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Burn or why your treadmill hour never budges the scale

Eat less. Move more. Radical fad diets aside, this simple prescription has been at the heart of conventional weight loss guidelines for decades. And like most conventional wisdom, it contains a certain kernel of truth. But in the wake of a seemingly unstoppable obesity epidemic, an endless barrage of dietary books, blogs, podcasts, and specials promise those struggling to maintain normal body weight new (and hopefully) easier answers. The problem is sugar. The problem is meat. The problem is carbohydrates. The problem is a lack of exercise. More recently, some have claimed that the problem is that we have failed to eat a diet that is an exact replica of what our Paleolithic ancestors consumed throughout the Pleistocene.

Personally, I've been a little disappointed in how many of my colleagues have—or have not—engaged in this public conversation. When the Paleo diet first emerged over a decade ago, in part from Cordain's (2010) eponymous book, anthropological critiques ranged from the sound and obvious (e.g., hunter gatherer diets vary widely in macronutrient content and are dependent on latitude) to the nit-picky and irrelevant (e.g., a “real” Paleo diet should not include New World foods if we want to replicate the “ancestral” condition). And perhaps those things needed to be said. But as anthropologists, what constructive advice do we have to offer if we disagree with particular tenets of the Paleo diet? How can evolutionary scholars join the public dialog surrounding issues like health, disease, and obesity? I suspect most of us would agree that an evolutionary perspective is relevant and timely and that at least some of the results from studying hunting and gathering communities can shed light on human health in the modern world. Unfortunately, most anthropological critiques have been less than constructive. While it is easy to critically assess the factual limitations and failures of something like the Paleo diet, it is harder to find positive ways to implement knowledge gained from anthropological studies in modern dietary contexts.

Herman Pontzer's *Burn* is one of the few successful attempts I have read at making contemporary anthropological research relevant and applicable to the on-going obesity crisis. The beginning of *Burn* carefully reveals the basics of metabolism, micronutrients, and the evolution of traits such as brain size and cooperative sharing, providing the reader, be they academic or average Joe, with all the tools they need make sense of the book's central arguments. The real meat of the volume focuses on what Pontzer calls the “constrained daily energy expenditure” hypothesis and its implications for weight loss and disease for everyone from the sedentary office worker to the Olympic athlete. In 2009, Pontzer and colleagues began a research project among the Hadza, a highly active population in which men walk an average of eight and a half miles a day. Using doubly labeled water, which is the only way to directly and objectively measure daily

energy expenditure, the team planned to investigate variation in energy expenditure across different human groups. The obvious initial expectation was that a population like the Hadza would have much higher daily energy expenditures than less active people from Europe or the United States. Much to everyone's surprise, this did not seem to be the case—all of the humans in a global sample appeared to be maintaining daily energy expenditures within a narrow window, regardless of activity level. Building on this result and others, *Burn* paints a picture of an incredibly flexible and dynamic metabolic system, where metabolic rate, hunger levels, and caloric investment in different anatomical systems and bodily functions fluctuate in response to changes in body mass and physical activity. This malleable metabolic dance has been selected for over millennia and its very plasticity is in part what makes sustained weight loss so very challenging for so many.

Pontzer is careful to note the just because exercise is not the key to weight loss, that does not mean exercise is irrelevant for human health. What *Burn* suggests is that within the context of a relatively fixed energy budget, one in which a calorie spent on one activity cannot be simultaneously spent on another, exercise shifts the allocation of our energy expenditure from potential disease response to activity. For example, if the body is forced through a combination of constrained energy expenditure and daily exercise to be more frugal in its investments, this may lead to a lower magnitude of stress response or less systemic inflammation, two conditions we know do decline with regular exercise.

At some point in *Burn*, Pontzer quips that there is always some colleague waiving their arm after a public lecture and asking how constrained energy expenditure applies to Michael Phelps—and I freely confess that this probably would have been me. Some of the more fascinating implications of Pontzer's ideas are what happens to humans at the limits of metabolic tolerance. When following participants in Race Across the U.S.A., a 5 month, 3000 mile trek totaling a marathon a day, Pontzer found that the runner's metabolic rate adapted and compensated for the increased activity level to the tune of 600 calories a day. But above that, the real constraint on how long you can continue to perform may be how efficiently your gut absorbs calories. Most people cannot absorb more than 2.5 times their basal metabolic rate (BMR) and beyond that are subject to exhaustion, weight loss, and all the symptoms of over-training. So perhaps the key to being Phelps is not his amazing wing span, but his ability to absorb calories at a rate that hovers around (or is just beyond) the 2.5 times BMR threshold.

In spite of covering detailed metabolic studies and theoretical principles, *Burn* remains a fun and, at risk of being hyperbolic, almost

joyful read. It is clear that its author is really enjoying the journey he is taking us on. The writing style actively conveys the fun of scientific research as Pontzer reveals his own process of discovery, peeling back the layers of his research one by one so the reader can understand the process that led to his conclusions. Pontzer seamlessly interweaves scientific information with a series of highly entertaining anecdotes ranging from explaining to the Hadza that walrus are indeed real animals to a relatable tale of an epic hangover at the Paleolithic site of Dmanisi. In all honesty, I chuckled more than I expected during a book that delves into lengthy explanations of the Krebs cycle. It is hard not to smile at someone who routinely uses M&Ms as a unit of caloric measurement, or compares tracking food intake to asking participants if they have had impure thoughts about Brad Pitt (“Everyone underreports” [p. 103]).

If there are criticisms to be made, they are minor. I worry that although it was not likely intended to be such, some might mistake Pontzer’s book for the latest in the aforementioned stream of diet books promising fast and novel solutions to their ever-widening waistlines. After all, the cover reads, “new research blows the lid off how read really BURN CALORIES, LOSE WEIGHT, and STAY HEALTHY.” Readers who are seeking a “lose the last twenty pounds” instruction manual will find themselves woefully disappointed, as the book’s more appropriate audience would be both students and the general public interested in metabolic research and evolution more widely. Pontzer’s dietary advice, when all is said and done, consists primarily of a reduction in caloric consumption through eating some protein and fiber to stay full and avoiding as much heavily processed food as possible. While such dietary advice is eminently sensible and empirically grounded, it is perhaps not the

“get skinny quick” solution craved by the modern dieter. What modern dieters may find unique about this particular book, however, is that it provides a coherent and sympathetic model for why losing weight is so very, very difficult for many of us. Our metabolic engine appears to be a flexible, dynamic system shaped by millennia of evolution to ensure our survival and reproduction, a finding that should surprise absolutely no one with a background in evolutionary biology. However, this means that while the “eat less” part of the old axiom still stands, the “move more” adage might not be quite as likely to shift scale weight as we once thought.

Burn. By Herman Pontzer. New York, NY: Avery. 2021. 384 pp. ISBN 978-0525541523. \$20.23/\$19.99/\$24.50 (hardcover/Kindle/Audiobook).

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