FACULTY OF VETERINARY MEDICINE
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DYNAMICS OF TRAINING AND ACUTE EXERCISE-INDUCED SHIFTS IN MUSCULAR GLUCOSE TRANSPORTER (GLUT) 4, 8 AND 12 EXPRESSION IN LOCOMOTION VERSUS POSTURE MUSCLES IN HEALTHY HORSES

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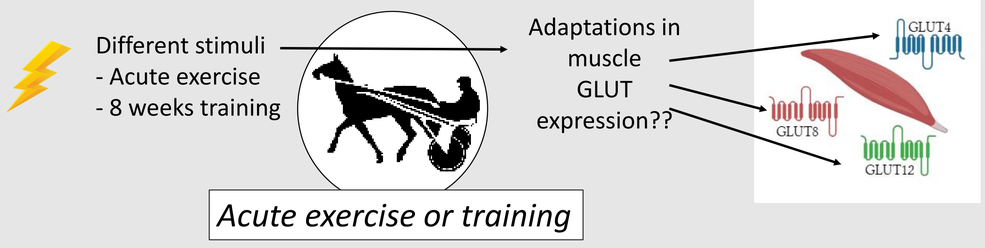
1. Introduction

Important changes in muscular glucose transporter (GLUT) expression are to be expected if the glucose influx plays a pivotal role in fuelling or connecting metabolic pathways that are upregulated in response to exercise.

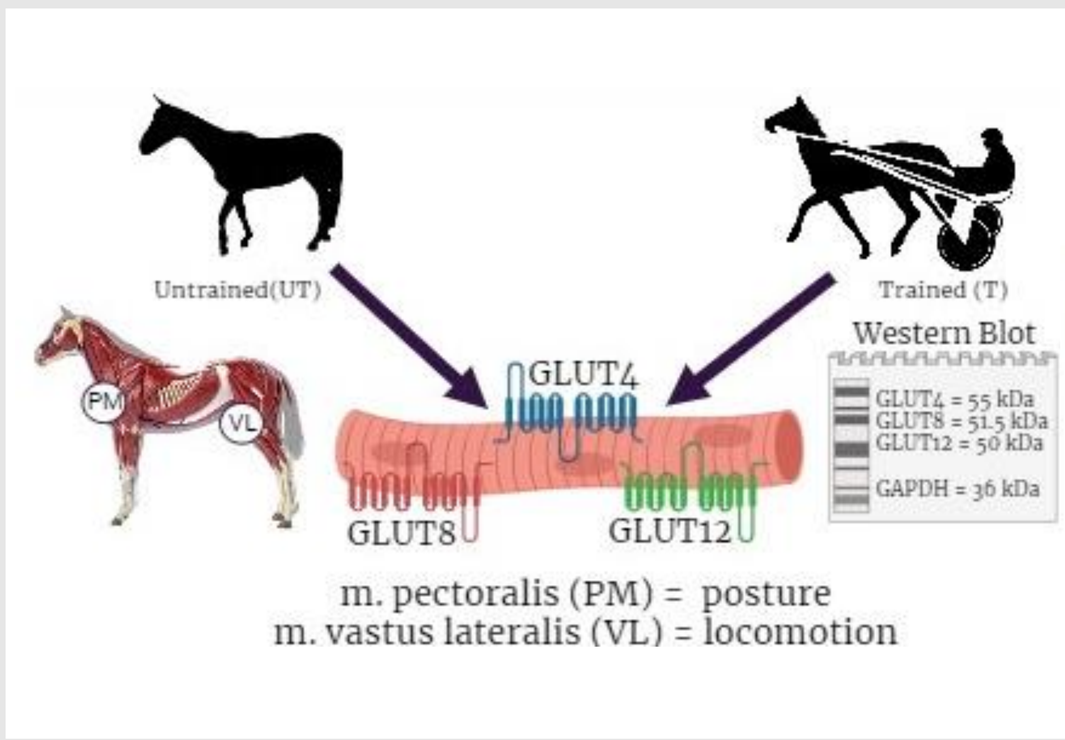


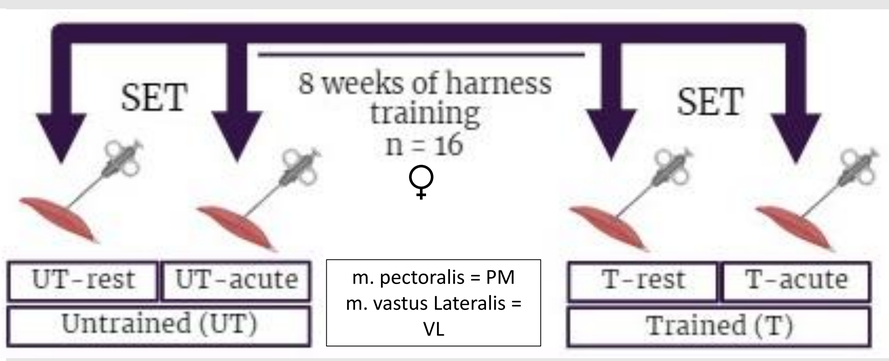
2. Aim

To assess the **dynamics of GLUT 4, 8 and 12** isotypes in **posture** (M. Pectoralis) versus **locomotion muscles** (M. Vastus lateralis) in answer to **8 weeks of harness training** and to **acute exercise**:

1. Basal GLUT quantification by comparing GLUT 4, 8 and 12 expression in **PM** versus **VL.**
2. GLUT 4, 8 and 12 expression after **acute exercise** – *allowing to compare rest and acute samples.*
3. GLUT 4, 8 and 12 expression after **8 weeks of training** – *allowing to assess the effect of training.*

3. Methods





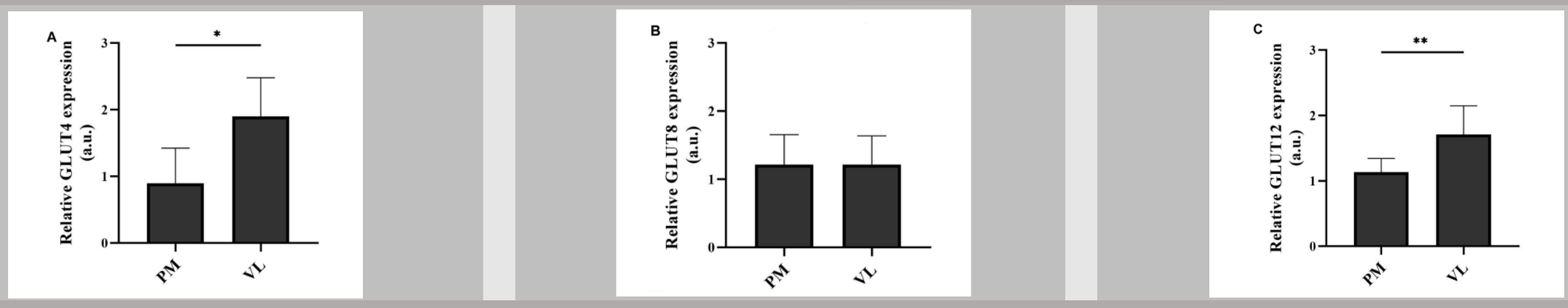
Protein expression was determined with Image Pro1 analyzer software v.10 (Media Cybernetics Inc., Rockville, US).
Data was normalized against housekeeping gene GAPDH.
Significance level was set at* $p<0.05$; **$p<0.01$.

Statistical Analyses

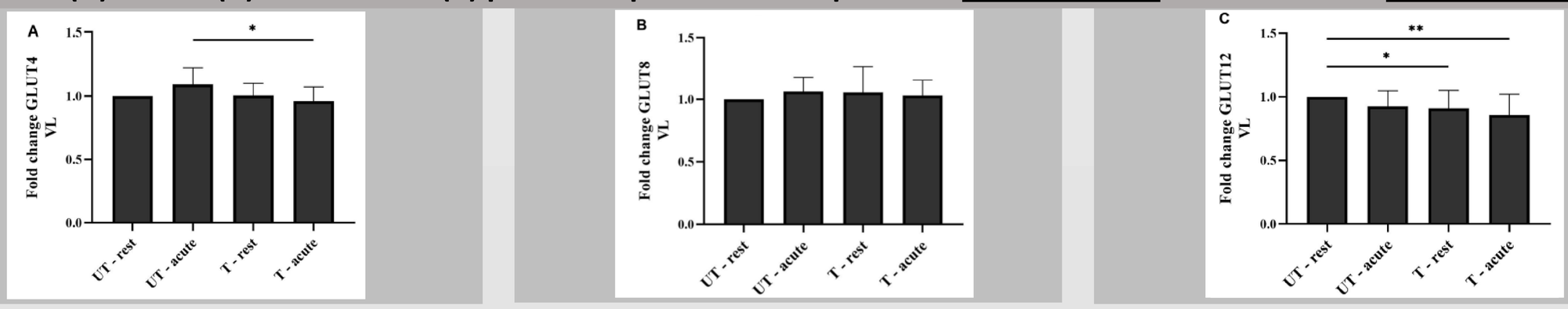
- **Nonparametric** tests were used to analyze data since normality could not be assumed (Shapiro-Wilk's test).
- **Wilcoxon matched-pairs signed rank test** for the differences in basal GLUT4, 8 or 12 protein expression between PM and VL.
- **Friedman test with a *post hoc* Dunn's test** for the effect of acute exercise and/or training on total GLUT4, 8 and 12 expression in PM and VL.

4. Results

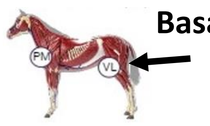
Basal GLUT4 (A) GLUT8 (B) and GLUT12 (C) protein expression in the posture versus locomotion muscle in Standardbred mares



VL GLUT4 (A) GLUT8 (B) and GLUT12 (C) protein expression in response to acute exercise and 8 weeks of harness training



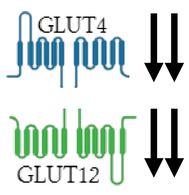
5. Conclusion



Basal GLUT4 and GLUT12:
VL > PM

VL GLUT4:
UT-acute >>>T-acute

VL GLUT12:
UT-rest>>>T-rest
UT-rest>>>T-acute



6. Clinical relevance

The important **downregulation of GLUT12**, both in answer to **training and acute exercise**, the **GLUT4 downregulation after acute exercise** in trained condition and the **lack of differential shifts in GLUT8** in any of the studied conditions, questions the importance of glucose as substrate to fuel training and exercise in healthy horses.
These findings encourage to further explore **alternative fuels** for their involvement in equine muscular energetics.

Please check our full publication in Frontiers in Physiology by scanning following QR-code:

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This study was approved by the Animal Ethics Committee of the Ghent University (EC 2016/40) and by the Centrale Commissie Dierproeven, The Hague, The Netherlands (AVD262002015144)

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