO
- ISO13485
- ISO9001
- KFDA
- CE 0120
- U.S. patent U.S. 5720296
- Korea Food & Drug Administration

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**Biospace America, Inc.**

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- **Homepage:** http://www.biospaceamerica.com
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