

seca mBCA

Clinically validated BIA for improved Nutritional Assessment



Looking back: 1840

Birth of the world market leader for medical
weighing and measuring solutions



Today: 2020

seca remains world market leader with more than 3 mio. products exported in more than 140 countries per year and a market share of 50% for medical weighing solutions



seca group

seca deutschland

seca france

seca united kingdom

seca north america

seca schweiz

seca zhong guo

seca nihon

seca méxico

seca austria

seca polska

seca middle east

seca brasil

seca suomi

seca américa latina

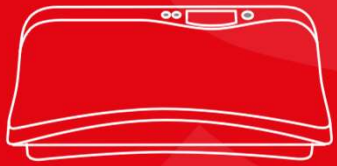
seca asia pacific

seca danmark

seca benelux

seca lietuva





Measuring and Weighing



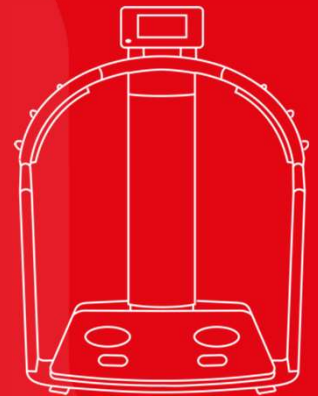
mVSA



Software & Integration



Service



mBCA

seca mBCA

medically validated bioelectrical
Impedance Analysis in just 17 seconds



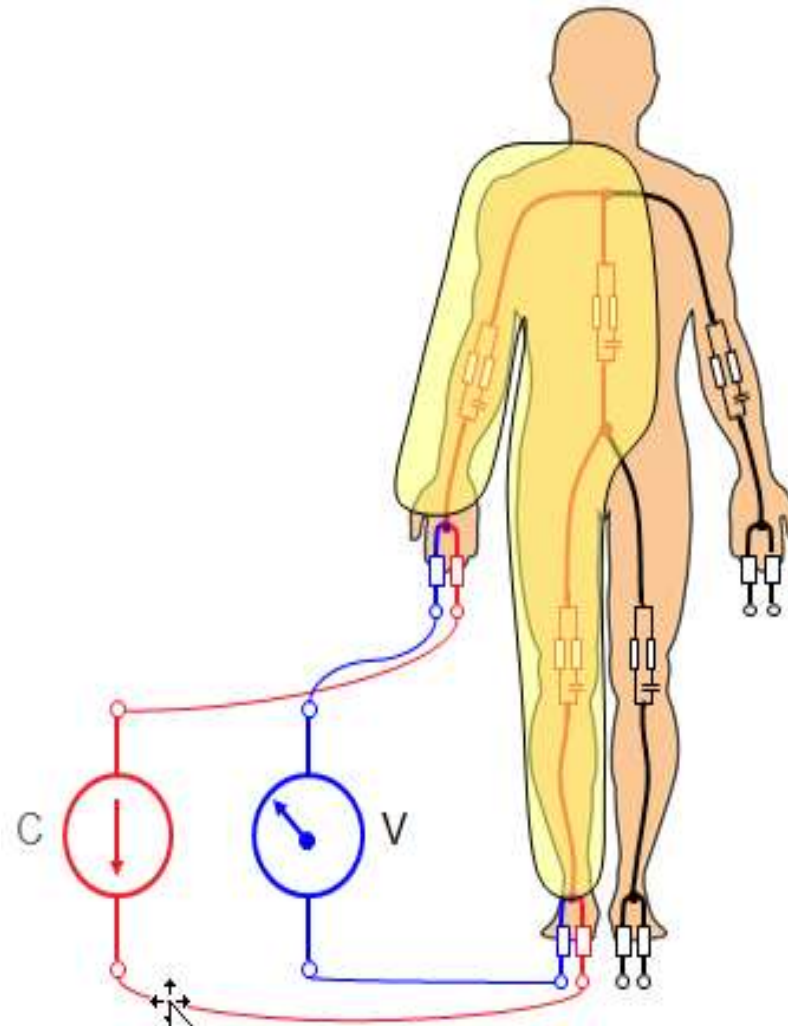
Body Composition Analysis today...

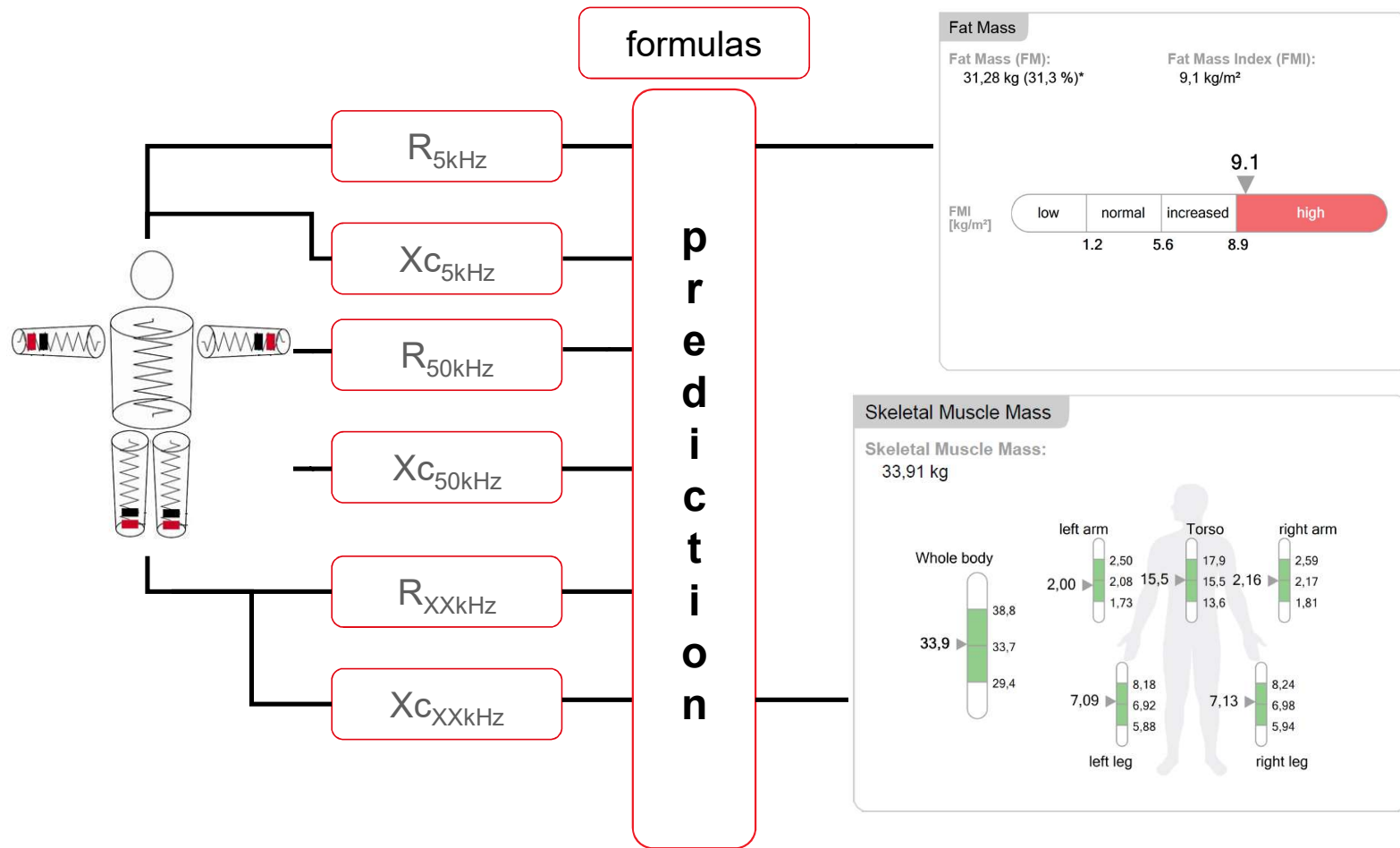
What do you already know about Bio-Impedance analysis?



