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Muscle oxygenation during the maximum aerobic metabolism workouts in world class kayakers: a Case Study

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INTRODUCTION:
In 1000-meter sprint kayaking events some muscle energy is generated through aerobic reactions and the other part of the energy comes from anaerobic reactions. Near Infrared Spectroscopy (NIRS) is one of the most informative methods for the analysis of aerobic metabolism in muscles. Although some researchers have analyzed the muscle oxygenation in different age kayakers by the NIRS method, there is little research evidence about the muscle oxygenation in world-class kayakers getting ready for 1000-meter sprint events.
The aim of this research work is to investigate muscle oxygenation of the world-class kayaker during workouts with different intensity efforts.
METHODS:
A single case study was conducted with the kayaker who is the winner of Europe and World championships and who was the fifth at the Olympic Games. Athlete's data: height 184.5 cm, weight 89.4 kg, lean body mass 50,2 kg, vital capacity 7.7 l, grip strength 74 kg, VO2 max 5.24 l/min, maximum aerobic power on kayak ergometer 340 W, with VO2 at the anaerobic threshold of 3,90 l/min, capacity 220 W. NIRS monitors were fixed on the following muscles: Lateralis Dorsi (LD), Pectorlis Major (PM) and Vastus Lateralis (VL). The athlete performed two special workouts with explosive and high-intensity efforts. One workout was used to determine the VO2 max using a kayak ergometer. The other workout was rowing in water in a 1000-meter race (average 310 W, 3 min 38 sec.).
RESULTS:
The VO2 max test revealed different oxygenation processes. Oxygen saturation reduced the most in VL muscle, whereas in LD and PM muscles the SmO2 dropped down to 20–30 %. During the racing workout, the SmO2 gradually reduced and reached the 0–10 % limit at the end of the distance. The heart rate was 184 bpm during both workouts.
CONCLUSION:
Our study revealed that aerobic processes were very intensive in all world-class kayaker's muscles during both workouts involving high-intensity efforts. The greatest oxygenation changes were observed in VL muscle. These findings prompt the need for further research into aerobic metabolism in the muscles of world-class athletes.

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