



PARALYMPIC ATHLETES FITNESS USING A NEW WHEELCHAIR ERGOMETER

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MOTIVATION

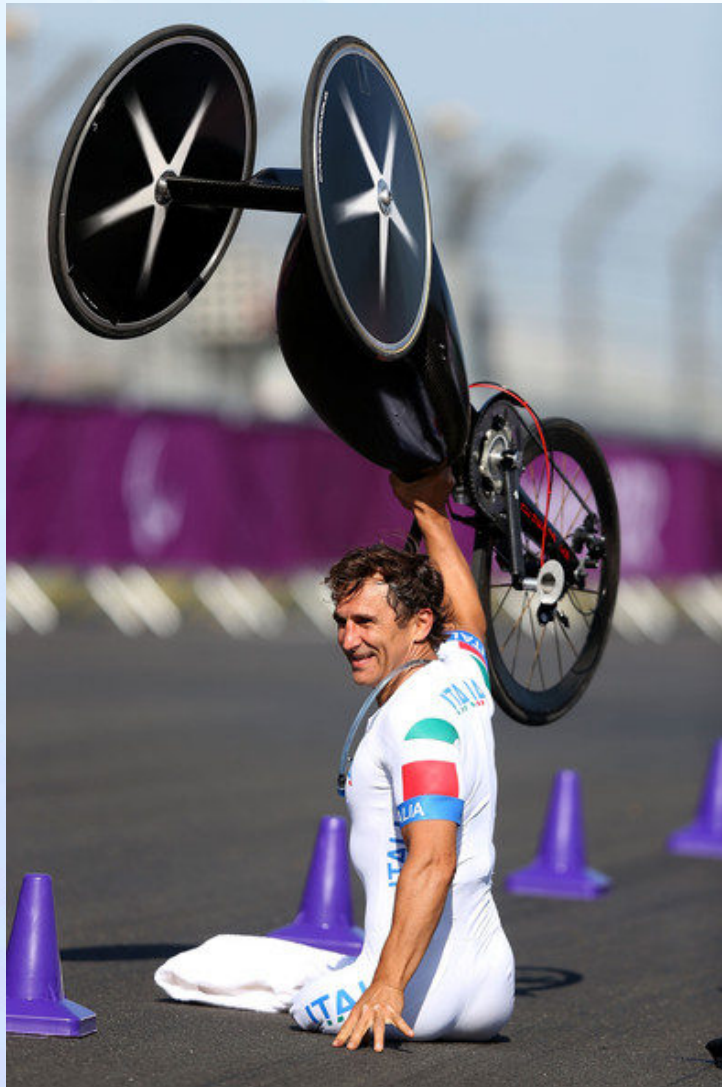
PURPOSE

METHOD

RESULTS

DISCUSSION

CONCLUSION



- Improvement of the physical conditioning
- Technological evolution of equipment .

(BURTON, 2010)

MOTIVATION

PURPOSE

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- New ergometers have emerged as devices for the assessment of paralympic wheelchair athletes

(FAUPIN, 2008)

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- Technological innovations in wheelchair ergometers
 - Replicate the biomechanical aspects of propulsion in manual wheelchair
 - Assessment the physiological response of specific sport paralympic





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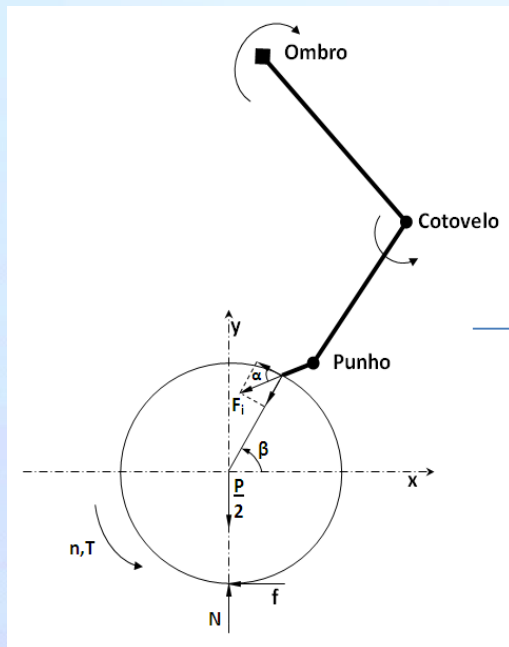
DISCUSSION