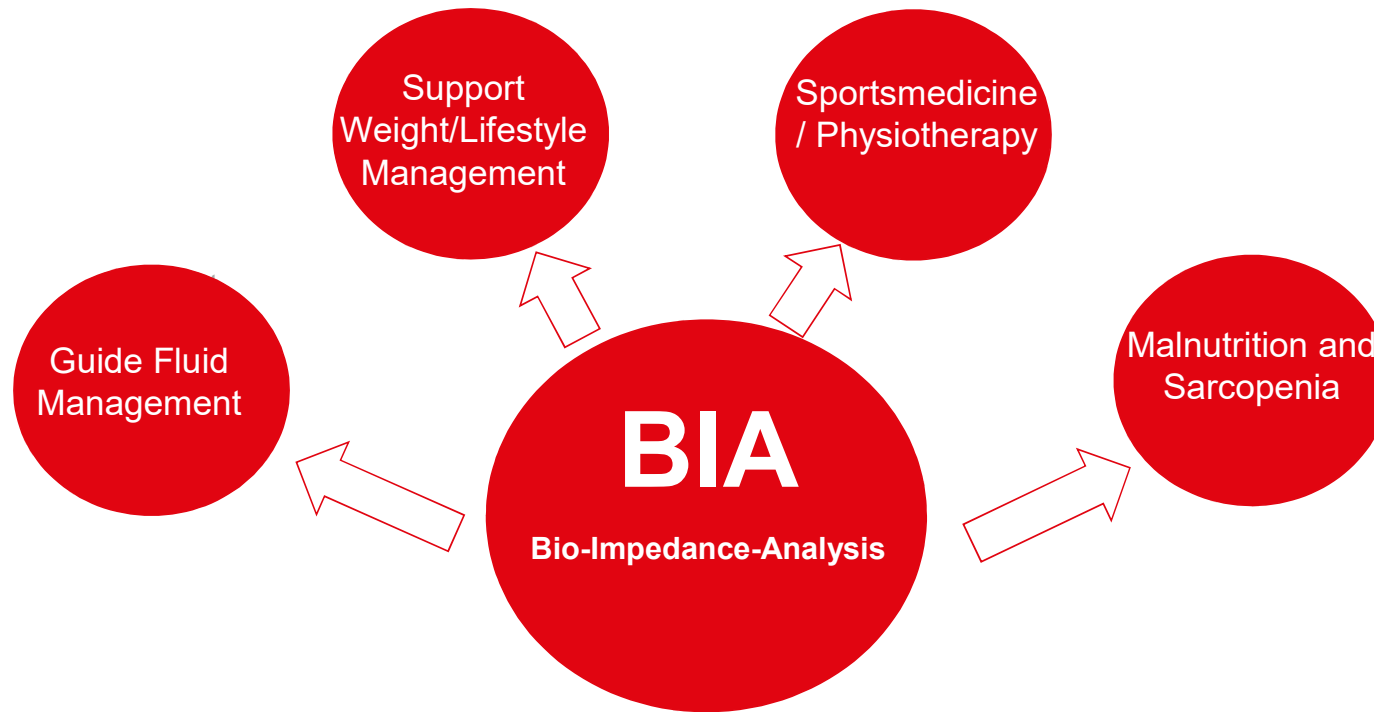
BIA principles

- **Impedance (Z)** is a function of Resistance and Reactance
 - **Resistance (R)** is a measurement of pure opposition to current flow through the body
 - **Reactance (Xc)** is the opposition to current flow caused by capacitance (voltage storage) produced by the cell membrane (Kushner 1992)





