ANTHROPOMETRY

- Measuring of outer body dimensions (body composition and somatotype)
- Evaluations of a developing, maturing or aging organism
- Helps to define a child as talented for particular sport

A VERY SHORT DETOUR…

- https://www.telegraph.co.uk/travel/maps-and-graphics/the-tallest-and-shortest-countries-in-the-world/
- https://worldpopulationreview.com/country-rankings/average-height-by-country

Body Build, Size, and Composition

Body build is the form or structure of the body.

- Muscularity (mesomorphy, athletic)
- Linearity (ectomorphy, asthenic)
- Fatness (endomorphy, pyknic)

Body size is determined by height and weight.

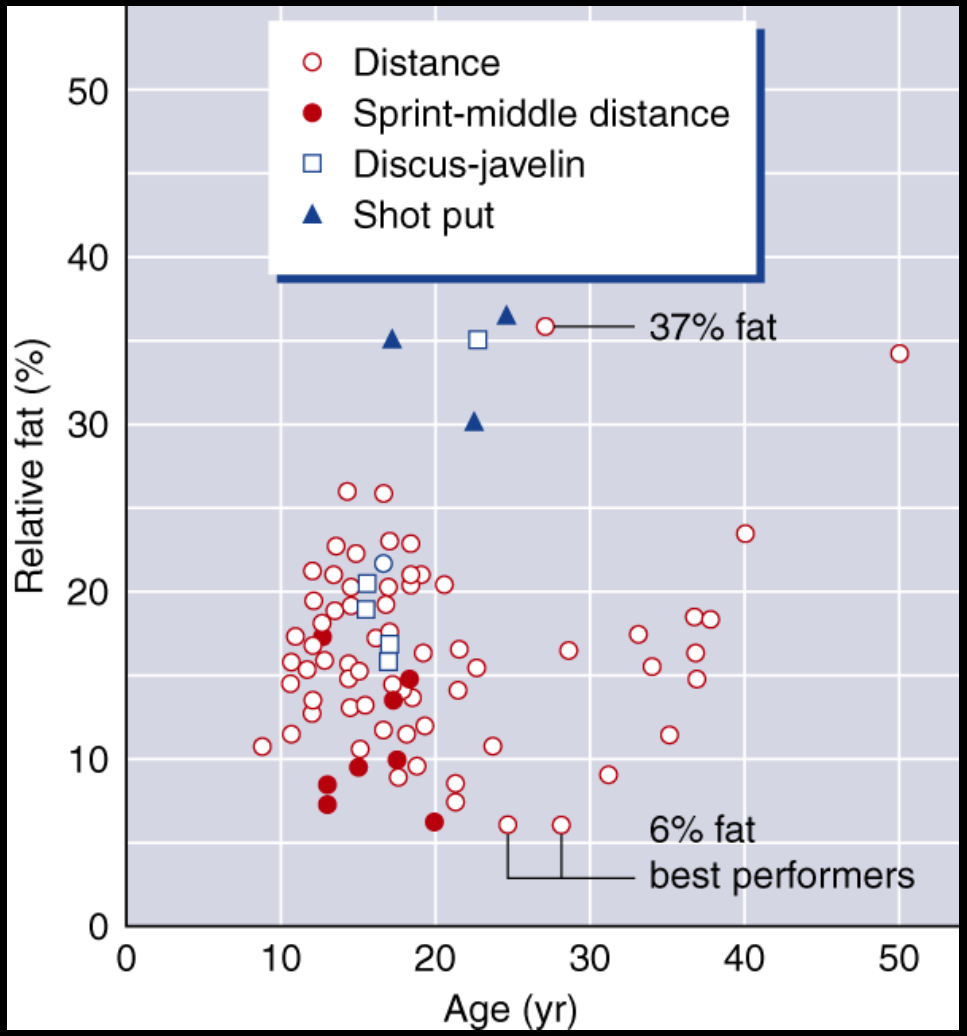
Body composition refers to the chemical composition of the body.

- Fat mass
- Fat-free mass

Did You Know…?

Body composition is a better indicator of fitness than body size and weight. Being overfat (not necessarily overweight) has a negative impact on athletic performance. Standard height-weight tables do not provide accurate estimates of what an athlete should weigh because they do not take into account the composition of the weight. An athlete can be overweight according to these tables yet have very little body fat.

RELATIVE BODY FAT IN ELITE TRACK AND FIELD ATHLETES



BODY COMPOSITION (MATIEGKA)

- Skeleton weight (breadths and height)
- Thickness of skin and subcutaneous tissue (skinfolds and body surface)
- Skeletal muscles weight (circumferences and subtracted skinfolds)
- Weight of the rest

BASIC PARAMETERS

- Weight
- Height
- Sitting height
- Upper extremity length
- Lower extremity length

- Body surface

Body surface A (m^2) calculation according to DuBois & DuBois:

$A = W^{0,425} \cdot L^{0,725} \cdot 0.007184$

W = weight (kg); L = height (cm)

