



UNIVERSITY OF PÉCS
MEDICAL SCHOOL



Bests of athletic performance

Lecture 3



PTE558

<http://potecho.pte.hu>

Eva Tékus (PhD)

Requirements, recommended literature

- 25 % absence is allowed
- Examination: written test (simple choice, true false questions)

Lessons:

- 10/10/2024; 17/10/2024; 24/10/2024; 07/11/2024

Room: SIOT0037

Presentations: homepage of Sports Medicine Center (Educational materials)

- Recommended literature:

1. Cooper C.B, Storer T.W. Exercise testing and interpretation. A practical approach.

Cambridge University Press, Cambridge, 2004

2. Katch V.L., McArdle W.D., Katch F.I. Essentials of exercise physiology. Lippincott Williams & Wilkins, a Wolters Kluwer business, Philadelphia, USA, 2011

Result of the test (%)	Grade
100-85	5
84-75	4
74-65	3
64-50	2
0-49	1

The most extreme body compositions in sport



Physical performance - Classification of physical abilities

Conditional physical abilities:

1. Endurance
2. Force
3. Speed

Flexibility

Coordinational physical abilities:

1. Ability to differentiate (coordination)
2. Coupling or synchronization capacity
3. Rhythm ability or rhythm
4. Balancing ability
5. Readaptation or change capacity
6. Guidance capacity
7. Reaction capacity

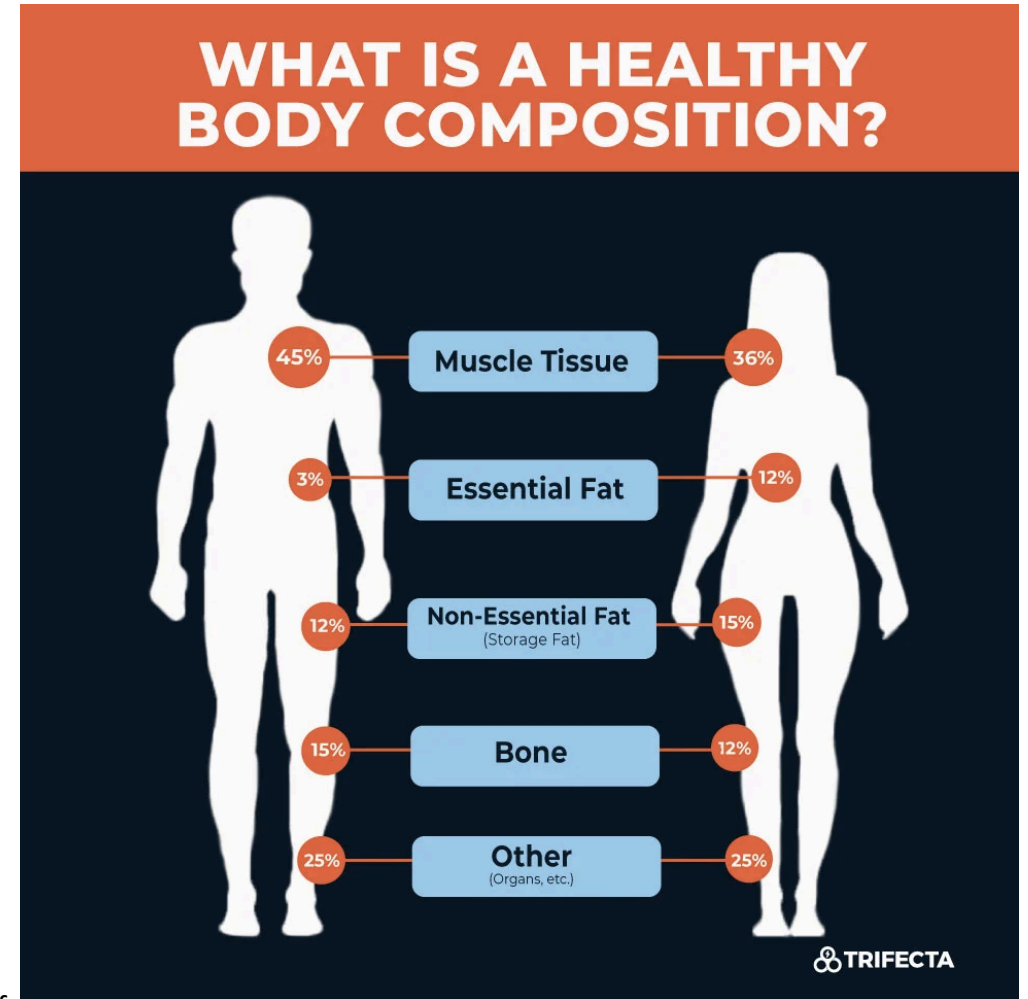
Body composition

Special abilities

Body composition, sport specific anthropometry

Sportanthropometry: investigate the relationship between sports performance and body composition, and characterize the somatotype of athletes at different ages.

