

## Technological Impact on Human Performance

Human performance optimization is probably the most studied topic in sport science, as it is in other closely related areas such as rehabilitation or settings like industry and the army. In the *International Journal of Sports Physiology and Performance (IJSP)*, an abundance of studies appears on nutritional manipulations that aim to get athletes at the start of a race in the best possible shape<sup>1</sup>; training strategies and training-load-monitoring tools to avoid having athletes crossing the thin line between training and recovery, making them vulnerable to nonfunctional overreaching and the overtraining syndrome<sup>2</sup>; or recovery strategies or manipulations designed to optimize recovery<sup>3</sup> or accelerate the return to play.

One of the emerging topics in sport science is technology. For healthy athletes, newly developed state-of-the-art equipment or monitoring tools are technological advancements that have the capacity to boost performance. “Apps,” for example, have become extremely popular for many applied scientists, recreational and professional athletes, and coaches for collection of data and/or in the provision of feedback on training sessions. Global positioning systems provide important training and game statistics, the Hawk-Eye system in tennis helps umpires make the correct decisions, and the video assistant referee in soccer does the same—all indicators of how emerging new technologies optimize performance. For disabled athletes, specialized equipment or assistive technologies create the possibility not only to participate in sports events but also to enjoy sport and optimize performance. An applied example of technology used to augment human performance is the well-known blades in transtibial amputees. In 2016, the Cybathlon, a championship for people with physical disabilities competing against each other using state-of-the-art technological assistive systems, was organized for the first time. This competition provided a first glance of what we might expect of technological integration in sport science. We are already looking forward to the next edition of this competition in 2020.

Converging technologies for improving human performance require a multidisciplinary approach of mechanical engineers, artificial intelligence experts, and sport scientists. For example, mechanical engineers focus on the design, development, and construction of orthotics, prosthetics, and exoskeletons to augment human performance. Many proof-of-concept and proof-of-principle prototypes have been constructed for military and industrial use, but

only a handful reach the market. In sports, a skiing exoskeleton has recently been designed, developed, and constructed—the Againer Ski Exoskeleton—to assist the athlete during skiing. Researchers also focus on technologies to accelerate postexercise recovery. One of the most important postexercise recovery interventions to achieve an optimal training adaptation is sleep. Recently, engineers have built a sleep robot, Somnox, to assist the sleep process. Artificial intelligence experts have been working on the implementation of virtual-, augmented-, and mixed-reality sessions into the microcycle planning of athletes. These strategies seemed science fiction only a few years ago but are now being used in tactical training sessions.

The integration of technology in sport science provides opportunities to improve exercise performance and to accelerate the recovery process. Although the use of state-of-the-art technology in sport science is promising, the big question of how the human body reacts to these novel strategies remains. To answer this question, an interdisciplinary approach is required. We are eager to learn more about strategies integrating technology in sport science and to comprehend the impact of technology on performance and the physiology of the human body. *IJSP* will be a natural place to report on these endeavors.

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### References

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