CONCLUSION

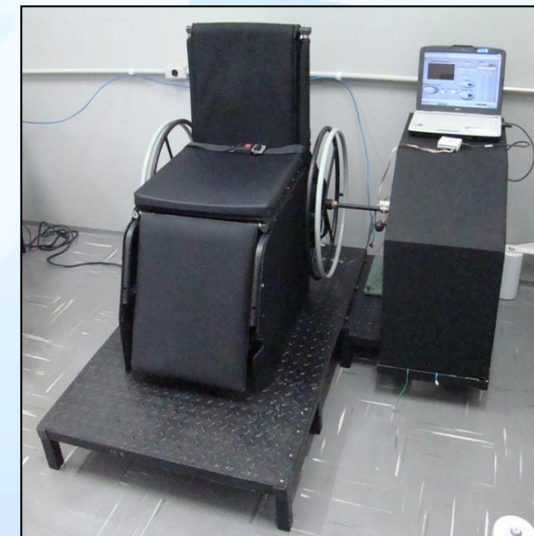
Evaluate the power parameters and fatigue index of paralympic wheelchair athletes using the Wingate test in a new wheelchair ergometer.

MOTIVATION	PURPOSE	METHOD	RESULTS	DISCUSSION	CONCLUSION
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- A new wheelchair ergometer prototype was developed to apply anaerobic tests
- Structural parts were designed with anthropometric measurements and manufactured in two modules (propulsion and electromagnetic resistance)

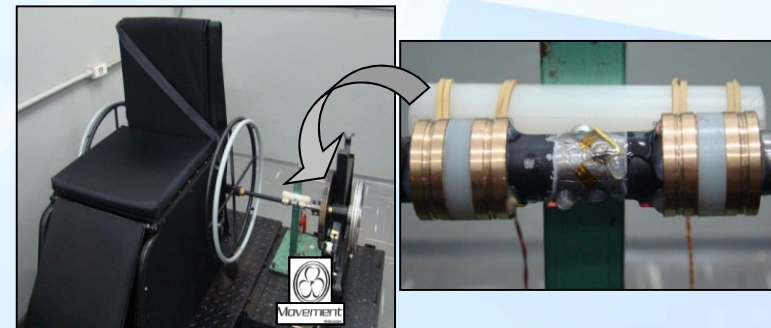
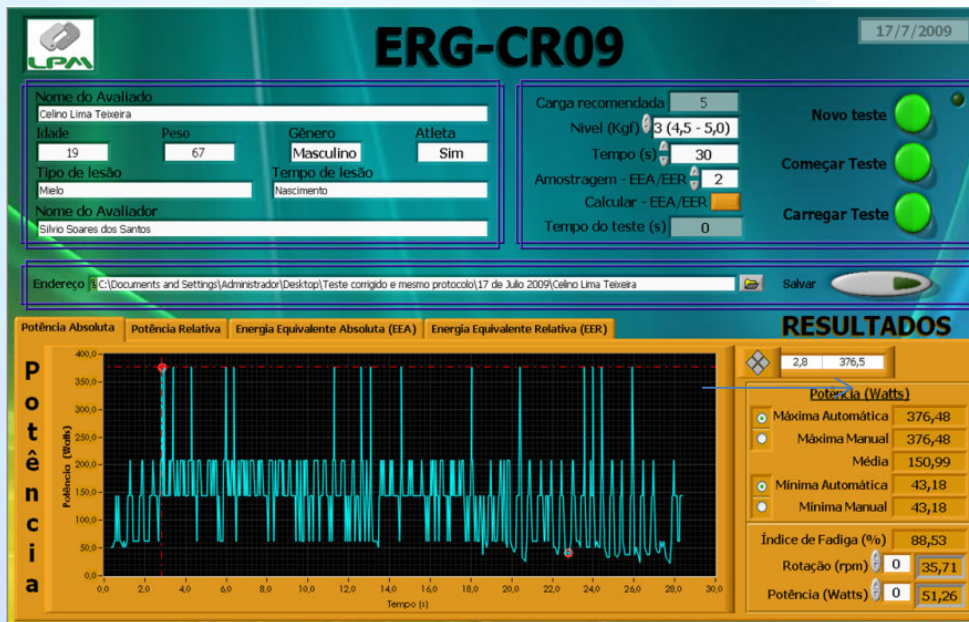


