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VERSKILLE IN INDIWIDUELE ENERGIEVERBRUIK

Dit is 'n ou bekende waarheid dat vet van kos afkomstig is—watter ander oorsprong kan dit miskien hê? En omdat die menslike liggaam onderworpe is aan die tweede wet van die termodinamika, kan oormatige kos wat geëet word nie somaar soos 'n groot speld verdwyn nie; dit word òf in energie òf in liggaamsmassa omgesit. Dit moet egter onthou word dat 'n klein daaglikse oormaat voedsel van 100 kalorieë gelyk staan aan 'n vettoename van 4 kilogram per jaar. En tog ken ons almal mense wat ,soos 'n perd' kan eet maar nooit vetter word nie en, aan die ander kant, ken ons almal mense wat oënskynlik min eet en tog te vet is. Widdowson en McCance[1-3] het bewys dat daar in enige gelyksoortige groep volwassenes en kinders altyd 'n paar is wie se kalorie-inname veel groter is as dié van die res, en dat die verskil nie noodwendig op liggaamsgrootte of ooglopende spieraktiwiteit berus nie.

'n Moontlike rede vir hierdie toedrag van sake is dat sommige mense veel meer energie verbruik as ander wanneer hulle dieselfde taak verrig. In 1955 het Edholm *et al.*[4] bevind dat kadette wat uiterlik baie min verskil het, onderling verbasend verskil het in hul energie-uitgawe by lê, sit en staan. Booyens en McCance[5] het hierdie werk 'n stap verder gevoer. Hulle het 14 vrouens en 21 mans bymekaargemaak en hul afsonderlike energieverbruik by lê, sit en staan, onder vergelykbare toestande, gemeet. Hulle berekening van energie was gegrond op die ontleding van uitgeasemde lug wat in Douglas-sakkies opgevang was. Drie van die deelnemers aan die toets se metabolismespoed was niks minder as 30% onder die gemiddelde spoed van die groep vir alle aktiwiteite nie, en daar was een wie se spoed 24% bo die gemiddelde was. Hierdie navorsers het vervolgens vir nadere ondersoek 6 deelnemers uitgekies wie se energieverbruik die meeste van die gemiddelde afgewyk het. Die energie-balanse van hierdie 6 deelnemers is vir 'n tydperk van 7-14 dae bestudeer. Die inname is bereken deur die voedsel te weeg, en die verbruik deur 'n tyd- en bewegingstudie tesame met berekening by die belangrike aktiwiteite. Dit is bevind dat, vir alle aktiwiteite, hierdie 6 mense geweldig van mekaar verskil het in die hoeveelheid energie wat hulle verbruik het.

Booyens en McCance beweer dat hierdie skerp verskille in energieverbruik ,heeltemal goed kan verklaar waarom party mense minder kalorieë nodig het om hul gewig te behou en waarom ander tweemaal soveel kalorieë daarvoor nodig het'. Aan die ander kant het hulle bevind dat die mens met 'n baie lae metabolismespoed nie noodwendig geneig is om vet te word nie. Twee van hulle deelnemers wie se stofwisselingspoed baie laag was, was besonder maer en hoef hul nooit te bekommer het oor die kos wat hulle geëet het nie. Die

EDITORIAL

DIFFERENCES IN INDIVIDUAL ENERGY EXPENDITURE

It is a truism that fat comes from food—where else could it come from? Furthermore, the human body being subject to the second law of thermodynamics, any excess food ingested cannot vanish into thin air, but must either be transformed into energy or body bulk. It must, however, be remembered that a tiny daily excess food intake of 100 calories is equivalent to a gain of 4 kilograms of fat per annum. Nevertheless, we all know people who 'eat like a horse' but fail to put on weight, and conversely others who seem to eat less than their neighbours and yet are obese. Widdowson and McCance[1-3] have shown that, in any homogeneous group of adults or children, there are always some individuals who have caloric intakes greatly in excess of those of others, and that the difference cannot necessarily be explained by size or obvious muscular activity.

A possible explanation of this state of affairs would be a greatly varying expenditure of energy in different individuals performing the same tasks. In 1955 Edholm *et al.*[4] found that cadets who appeared very similar outwardly sometimes expended surprisingly different amounts of energy in lying, sitting and standing. Booyens and McCance[5] have taken this work a stage further. They took 14 females and 21 males and measured their individual expenditure of energy while lying, sitting and standing under comparable conditions. Their assessment of energy was based on the analysis of expired air, which was collected in Douglas bags. Three of the subjects tested actually had metabolic rates which were more than 30% below the average of the group for all occupations, and one a rate of more than 24% above that average. These workers then selected for further study 6 subjects whose expenditure of energy differed most from the mean. The energy balance sheets of these 6 subjects were investigated for 7-14 days. The intake was measured by weighing the food, and the output by a time and motion study combined with measurement at the important occupations. It was found that for all activities these 6 subjects expended enormously different amounts of energy when compared one with another.

Booyens and McCance claim that these marked variations in expenditure of energy can 'explain well enough why some people require fewer calories to maintain their weight and others twice as many'. On the other hand they found that it did not follow that the person with a very low metabolic

skrywers voer aptytverskille aan as verduideliking van hierdie oënskynlike teenstrydigheid—maar hulle beweer darem ook nie dat die aansienlike verskille in energieverbruik enige rol speel by die basiese beheer van die aptyt nie.