Bio-Impedance analysis in medicine

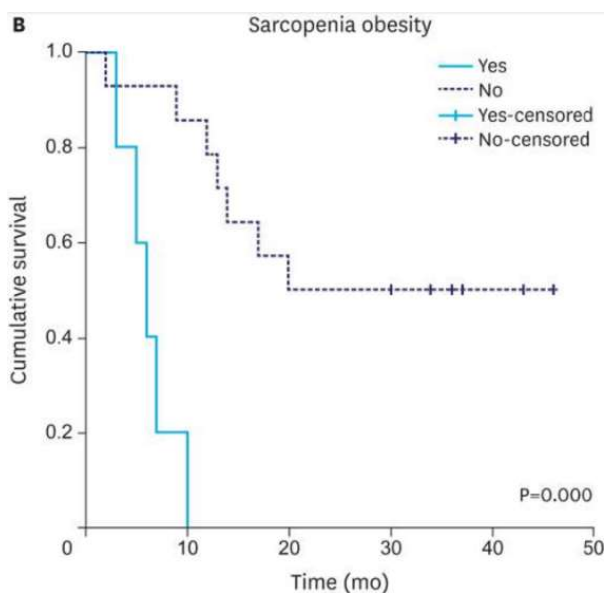


Clinical implications of sarcopenia & sarcopenic obesity

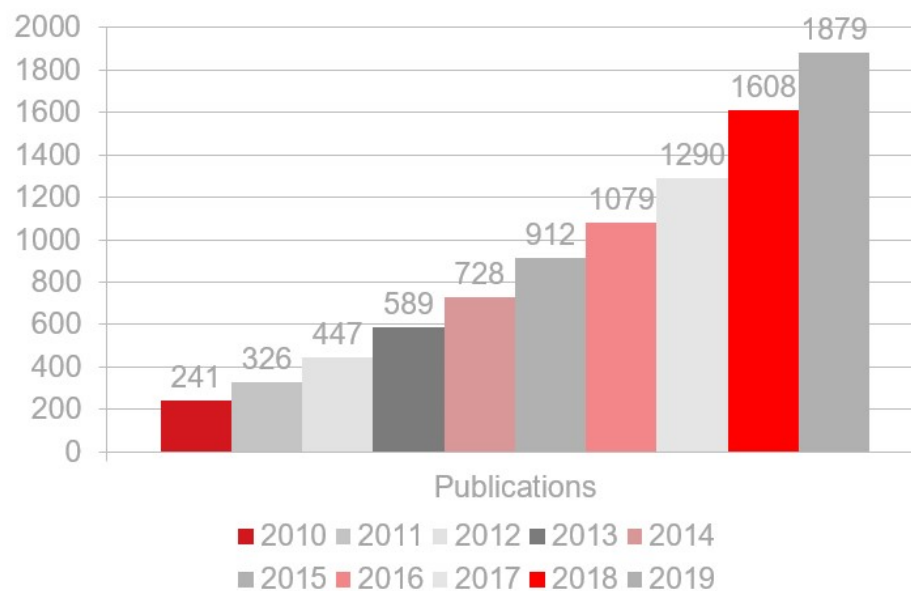
J Gastric Cancer, 2017 Mar;17(1):74-87. doi: 10.5230/jgc.2017.17.e8. Epub 2017 Mar 14.

Body Composition as a Prognostic Factor of Neoadjuvant Chemotherapy Toxicity and Outcome in Patients with Locally Advanced Gastric Cancer.

Palmela C¹, Velho S², Agostinho L³, Branco F⁴, Santos M⁵, Santos MP¹, Oliveira MH⁶, Strecht J³, Maio R⁵, Cravo M¹, Baracos VE⁷.



Search results of "sarcopenia" on pubmed



Wide spectrum of patients with malnutrition/sarcopenia



- Significant weight loss, low food intake, weakness
- Obvious nutritional problem
- Survival is poor
- Standard assessment tools are suitable
- Gain/maintain lean mass
- Body composition analysis as monitoring tool



- No obvious sign of malnutrition
- Increased Body Fat in combination with normal or low lean-mass
- Standard assessment tools are not suitable
- Nutritional needs difficult to assess
- Body Composition Analysis to identify sarcopenic obesity

Definition and diagnosing of malnutrition and sarcopenia

[Clin Nutr](#). 2015 Jun;34(3):335-40. doi: 10.1016/j.clnu.2015.03.001. Epub 2015 Mar 9.

Diagnostic criteria for malnutrition - An ESPEN Consensus Statement.

[Cederholm T](#)¹, [Bosaeus I](#)², [Barazzoni R](#)³, [Bauer J](#)⁴, [Van Gossum A](#)⁵, [Klek S](#)⁶, [Muscaritoli M](#)⁷, [Nyulasi I](#)⁸, [Ockenga J](#)⁹, [Schneider SM](#)¹⁰, [de van der Schueren MA](#)¹¹, [Singer P](#)¹².

[Clin Nutr](#). 2017 Feb;36(1):49-64. doi: 10.1016/j.clnu.2016.09.004. Epub 2016 Sep 14.

ESPEN guidelines on definitions and terminology of clinical nutrition.

[Cederholm T](#)¹, [Barazzoni R](#)², [Austin P](#)³, [Ballmer P](#)⁴, [Biolo G](#)⁵, [Bischoff SC](#)⁶, [Compher C](#)⁷, [Correia I](#)⁸, [Higashiguchi T](#)⁹, [Holst M](#)¹⁰, [Jensen GL](#)¹¹, [Malone A](#)¹², [Muscaritoli M](#)¹³, [Nyulasi I](#)¹⁴, [Pirlich M](#)¹⁵, [Rothenberg E](#)¹⁶, [Schindler K](#)¹⁷, [Schneider SM](#)¹⁸, [de van der Schueren MA](#)¹⁹, [Sieber C](#)²⁰, [Valentini L](#)²¹, [Yu JC](#)²², [Van Gossum A](#)²³, [Singer P](#)²⁴.

[Clin Nutr](#). 2019 Feb;38(1):1-9. doi: 10.1016/j.clnu.2018.08.002. Epub 2018 Sep 3.

GLIM criteria for the diagnosis of malnutrition - A consensus report from the global clinical nutrition community.

[Cederholm T](#)¹, [Jensen GL](#)², [Correia MITD](#)³, [Gonzalez MC](#)⁴, [Fukushima R](#)⁵, [Higashiguchi T](#)⁶, [Baptista G](#)⁷, [Barazzoni R](#)⁸, [Blaauw R](#)⁹, [Coats A](#)¹⁰, [Crivelli A](#)¹¹, [Evans DC](#)¹², [Gramlich L](#)¹³, [Fuchs-Tarlovsky V](#)¹⁴, [Keller H](#)¹⁵, [Llido L](#)¹⁶, [Malone A](#)¹⁷, [Mogensen KM](#)¹⁸, [Morley JE](#)¹⁹, [Muscaritoli M](#)²⁰, [Nyulasi I](#)²¹, [Pirlich M](#)²², [Pisprasert V](#)²³, [de van der Schueren MAE](#)²⁴, [Siltharm S](#)²⁵, [Singer P](#)²⁶, [Tappenden K](#)²⁷, [Velasco N](#)²⁸, [Waitzberg D](#)²⁹, [Yamwong P](#)³⁰, [Yu J](#)³¹, [Van Gossum A](#)³², [Compher C](#)³³; [GLIM Core Leadership Committee](#); [GLIM Working Group](#).

ESPEN Consensus statement 2015.

Fact box: Two alternative ways to diagnose malnutrition. Before diagnosis of malnutrition is considered it is mandatory to fulfil criteria for being “at risk” of malnutrition by any validated risk screening tool.

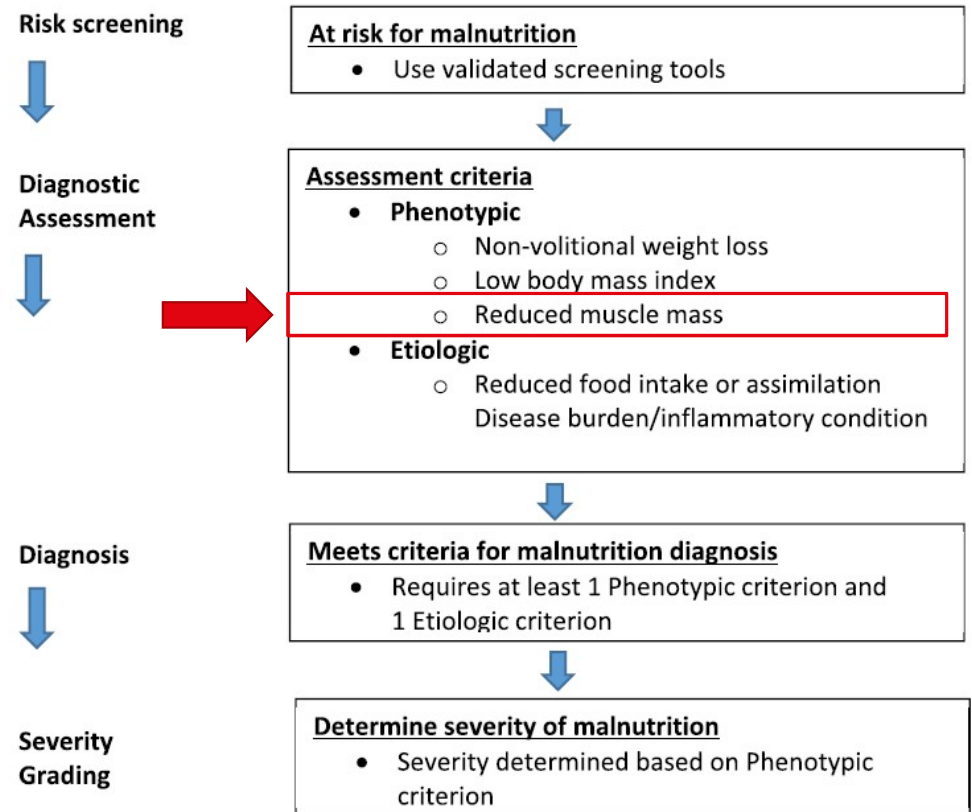
Alternative 1:

- BMI <18.5 kg/m²

Alternative 2:

- Weight loss (unintentional) > 10% indefinite of time, or >5% over the last 3 months combined with either
- BMI <20 kg/m² if <70 years of age, or <22 kg/m² if ≥70 years of age or
- FFMI <15 and 17 kg/m² in women and men, respectively.

GLIM diagnostic scheme for screening, assessment, diagnosis and grading of malnutrition.



Definition and diagnosing of sarcopenia

GLIM

Table 2
Examples of recommended thresholds for reduced muscle mass.

	Males	Females	
Appendicular Skeletal Muscle Index (ASMI, kg/m ²) [15]	<7.26	<5.25	
ASMI, kg/m ² [24] ^a	<7	<6	EWGSOP
ASMI, kg/m ² [17] ^b			
DXA	<7	<5.4	AWGS
BIA	<7	<5.7	AWGS
Fat free mass index (FFMI, kg/m ²) [8]	<17	<15	ESPEN
Appendicular lean mass (ALM, kg) [25]	<21.4	<14.1	
Appendicular lean mass adjusted for BMI = ALM/BMI [26]	<0.725	<0.591	

DXA = dual energy x-ray absorptiometry, BIA = bioelectrical impedance analysis.
BMI = body mass index.

^a Recommendations from European Working Group on Sarcopenia in Older People 2 (EWGSOP2); personal communication Alfonso Cruz-Jentoft.

^b Recommendations from Asian Working Group for Sarcopenia (AWGS) for Asians.

ASMI

Appendicular Skeletal Muscle Index

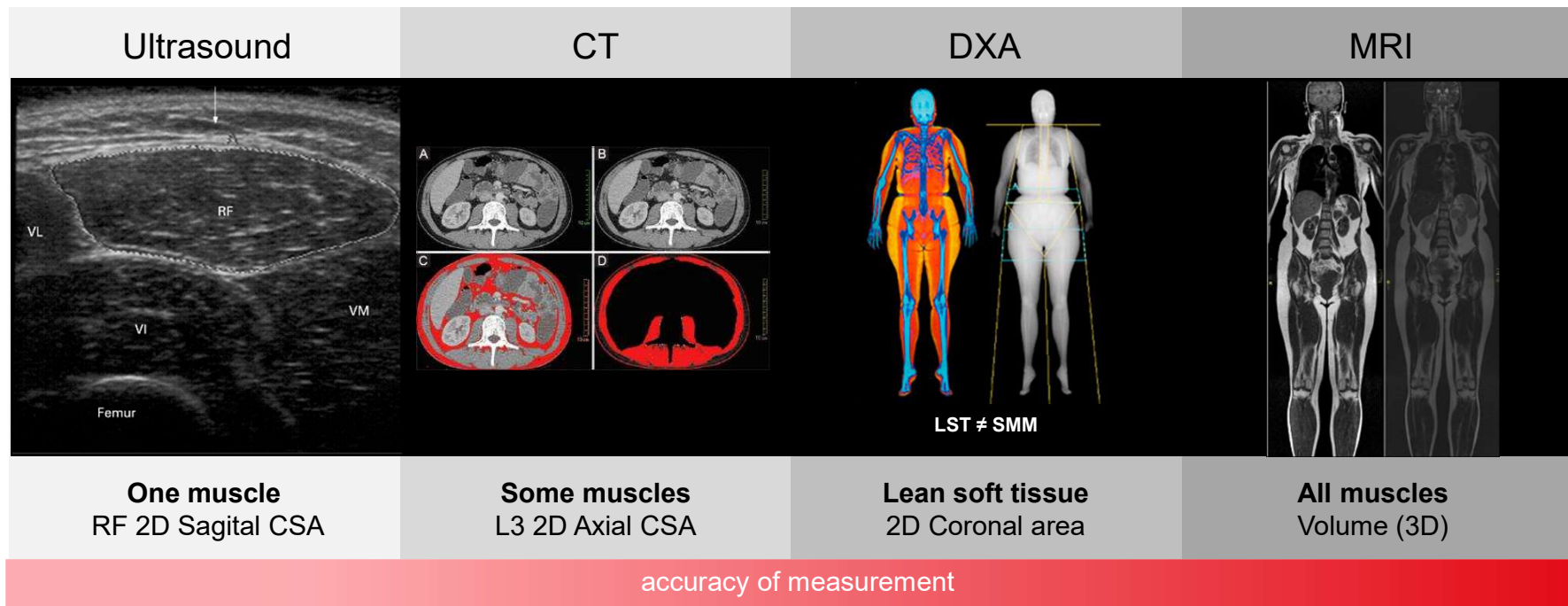
FFMI

Fat-Free Mass Index

ALM

Appendicular Lean Mass

Accuracy of methodologies to assess muscle mass / lean mass



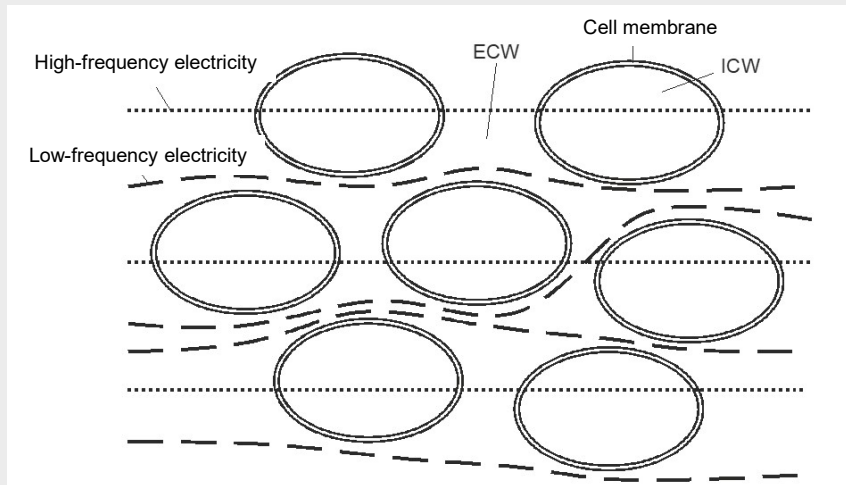
Body Composition Analysis today:

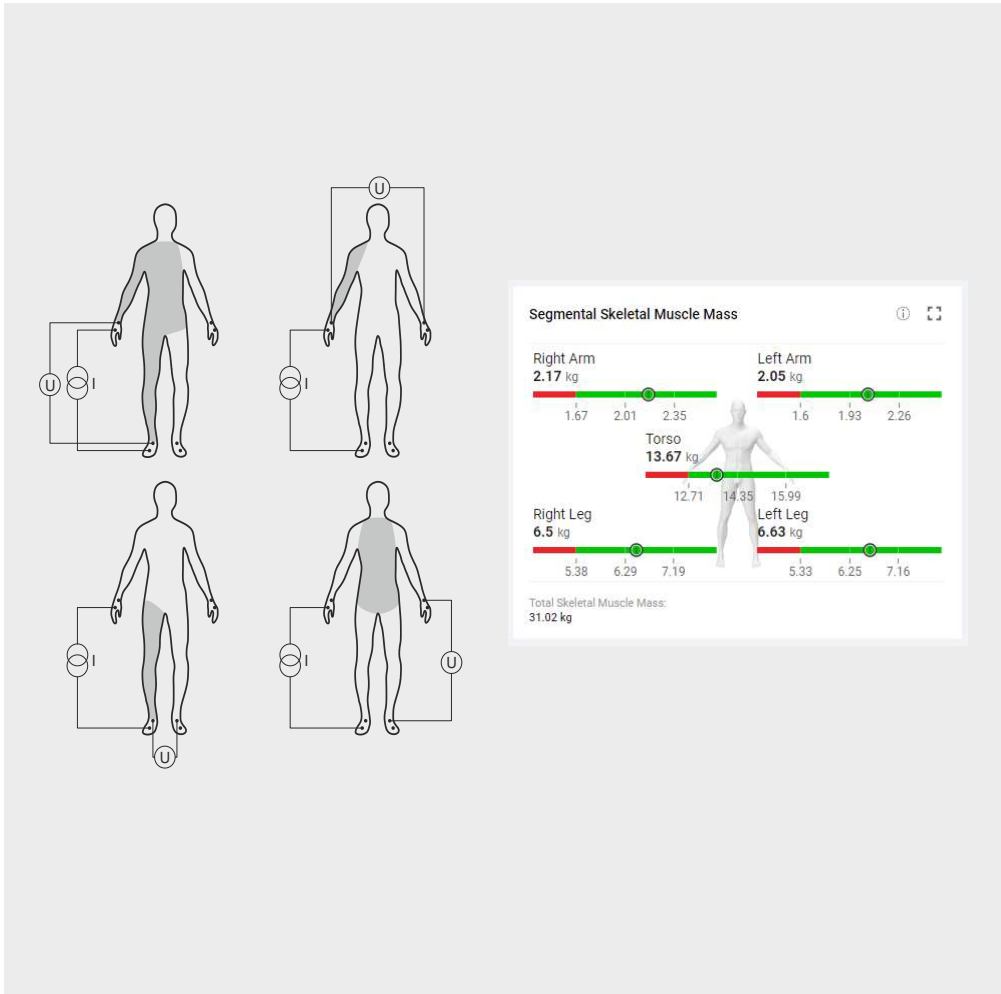
Criteria for a meaningful BIA?



Multifrequency measurement

- Multifrequency BIA
- Alternating currents with **lower frequency** do not pass through the cell membranes and therefore only flow through the **ECW**
- **Increasing the frequency** causes this cell membrane to pass and flow through the **TBW**

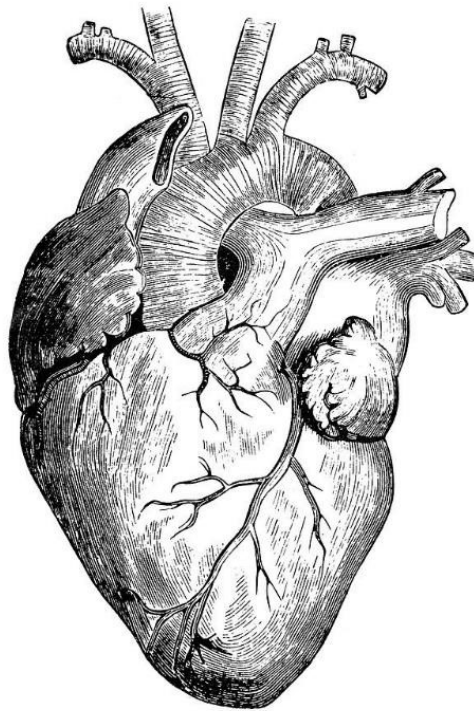
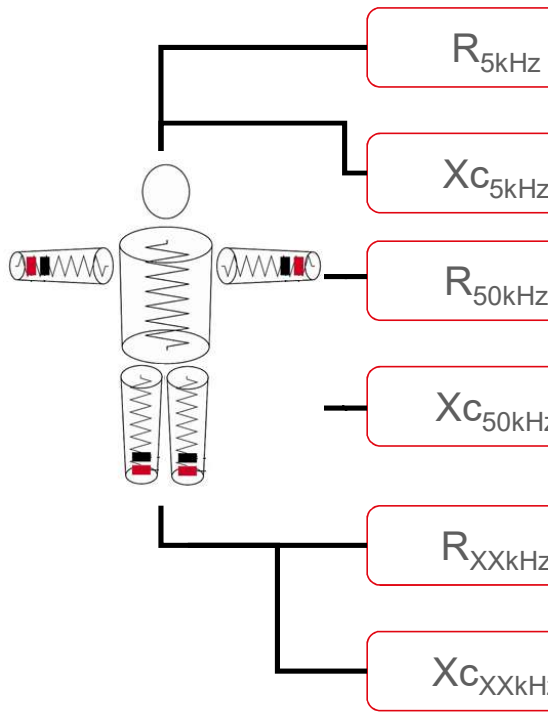




segmental measurement

with **8 electrodes** for a separate measurement of the impedance of individual arms, legs and torso