Body composition: it describes the percentages of fat, bone and muscle in human bodies



Body composition measurements

- Non-laboratory measurements

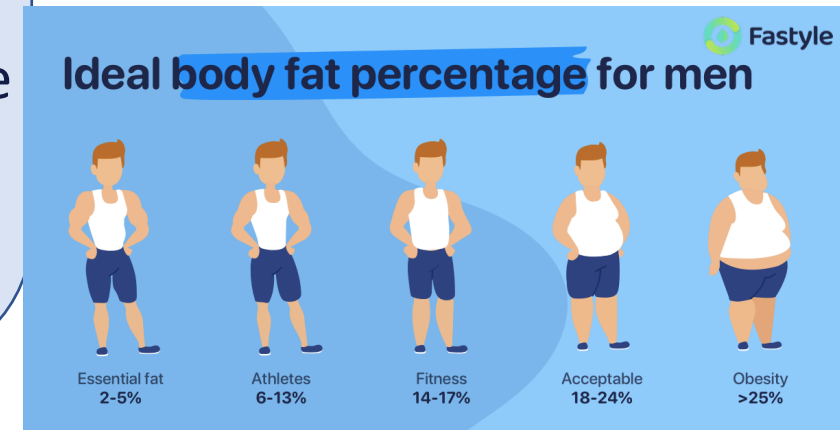
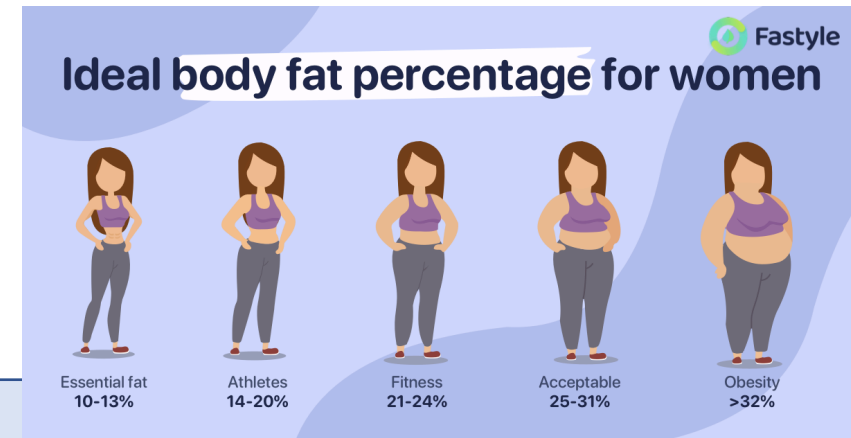
E.g. Body fat percent estimation with Lange caliper