$$T = \frac{P \cdot \mu \cdot r}{2} \left[\frac{\sin(\alpha + \beta)}{\sin(\alpha + \beta) - \mu \cdot \cos(\alpha + \beta)} \right]$$



MOTIVATION	PURPOSE	METHOD	RESULTS	DISCUSSION	CONCLUSION
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- LabVIEW program



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- A second version the wheelchair ergometer prototype was developed.



MOTIVATION**PURPOSE****METHOD****RESULTS****DISCUSSION****CONCLUSION**

- 12 Paralympic athletes users of wheelchair
 - 4 Wheelchair Basketball, 4 swimming, 4 weightlifting
 - Gender - 9 males and 3 females;
 - Age – 27.9 ± 11.1 years;
 - Injury time – 13.5 ± 9.9 years;
 - Body mass – 69.0 ± 21 kg.
- Injury of wheelchair athletes: 6 spinal cord injured; 1 poliomyelitis, 1 myelomeningocele, 1 congenital malformation of the lower limb, 1 epiphysiolysis in lower limb, 2 with lower limb ampute.



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Sample	Gender	Age (years)	Injury	Paralympic Sport	Injury Time (years)	Weight (kg)
1	M	42	Amputee MMII	weightlifting	11	58
2	F	23	SCI L4 - L5	weightlifting	9	88
3	M	23	SCI T8	weightlifting	21	77
4	M	32	Epiphysiolysis in lower limb	weightlifting	10	103
5	F	27	SCI T10	Swimming	16	42
6	F	50	SCI T5	Swimming	3	57
7	M	19	SCI T11	Swimming	2	61
8	M	27	SCI T3 - T4	Swimming	6	52
9	M	41	Poliomyelitis	Wheelchair Basketball	39	110
10	M	19	Myelomeningocele	Wheelchair Basketball	19	67
11	M	17	Malformation of the lower limb	Wheelchair Basketball	17	58
12	M	15	Amputee MMII	Wheelchair Basketball	12	56