Indien hierdie uitslae geheel en al aanvaar kan word, is daar blykbaar twee hoofsaaklike afleidings wat ons kan maak. Ten eerste: Die aansienlike maar onooglopende verskille in energieverbruik (gemiddelde metabolismespoed) kan ten volle rekenskap gee van die baie groot verskille in die reaksie van die liggaamsgewig van verskillende indiwidue op soortgelyke voedselinnames. 'n Mens moet egter nie daaruit aflei dat die laaste persoon met 'n lae gemiddelde metabolismespoed geneig is om vet te word nie, want by baie mense bewaar die aptyt vanself die ewewig. Ons kan natuurlik nooit die feit ontduik dat vetsug alleen kan voorkom as ons meer eet as wat ons liggame nodig het nie.

Die tweede gevolgtrekking is dat die gewone standaarde vir metabolismespoed glad te eng is. Booyens en McCance voer dit selfs verder en beweer dat ‚dit nog bewys moet word dat 'n basale metabolismespoed 30-35% onder die gemiddelde van 'n groep noodwendig abnormaal is'. Terloops, hierdie opvatting trek die ‚nuwe sindroom' wat Kurland *et al.*[6] en Tittle[7] rapporteer in twyfel. Hulle beskryf 'n toestand van lae metabolismespoed sonder hipotiroïedisme maar met vae klagtes oor slaapsug, vinnige vermoeidheid, senuweeagtigheid, prikkelbaarheid, gevoeligheid vir koue, hoofpyn, vae pyne en verminderde geslagtelike aktiwiteit. Hierdie skrywers maak aanspraak op 'n gunstige reaksie op tri-iodotironien, maar nie op tiroïed sikka of op tiroksien nie. Sommige geneeshere mag wel meen dat meer feite nodig is om die stelling van so 'n sindroom te staaf, veral nou dat Booyens en McCance beweer dat 'n lae basale metabolismespoed tog normaal kan wees.

1. Widdowson, E. M. (1936): J. Hyg. (Camb.), **36**, 269.
2. *Idem* (1947): Spec. Rep. Ser. Med. Res. Coun. (Lond.) Nr. 257.
3. Widdowson, E. M. en McCance, R. A. (1936): J. Hyg. (Camb.), **36**, 293.
4. Edholm, O. G., Fletcher, J. G., Widdowson, E. M. en McCance, R. A. (1955): Brit. J. Nutr., **9**, 286.
5. Booyens, J. en McCance, R. A. (1957): Lancet, **1**, 225.
6. Kurland, G. S., Hamolsky, M. W. en Freedberg, A. S. (1955): J. Clin. Endocr., **15**, 1354.
7. Tittle, C. R. (1956): J. Amer. Med. Assoc., **162**, 271.

rate would necessarily tend to become obese. Two of their subjects with very low metabolic rates were exceptionally thin and did not have to worry about the food they ate. The authors explain this apparent discrepancy by difference in appetite—but they do not claim that the marked variations in energy expenditure play any part in the fundamental control of appetite.

If these results can be fully accepted there would appear to be two main conclusions to be drawn. First, that very considerable, but inapparent, differences in energy expenditure (mean metabolic rate) may fully account for the very great differences in the response of the body weight of different subjects to similar food intakes. It is not to be concluded, however, that everyone with a low mean metabolic rate tends to become fat, because in many persons the appetite produces an automatic adjustment. We cannot, of course, ever get away from the fact that obesity can only occur when the food intake is greater than the needs of the body.

The second conclusion is that the usual standards for metabolic rates are far too narrow. Booyens and McCance go so far as to say that 'it has still to be proved that a B.M.R. 30-35% below the average for the group is necessarily abnormal'. This concept, incidentally, may throw doubt on the 'new syndrome' reported by Kurland *et al.*[6] and Tittle,[7] who describe a state of low metabolic rate without hypothyroidism but with vague complaints of lethargy, easy fatigue, nervousness, irritability, sensitivity to cold, headache, ill-defined pains, and diminished sexual activity. These authors have claimed a good response to tri-iodothyronine, but not to thyroid sicca nor to thyroxin. Some may think that more evidence is needed in support of such a syndrome—particularly now that Booyens and McCance claim that the low B.M.Rs. may really be normal.

1. Widdowson, E. M. (1936): J. Hyg. (Camb.), **36**, 269.
2. *Idem* (1947): Spec. Rep. Ser. Med. Res. Coun. (Lond.) No. 257.
3. Widdowson, E. M. and McCance, R. A. (1936): J. Hyg. (Camb.), **36**, 293.
4. Edholm, O. G., Fletcher, J. G., Widdowson, E. M. and McCance, R. A. (1955): Brit. J. Nutr., **9**, 286.
5. Booyens, J. and McCance, R. A. (1957): Lancet, **1**, 225.
6. Kurland, G. S., Hamolsky, M. W. and Freedberg, A. S. (1955): J. Clin. Endocr., **15**, 1354.
7. Tittle, C. R. (1956): J. Amer. Med. Assoc., **162**, 271.