Men height average in CZ
179 cm

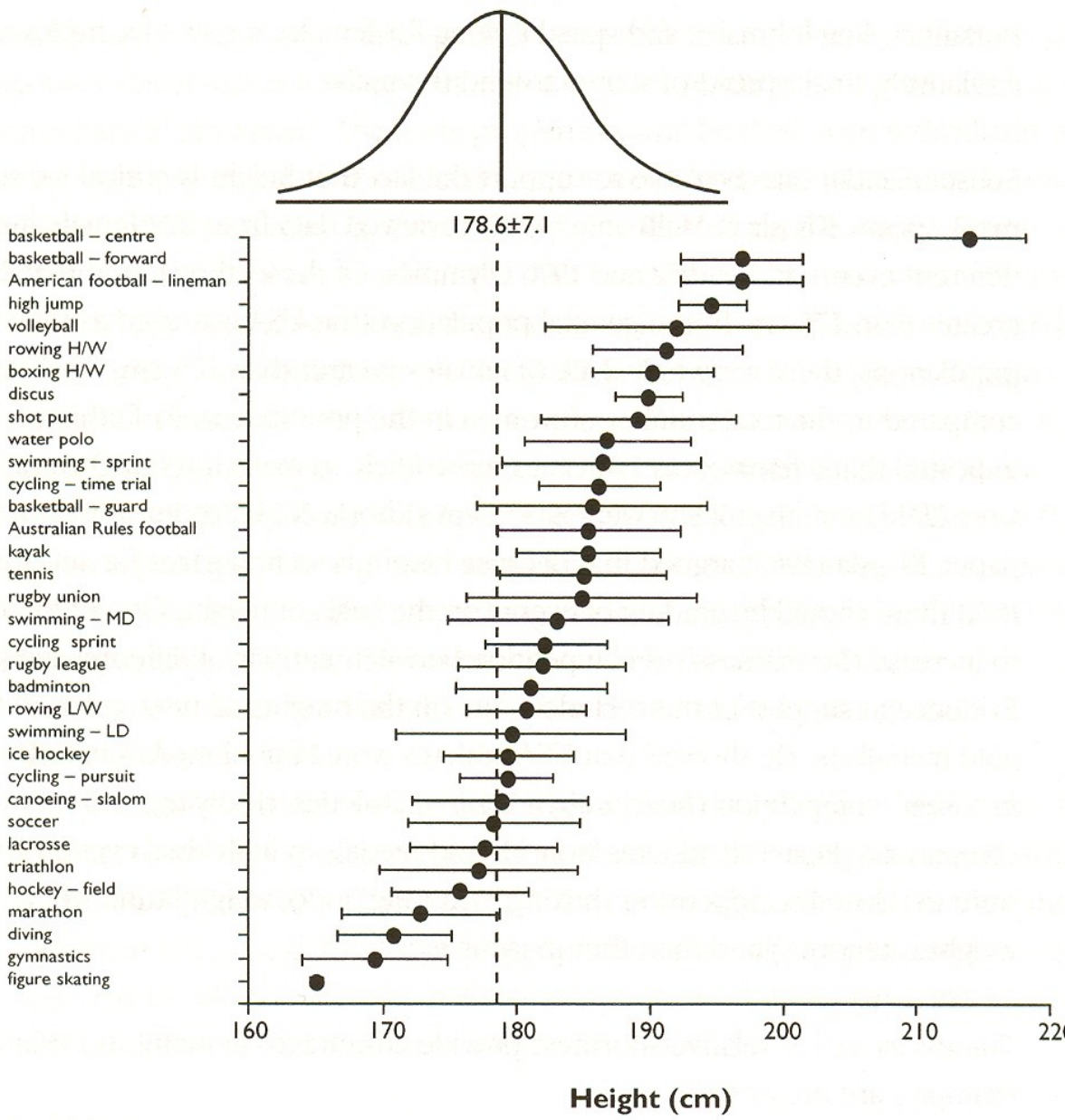


Figure 4 Plot of mean (± SD) heights for male athletes in different sports relative to a reference popula
non-athletes.