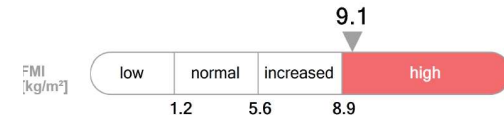
formulas



Fat Mass

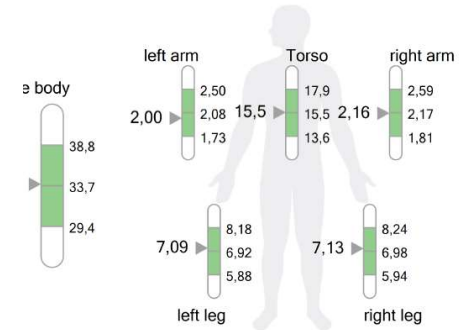
Fat Mass (FM):
31,28 kg (31,3 %)*

Fat Mass Index (FMI):
9,1 kg/m²



Muscle Mass

Muscle Mass:



Relevant parameters for reliable BIA equations:

- Height
- Weight
- Gender
- Age
- Waist Circumference
- Ethnicity

Table 2. Results of three stepwise regression analyses in phase 1 (Kiel) with FFM_{4C} (kg), TBW_{D_2O} (l) and ECW_{NaBr} (l) as the dependent variables

Predictors of FFM_{4C} (kg)	R^2	P-value
Ht^2/R_{50} (Ω)	0.93	<0.001
X_{C50} (Ω)	0.95	<0.001
Index R_{50} trunk/extremities (Ω)	0.96	<0.001
Weight, kg	0.97	<0.001
Gender	0.97	<0.001
Age, year	0.98	<0.001
Intercept		0.092
<i>Predictors of ECW_{NaBr} (l)</i>		
Ht^2/R_{50} (Ω)	0.89	<0.001
Weight, kg	0.92	<0.001
Index R_{50} trunk/extremities (Ω)	0.94	<0.001
Intercept		<0.001
<i>Predictors of TBW_{D_2O} (kg)</i>		
Ht^2/R_{50} (Ω)	0.93	<0.001
X_{C50} (Ω)	0.95	<0.001
Weight, kg	0.96	<0.001
Index R_{50} trunk/extremities (Ω)	0.97	<0.001
Index X_{C50} trunk/extremities (Ω)	0.97	0.046
Age, year	0.98	0.002
Gender	0.98	0.027
Intercept		0.488

Abbreviations: ECW extracellular water; FFM fat-free mass; $RMSE$ root

Formula validation against Gold Standard methods



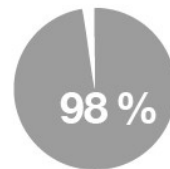
97 % for muscle mass in comparison to **MRI**

In an elaborate analysis, over 250 full-body MRI scans were evaluated in total. The high resolution of magnetic resonance imaging allows especially high-contrast and differentiated images, in contrast to the less precise DEXA method.



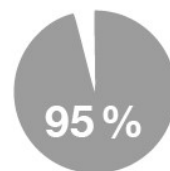
98 % for Fat-Free Mass in comparison to the **4C model**

The elaborate and time-consuming 4-compartment model requires individually assessing body volume, body weight, bone minerals and total body water.



98 % for total body water in comparison to the **D₂O dilution**

The body water is marked with the isotope deuterium. The total body water is determined from the distribution area. The enrichment of blood is analyzed by mass spectrometry.



95 % for extracellular water in comparison to the **NaBr dilution**

Dilution methods measure body water and its distribution via the dilution of a radioactive tracer in the body. To accomplish this, the stable isotope NaBr is administered orally and several hours later a blood sample is analyzed.



Formula validation against Gold Standard methods



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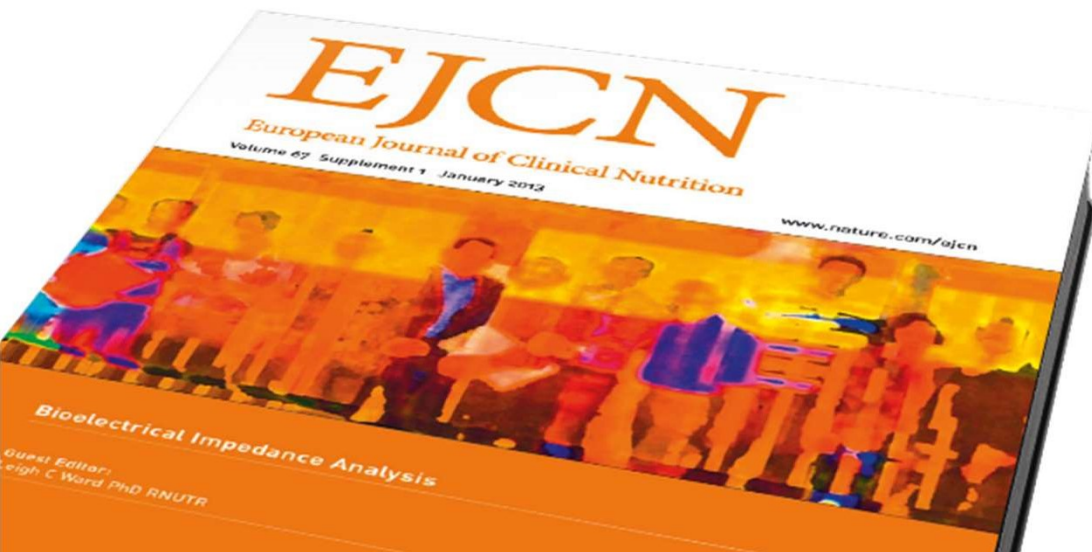


Validated multi-ethnic normal ranges



Comprehensive **normal ranges** based on more than 3,000 subjects

Transparent publicized studies in Peer-Reviewed Journals and global research collaborations



Christian-Albrechts-Universität zu Kiel



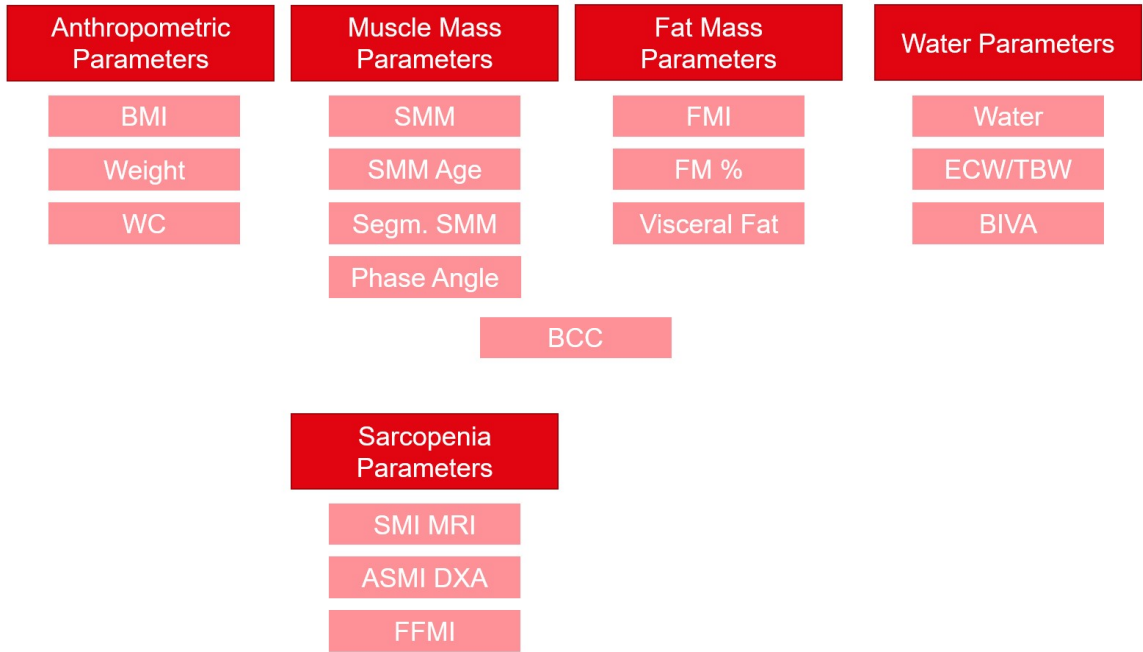
COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK