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Wingate Test

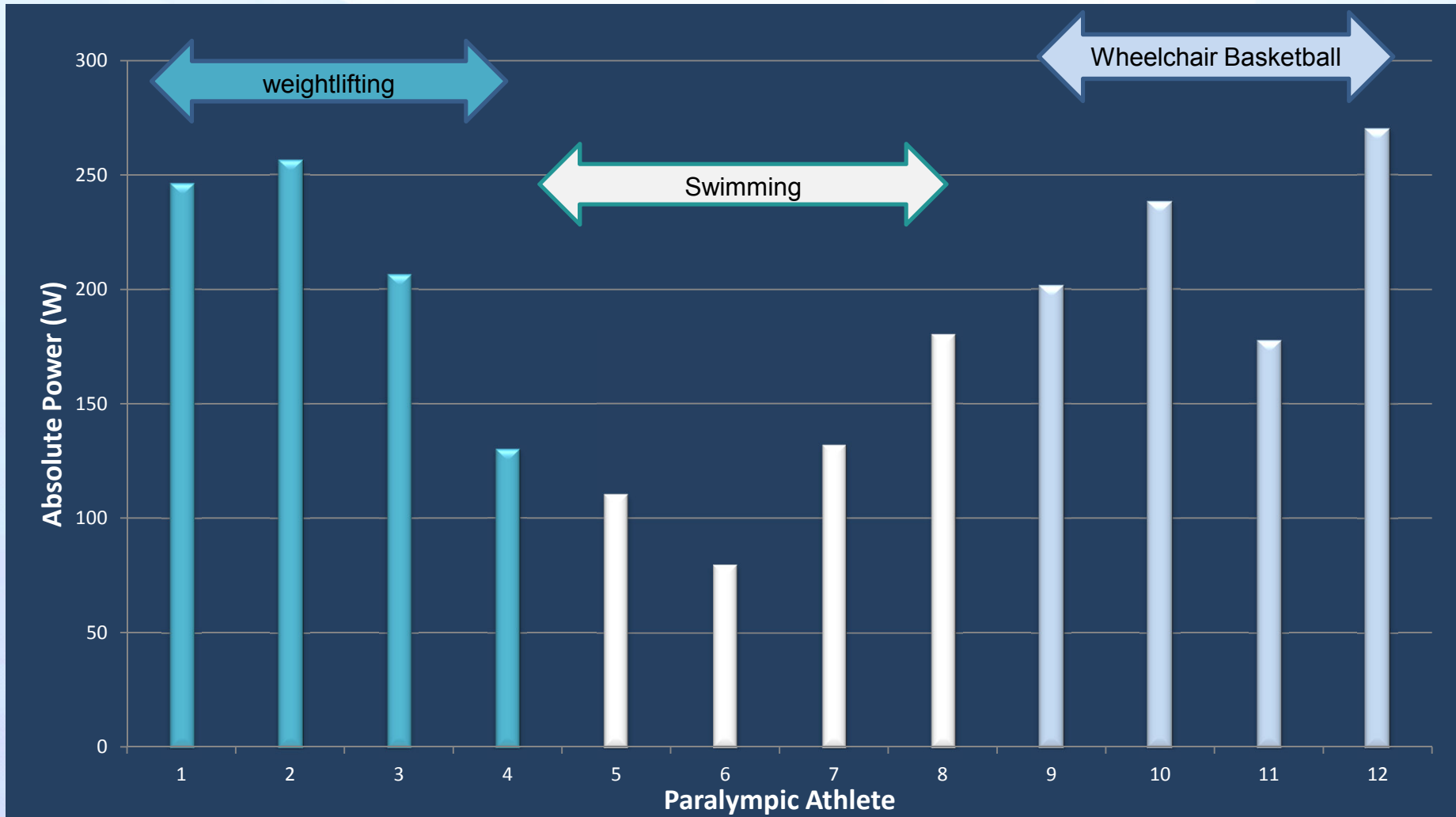
- Phases
 - Heat phase
 - Maximum strength (30 seg)
 - Recovery phase
- Load
 - 7.5% of body mass.