<https://www.youtube.com/watch?v=msMg9rkM4DU>

- Laboratory measurements

E.g. Body fat percent estimation with bioimpedance analysis

<https://www.youtube.com/watch?v=c3SDVlhe8HQ>

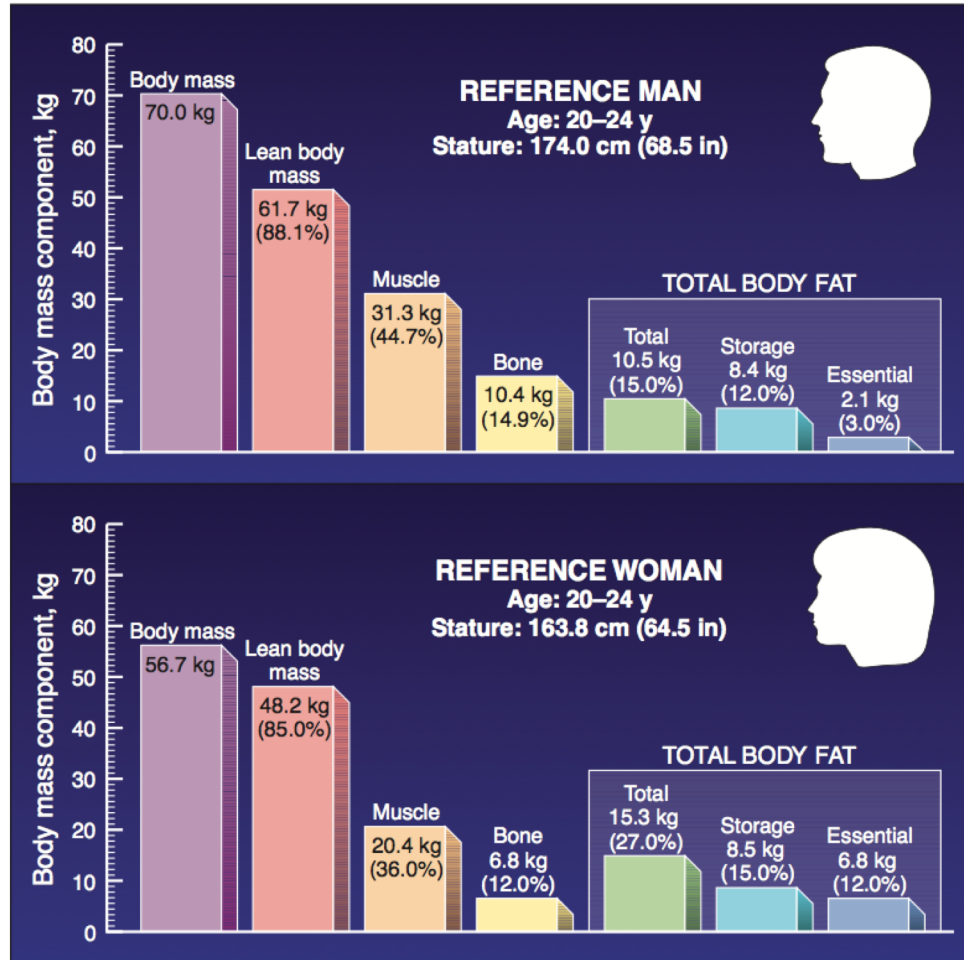


Bests of athletic performance

Different somatotypes in sport

<https://www.youtube.com/watch?v=IB6vQ0tkEkU>

Athletes with extreme body composition I.



Reference: Katch V.L., McArdle W.D., Katch F.I. Essentials of exercise physiology. Lippincott Williams & Wilkins, a Wolters Kluwer business, Philadelphia, USA, 2011

Table 16.1 Percentage Body Fat of Male and Female Athletes

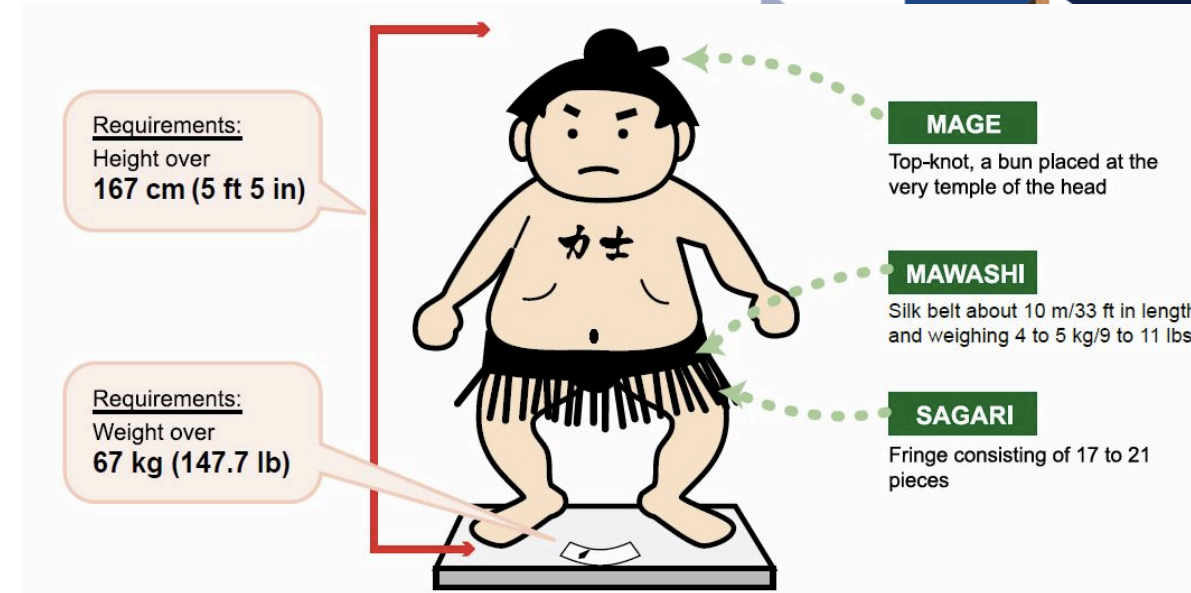
SPORT	PERCENTAGE BODY FAT	
	MALE	FEMALE
Ballet dancing	8-14	13-20
Baseball/softball	12-15	12-18
Basketball	6-12	20-27
Body building	5-8	10-15
Canoe/Kayak	6-12	10-16
Cycling	5-15	15-20
Football		
Backs	9-12	
Linebackers	13-14	
Lineman	15-19	
Quarterbacks	12-14	
Gymnastics	5-12	10-16
Horse racing	8-12	10-16
Ice/Field hockey	8-15	12-18
Orienteering	5-12	12-24
Racquetball	8-13	15-22
Rock climbing	5-10	13-18
Rowing	6-14	12-18
Rugby		10-17
Skiing		
Alpine	7-14	18-24
Cross-country	7-12	16-22
Jumping	10-15	12-18
Speed skating	10-14	15-24
Synchronized swimming		12-24
Swimming	9-12	14-24
Tennis	12-16	16-24
Track and field		
Discus throwers	14-18	22-27
Jumpers	7-12	10-18
Long distance	6-13	12-20
Shot putters	16-20	20-28
Sprinters	8-10	12-20
Decathletes	8-10	
Triathlon	5-12	10-15
Volleyball	11-14	16-25
Weightlifters	9-16	
Wrestling	5-16	