CLI/SI

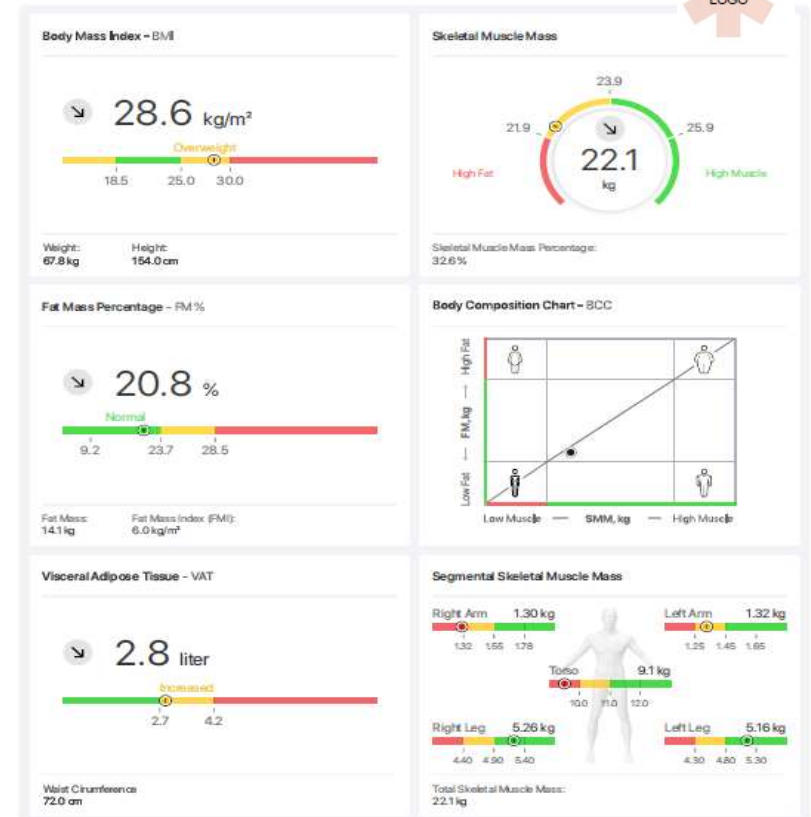
seca

mBCA parameters



seca mBCA medical Body Composition Analyzer

ID 1157-20200324-094134
Name Max Mustermann
Gender, Age Male, 57
Date of test 11.09.2020 09:41 am
Device seca mBCA 545



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Selection of Malnutrition/Sarcopenia related parameters from the seca mBCA

Fat-Free Mass Index - FFMI

↘ 20.4 kg/m²



Fat-Free Mass:
66.99 kg (86.3 %)

Appendicular Skeletal Muscle Index by DXA - ASMI

↘ 8.5 kg/m²

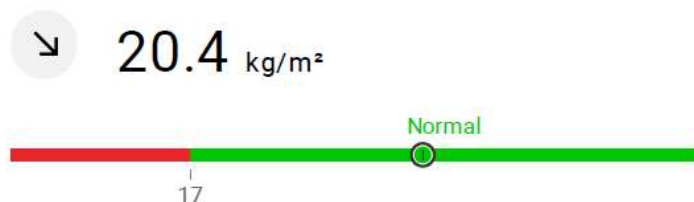


Skeletal Muscle Mass by DXA is equivalent to lean soft tissue

Appendicular Skeletal Muscle Mass:
28.01 kg (36.1 %)

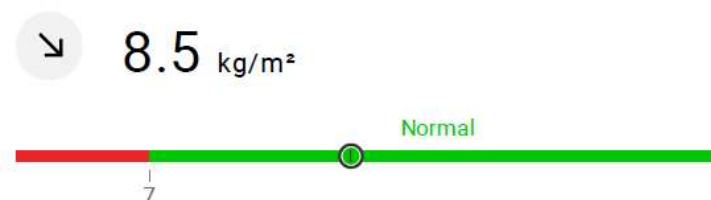
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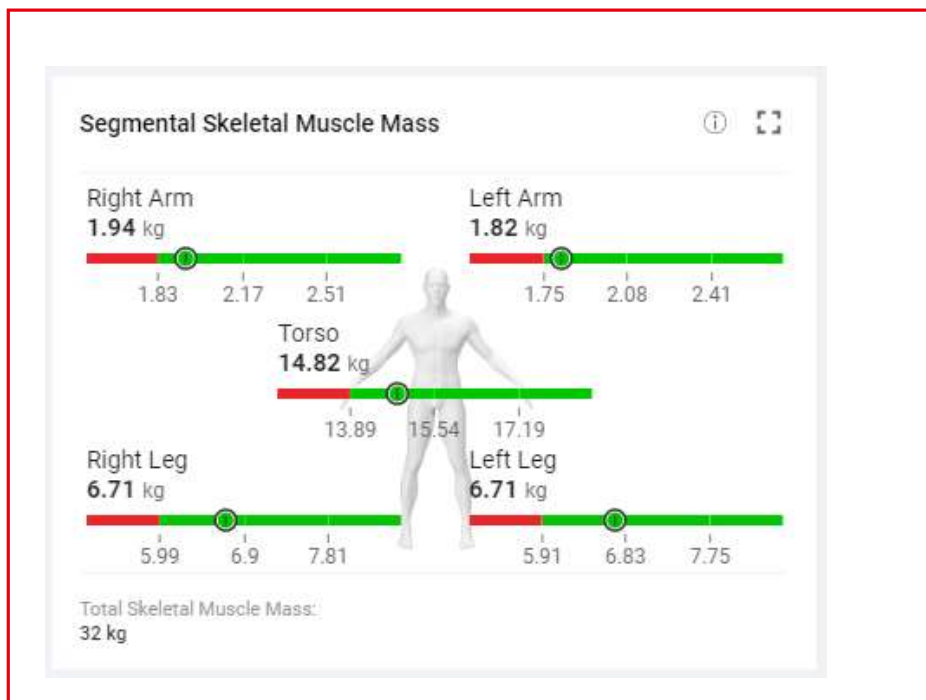
Appendicular Skeletal Muscle Index by DXA - ASMI