ABSOLUTE POWER



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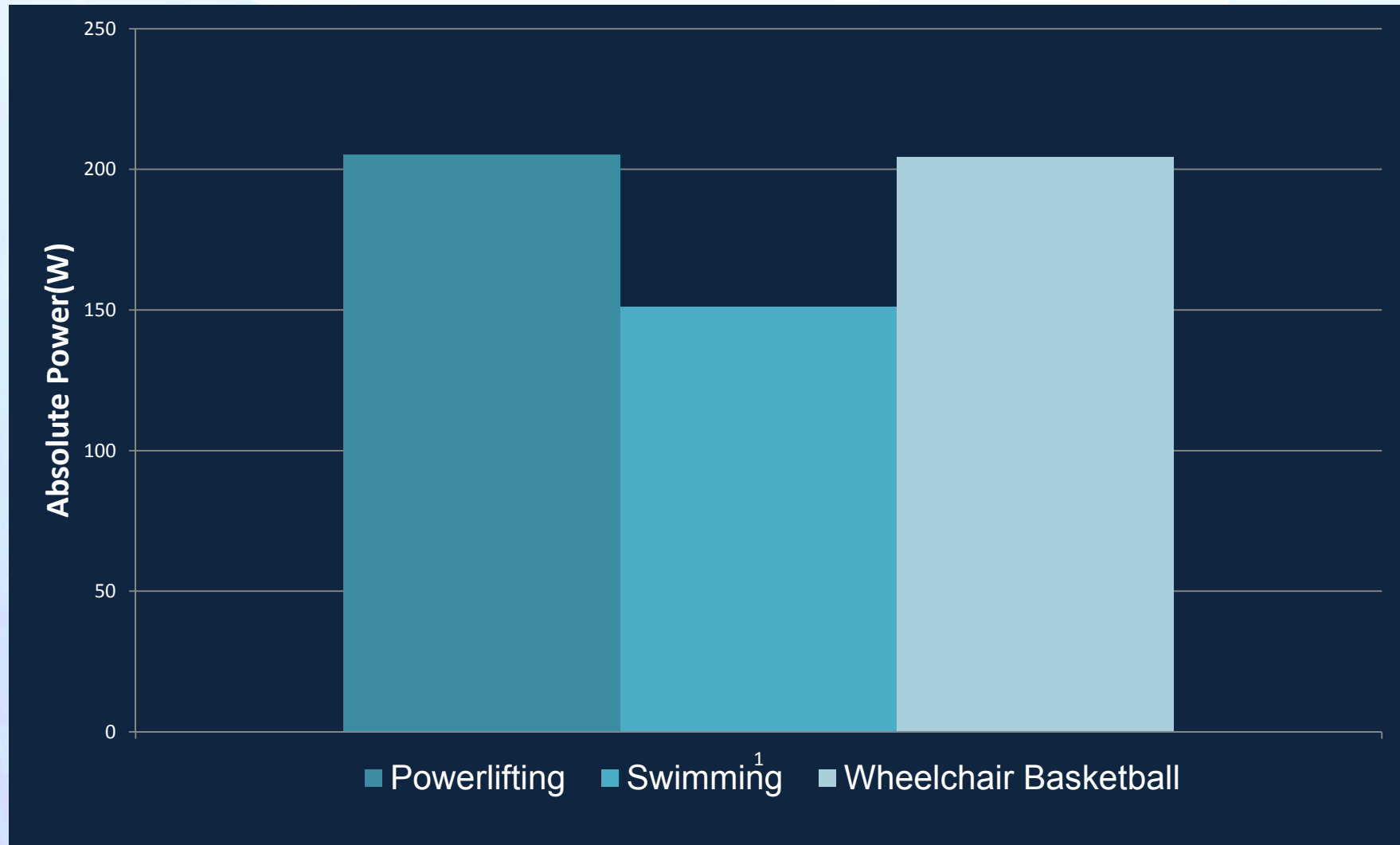




