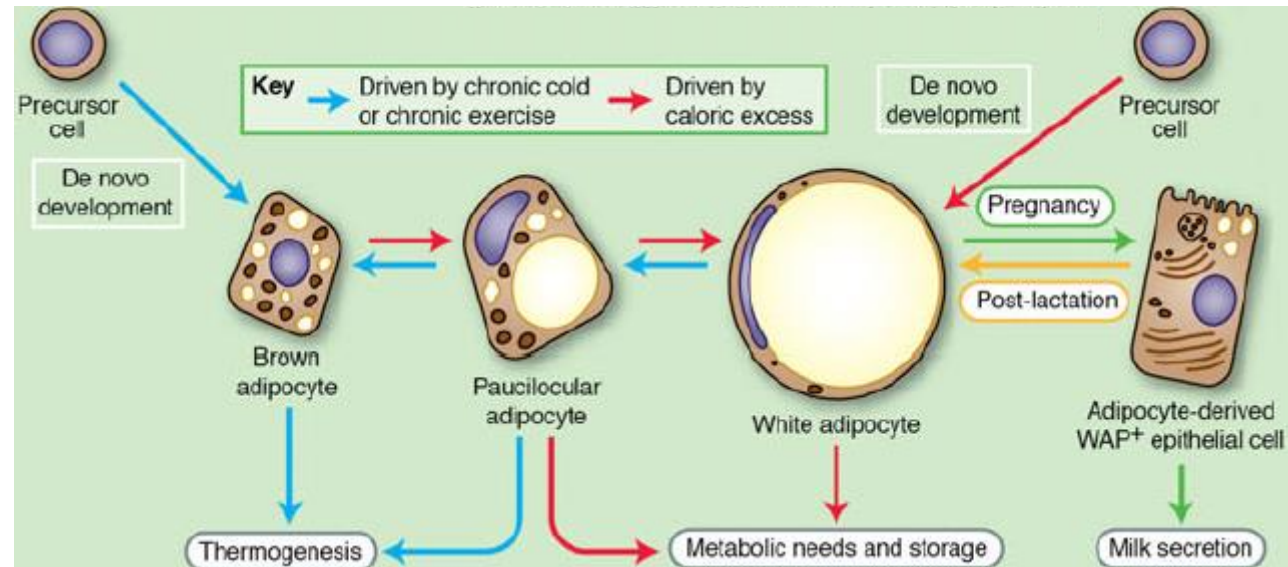
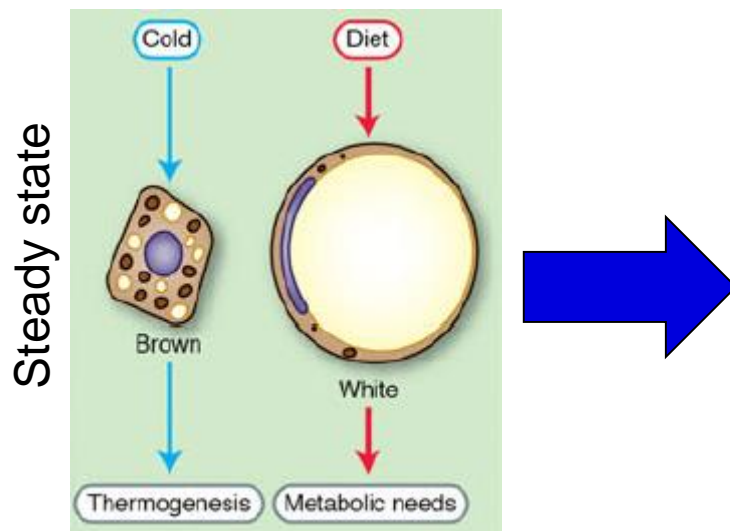


# **Evaluation of the nutrition state**

# Adipose tissue

- White (for storing dietary energy as TAGs)
- Brown (for ability to convert chemical energy into heat)
- Beige = harbored



