



EVALUATING THE ANAEROBIC RESPONSES TO PHYSICAL EXERCISE IN TRAINED MALE PARALYMPIC ATHLETES WITH LOCOMOTOR IMPAIRMENT

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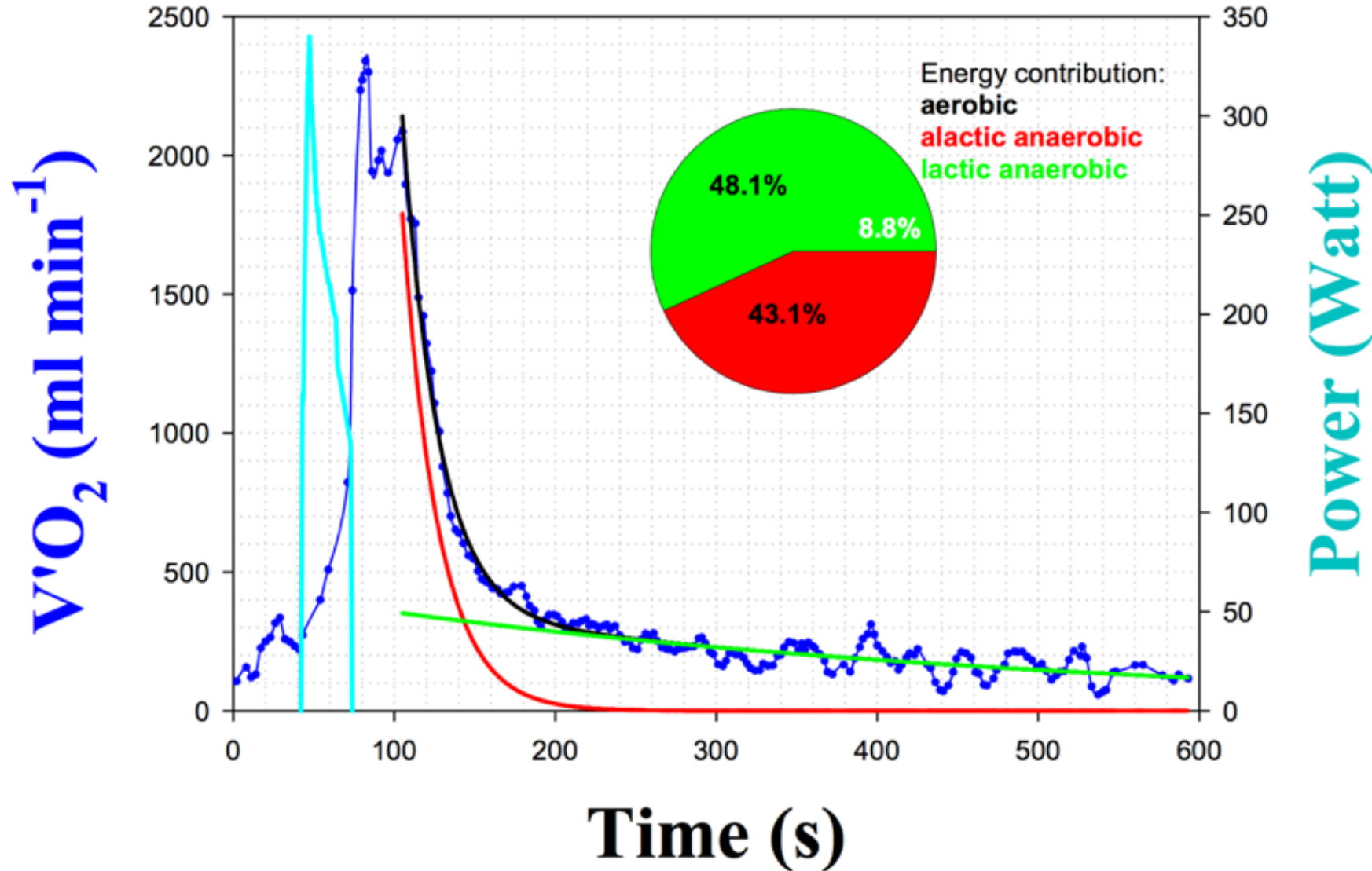
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SCIENTIFIC BACKGROUND AND EXPERIMENTAL APPROACH TO THE PROBLEM