Women height average in CZ 166 cm

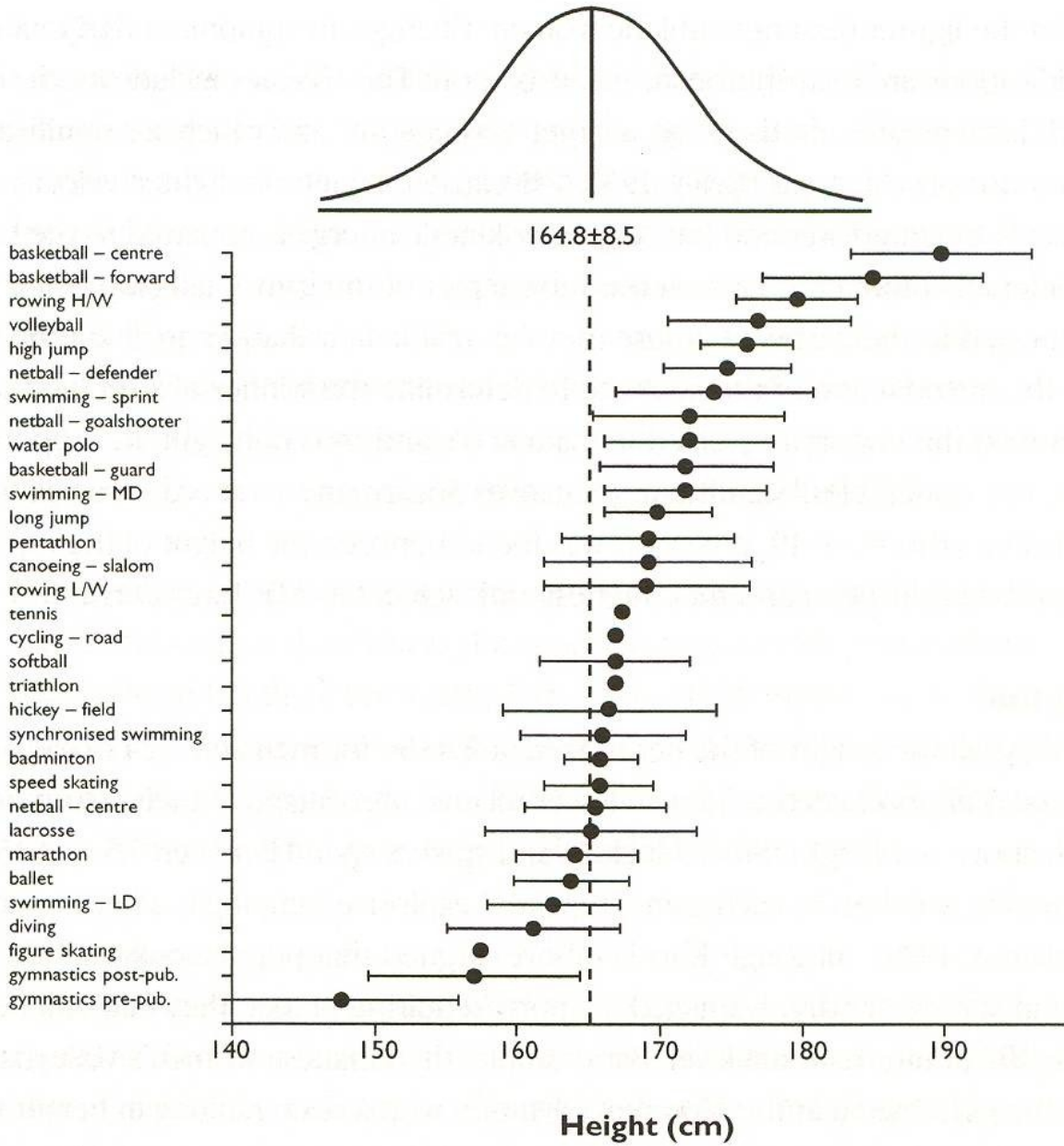


Figure 5 Plot of mean (± SD) heights for female athletes in different sports relative to a refere
non-athletes.

Men weight average in CZ 75 kg

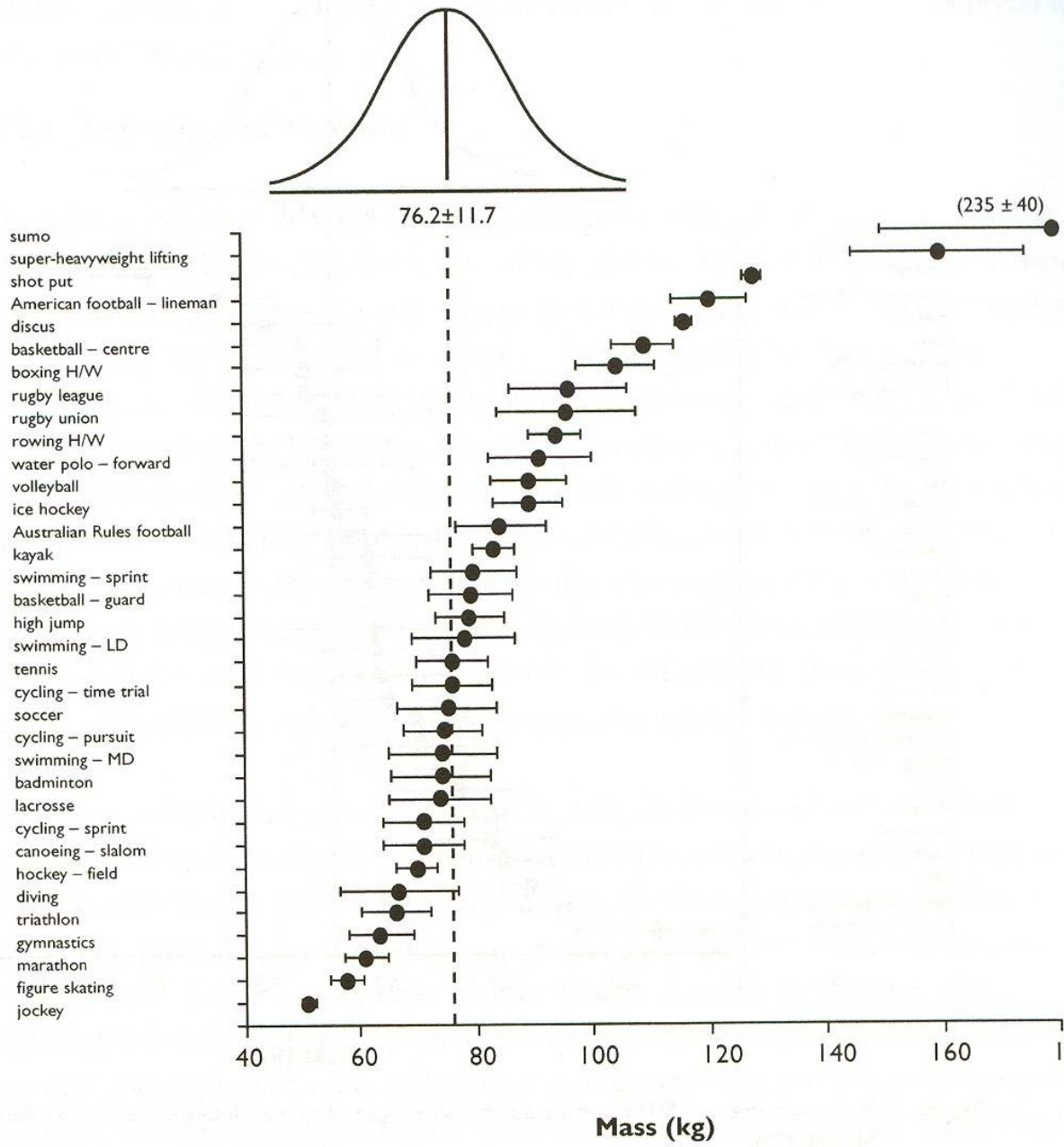


Figure 8 Body mass (mean ± SD) of male athletes in a range of sports plotted relative to a reference group non-athletes.