# Fat tissue functions

- Thermogenesis
- Lactation
- Immune responses
- Fuel for metabolism

# Structure of adipose tissue

- Adipocytes
- Non-fat cells:
  - inflammatory cells (macrophages)
  - immune cells
  - preadipocytes
  - fibroblasts
- Connective tissue matrix
- Vascular tissue
- Neural tissue

# Abdominal fat

The abdominal fat is present in two main depots:

- Subcutaneous (80% of all body fat)
- Intra-abdominal (10–20% of total fat in men and 5–8% in women)

# Adipocytes

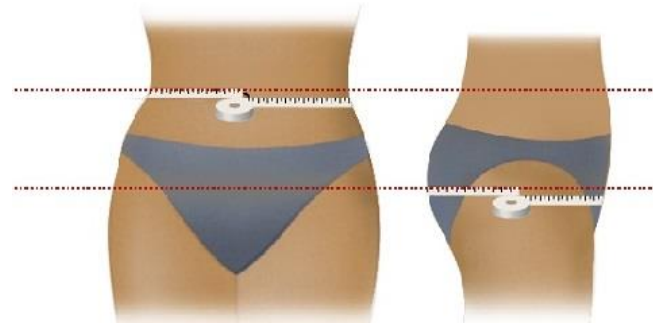
- New smaller adipocytes act as a buffers. They are more insulin-sensitive and have high avidity for FFAs and TGs uptake, preventing their deposition in non-adipose tissue (SCAT)
- Large adipocytes are insulinresistant, hyperlipolytic and resistant to anti-lipolytic effect of insulin (VAT)

# Clinical and prognostic differences

- Metabolic risks
- Metabolic syndrome
- Vascular risk and cardiovascular events
- Prediction of mortality

# Anthropometric indexes of abdominal adipose tissue mass

- WHR
- Waist circumference
- Abdominal sagittal diameter\*



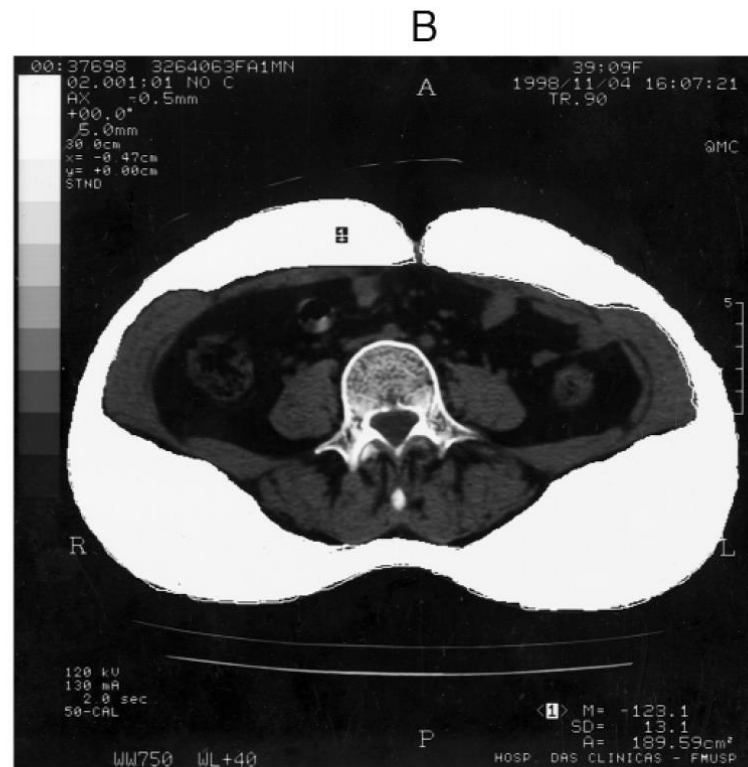
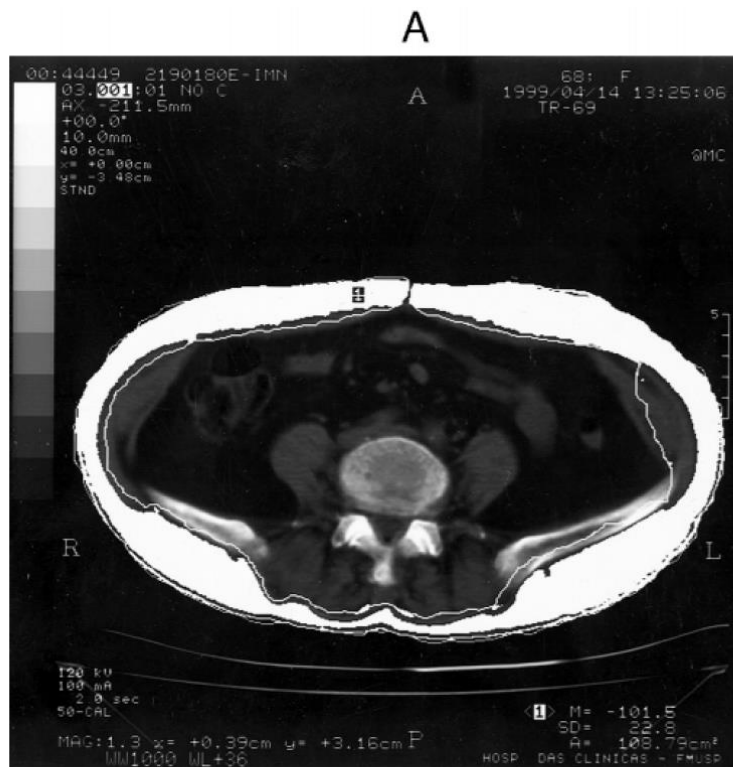
Waist circumference (cm)		
Category	Men	Women
Normal value	≤ 94	≤ 80
Necessity to decrease body mass	95–102	81–90
Medical assistance with decreasing of body mass necessary	> 102	> 90