- Assessment of anaerobic components of physical fitness is of great importance in Paralympic sports in terms of health-related reasons, competitive success and functional classifications (Hutzler et al., 2011; Bernardi et al., 2012).
- However, the anaerobic responses to physical exercise have been poorly investigated in Paralympic athletes (PA) with various types and severity of physical impairments.
- There are many laboratory procedures for evaluating anaerobic power or capacity. Yet the Wingate cycloergometer test seems to be most popular because of its high reliability. The Wingate test has many versions, of which the 30-second test is applied most often.
- Shorter versions of the test (e.g. the 10-second test) should be applied to those athletes requiring short bursts of explosive power as required in many Paralympic sports. The reliability of the 10-seconds test has never been investigated in Paralympic athletes yet.

Metabolic Analysis of an Anaerobic Test



AIMS

1. To evaluate the relationship between a functional classification and the anaerobic power evaluated through a 30-second-long (30-s) Wingate anaerobic test (WAnT) in Paralympic Athletes with a locomotor impairment.
2. To explore whether an abbreviate (10-second long, 10-s) WAnT protocol could be used in Paralympic Athletes with a locomotor impairment to accurately predict the anaerobic power of a traditional WAnT.
3. To propose a new test to assess the anaerobic glycolytic capacity.



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MATERIAS AND METHODS

PARTICIPANTS

- Thirty-two trained male Paralympic athletes were tested before their participation in Summer Paralympic Games.

Athletics	n = 5
Handbike	n = 1
Swimming	n = 5
Shooting	n = 3
Table tennis	n = 3
Archery	n = 3
Sailing	n = 2
Wheelchair basketball	n = 5
Wheelchair tennis	n = 5

- In order to group athletes with a similar functional limitation, each Paralympic Athlete was assigned a functional classification class ranging from 1 to 10 on an ordinal scale according to the classification system adopted in Para swimming.

Para swimming class		
3	n = 1	Group 1
4	n = 7	
5	n = 3	Group 2
6	n = 8	
7	n = 1	
8	n = 7	Group 3
9	n = 3	
10	n = 2	

PROCEDURES

- All Paralympic Athletes completed a 30-s WAnT and a 10-s WAnT with an electronically braked arm cycle-ergometer (Lode Excalibur, Holland).
- Data were collected during the institutional health and fitness screenings carried out in the Institute of Sports Medicine and Science of the Italian National Olympic Committee before the Paralympic Games.
- Prior to testing, athletes received the same pre-test instructions, i.e. to void their bladder.
- On the day of testing, all athletes were required to avoid strenuous exercise for 24 hours and to abstain from caffeine for at least 12 hours as well as from food and drink for at least 2 hours prior to testing.



