



Hi, <<First Name>>!

My guest this week was Claude Bouchard, PhD. It was a great honor to speak with him; his work has influenced me throughout my career as it has countless others in exercise science. He's the John W. Barton, Senior Endowed Chair in Genetics and Nutrition and Professor of Human Genomics at the Pennington Biomedical Research Center at Louisiana State University. He's published more than 1,000 peer-reviewed research papers, over 35 books and chapters and has received national and international awards and accolades too numerous to list here. He is without question not only the world's leading expert in human genetics of exercise but has been the principle architect of the field since he pioneered its beginnings. Here's a nice [biographical video interview](#) reflecting on his career.

Are you an 'n' of 1?

The notion that we're all an 'n' of 1 refers to the use of 'n' in science to indicate the number of subjects in a study. Is your response to training significantly different from someone else's response to the same training? First, you're human (homo sapien), which means that most your genetics are the same as mine. We all rely on the same mechanisms of adaptation to grow progressively stronger – physically and mentally. Adaptation to training occurs in small steps. While the genetic differences between us are small, those differences exist in many places throughout our DNA. Collectively, these create a set of differences that make each of us unique. So, yes, you are an 'n' of 1 and should keep a training diary to help you better understand the training to which you respond

best.

Responders vs non-responders

The response to training varies among people. The differences can be so large that some people are non-responders. As Dr. Bouchard explained, if you are a distance runner, you are not a non-responder. Throughout the endurance running community, however, we probably do have moderate-responders and high-responders. This means that one person may have a small adaptation to a specific block of training while someone else will have a large adaptation to the same training. We can't change the type of responder you are because that's programmed by your genes. But, your training will be more effective when you emphasize your adaptive strengths. In other words, if you respond well to one sort of training (hills, speed, long distance, etc.), then you might want to emphasize it in your workouts and in your choice of races/events.

Limits

Your genetics do place a limit on your potential. The notion of the 'gifted' athlete is confirmed by science. If you are at least moderately trained now and not regularly competing for the podium, don't expect to become the next Killian Jornet or Jim Walmsley no matter how you train. Most of the improvements in ultra-marathon performance achieved by experienced runners will come from getting the non-workout components right: sleep, hydration, nutrition, efficiency at aid stations, economy when running, mindset, etc.

Is your potential influenced by past behavior?

Does it make a difference to your capacity later in life if you were sedentary vs athletic early in life? There are many variations on this question that all build on the fact that our gene sequence is not the end of the story. We also have epigenetics, which make genes more/less available to be turned on and off. And, there are many other layers of control in the expression of our genes. We do not know whether your lifestyle or behaviors in one period of your life make a difference in your responses to training in another period of your life. We suspect that it does but have no data.

Genetics of the long run

Workouts are your way of stimulating adaptation. Once you've been running for an hour or two, haven't you already stressed the various systems and structures enough to make them adapt...what's the benefit of longer training runs? Dr. Bouchard suggested that energetics and efficiency continue to experience new adaptive stress with longer runs. So, pay attention to working on your hydration, nutrition, and running form in the later stages of your long training runs.

Detraining

There are no studies that have explored whether there are genetic differences in the rate of detraining. However, Dr. Bouchard drew a comparison with the variability in training responses among people. Some athletes respond slowly but steadily, others respond quickly and plateau, and others are delayed responders but still improve as much as their peers. So, he hypothesized, similar variability is likely to be true of detraining as well.

Microbiome

Exercise improves the relative amount of 'good' microbes in your gastrointestinal (GI) tract. Whether those microbes provide anything back to you to help improve your training adaptations (beyond good GI function) remains unknown.

What can you take away from this episode?

1. There's a lot of research yet to be done regarding the genetics of training.
2. Pay close attention to how you improve through different types and phases of training to learn where you respond best. If you like that sort of training, then maybe your greatest potential in competition would be in events that emphasize those capacities. For example, if you respond well to lots of vertical training, maybe the more extreme vertical races (even Vertical Kilometer, VK, races) are your forte.
3. Accept that your genetics limit your maximal potential but make the most of what you have. While you need to train the capacities that are important for the events in which you participate (specificity of training),

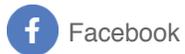
you might spend a little less time on your weaknesses if you don't seem to respond well to training in that domain. Work on your weaknesses by emphasize your strengths.

Do you know someone with depression? Take a moment to let them know how much you appreciate them. Then, please consider giving me a voice to help others with depression to seek help at GoFundMe.com/worldmarathons Thanks in advance.

Have a great run today!

All the Best,
Shawn
Chief Running Officer, [Science Of Ultra](#)

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