


**Please cite the Published Version**

Bagley, Liam J, Degens, Hans , Drey, Michael, Mueller, Klaus, Korhonen, Marko, Ganse, Bergita, Rittweger, Joern and McPhee, Jamie (2015) Maximal oxygen uptake and fatty acid oxidation in athletic older men and women and healthy control. In: Ageing and Degeneration, 10 April 2015 - 11 April 2015, Edinburgh, UK.

**Publisher:** The Physiological Society

**Version:** Published Version

**Downloaded from:** <https://e-space.mmu.ac.uk/632468/>

**Additional Information:** This is a poster abstract presented at Ageing and Degeneration (The Physiological Society Topic Meeting, 2015)

**Enquiries:**

If you have questions about this document, contact [openresearch@mmu.ac.uk](mailto:openresearch@mmu.ac.uk). Please include the URL of the record in e-space. If you believe that your, or a third party's rights have been compromised through this document please see our Take Down policy (available from <https://www.mmu.ac.uk/library/using-the-library/policies-and-guidelines>)

---

PC18

**Maximal oxygen uptake and fatty acid oxidation in athletic older men and women and healthy control**

L. Bagley<sup>1</sup>, H. Degens<sup>1</sup>, M. Drey<sup>2</sup>, K. Müller<sup>3</sup>, M. Korhonen<sup>4</sup>, B. Ganse<sup>3</sup>, J. Rittweger<sup>3,1</sup> and J.S. McPhee<sup>1</sup>

<sup>1</sup>Manchester Metropolitan University, Manchester, UK, <sup>2</sup>University of Erlangen-Nurnberg, Nurnberg, Germany, <sup>3</sup>Institute of Aerospace Medicine, German Aerospace Centre, Cologne, Germany and <sup>4</sup>University of Jyväskylä, Jyväskylä, Finland

**Introduction:** Cardiopulmonary and musculoskeletal systems deteriorate through middle and into older age. This has a negative impact on physical capability and energy metabolism. The purpose of the present study was to determine the effects of ageing and exercise on peak rates of oxygen uptake ( $VO_{2peak}$ ) and fatty acid oxidation (PFO).

**Methods:** All participants provided written, informed consent. Masters Athletes (MA: n=40, aged 37-90) specialised in endurance (n=10) or sprint running (n=30) were recruited during the 2012 European MA Championships in Zittau, Germany. Untrained (n=42, aged 18-67; 23 men and 16 women) were recruited from the general Manchester population (UK). The untrained participants also completed 12 weeks very high intensity sprint cycle training (4\* 20s at 170%  $VO_{2max}$ , 3/wk).  $VO_{2max}$  and PFO were assessed using indirect calorimetry and incremental cycle ergometry. Statistical significance was gained by independent samples t-tests using IBM SPSS v.20.

**Results:** The endurance and sprint trained MA were a similar age and had similar  $VO_{2max}$  (Endurance MA: 47.22 ml/kg/min ( $\pm 4.15$ ) vs Sprint MA: 43.52 ml/kg/min ( $\pm 2.21$ )  $p=0.416$ ). Both MA groups were significantly higher than untrained people

(38.86 ml/kg/min). MA sprinters and endurance runners had a  $\text{VO}_2\text{max}$  similar to 19 years younger untrained, healthy people. Regression analysis showed that  $\text{VO}_2\text{max}$  decreased by around 11% per decade after the age of 40 yrs in the MA group and 5% per decade after the age of 40 yrs in the untrained group. PFO was similar in endurance and sprint trained MA (Endurance: 8.09 mg/kg/min ( $\pm 0.95$ ) vs Sprint: 6.91 mg/kg/min ( $\pm 0.53$ )  $p=0.284$ ). In the untrained group, PFO was significantly lower than MA ( $p=0.006$ ). Regression showed that PFO of MAs was similar to that of an untrained, healthy person 19 years younger. The sprint-training programme caused  $\text{VO}_2\text{max}$  to increase by 10% (Pre: 38.86 ml/kg/min ( $\pm 1.31$ ) vs Post: 42.84 ml/kg/min ( $\pm 1.24$ )  $p<0.001$ ) and PFO to increase by 18% (Pre: 5.57 mg/kg/min ( $\pm 0.33$ ) vs Post: 6.58 mg/kg/min ( $\pm 0.41$ )  $p=0.050$ ).

**Conclusion:** These results show that MAs have a cardiopulmonary and metabolic fitness at levels equivalent to someone almost 20 yrs younger. Previously untrained middle-aged people can achieve substantial gains in fitness by completing relatively short duration, but high intensity sprint training and reach levels similar to those observed in the master athletes.

*Where applicable, the authors confirm that the experiments described here conform with The Physiological Society ethical requirements.*

---