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Study finds variations in one gene may be associated with endurance running

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A few minor variations in one gene may make a difference in athletic endurance, according to a new study from *Physiological Genomics*.

The study found that elite endurance athletes were more likely to have variations of the NRF2 gene than elite sprinters. Non-elite endurance athletes were also more likely to have the genetic variations compared to sprinters, although the difference was not as pronounced.

The study shows an association between the gene variation and endurance, but does not establish a cause-effect relationship. Future studies are needed to unravel exactly what role the gene plays in athletic performance. The study is part of a larger body of research that is exploring the human genome and which aims to understand the genetic underpinnings of athletic performance.

Although the human genome is relatively uniform, there are variations among individuals. The researchers investigated the NRF2 gene because previous studies have shown that it may play a role in endurance performance because it:

- helps produce new mitochondria, a key cellular structure that produces energy
- reduces the harmful effects of oxidation and inflammation, which increase during exercise

"These findings suggest that harboring this specific genotype might increase the probability of being an endurance athlete," said one of the authors, Nir Eynon of Wingate Institute in Israel. The study, "Interaction between SNPs in the NRF2 gene and elite endurance performance," was carried out by Dr. Eynon, Alberto Jorge Alves, Moran Sagiv, Chen Yamin, Prof. Michael Sagiv and Dr. Yoav Meckel. All are at the Wingate Institute except for Alberto Alves, who is with the University of Porto in Portugal. The American Physiological Society (www.the-APS.org) published the study.

The Study

The study examined 155 track and field athletes who had competed in national or international track and field competitions. The athletes were further subdivided into endurance group (10,000 meter and marathon runners) and a sprint group (100- and 200-meter and long jump). The control group consisted of 240 non-athletic healthy individuals.

These groups were further divided into elite-level (those who had represented Israel in the world track and field championships or in the Olympics) and national-level (those who had competed in national competitions, but not international).

The study found that two variations in the NRF2 gene (specifically, the NRF2 A allele and the NRF2 C/T genotype) occurred more often in endurance athletes than in sprinters. "Eighty percent of the elite-level endurance athletes were carrying the A allele of the NRF2 A/C single nucleotide protein, compared to only 46% of the elite-level sprinters," Nir. Eynon said. The study also found that the combined NRF2 AA+ NRF2 C/T genotype was more frequent in endurance athletes than in the sprinters group and the control group.

"So," concludes Eynon, "some of us are truly born to run."

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