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Study shows midlife metabolism is a myth

When we are babies, our bodies have the highest energy expenditure they will ever have to keep up with the growth needed. Then, after age one, it slows down until we reach age 20, stabilising until age 60, when it slows down again. These are the fascinating findings published in the international journal, *Science*, with contributions from the University of Cape Town's (UCT) Professors Lara Dugas and Professor Vicki Lambert. The findings will change the way we think about metabolism.

Using a method known as doubly labelled water, Dugas and Lambert contributed their research to an international research consortium which included over 6 500 people from 29 countries, aged from eight days to 95 years old, providing data for the full lifespan of humans. Dugas and Lambert's data is from their international study including research participants from Ghana, Jamaica, South Africa, the Seychelles and the United States.

Concrete method

Dugas, the [AXA Research Chair](#) in Non-Communicable Disease Epidemiology in the Division of Epidemiology and Biostatistics, School of Public Health and Family Medicine at UCT and jointly an Associate Professor of Global Public Health and Epidemiology at Loyola University Chicago, explained what the data showed about energy expenditure, or metabolic rates, at four stages of life.

"In the first year of life, you are just a metabolic machine. You are burning through energy at a very rapid rate. And then from the age of one to 20 your metabolic rate is starting to slow down until you get to 20, we call that your adult metabolic rate. Then from 20 to 60 it is very stable. Only after 60 does it again start to decline and that is what is associated with ageing."

Lambert, a professor at UCT's Research Centre for Health through Physical Activity, Lifestyle and Sport and principal investigator for the study in South Africa, said: "This incredibly well constructed and well written paper involving data from infants to people over 80 has provided insight. What the Science paper showed, was that in neonates, that energy expenditure is almost 50 percent higher than it is for the average adult per kilogram of fat-free mass (muscle mass). It's not surprising that people eat less when they are older and also put on weight more easily, even if you account for physical inactivity."

The study shows how metabolic rate changes with ageing, but sex, relative to fat-free mass, does not change metabolic rates in humans. "Men have a higher muscle mass. Once we adjust the measurements for the higher muscle mass, metabolism is the same," said Dugas.

"We know there are definitely certain conditions that will change your metabolic rate for sure. There are certain substances, like nicotine and caffeine (in-take) that artificially elevate the metabolic rate, but over a long period of time, your body gets used to these and then it slowly comes down to normal. On the other side, you have medical conditions, where there is a depression in the metabolic rate and so those people are more prone to weight gain," she added.

New thoughts about older adults

Said Dugas: "The findings provide us with new insights and understandings about metabolism during older adult life, which could change the way we advise people or plan activity schedules."

"It was assumed that your energy expenditure started to decline much earlier, around 50. Your metabolism is really good until you are 60. When you are 60, there are true changes on a cellular level that are associated with ageing that slow your metabolic rate down," said Dugas. "You can keep going for a lot longer. We can do so much more. Don't give up. Your genes and your body and your cellular repair are going on for longer. Your body is working hard for you."

"This would be cause for thought around developing intervention strategies for older adults," confirmed Lambert. "Nobody wants to advise someone to eat less. That is unpleasant to advise particularly to someone who is weight stable and has been eating the same way their whole life and is perhaps putting on weight. It is really important for people as they become older to remain physically active, not only for managing their weight, but to retain their muscle mass and to lower the risk for other chronic diseases. The World Health Organization now recognises that even light intensity activity is beneficial for health."

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