MATERIAS AND METHODS

PROCEDURES

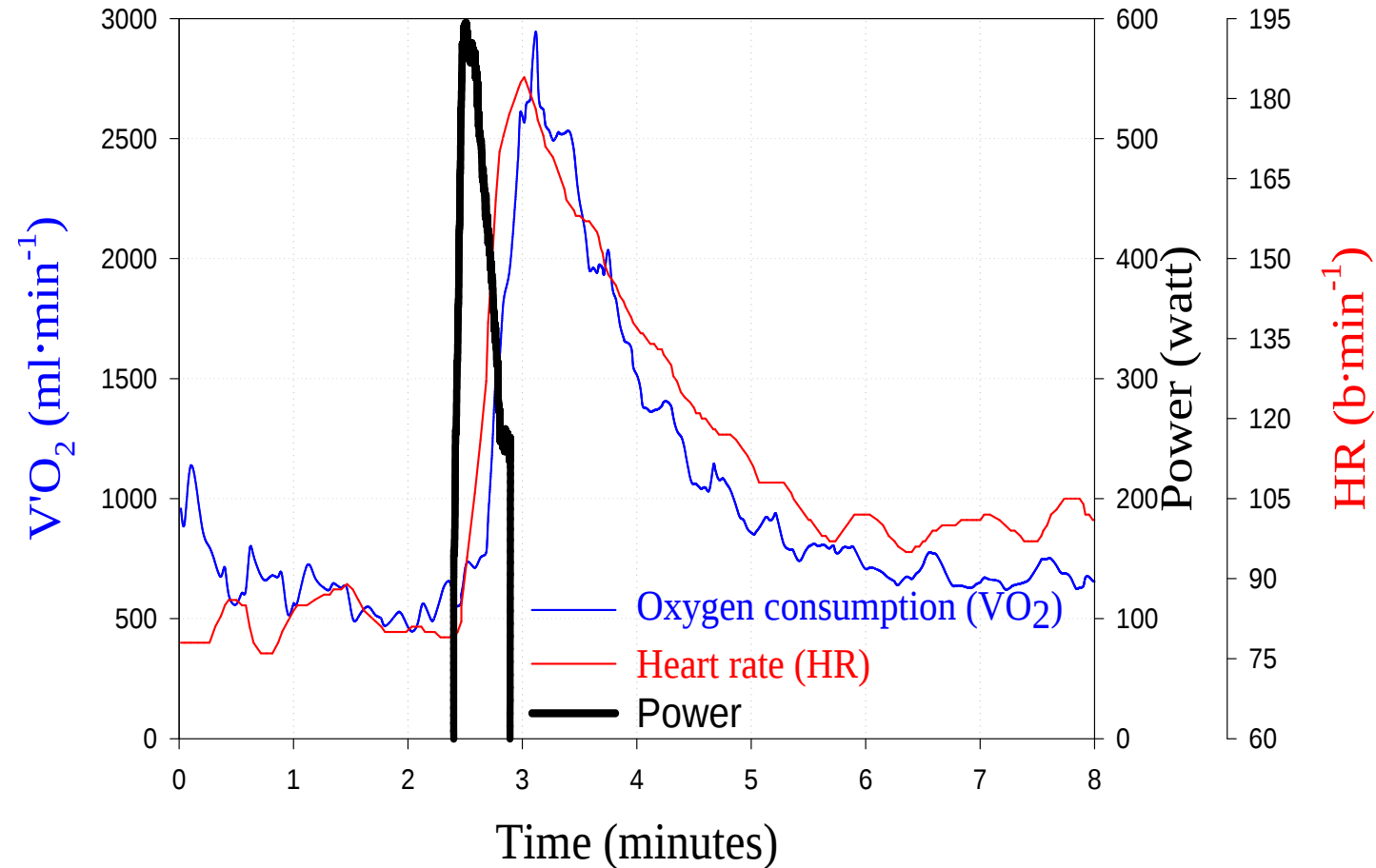
➤ Variables considered for analysis:

- The average power achieved throughout the 30-s and the 10-s WAnT (mean power [MP_30 and MP_10, respectively]);
- The maximum (peak) power achieved throughout the 30-s and the 10-s WAnT [PP_30 and PP_30, respectively].

Other Measurements taken during the 30-s WAnT:

Oxygen Uptake during and after the test and Blood

Lactate after the tests

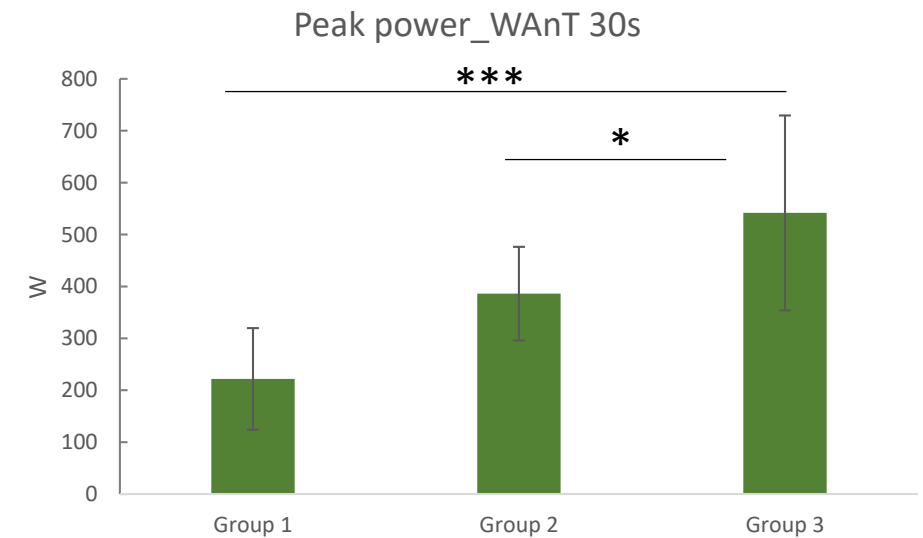
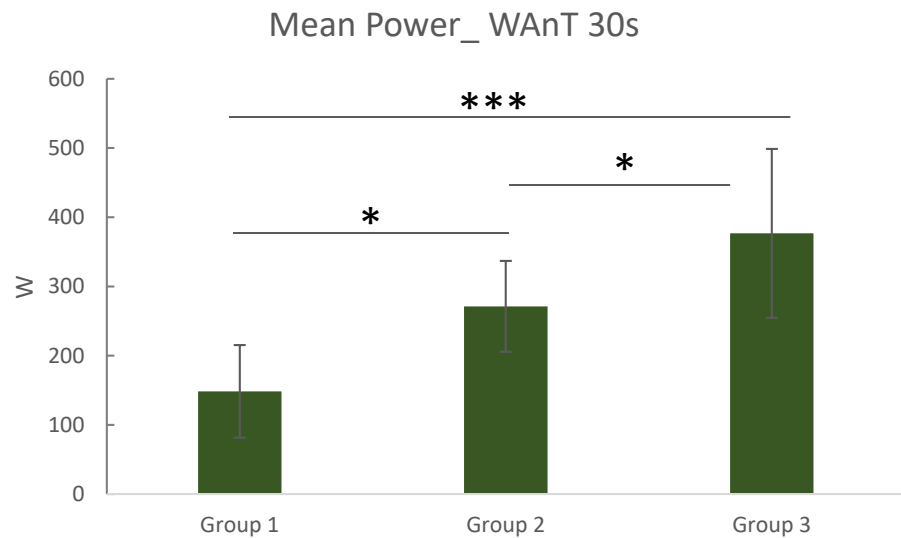
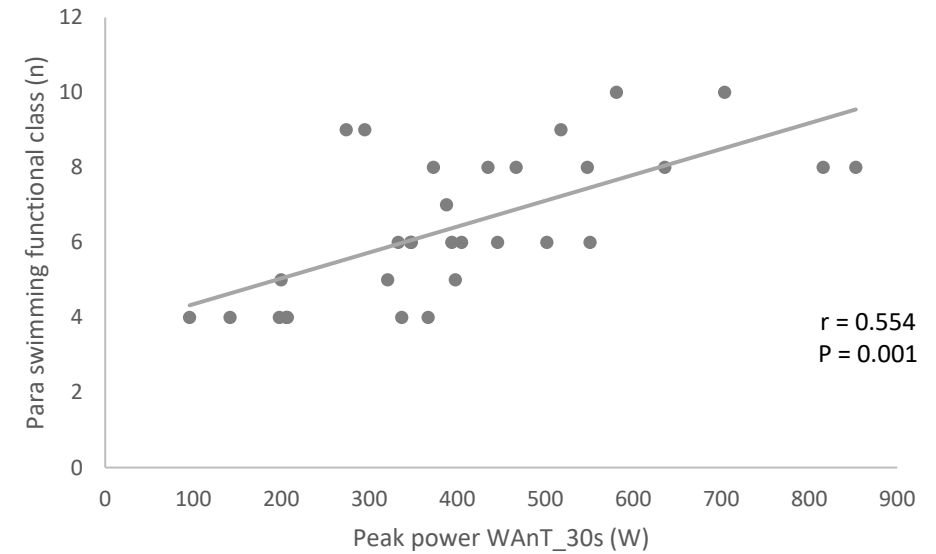
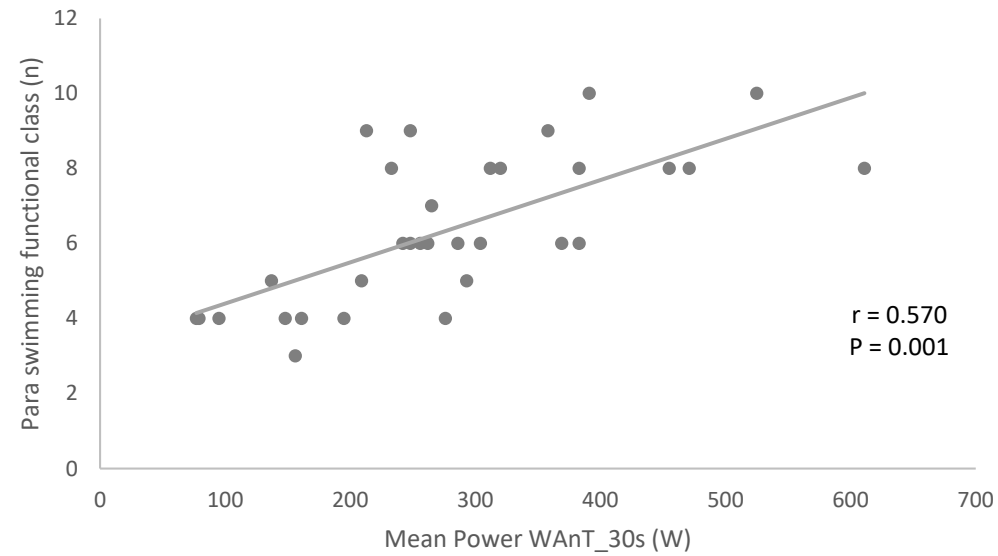