WHR: for women < 0.80  
for men < 1.00



# Imaging techniques

## – Computed tomography (CT)



- L4 – L5 region
- V/S ratio
- $V/S \geq 0.4$  (V group)
- $V/S < 0.4$  (SC group)

Computed tomography showing cross-sectional abdominal areas at umbilicus level in two patients demonstrating variation in fat distribution. A, Visceral type (49-yr-old female, 23.1 of BMI, visceral fat area: 146 cm<sup>2</sup>; subcutaneous fat area, 115 cm<sup>2</sup>; V/S ratio, 1.27). B, Subcutaneous type (40-yr-old female, 24.0 of BMI, visceral fat area: 60 cm<sup>2</sup>; subcutaneous fat area, 190 cm<sup>2</sup>; V/S ratio, 0.31).

*Abdominal sagittal diameter\**

# Imaging techniques

- Computed tomography (CT)
- Magnetic resonance imaging (MRI)
- Ultrasound (US)\*

# Bioimpedance measuring

- Bioimpedance spectroscopy (BIS)
- Bioelectrical impedance analysis (BIA)



[InBody270]  
TEL:02-501-3939 FAX:02-501-2716

ID	Height	Age	Gender	Test Date & Time
Jane Doe	156.9cm	51	Female	2015.05.04. 09 :46

### Body Composition Analysis

Total amount of water in body	<b>Total Body Water</b>	(L)	27.2 (27.0 ~ 33.0)
For building muscles	<b>Protein</b>	(kg)	7.1 ( 7.2 ~ 8.8 )
For strengthening bones	<b>Minerals</b>	(kg)	2.74 (2.49 ~ 3.05)
For storing excess energy	<b>Body Fat Mass</b>	(kg)	22.1 (10.6 ~ 16.9)
Sum of the above	<b>Weight</b>	(kg)	59.1 (45.0 ~ 60.8)

### Muscle-Fat Analysis

	Under	Normal	Over
<b>Weight</b> (kg)	65 70 85 100 115 130 145 160 175 190 205	59.1	
<b>SMM</b> (kg)	70 80 90 100 110 120 130 140 150 160 170	19.3	
<b>Body Fat Mass</b> (kg)	40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520	22.1	