ABSOLUTE POWER



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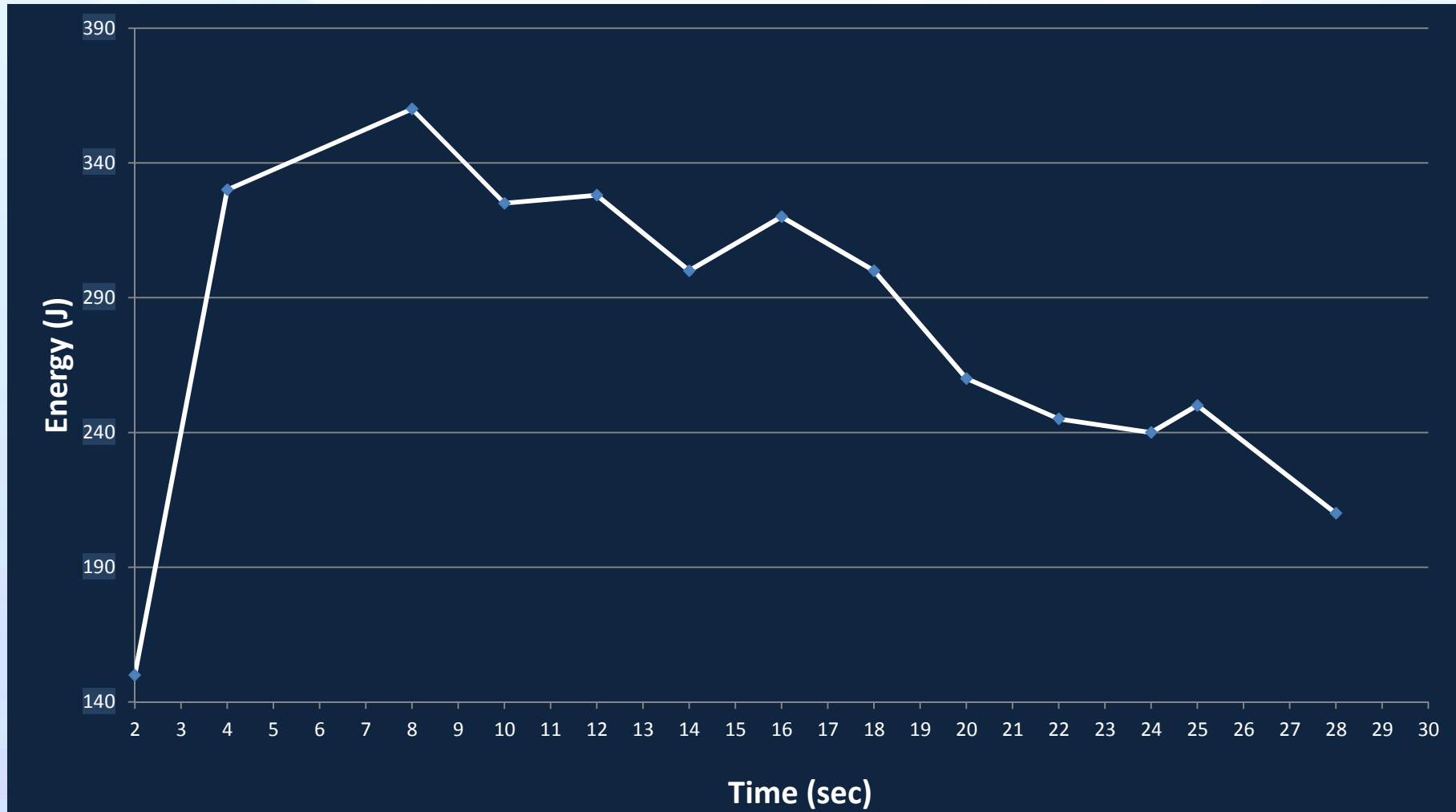
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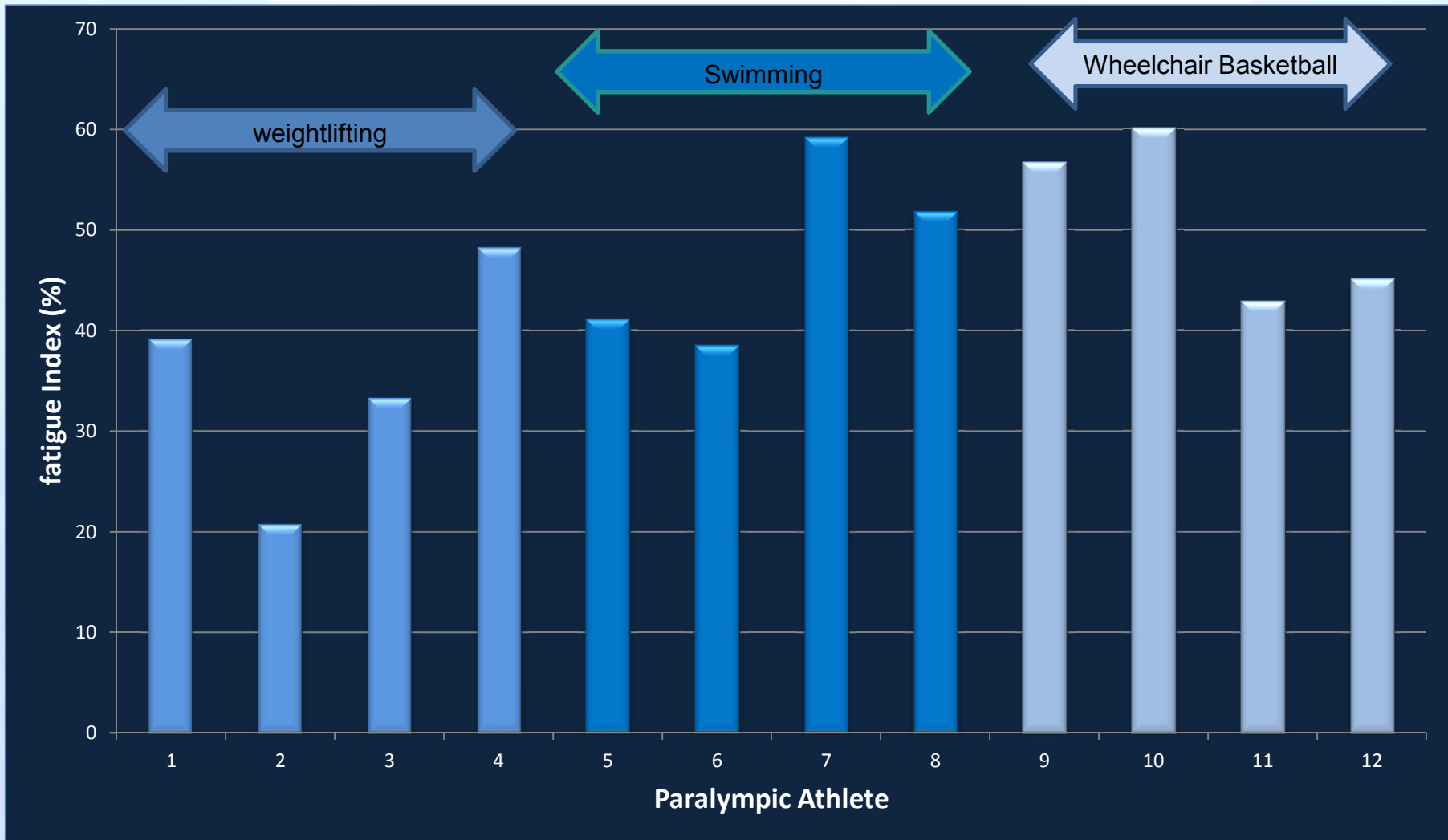




NEW FATIGUE INDEX



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- Studies report factors to be considered:
 - Specificity of each paralympic sport
 - Gender
 - Level of injury

(Devillard, 2001)

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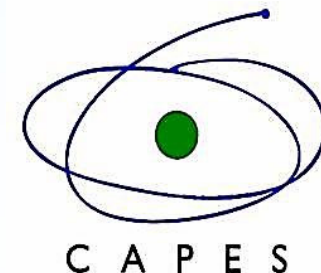
DISCUSSION

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- Using the new wheelchair ergometer prototype were found absolute power and a new energy fatigue index parameters;
- The parameters studied to the sample was related to functionality, gender, level of injury and the specific paralympic sports.



Thank you!



Acknowledgments



**Habilitation / Rehabilitation Center
in Paralympic Sports**