Women weight average in CZ 60 kg

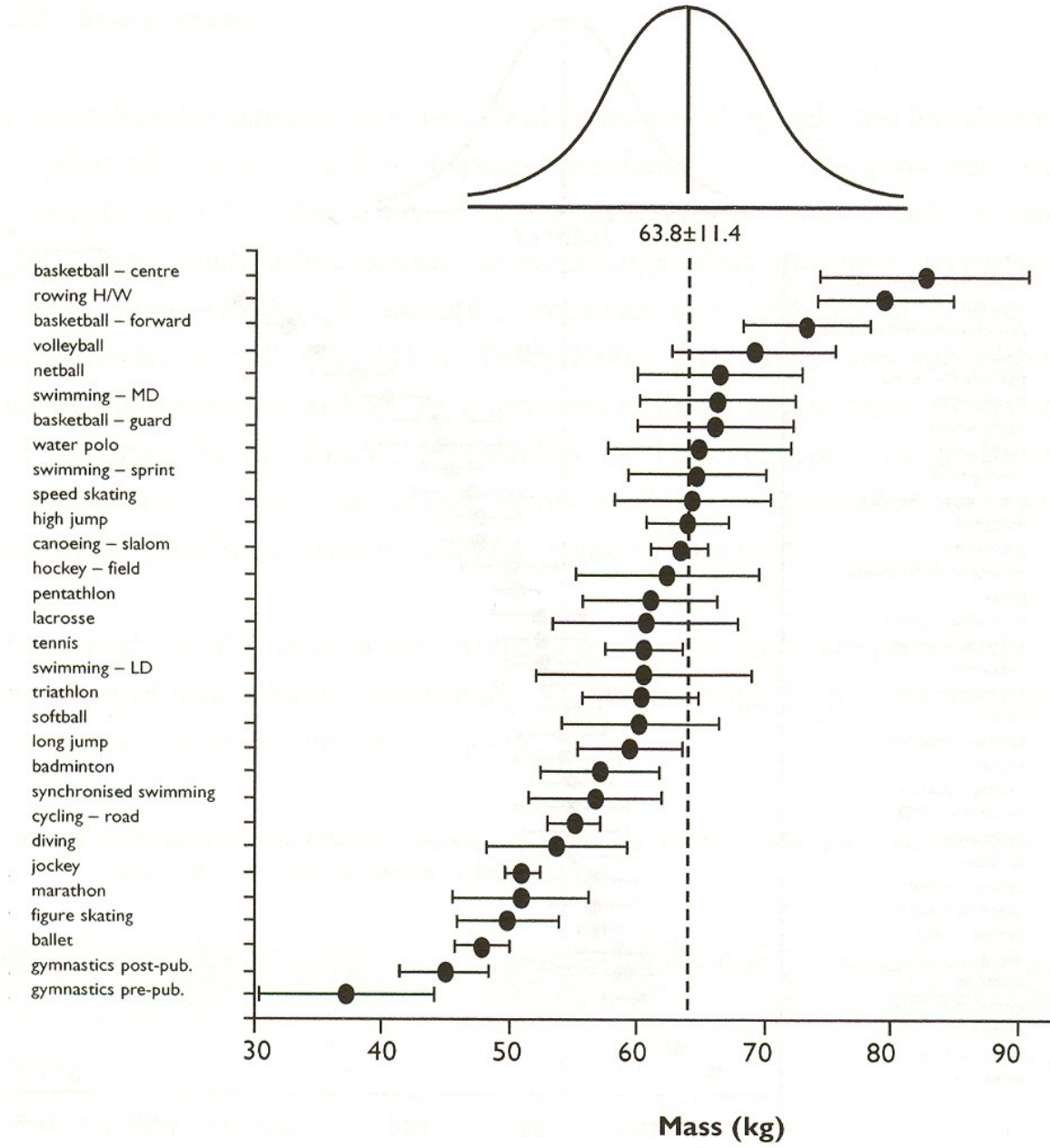
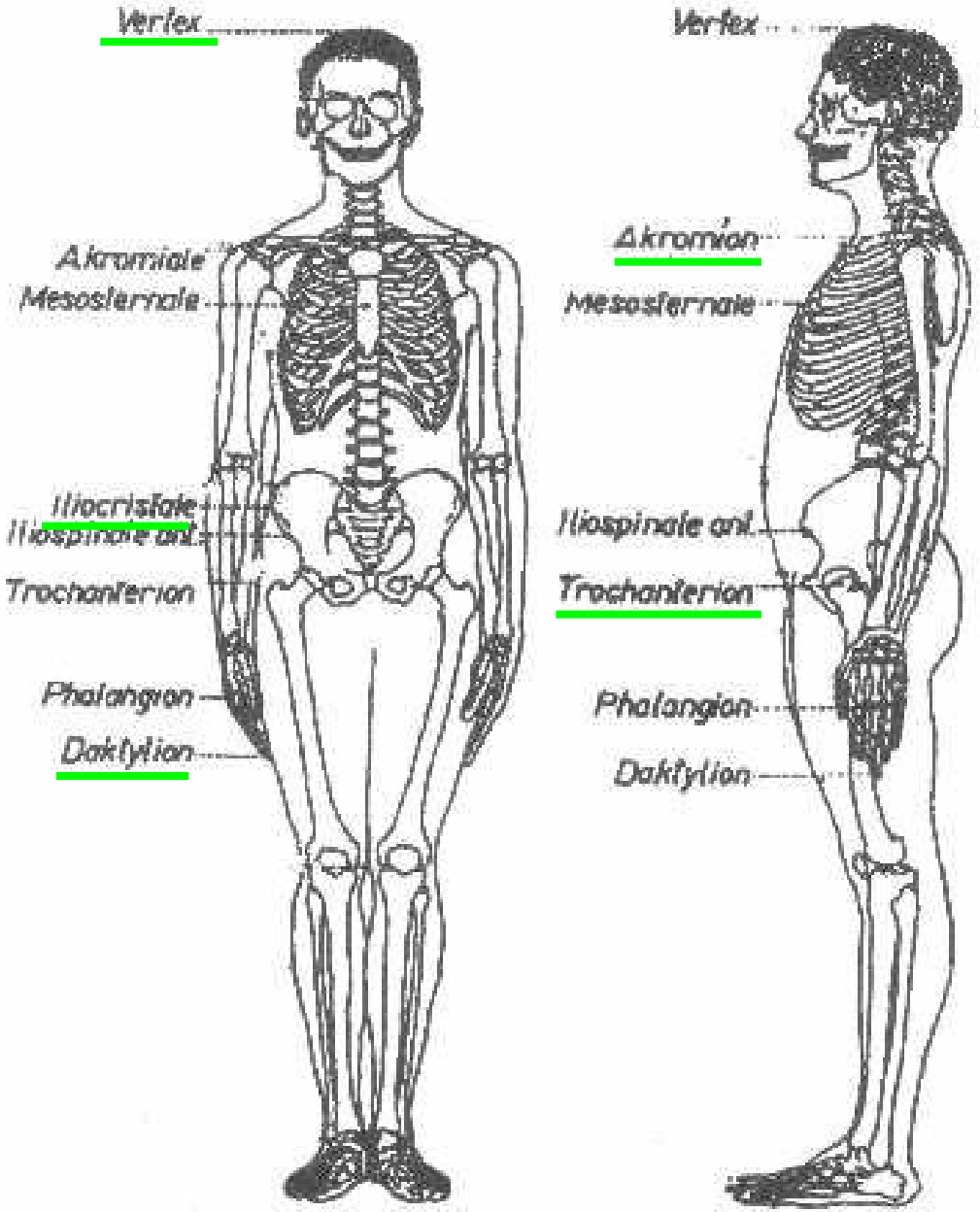


