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Study revives Olympic prospects for amputee sprinter

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A world-renowned team of experts in biomechanics and physiology from six universities, led by Professor Hugh Herr of the Massachusetts Institute of Technology's Media Lab, refute scientific claims that the prostheses worn by Oscar Pistorius, a 21-year-old South African bilateral amputee track athlete, provide him with an unfair advantage in the 400-meter race. Their conclusions were based on data collected at the Rice University Locomotion Laboratory, under the direction of Professor Peter Weyand. Pistorius hopes to run in the 400-meter race at the Beijing Olympics this summer.

Based on the team's findings, the Court of Arbitration for Sports (CAS) in Lausanne, Switzerland, has ruled that Pistorius is eligible to participate in International Association of Athletics Federations (IAAF) sanctioned competitions. If he qualifies for the 2008 Beijing games, Pistorius would be the first disabled athlete ever to run against able-bodied athletes in an Olympic event.

The team's findings were presented to the CAS April 29-30 by Herr and Professor Rodger Kram of the University of Colorado at Boulder, and provided the foundation for Pistorius' appeal to overturn the IAAF decision that previously banned him from running against able-bodied athletes in races that are governed by IAAF rules. The team's findings were presented at the CAS, where Pistorius was represented by the international law firm of Dewey & LeBoeuf on a pro-bono basis.

In addition to Herr, Weyand and Kram, the panel of experts included

Professor Matthew Bundle from the University of Wyoming, an expert in the energetics and mechanics of sprinting performance; Craig McGowan, from the University of Texas at Austin, a leading authority on muscle, tendon and joint mechanics; Alena Grabowski, from the Massachusetts Institute of Technology, an expert in human locomotor energetics and biomechanics; and Jean-Benoît Morin from the University of Saint-Etienne, an expert in the mechanics of human running performance.

None received compensation for their research or participation in the hearing. The authors plan to submit the study to a peer-reviewed journal now that the legal case has been settled.

The scientific team was asked to evaluate the IAAF's initial claim that the Cheetah Flex-Foot prostheses (J-shaped, high-performance prostheses used for running) worn by Pistorius give him an advantage over able-bodied runners. The team concluded that the scientific evidence put forth by the IAAF investigation to ban Pistorius was fundamentally flawed. "While an athlete's performance in sprints of very short duration is determined almost entirely by mechanical factors, in races of longer duration, such as the 400m, performance depends on both mechanical and metabolic factors," said Herr, a bilateral amputee who heads the MIT Media Lab's Biomechatronics research group.

Based on this performance link, the scientists refuted the IAAF findings on two major points: the speed-duration relationship and rates of metabolic energy expenditure.

Specifically, the scientists concluded that:

-- Pistorius' ability to maintain speed over the course of longer sprints--his speed-duration relationship--is essentially identical to that of able-bodied runners, indicating that he fatigues in the same manner as

able-bodied sprinters.

-- Pistorius' rates of metabolic energy expenditure do not differ from elite non-amputee runners. In particular, he has nearly the same running economy, or rate of oxygen consumption at submaximal speeds, and a similar maximal rate of oxygen consumption as elite non-amputee runners.

"Based on the data collected at Rice, the blades do not confer an enhanced ability to hold speed over a 400m race," Weyand said. "Nor does our research support the IAAF's claims of how the blades provide some sort of mechanical advantage for sprinting."

"The study commissioned by the IAAF claimed that Pistorius has a 25 percent energetic advantage at 400m race speeds. That claim is specious because anaerobic energy supply cannot be quantified," Kram said.

In summary, the team of experts unanimously concluded that the IAAF allegations were not scientifically valid.

Source: Rice University