Editor’s Notes
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Fooling the Central Governor: The Tragic Story of Tom Simpson

“Like a ship foundering in a storm, his torso rolls slowly from side to side with each turn of the pedals as he struggles up the mountain. The gasping mouth never closes: he has the look of a man drowning. The end is sudden, a brutal transformation from struggling man to inert body on a bike, held up, lowered gently down, his chest pumped vigorously by the desperate doctor.”

William Fotheringham (2)

The next time you are motoring up Mont Ventoux on the D974 in southern France, make sure you stop a moment to take it in, about a kilometer from the top. A roadside memorial to Tom Simpson—stone marker, flowers, remembrances written on stones, an array of cycling gear (caps, tubes, water bottles) left by visitors, a plaque placed by his daughters (reading “There is no mountain too high”). On this spot during the 13th stage of the 1967 Tour de France, Simpson, the darling of British cycling, began zig-zagging out of control and toppled onto the road side. By the time they reached him he was dead, and thus began a saga—at once tragic, puzzling, heroic, and sadly revealing—with controversies and consequences that reverberate even to this day, more than 40 years later. (For the complete story, read William Fotheringham’s fascinating account in his classic book “Put me back on my bike. In search of Tom Simpson” (2).)

There exists no record of the temperature on Mont Ventoux that day. As one nears the summit there is nothing to provide any shade, and the bare limestone rocks that day were reflecting a glaring solar inferno. An anecdote goes that a local barkeeper claimed that his thermometer hit 54°C (that’s about 130°F). By any argument, it was hot. Extremely hot. At that time the sports world was ignorant regarding the importance of fluids in race competition, and the Tour rules prohibited riders from consuming more than 4 bottles (that’s about two liters) of water. Too, Simpson had been suffering from gastroenteritis, and after the previous day’s stage they had to wipe diarrhea off his bicycle. So, already dehydrated at the starting line in Marseilles, with ambient temperature well over 100°F., taking on little fluid, he challenged the 13-mile climb in the direct sunlight on Ventoux’s stony slopes.

It was well-recognized that Simpson was a frequent user of stimulant drugs during his races, and the evidence is thoroughly convincing that he had loaded himself with amphetamines the day he died. When the tour physician Pierre Dumas bent over Simpson in vain resuscitative efforts at the road side, he found in the cyclist’s racing jersey three glass tubes, two empty and one containing amphetamine tablets. The autopsy report confirmed amphetamines in stomach and urine samples. Tablets were found in his hotel room later, as well. What’s more, just as he was starting up the slopes, he consumed a quantity of brandy, supplied by a teammate.
Tom Simpson was certainly an aggressive and driven cyclist who challenged the limits of endurance performance. He had come to the Tour in that summer of 1967 to win. He had racked up a remarkable number of past achievements—wins in the World Championships, the Tour of Lombardy, the Tour of Flanders, Bourdeaux-Paris, Milan-San Remo, the Tour du Sud, and Paris-Nice. Previous results in the Tour de France, however, had left him disappointed and frustrated. In 1962 he became the first Brit to wear the maillot jaune as the Tour leader after stage 12, but injuries, exhaustion, and a fall during the descent from the Col du Galibier kept him from ever finishing higher than sixth place. No doubt, Simpson was under considerable pressure, both personally and from his Peugeot team sponsor, to do well in the 1967 event.

For exercise physiologists, the story of Tom Simpson’s tragic ending on the slopes of Mont Ventoux bears importance surrounding the validity of what is termed the “central governor hypothesis.” We’ve discussed this topic in these notes before (5). The central governor hypothesis holds that there exists within your brain a controlling mechanism, operating below the level of consciousness, that limits exercise performance for the sake of your health and safety. According to this idea, such a benevolent governor is an expression of a homeostatic mechanism that has permitted survival through the process of human evolution. What it protects you against are a number of disasters which could occur with extremes of exercise—bone fractures, muscle tetany, coronary artery insufficiency, fatal ventricular arrhythmias, heat stroke. It functions by a) decreasing central drive to motor neurons, and b) producing those agonizing sensations of fatigue—dizziness, nausea, hyperpnea—that make you stop.

In any consideration of the reality of the central governor, one question always arises. Is it possible to over-ride this subconscious governor by willful effort? That is, the very nature of success in many forms of sports competition rests on the ability of the athlete to withstand the discomfort of fatigue—to push “beyond the limits” is the hallmark of the elite competitor. But, in doing so, could the athlete be creating risks of excessive exercise stress against which the preferred governor is protective?