Data compiled from the research literature.

Athletes with extreme body composition II.

Hakuho: one of the most successful sumo athletes.
(Height: 192 cm, Weight: 158 kg)

Professional Sumo wrestlers: **weight** between 77.0 and 150.0 kg, **BMI** between 25.9 and 44.5 kg/m², **body fat %** between 11.9 and 37.0%, **lean body mass** between 59.1 and 107.6 kg.



Most career championships [\[edit\]](#)

Official championships since 1909⁺

	Name	Total	Years
1	Hakuhō	45	2006–2021
2	Taihō	32	1960–1971
3	Chiyonofuji	31	1981–1990
4	Asashōryū	25	2002–2010
5	Kitanoumi	24	1974–1984
6	Takanohana II	22	1992–2001

Most undefeated championships [\[edit\]](#)

Zenshō-yūshō since 1949⁺

	Name	Total	Years
1	Hakuhō	16	2007–2021
2	Futabayama	8	1936–1943
	Taihō	8	1963–1969
	Tachiyama	7	1910–1915
4	Kitanoumi	7	1977–1984

Most consecutive championships [\[edit\]](#)

Consecutive championships

	Name	Total	Years
1	Hakuhō	7 ⁺	2010–2011
	Asashōryū	7 [†]	2004–2005
	Hakuhō	6	2014–2015
3	Taihō	6	1966–1967
	Taihō	6	1962–1963

Most championship playoffs [\[edit\]](#)

Most playoffs

	Name	Total	Won	Lost
1	Hakuhō	10	6	4
	Takanohana II	10	5	5
3	Kitanoumi	8	3	5
4	Akebono	7	4	3
	Musashimaru	7	1	6
	Chiyonofuji	6	6	0

References: Katch V.L., McArdle W.D., Katch F.I. Essentials of exercise physiology. Lippincott Williams & Wilkins, a Wolters Kluwer business, Philadelphia, USA, 2011
https://en.wikipedia.org/wiki/List_of_sumo_record_holders
 Kanehisa, H., Kondo, M., Ikegawa, S., & Fukunaga, T. (1998). European journal of applied physiology and occupational physiology, 77(4), 352–359.

**The most skillful, the most
accurate athletes**



Skillfulness, accuracy

Skillful: Having the ability to perform well: able, capable, competent, good, skilled under high pressure and under competitive conditions.

Accuracy: the ability to control movement in a given direction or at a given intensity.

Skillfulness and technique of Ronaldo (27:25)
<https://www.youtube.com/watch?v=4achmhzLNoY>

Measuring skillfulness and accuracy

- Field tests E.g. Pin Point Accuracy (in Tennis)

<https://www.youtube.com/watch?v=o0PQoiBRXJQ>

- Laboratory measurement E.g. Accuracy of the throwing (American football)

<https://www.youtube.com/watch?v=tVoqA-LKGb4>
(1:45)

Sports, where is vary important the skillfulness and the accuracy

1. Golf
2. Boxing
3. Ice hockey
4. Mixed martial arts
5. Tennis
6. Gymnastics
7. Hurling
8. Soccer
9. Water polo
10. Rugby

1. Billiards
2. Golf
3. Archery
4. Rifle, pistol, and shotgun shooting

Bests of athletic performance

The most skillful, the most accurate athletes

<https://www.youtube.com/watch?v=VltAgg2H-HE>



What skills are necessary for someone to be the most accurate and skillful athletes?



