

Sport Medicine Support and Research – Reflections on an Olympic Year

Sportmedizinische Betreuung und Forschung – Reflektionen nach einem Olympiajahr

Olympic Games and Highlights! The comeback of Michael Phelps, whose fifth Olympia participation and gold medals 19 to 23 or the third triple gold of Usain Bolt in Rio fascinate worldwide.

From the viewpoint of an internationally-interested sports physician active in both care and research, I asked myself, among other things, whether the increase in serious injuries in gymnastics might be a sign of a dysbalance between developments in performance, equipment and sports venues. Later, the high number of serious crashes with surprisingly happy end, but also with fatal head injuries in the paralympic road cycle race made me consider the term “selective route profile”. Both considerations affect the health of the athletes, but they are not part of sports-medical examination and sports-medical care in training and competition (6).

Top Performance is the Result of Complex Processes

I found the fueling of the debate on specialization vs. versatility greatly exciting. Some swimmers, like Katinka Hosszu, were more successful in multiple starts than competitors who had concentrated on only one distance. The hepta-athletes Nafissatou Thiam and Katarina Johnson-Thompson both jumped to share rank 4 in the year’s best list in high jump (3). What is the ideal mixture of versatility and specialization?

In Rio, as well, results of brilliant but also disastrous preparation or planning could be observed in the qualification competitions. Many athletes reached or exceeded their goals. Others could not fulfill the expectations and shone with their best performances clearly before or after the Games.

Support of sport-type-specific training/performance control is the responsibility of sports medicine (6). Prerequisite to this is verifiable knowledge of the effect and dynamics of specific training measures. In this, sports medicine can rely on extensive, increasingly evidence-based, but primarily retrospective-descriptive findings. Factors which limit performance in numerous types of sports have not, however, been defined. The dynamic and complex interaction of potentially performance-enhancing adaptive processes is unclear. Scientifically-founded interventions in the sense of individualized modulation of the form, intensity and scope of exercise in dependence on the type of sport and specific socio-economic settings are still difficult to impossible (1, 7).

The best athletes compete in the Olympic Games. Nonetheless, world records are seldom improved. In Rio, there were 22 (8 in swimming, 6 in weightlifting, 5 in cycling and 3 in track and field), 15 records less than in London but comparable to the 20 to 37 at all Olympic Games since 1996. Cycling and track and field show typical developments. In 1981, Jelena Sipatowa set the women’s first world record over 10 000m at 32:17.20min. This was increased eight times by 1993 to 29:31.78min. The Olympic and world record of Almaz Ayana, 29:17.45min, was the only improvement in 23 years. Best times over 400m by the men have nearly stagnated since electronic timing was introduced in 1968 in Mexico City. Lee Evans’ 43.86s was improved four times in 48 years. Wayde van Niekerk achieved 43.03s in Rio. Since 2013 there is the 4000m team pursuit in women’s indoor cycling with 11 world records. But the logical thought that world best performance is easier to achieve in young types of sport is too simple. One record each was set by Australia and the USA, but 9 records by the team from Great Britain. The 4000m men’s team pursuit has shown a surprisingly continuous performance trend for about 30 years. The Soviet Union dominated until professional athletes were admitted, followed by Australia until 2004. Great Britain finally won another gold medal in 2000 after 24 years but has set all records since 2008 (3). The key to these successes is not only the best-possible physical preparation, but also Velodrom-specific racing strategies, material properties and design. They reflect the work of a multidisciplinary team of experts, in part with support from Formula 1.

Top Performance Needs Resources

The 4-year preparation program of British Cycling for Rio was funded with 30.2Mio £ (ca. 40Mio €) and achieved 11 medals (3). According to information from the Federal Government (5), The Olympic elite sport leagues can reckon with state funding of 62.79Mio € for 2017– a considerable sum, but spectacular compared to the resources of British Cycling. Nonetheless the position of the Minister of the Interior “The solid funds of the promotion are also medals” is backed up with an additional reference to the Comptrollers (Thomas de Maiziére 11.03.15).

