

EDITORIAL

Excess body fat is a serious health risk leading to problems such as hypertension, elevated blood lipids (fats and cholesterol), diabetes mellitus type 2, cardiovascular disease, respiratory dysfunction and gallbladder disease. Individuals who accumulate a lot of visceral fat are at higher risk than those who are more likely to accumulate fat on their thighs and buttocks.

These days, people are more concerned than ever about how much they weigh. Similarly, scientists propose a range of classification strategies based on body mass or composition, as is also evident in several publications in this issue of *Annales Kinesiologiae*. However, pure body mass or the body mass index is not an appropriate measure of health. For example, being thin does not necessarily mean that you have a lower health risk. In fact, the obsession with becoming thin often leads to serious eating disorders such as anorexia and bulimia. Being thin simply means weighing less than the recommended levels. It is important to distinguish between healthy leanness and unwanted thinness. There are also several important reasons to monitor body composition:

- To develop holistic physical fitness programs;
- To monitor body mass change = body fat loss with muscle growth;
- To provide a baseline for diet and the treatment of obesity;
- To follow changes due to growth, development, maturation and ageing;
- To individualise and optimise the performance of athletes.

The simplest 2-component body composition models divide it into a fat component and a fat-free component, and not all fat is considered unhealthy. This is an important advance over body mass indexing. Essential fat is found in the bone marrow, heart, lungs, liver, spleen, kidneys, intestines, muscles and fat-rich tissues, while storage fat accumulates in the adipose tissue. In addition, storage fat is found around the internal organs and under the skin. Fat-free mass is the weight of your muscles, bones, ligaments, tendons and internal organs, with essential fat subtracted.

The search for methods to determine body composition went through several phases (with the methods of each phase labelled): (1) precision without biology (anthropometry); (2) biology without precision (dilution methods); (3) in search of precision (bioimpedance); and (4) in search of accuracy (dual-energy X-ray absorptiometry). As bioimpedance is a very affordable method with a high potential for error of < 4%, one should consider multiple standards for a valid evaluation:

- Supine position with arms and legs abducted by 30 deg and 45 deg, respectively;
- No eating for 12 hours and no drinking for 4 hours before the test;
- No exercise within 12 hours of the test;
- Urinate within 30 minutes of the test;
- No alcohol consumption within 48 hours of the test
- No diuretics within 7 days of the test.

These standards for valid bioimpedance assessment are difficult to achieve, and many authors simply ignore them. Nevertheless, body composition is an integral component of overall health and physical fitness that leads to important decision-making strategies for our health.

On the other hand, dual-energy x-ray absorptiometry (DEXA or DXA) measures body fat, muscle and the total body bone mineral (TBBM) using two x-ray energies. DEXA is fast and has low radiation exposure. The analysis can be broken down into regional levels. While DEXA is the gold standard for measuring bone mineral density, it is also used to estimate total and regional body fat and lean mass.

Therefore, I would like to point out to scientists that they need to be aware of the measurement standards to be followed and to choose state-of-the-art methods for valid results in order to ensure high-quality result interpretation.

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UVODNIK

Čezmerna telesna maščoba pomeni resno tveganje za zdravje, ki vodi v bolezni, kot so povišan krvni tlak, povišane vrednosti lipidov (maščob in holesterola) v krvi, sladkorna bolezen tipa 2, bolezni srca in ožilja, motnje v delovanju dihal in bolezni žolčnika. Posamezniki, ki si naberejo veliko visceralne maščobe, so bolj ogroženi kot tisti, ki si maščobo bolj nabirajo na stegnih in zadnjici.

Danes se ljudje bolj kot kdaj koli prej ukvarjajo s tem, koliko tehtajo. Podobno tudi znanstveniki predlagajo različne strategije razvrščanja glede na telesno maso ali sestavo, kar je razvidno tudi iz več objav v tej številki revije *Annales Kinesiologiae*. Vendar samo telesna masa ali indeks telesne mase ni ustrezno merilo našega zdravja. Na primer, če ste vitki, to še ne pomeni, da je vaše tveganje za zdravje manjše. Pravzaprav obsedenost z vitkostjo pogosto vodi v resne motnje hranjenja, kot sta anoreksija in bulimija. Biti vitek preprosto pomeni tehtati manj, kot je priporočeno. Pomembno je ločiti med zdravo vitkostjo in neželjeno vitkostjo. Je tudi več pomembnih razlogov za spremljanje telesne sestave:

- za razvoj celostnih programov telesne pripravljenosti,
- za spremljanje sprememb telesne mase = izguba telesne maščobe z rastjo mišic,
- za zagotavljanje izhodišč za dieto in zdravljenje debelosti,
- za spremljanje sprememb zaradi rasti, razvoja, transformacijskih procesov in staranja,
- za individualizacijo in optimizacijo zmogljivosti športnikov.

Najpreprostejši dvokomponentni modeli telesne sestave se delijo na maščobno in pusto komponento, pri čemer vsa maščoba ne velja za nezdravo. To je pomemben korak naprej v primerjavi z indeksom telesne mase. Zdravju koristno maščobo najdemo v kostnem mozgu, srcu, pljučih, jetrih, vranici, ledvicah, črevesju, mišicah in tkivih, bogatih z maščobo, medtem ko se maščoba kopiči predvsem tudi v visceralnem in podkožnem maščevju. Pusta masa je masa mišic, kosti, vezi, kit in notranjih organov, od katere je odšteta tudi zdravju koristna oziroma potrebna maščobna masa.

Iskanje metod za določanje telesne sestave je potekalo v več fazah (s primeri najbolj razširjenih metod te faze): 1. natančnost brez biologije (antropometrija); 2. biologija brez natančnosti (metode presnavljanja snovi); 3. iskanje natančnosti (bioimpedanca) in 4. iskanje natančnosti (dvoenergijska rentgenska absorpciometrija). Ker je bioimpedanca cenovno zelo dostopna metoda s potencialno nizko napako merjenja $< 4\%$, je treba za veljaven rezultat merjenja upoštevati več standardov:

- ležeči položaj z abduciranimi rokami in nogami za 30 oziroma 45 stopinj,
- 12 ur ne jesti in 4 ure pred testom ne piti,
- brez vadbe 12 ur pred testom,
- urinirati 30 minut pred testom,
- ne uživati alkohola 48 ur pred testom,
- ne jemati diuretikov 7 dni pred testom.

Za veljavno oceno bioimpedance je namreč te standarde težko doseči, zato jih številni avtorji preprosto ne upoštevajo, čeprav je telesna sestava sestavni del splošnega zdravja in telesne pripravljenosti, ki vodi do pomembnih strategij odločanja o našem zdravju.

Po drugi strani pa dvoenergijska rentgenska absorpciometrija (DEXA ali DXA) z dvema energijama rentgenskih žarkov meri telesno maščobo, mišice in kostno mineralno gostoto celega telesa (TBBM). Metoda DEXA je hitra in pri njej je izpostavljenost sevanju majhna. Analizo je mogoče razdeliti na regionalna območja telesa. Čeprav je DEXA zlati standard za merjenje mineralne kostne gostote, se uporablja tudi za oceno skupne in regionalne telesne maščobe in puste mase.

Zato bi rad opozoril znanstvenike, da se morajo zavedati merilnih standardov, ki jih je treba upoštevati, in ustrezno izbrati merilne metode za veljavno merjenje, da bi zagotovili visoko kakovost interpretacije rezultatov.

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