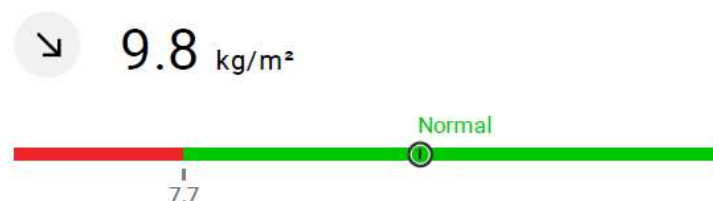
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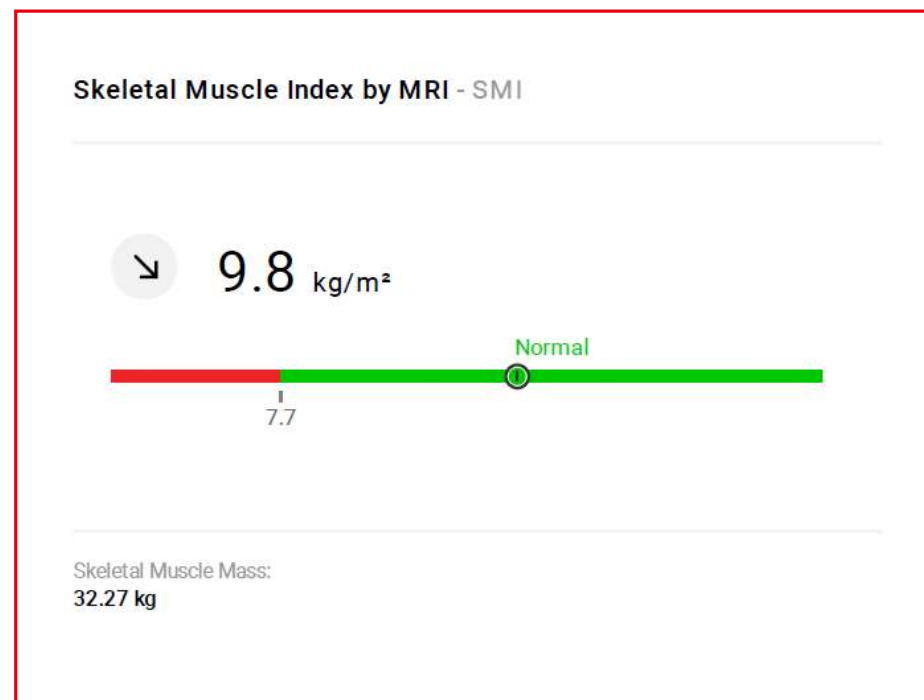
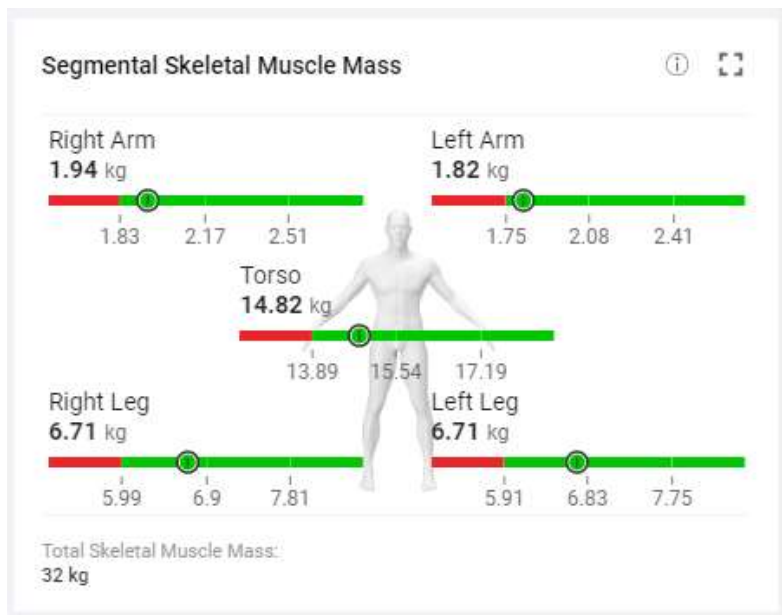


Skeletal Muscle Index by MRI - SMI

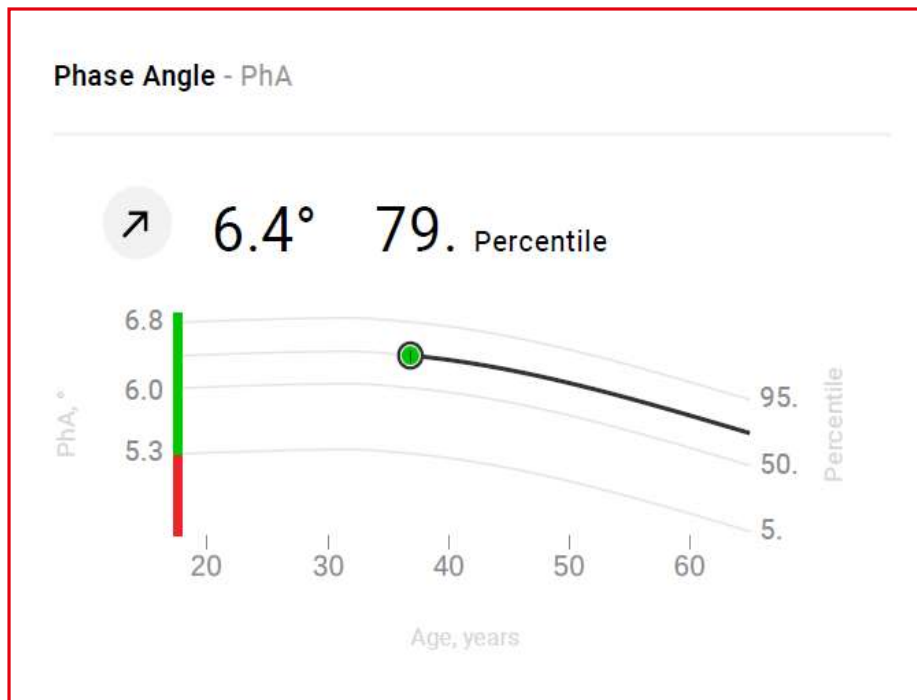


Skeletal Muscle Mass:
32.27 kg

Malnutrition/Sarcopenia related parameters



Malnutrition/Sarcopenia related parameters



Preciznost za zdravlje.

Precisie voor de gezondheid.

Tarkkuutta terveyteen.

Precisión para la salud. 为健康而精确

Precision for health.

La précision au service de la santé.

Präzision für die Gesundheit. Percyzja dla zdrowia.

Percisione per la salute.