Figure 9 Body mass (mean ± SD) of female athletes in a range of sports plotted relative to a refere non-athletes.



Obrázek měřených míst na těle podle R.Martina.

BREADTHS

- Humeral epicondyle
- Wrist
- Femoral epicondyle
- Ankle
- Shoulders (biacromial)
- Pelvis (bicristal)

- Measuring on the right side of the body

CIRCUMFERENCES (GIRTH)

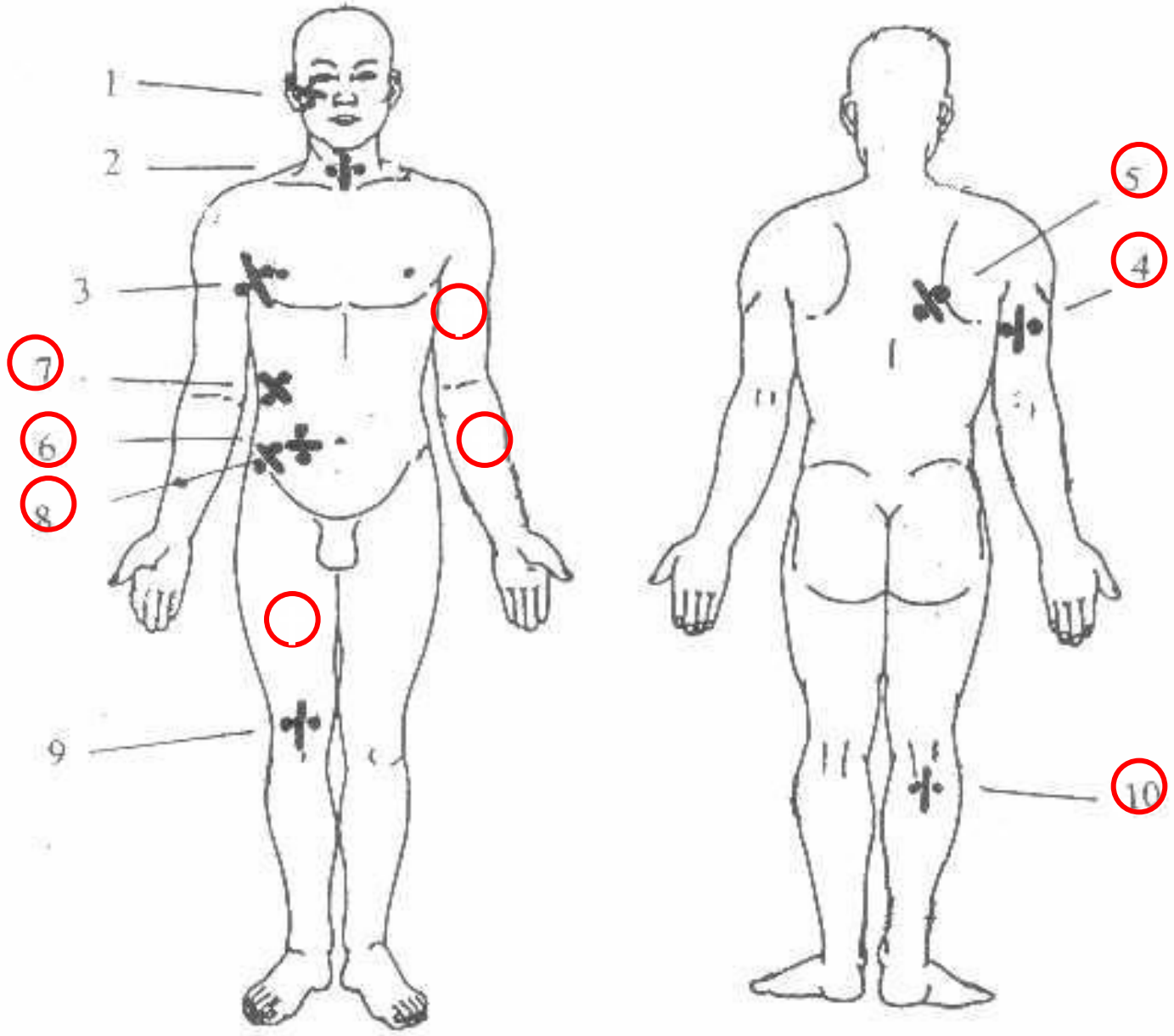
- Thorax (norm., insp., exp.)
- Arm (both loose and contracted)
- Forearm
- Thigh
- Calf