Accuracy:

- Hand-eye coordination
- Vision
- Balancing ability
- Strength, endurance
- Mental preparation

Skillfulness:

- Sport technical knowledge, practice
- Adequate level of motoric skills
- Creativity

The most extreme mental performances



Mental performance, mental toughness (MT)

Athlete has “a high sense of self-belief and an unshakable faith that they control their own destiny, these individuals can remain relatively unaffected by competition and adversity” .

https://www.youtube.com/watch?v=9B5pFK-X_tg

Components of MT:

(labelled the 4Cs)

- control** (emotional and life),
- commitment** (tendency to involve oneself),
- challenge** (belief that life is changeable and to view this as an opportunity)
- **confidence** (interpersonal and in abilities)

References: Jones G, Connaughton H.D., Connaughton D. (2002) Journal of Applied Sport Psychology 14(3):205-218

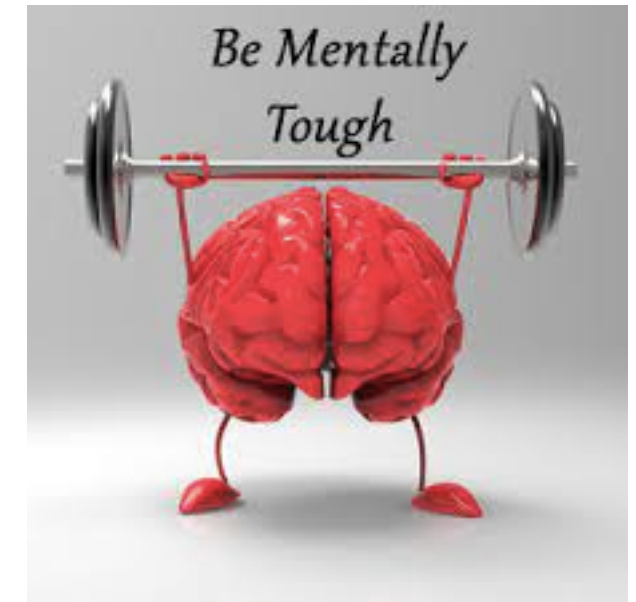
<https://www.donovanmentalperformance.com/5-tips-to-mental-toughness-in-sports>

Nicholls AR, Polman RCJ, Levy AR, Backhouse SH (2009) Personality and Individual Differences 47(1): 73-75.

Measuring the mental toughness

- Questionnaire survey: Mental Toughness Questionnaire 48-items (MTQ48)

<https://www.youtube.com/watch?v=8hQCwU7ReFU>



Athletes with extrem mental performance How do the real athletes think?



Asha Philip (sprinter, gymnast)

2007: 100 m sprint, winning gold at the 2007 World Youth Championships aged 16
Following a serious knee injury in gymnastics, and a rehabilitation period of several years, she returned to athletics.

2014: winning gold at the European Athletics Championships in the 4 x 100 m relay

2017: she won gold at the 2017 European Athletics Indoor Championships 60 m for women, and bronze in the 4 × 100 m relay

2016: won an Olympic bronze medal in the 4 x 100 m

Noted as the fast starter.

https://www.youtube.com/watch?v=_iuPewWbp2U

References: https://en.wikipedia.org/wiki/Asha_Philip<https://www.kingston.ac.uk/news/article/1877/20-jun-2017-olympian-asha-philip-encourages-promising-athletes-to-dream-big-while-on-kingston-universitys-sports-performance/>

www.kingston.ac.uk/news/article/1877/20-jun-2017-olympian-asha-philip-encourages-promising-athletes-to-dream-big-while-on-kingston-universitys-sports-performance/

What factors influence mental toughness (MT)?

- Genetic background
- Age
- Gender (M>F)
- Achievement level
- Sporting experience
- Type of sport (team vs. individual and contact vs. non-contact sports)

Not affected by:

- Physical performance of athletes

Not yet known:

- Educational qualifications
- Biological changes/maturation





UNIVERSITY OF PÉCS
MEDICAL SCHOOL

Thank you for your attention!

PTE558

<http://potecho.pte.hu>



Kahoot!

<https://play.kahoot.it/v2/?quizId=79a12405-c112-4eb2-8d0f-df99e4adfd45>