### Obesity Analysis

	Under	Normal	Over
<b>BMI</b> (kg/m <sup>2</sup> )	10.0 15.0 18.5 21.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0	24.0	
<b>PBF</b> (%)	8.0 13.0 18.0 23.0 28.0 33.0 38.0 43.0 48.0 53.0 58.0	37.5	

#### Segmental Lean Analysis

Left	1.81 kg 90.2 % Normal	Right	1.89 kg 94.1 % Normal
Left	16.7 kg 92.2 % Normal	Right	17.7 kg 92.2 % Normal
Left	4.61 kg 72.8 % Under	Right	4.70 kg 74.3 % Under

#### Segmental Fat Analysis

Left	1.7 kg 190.0 % Over	Right	1.7 kg 185.9 % Over
Left	11.9 kg 239.8 % Over	Right	11.9 kg 239.8 % Over
Left	2.9 kg 126.7 % Normal	Right	2.9 kg 127.4 % Normal

### Body Composition History

<b>Weight</b>	65.3	63.9	62.4	61.8	62.3	60.9	60.5	59.1
<b>SMM</b>	20.1	20.0	19.7	19.7	19.8	19.7	19.8	19.3
<b>PBF</b>	41.3	40.7	39.2	39.0	39.4	38.6	37.8	37.5

Recent Total

14.10.10	14.10.30	14.11.02	14.12.15	15.01.12	15.02.10	15.03.15	15.05.04
09:15	09:40	09:35	11:01	08:33	15:30	08:35	09:46

**Impedance**

	RA	LA	TR	RL	LL
Z <sub>0</sub> (20kHz)	345.0	358.5	23.4	286.6	296.0
Z <sub>100</sub> (100kHz)	322.0	335.5	21.2	273.2	282.6

### InBody Score

**66** / 100 Points

Total score that reflects the evaluation of body composition. A muscular person may score over 100 points.

### Weight Control

Target Weight: 52.9 kg  
Weight Control: -6.2 kg  
Fat Control: -10.0 kg  
Muscle Control: +3.8 kg

### Obesity Evaluation

BMI:  Normal  Under  Slightly Over  Over  
PBF:  Normal  Slightly Over  Over

### Waist-Hip Ratio

0.98 (Low 0.75 0.85 High)

### Visceral Fat Level

13 (Low 10 High)

### Research Parameters

Fat Free Mass: 37.0 kg  
Basal Metabolic Rate: 1168 kcal  
Obesity Degree: 112 % (90 ~ 110)  
Recommended calorie intake per day: 1397 kcal

### Calorie Expenditure of Exercise

Golf	104	Gateball	112
Walking	118	Yoga	118
Badminton	134	Table Tennis	134
Tennis	177	Bicycling	177
Boxing	177	Racketball	177
Mountain Climbing	193	Jumping Rope	207
Aerobics	207	Jogging	207
Soccer	207	Swimming	207
Japanese Fencing	295	Racketball	295
Squash	295	Taekwondo	295

\* Based on your current weight  
\* Based on 30 minute duration

### Results Interpretation QR Code

Scan the QR Code to see results interpretation in more detail.

# Indexes calculated from anthropometric parameters

## – Broca's index (ideal body mass):

- ♂: height in cm - 100                      or    (height in m)<sup>2</sup> × 23
- ♀: (height in cm - 100) - 10 %        or    (height in m)<sup>2</sup> × 21

Obesity degree	% ideal body mass
mild	115–129
moderate	130–149
severe	150–199
morbid	> 200

## – Quetelet's index or body mass index (BMI):

$$BMI = \frac{\text{body weight (kg)}}{\text{height (m)}^2}$$

BMI (kg.m <sup>-2</sup> )		
Category	Men	Women
Underweight	< 20	< 19
Healthy	20–24,9	19–23,9
Overweight	25–29,9	24–28,9
Obesity	30–39,9	29–38,9
Morbid obesity	> 40	> 39