For most of such catastrophic outcomes, at least in otherwise healthy individuals, the answer would seem to be “no.” That is, even the most competitive athletes do not suffer acute bone fractures, fatal dysrhythmias, or myocardial infarction at the finish line, even if they collapse in agonizing fatigue. But what about death from heat stroke? The central governor in the brain is supposed to say “Uh-oh. My guy’s core temperature has just risen to dangerous levels, and if he keeps going, I’m going to fry, and he’ll succumb to cardiovascular collapse. I’m going to have to shut him down.” So, the question is, can you willfully deny such signals and “over-ride” the central governor when competing in the heat, to the risk of your ultimate demise?

Here is where the Tom Simpson story becomes instructive. Because, in the entire 107-year history of the Tour de France, Simpson’s death is the single case of a cyclist dying of dehydration and heat stroke. In this event, we witness the performance of probably the most aggressive, driven athletes on the planet. If anybody can over-ride a CNS governor, it would be these guys. Yet despite incredible extremes of ambient heat, prolonged work loads, and steep mountain ascents, there has been only one death from hyperthermia among the many thousands of
highly-determined competitors. And in this single case the cyclist was suffering the effects of amphetamines and alcohol, well-recognized to alter brain perception of effort that could be expected to lull a protective central governor. Indeed, evidence exists to support the common assertion that “amphetamines do not prevent fatigue but rather mask the effects of fatigue and interfere with the body’s fatigue-alarm system, which could lead to disastrous results, especially under extreme environmental conditions” (1). The Tour de France experience supports the conclusion, then, that such a sage central governor serves effectively to prevent over-exertion, even from heat injury, in an otherwise healthy, drug-free athlete.

Here’s another piece of evidence that leads to the same conclusion. The Marathon des Sables. This has got to be the ultimate test of the question. A 150-mile ultramarathon (that’s the distance of six regular marathons), it’s conducted over six days in the Moroccan desert where daytime temperatures range from 86o to 120oF. Each year about 700 people pay an average of $5,000 each to compete in this event, which is considered the most difficult footrace on Earth. Some of the rules are interesting. Each competitor must carry his own food and “survival equipment.” If you get off course and become lost, you lose your security deposit. (This once happened to an Italian named Mauro Prosperi, who became disoriented in a sandstorm and was lost for over 9 days, losing 30 pounds in the process.) And beforehand you must sign an agreement that if you perish during the event, your heirs will pay 1525 euros to the organizers to transport your body home.

Here the point. Since its inception in 1986, this event, where it is difficult to imagine more competitive drive in extreme hyperthermic conditions, where heat exhaustion must be considered the norm, where a total of more than 10,000 have participated, there have reportedly been only two deaths. I was unable to obtain any information regarding these tragedies. Did they result from heat stroke and cardiovascular collapse? Did they occur in otherwise healthy individuals, without underlying predisposing conditions? Were ergogenic drugs involved? One doesn’t know. But even if they were outcomes purely of hyperthermia and dehydration, the incidence of an over-ridden central governor would be extraordinarily low.

But, you say, certainly there have been deaths from hyperthermia in other distance athletic events, such as marathon races. Yes, but such deaths specifically related to hyperthermia in marathons are extraordinarily rare. And often in these few cases, unusual aspects to the tragedy are evident. For example, in the 2001 Chicago Marathon a runner collapsed and died near the finish line with a body temperature of 107 degrees—yet he was dressed lightly, consumed large amounts of fluids, and the ambient temperature was 50o F. This kind of observation has led Tim Noakes and others to speculate that such hyperthermic deaths occur in individuals with abnormal failure of mechanisms to disperse body heat load (3,4).

As William Roberts has pointed out, “It seems illogical that the brain would ever ‘choose’ to allow an athlete to develop heat stroke, because the final outcome will be fatal if the condition is left untreated. The brain should always choose to protect the tissues and the body” (4) (italics his). Roberts concludes that “I agree with Dr. Noakes that this anticipatory response [of the central brain governor] ensures that exercise is almost always terminated before the core temperature reaches dangerous levels. However, note that the use of the word ‘almost’ leaves room for brain failure and other problems associated with the evolution of exertional heatstroke.” Noakes himself would contend that even in those few cases, death from hyperthermia in
distance competition occurs in individuals predisposed by certain conditions (use of drugs, concurrent infection, or inherent abnormalities of heat dissipation).

One would be hesitant to suggest that conscious over-riding of a subconscious central governor by an extremely committed athlete with, as the French say, rage à vaincre (the rage to win) can never occur. But the evidence is quite compelling that if this occurs, it must be extraordinarily rare. The argument for a protective mechanism to prevent catastrophic outcomes from physical overexertion during sports competition must be considered compelling.

Thomas Rowland
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References