- Measuring on the right side of the body

SKINFOLDS

- face
- neck
- thorax I
- arm
- back
- abdomen
- thorax II
- hip
- thigh
- calf

- Measuring on the right side of the body



Standardní místa snímání tloušťky kožních řas pro stanovení relativní hmotnosti depotní tukové tkáně kaliperem.

BIOELECTRIC IMPENDANCE (BI)

- Another options for assessing the body composition
- Very low alternating current (5 V, 25 kHz) runs through body
- The current runs through body liquids freely
- Fat tissues evince low to zero electric conductivity
  (= bioelectric impedance)
- Evaluation is based on volume of liquid in non-fat tissues

TANITA SCALE

- Device for BI analysis
- height
- age
- sex

- percentage of body fat
- weight

- assessing barefoot

https://osobni-vahy.heureka.cz/tanita-bc-545/#

BODY COMPOSITION (MATIEGKA)

Online calculator (in Czech)

https://publi.cz/books/159/index.html?secured=false#01

REFERENCE VALUES

	Men	Women
Skeletal portion:	17 %	16 %
Muscular portion:	46 %	41 %
Fat portion:	14 %	22 %
Rest:	23 %	21 %

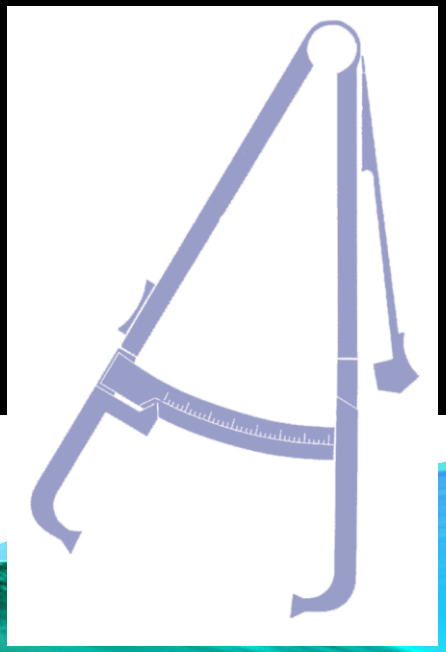
BODY MASS INDEX

H / V^2 [kg / m²]

H weight [kg] V height [m]

Category	Men	Women
underweight	< 20	< 19
normal	20–24.9	19–23.9
overweight	25–29.9	24–28.9
obesity	30–39.9	29–38.9
morbid obesity	> 40	> 39

SOMATOTYPE



SOMATOTYPE

Morphological structure of an individual based on the relative contribution of three fundamental elements (+/− body build).

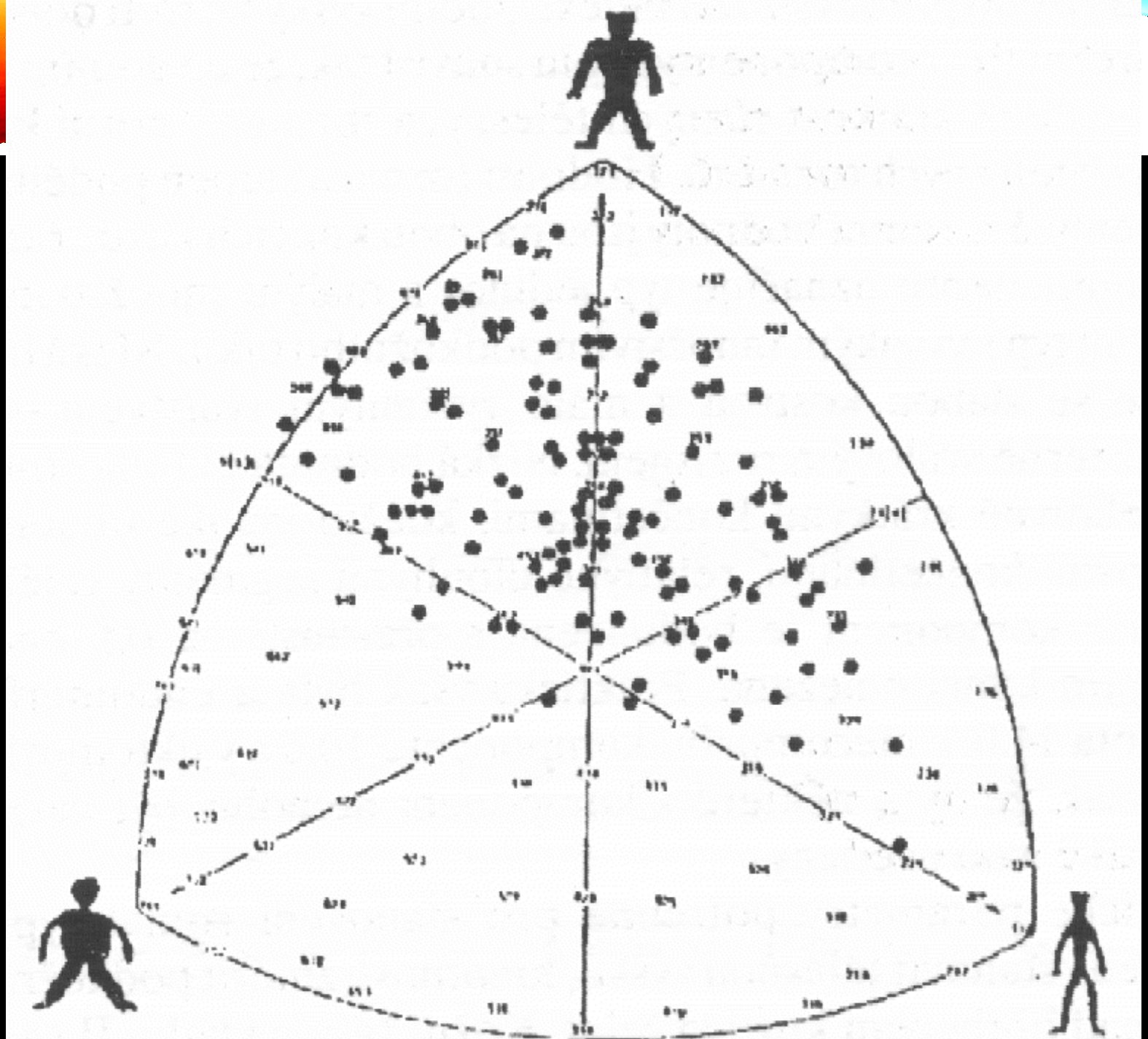
- Muscularity (mesomorphy, athletic)
- Linearity (ectomorphy, asthenic)
- Fa

