



## The Doctor is IN - Alec Isabeau DC

### Body Language – November 1997

We all know that running fast for more than just a few seconds produces pain. We're not talking about the pain of an injury (hopefully), but the familiar, welcome-to-training-and-racing discomfort of hard physical effort. Being trained in biology and healthcare and being a confirmed nerd (according to my wife), I've wondered about the pain of hard effort: what purpose does it serve?

Why can't I hammer out a 65 second quarter or a 35 minute 10K in complete, euphoric comfort, rather than grimacing pain? I'm physically capable of these feats without any fear of injury and yet when I do such things my body invariably screams, in the language of pain, "STOP, YOU IDIOT!!" This is interesting, don't you think? Come on you nerds out there, nod in agreement with me.

Physiologists know with certainty what causes the pain of fast running: chemicals. Specifically, an increase in the concentration of metabolic waste products (lactic acid is one we've all heard of) stimulates nerve endings embedded in muscles and blood vessels. These nerves fire off messages to the brain and you, running much faster than your comfortable jogging pace, begin to suffer.

Ok, so we know we hurt because the gunk produced in our muscles when we run fast builds up to levels which stimulate special pain nerves. That's all fairly simple – but what good is this masochistic feedback?!

Evolutionary biology asserts that all such basic "hard-wired" responses must in some direct or convoluted fashion assist in the reproductive success of an individual. What survival advantage might be confirmed on an animal by suffering pain during intense running? Here's where we get theoretical, but still quite logical. Follow along:

Our ability to run exists because it was previously extremely vital to our survival- our ancestors didn't run 10K's, but they sure as heck must have run a fair amount to stay alive. The capacity to run fast – whether all out, for just a minute or nearly as hard for many grueling minutes, must certainly have been essential in key scenarios: evading predators and running down wounded game for instance. Thus, we evolved specific metabolic pathways which enable us to run quite fast for brief periods, but – key point here! – always at a substantial price. Such very intense activity is metabolically costly and requires, inevitably, a protracted period of recovery afterwards during which our physical capacity is markedly compromised. As we've all experienced, a single demanding race or workout may leave us exhausted for many days afterwards.

Well, if you're out on the savannah, hunting and being hunted, it's handy to be able to run very fast when absolutely necessary, but remember, the price is extremely high: you may be physically worthless afterwards, for a few minutes, hours or days, depending on the rigor of your effort... and that may prove to be your subsequent undoing. Thus, hard efforts are hard-wired to set off a piercing warning alarm: the build-up of waste products in the muscles creates pain which essentially says to



the runner: "Listen, this fast running you're doing right now better be really, really important, because you are going to be wiped out for quite a while afterwards. Unless you're right on the verge of catching this week's one big meal, or you're barely 10 strides ahead of a hungry lion, you ought to slow down and mellow out right now, bubba". Slower running and walking, as we all know, can be sustained for very long periods, is not typically "painful" and for most survival scenarios was probably far more efficient and effective.

The pain induced by fast running, then, is a legacy of our desperate past. Fast running hurts because it was an activity which was not to be taken lightly: unless there was a truly compelling, do-or-die need to keep hammering along, the discomfort would naturally slow a person down and keep them from incurring a prolonged and costly metabolic debt.

Therein lies one of the great challenges we all face in racing: your primitive brain is saying "Slow down, you fool! This is not an extreme survival situation and you shouldn't be wasting your energy like this." This message is being transmitted non-verbally, of course, by the sensation of battery acid filling your legs and lungs. Your 20<sup>th</sup> century, intellectual brain battles back by saying "no, keep going, I'm on PR pace. This IS important! Don't be a wimp!"

When you run hard, and feel that searing full body sting, your sensations and emotions are indeed very primitive, internal and simple: speed up or slow down? PR or no PR? Gold medal or Silver medal? Eat or be eaten? Embrace the pain, or shut it down? You make the call.

## **Fast Forward UPDATE to 2011**

Well, here's one article from a while back that really doesn't warrant any revision or rebuttal. In fact, since that 1997 "Why Does It Hurt So Much To Run Fast?" article, I have come across a few additional papers which address that very question, and there appears to be strong consensus regarding the answer. The intense, transient discomfort we feel during hard physical effort (distinctly different from the pain of injury) is indeed an internal message designed to govern the level of exertion. Simply stated, intense activity (fast running, for example) burns a lot of fuel and requires a recovery period (minutes to days) during which the individual is unable to perform the same or similar tasks at a high level. In a primitive wilderness setting, such a massive expenditure of energy and the subsequent exhaustion and depletion were not conducive to survival, unless the demanding task at hand was of vital importance, such as running down wounded prey. Thus, we evolved a neurochemical feedback mechanism which reminds us while running hard that perhaps we should "downshift", conserve fuel and preserve function.

# The Empire Runner

In 2011, we now have a name for this neurochemical mechanism and a little deeper understanding of how it tries to slow us in a task as non-critical as a mere race or workout: it is called the Central Governor Theory. It appears that the primary source of pain and the urge to slow down comes from the brain, rather than the peripheral tissues and circulating chemicals. And here's the key point: the central governor (the brain) actually makes us want to slow down well before we've truly depleted our energy reserves or reached our true maximal level of intensity. Our brains, after all, are still wired for survival in an ancient, primitive setting, where "downshifting" was more often than not the wise thing to do. So, next time you're in a workout or race and your brain screams "Slow down!", you might be able to press on by remembering that the signal is purposefully sent early and you actually can keep hammering...if you deem it to be of great importance. ...So much easier said than done. Enjoy the challenge.

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