In-magnet bicycling exercise : a novel 31P MRS window on the energetics of human locomotion

Citation for published version (APA):

Jeneson, J. A. L., Schmitz, J. P. J., & Nicolaij, K. (2008). In-magnet bicycling exercise : a novel 31P MRS window on the energetics of human locomotion. In *Experimental biology 2008, San Diego California* (pp. 1176.6-). (FASEB Journal : The Journal of the Federation of American Societies for Experimental Biology; Vol. 22). FASEB. <https://doi.org/10.1096/fj.08-0103LTR>

DOI:

[10.1096/fj.08-0103LTR](https://doi.org/10.1096/fj.08-0103LTR)

Document status and date:

Published: 01/01/2008

Document Version:

Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.tue.nl/taverne

Take down policy

If you believe that this document breaches copyright please contact us at:

openaccess@tue.nl

providing details and we will investigate your claim.

(*The FASEB Journal*. 2008;22:1176.6.)
 © 2008 FASEB

1176.6

In-magnet bicycling exercise: a novel ^{31}P MRS window on the energetics of human locomotion

Jeroen Jeneson¹, Joep Schmitz^{1,2} and Klaas Nicolay¹

¹ Biomedical NMR

² BioModeling and Bioinformatics Group, Department of Biomedical Engineering, Eindhoven University of Technology, Eindhoven, Netherlands

ABSTRACT

The clinical standard test of patient fitness is the upright bicycle exercise test. For a number of reasons, no proper equivalent human MR exercise test has been available. Past ^{31}P MR studies employing single limb exercise regimens generally failed to put any significant demands on the cardiovascular system (1). As such, a comprehensive understanding of skeletal muscle performance during whole body activity has been lacking. Here, we report on ^{31}P MRS studies employing a novel ergometer that for the first time offers true in-magnet human bicycling exercise testing. Heart rates directly following exercise were of 150 ± 15 bpm. In addition to ^{31}P MRS study of ATP metabolism over a 100-fold dynamic range of ATP turnover at near-constant pH, it allows for non-invasive ^{31}P MRS study of glycogenolysis through the dynamics of hexose monophosphate (HMP) resonances. Here (but not previously (2)) we routinely observed HMP accumulations of up to 10 mM within 2 minutes after termination of exercise at high workloads indicating massive activation of glycogenolysis during the preceding exercise. Yet intramuscular pH typically did not fall below 6.8 during exercise confirming our previous observation of unique homeostatic robustness of quadriceps muscle involved in two-legged exercise (2).

REFERENCES

- Prompers JJ, et al. NMR Biomed 2006 19 1176.6–1176.6
- Jeneson JAL and Bruggeman FJ. FASEB J 2004 18 1176.6–1176.6