Somatic dispositi	Advantageous b
Tall	
Low, slim, low weight	Agility based performance, quick and accurate moves, synchronisation of body segments – sport gymnastics, trampoline leaps, acrobatics
Long arms, broad palms and feet	Swimming (longer and mightier strokes), rowing, paddling
Slim, low weight (astenic, ectomorph)	Endurance performance – whole body transport in bigger distance (or uphill) – road cycling, cyclocross, running (middle-distance, long-distance), walking, climbing, cross-country skiing
Developed musculature (athletic, mesomorph)	Strength performance – throwing, shot put, speed performance (sprint – running, cycling, swimming)
Balanced disposition, muscular, fat-free, size components (slim athletic, meso-ectomorph)	Most of sport performances (football, handball, baseball, downhill skiing, rowing)
Low constitution, developed musculature, robust skeleton (athletic, mesomorph)	Weight-lifting
Robust with higher weight (athletic-pyknic, meso-endomorph)	Sumo

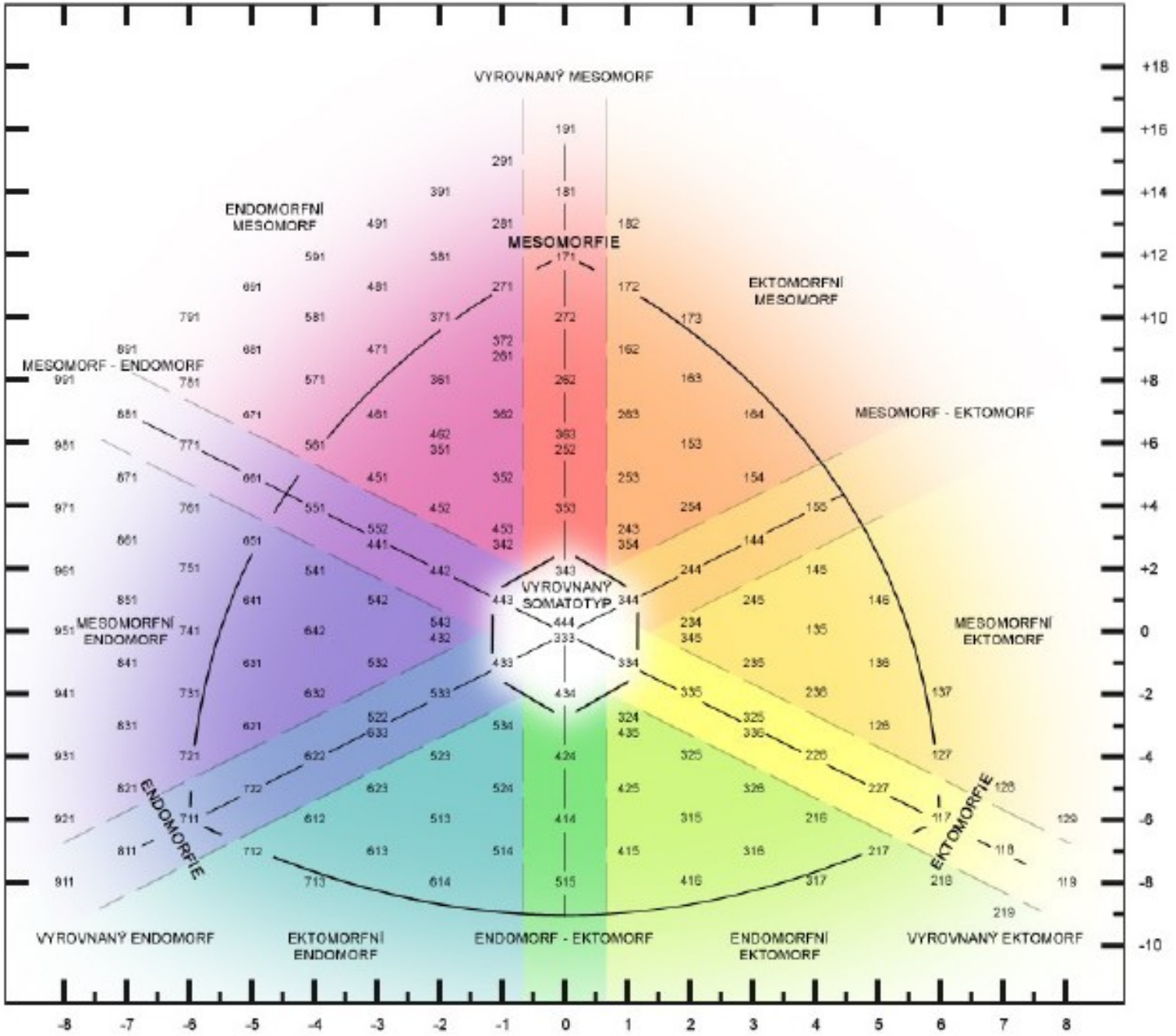
SOMATOTYPES:

1) BASED ON THE COMPONENT'S DOMINANCE (ŠTĚPNIČKA 1979)

Pure somatotype (ectomorph, mesomorph, endomorph)	1 component dominates, 2 and 3 balanced
Mesomorphic endomorph (ectomorphic endomorph, endomorphic mesomorph)	1 component dominates, 2 over 3
Endomorph – mesomorph (endomorph – ectomorph, ectomorph – mesomorph)	2 balanced components dominate, 3 minor
Medium somatotype	all components balanced

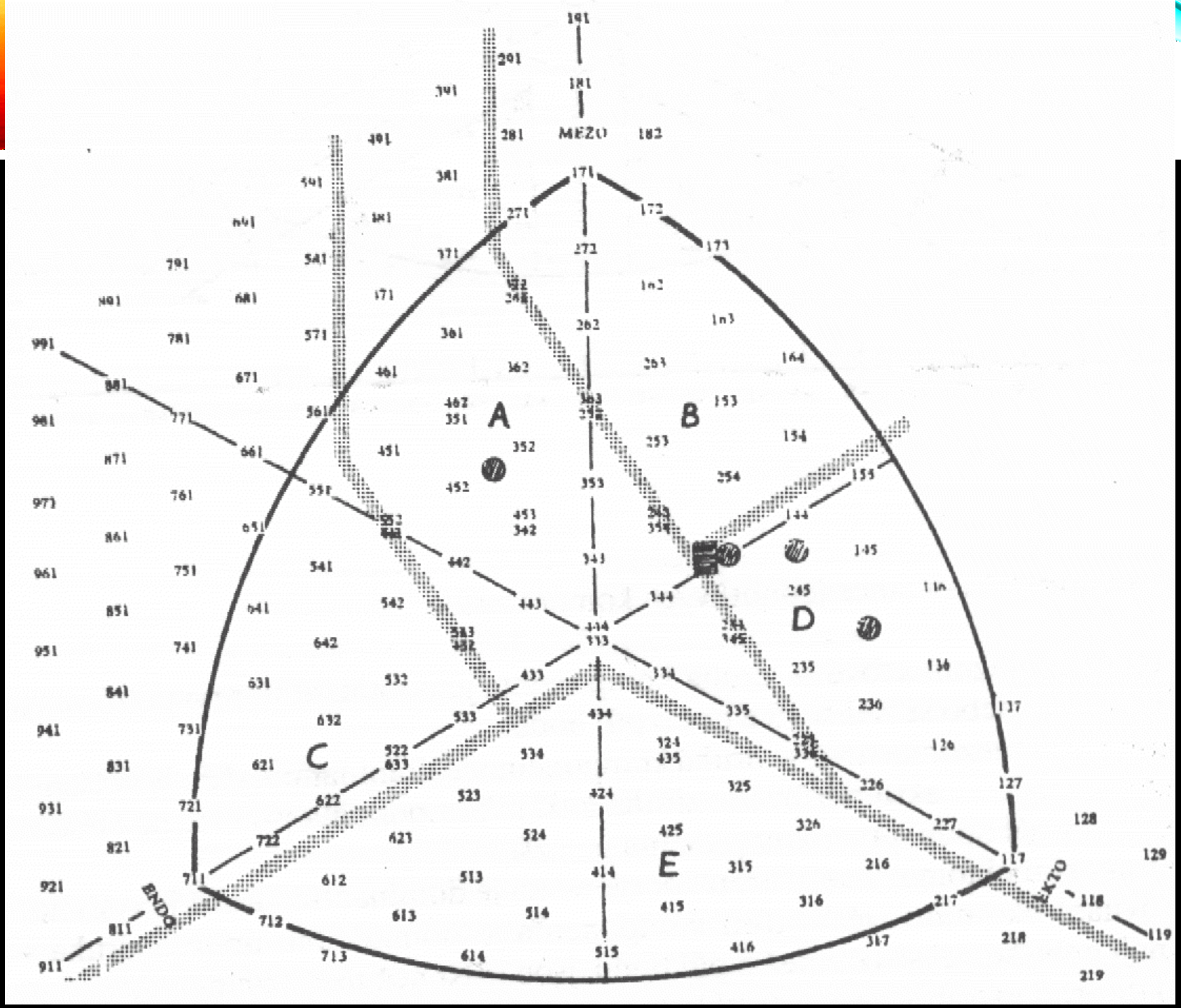


X = EKTOMORFIE - ENDOMORFIE
Y = 2 x MESOMORFIE - (ENDOMORFIE + EKTOMORFIE)



2) BASED ON THE MOTION ABILITIES (CHYTRÁČKOVÁ 1989):

A Category	Strength capabilities
B Category	The most versatile sport capabilities
C Category	The least sport capabilities
D Category	Endurance and agility capabilities
E Category	Low sport capabilities (general lack of muscular element)


MEZO
ENDO
EXTO
A
B
C
D
E

SOMATOTYPE APPROXIMATION

- https://www.tigerfitness.com/blogs/motivation/body-types-endomorph-mesomorph-ectomorph-calculator