STATISTICAL ANALYSIS

- Data were assessed for normality with the Kolmogorov-Smirnov test and transformed using the method described by Box and Cox where necessary.
- The Pearson's product-moment correlation coefficient (r) was used to assess the relationship between the functional classification point score, the MP_30 and the PP_30.
- One-Way Analysis of Variance followed by Bonferroni's post-hoc test was used to assess between-groups differences in MP_30 and PP_30.
- Paired-Samples T-tests were performed to assess differences between MP_30 and MP_10, as well as between PP_30 and PP_10.
- The Pearson's product-moment correlation coefficient (r) and linear regression analyses were performed to determine the accuracy with which MP_30 and PP_30 could be predicted from values of MP_10 and PP_10, respectively.
- Statistical significance was set at $P < 0.05$.

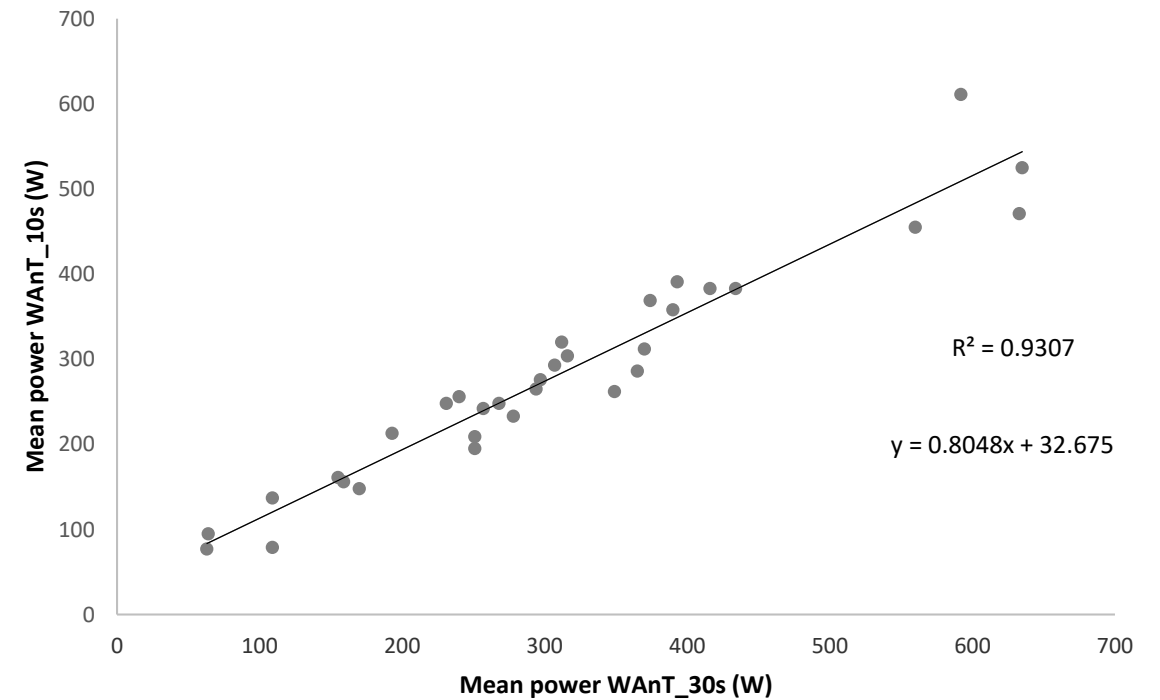
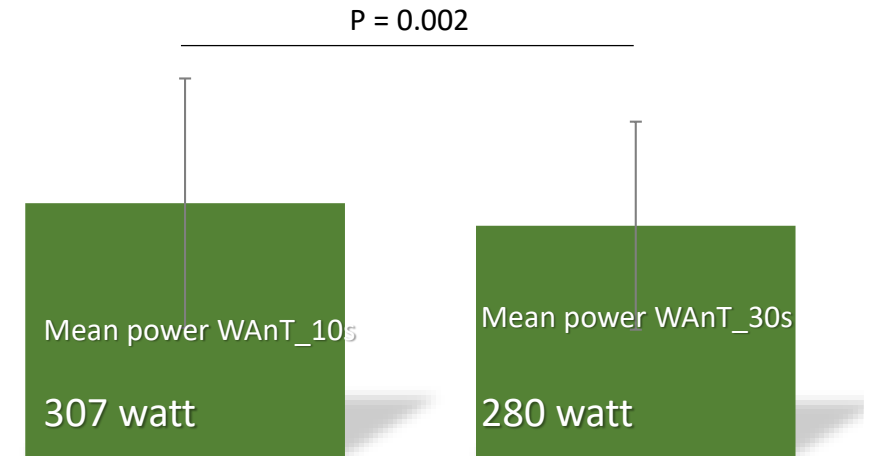
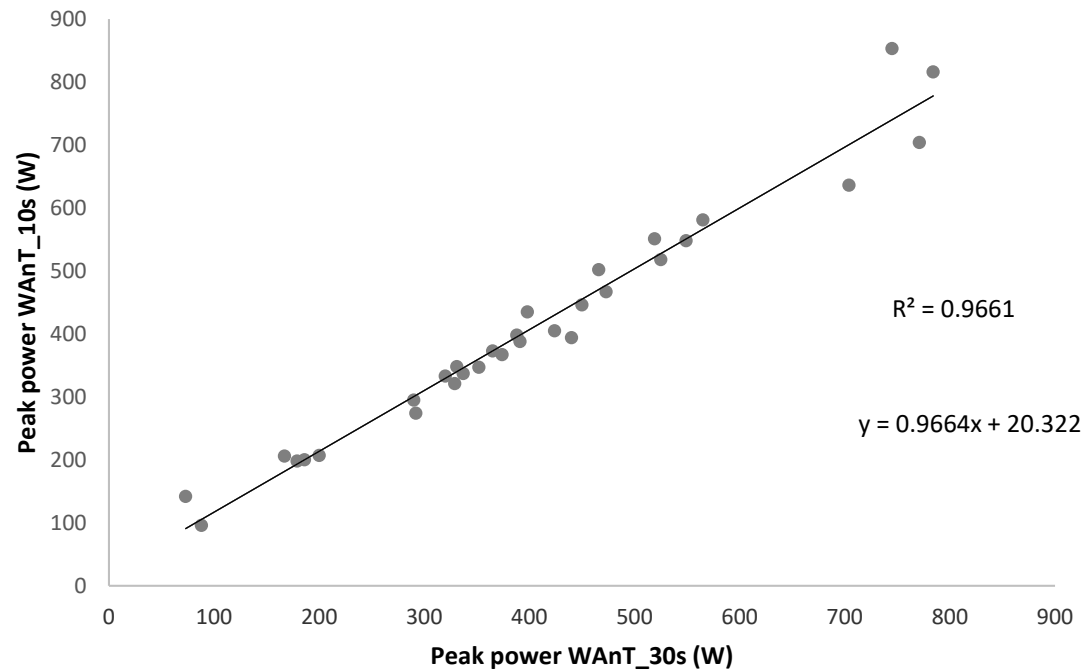
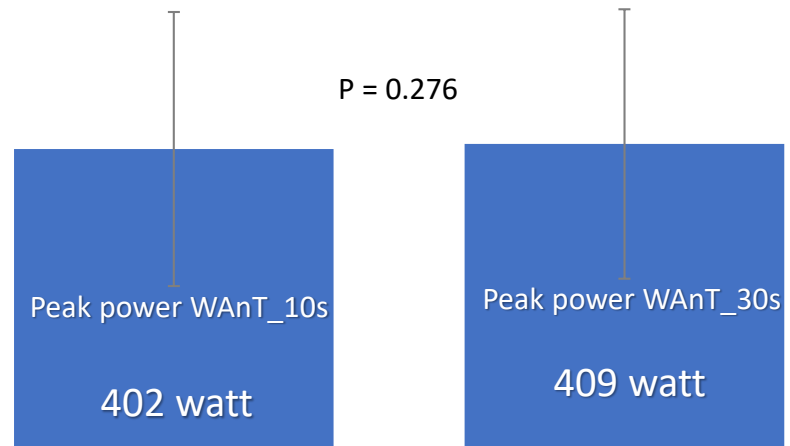