If medals are calculated, the costs in Great Britain (65 Mio residents, 67 medals, Rank 2 in the medals list) with ca. 5.2 Mio € per medal is a “bargain price”. Australia (24 Mio residents, 29 medals) spent ca. 9 Mio € per medal in Rio. A comparative analysis >

ACCEPTED: January 2017

PUBLISHED ONLINE: February 2017

DOI: 10.5960/dzsm.2017.269

Beneke R. Sportmedizinische Betreuung und Forschung – Reflektionen nach einem Olympiajahr. Dtsch Z Sportmed. 2017; 68: 29-30.



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for Germans (82 Mio residents, 42 medals) is unfortunately not possible due to lower transparency. Be that as it may, compared to the 1.3 Bln € takings of the IOC, nearly quadruple the budget for the preparation of the entire British Olympic team for Tokyo, just from sale of the transmission rights for the Olympic Games 2018-2024, the above costs seem to be low (3, 8).

Nonetheless, the cost and success-related discussion which has been going on for 2 years now on revision of German elite sports was necessary and fruitful. Deficits and the necessity for reform of structure and content were clearly recognized (4).

Elite Performance Needs Science-Based Care

The resultant central demand for an “optimal combination and networking of science and elite sport practice” affects sports medicine in a variety of ways. The tasks of keeping the athletes healthy by immediate application of continual increases in knowledge in medical specialization appear uncontested. The emphasis on multidisciplinary research perspectives with adequate resources is profitable for sports medicine. By contrast the term “scientific support” appears unclear and possibly even counterproductively narrowly interpreted. A clear differentiation between science-based care and research is lacking. Science-based care applies available knowledge in athlete-, trainer- and league-focused training and competition practice, as well as in basic, advanced and continued education.

Elite Performance Needs Expanded Knowledge through International Competitive Research

Research is directed by theory and answers questions for better understanding of diverse, complex, factors determining performance and potentially performance-enhancing dynamic-adaptive processes, rarely with immediate benefit in practice but with high potential for mid- to long-term benefits (2). The increased intention of initiating and implementing projects at the league level opens advantages of a closer binding to selected types of sports. However, it also brings the danger that research into intersport, exercise-structure-dependent questions of adaptive, performance or health-relevant mechanisms may be shelved in favor of quickly-done measures closely applicable in care. This could mean that mid- and long-term relevant knowledge and innovation deficits arise for German elite sports compared to nations with more active research (2, 3, 7).

Scientific exchange is a critical test of new knowledge and a source of new queries. The core of this basis of possible increased knowledge is publication in competition with and evaluation by leading international scientists. The chance that a research-based manuscript will be published after revision in an international top journal is less than 20%. Application of current knowledge as a central element of sports-medical care can be correctly described as retrospective-scientific but is very rarely analyzed in a prospective-theory-directed researching manner. Thus it is nearly impossible to competitively publish care findings.

In high-performance sports, even international research findings with immediate competition advantages are only published after a delay. This does not question the very high international expectations about the benefit of theory-directed research and the high value of scientific publication. One proof of this statement is that the presently highest-rated performance-physiological and high-performance sports-oriented journal was launched 11 years ago at the “Australian Institute of Sports”. The editorial team is comprised of researchers in high-performance sports from 9 countries. Each of them was involved in the preparation of athletes for international events in the last Olympia cycle.

Hope after 2 Years of Discussion on the Revision of German Elite Sports

The German Journal of Sports Medicine represents the entire scope of the cross-discipline Sports Medicine both for the practitioner and the scientist. The circulation numbers are impressive. May this Editorial in the most important sports-medical dedicated journal in the German language contribute to ensure that reforms of the framework of sports-medical research in the fascinating field of elite sports take international developments into constructive consideration and demonstrate far-sightedness. ■

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