

THE ROLE OF TESTOSTERONE IN ATHLETIC PERFORMANCE

Based on our collective expertise and experience, the undersigned specialists in the sports science and sports medicine communities consider the following to be indisputable scientific facts:

1. The main physical attributes that contribute to elite athletic performance are:

- **power generation** (speed and strength), which is based on muscle mass, muscle fiber type, and biomechanics;
- **aerobic power** (VO₂ max), which is based on hemoglobin concentration, total blood volume, maximal stroke volume, cardiac size/mass/compliance, skeletal muscle blood flow, capillary density, and mitochondrial content;
- **body composition**, i.e., lean body mass and fat mass;
- **fuel utilization**, i.e., glycogen breakdown and anaerobic capacity; and
- **economy of motion.**

2. Biological males and biological females are materially different with respect to these attributes.

Compared to biological females, biological males have greater lean body mass (more skeletal muscle and less fat), larger hearts (both in absolute terms and scaled to lean body mass), higher cardiac outputs, larger hemoglobin mass, larger VO₂ max (also both in absolute terms and scaled to lean body mass), greater glycogen utilization, higher anaerobic capacity, and different economy of motion.

3. The primary reason for these sex differences in the physical attributes that contribute to elite (> 99th percentile) athletic performance is exposure in gonadal males with functional androgen receptors to much higher levels of testosterone during growth and development (puberty), and throughout the athletic career.

No other endogenous physical or physiological factors have been identified as contributing substantially and predominantly to these differences. As a policy matter, the exogenous factors that influence elite athletic performance – nutrition, training, sports psychology, environmental manipulation, sports medicine techniques, etc. – should be equally accessible to biological male and biological female athletes.

4. **Therefore, the primary driver of the sex difference in elite athletic performance is exposure in biological males to much higher levels of testosterone during growth, development, and throughout the athletic career.**

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