RESULTS



*, $P < 0.05$; **, $P < 0.01$; ***, $P < 0.001$

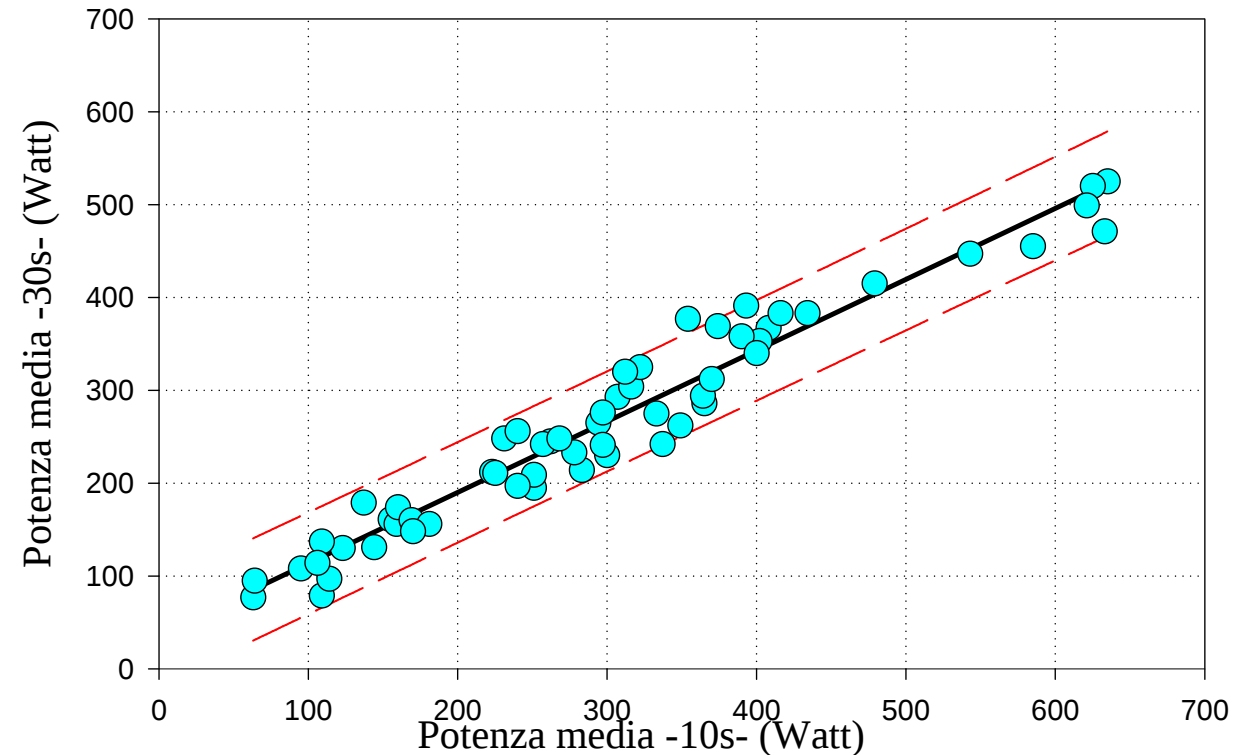
RESULTS



DISCUSSION

- Results suggest that the severity of the impairment impact on the anaerobic power of Paralympic Athletes offering important practical implications in Paralympic sports from the perspective of fitness evaluation (Bernardi et al., 2012) and functional classification assessment (Hutzler et al., 1998).

- Furthermore, a 10-s WAnT seems to be accurate to predict the anaerobic power as traditionally evaluated through a 30-s WAnT in male PA with locomoto impairment allowing for a decrease in the mild to severe physical discomfort often associated with this traditional protocol.



A grayscale photograph of a wheelchair basketball game in progress. In the foreground, a player in a white jersey with the number 12 is seen from the back, sitting in a wheelchair. In the center, a player in a dark jersey is holding the basketball and looking up. To the right, another player in a white jersey with the number 4 is also in a wheelchair, looking towards the center. The background shows a basketball court with a crowd of spectators in the stands.

Thank you for your attention!

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