

POSTER PRESENTATION

Open Access

# Determinants of exercise calf muscle perfusion in Peripheral Arterial Disease (PAD)

Jorge A Gonzalez<sup>1\*</sup>, Yan Li<sup>1</sup>, Peter W Shaw<sup>1</sup>, Jennifer Kay<sup>3</sup>, Robyn McKenzie<sup>1</sup>, David Lopez<sup>1</sup>, Aditya Sharma<sup>1</sup>, Joseph DiMaria<sup>3</sup>, Yang Yang<sup>2</sup>, Petroni Gina<sup>4</sup>, Michael Salerno<sup>1,3</sup>, Craig H Meyer<sup>2</sup>, Frederick H Epstein<sup>2</sup>, Brian H Annex<sup>1</sup>, Christopher M Kramer<sup>1,3</sup>

From 19th Annual SCMR Scientific Sessions  
Los Angeles, CA, USA. 27-30 January 2016

## Background

In patients with PAD, ankle-brachial index (ABI) does not correlate well with time to claudication and lacks the ability to quantify tissue perfusion, therefore limiting the development of new therapies. Arterial spin labeling (ASL) MRI is a novel non-contrast technique that measures peak calf muscle perfusion noninvasively at a microvascular level. We sought to analyze the relationship of traditional risk factors for PAD and levels of exercise-induced calf muscle perfusion measured by ASL MRI.

## Methods

Forty-two (42) patients with PAD (ABI < 0.9) were prospectively enrolled. All performed supine plantar flexion exercise using a pedal ergometer until exhaustion or limiting symptoms. Images of the most symptomatic leg were obtained at end exercise using a flexible calf coil in a 3-T Siemens Trio. Fifteen (15) averaged perfusion-weighted ASL images were acquired over 1 minute post-exercise with single-shot echo-planar imaging read-outs (field of view: 200 × 200 mm, matrix: 64 × 64, repetition time: 4,000 msec, echo time: 32 msec, slice thickness: 10 mm).

## Results

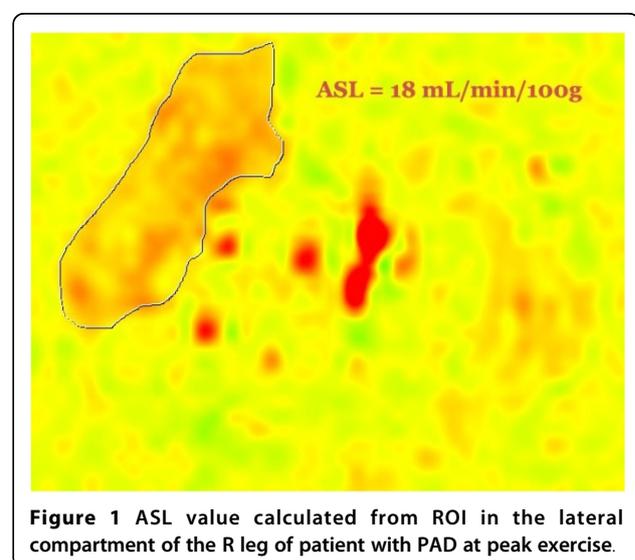
The mean age was 66 ± 11 years, 64% were male, 67% Caucasians and mean ABI was 0.60 ± 0.12.

Fifty-two (52%) were diabetics, 86% had hypertension, 79 % had hyperlipidemia (HLD), 62% had CAD, 91% were smokers and 14% had a prior TIA/Stroke. The mean BMI was 29.1 ± 5.0, mean GFR was

70.5 ± 23.7 mL/min/1.73 m<sup>2</sup>. Mean log(ASL) values were higher (1.39 ± 0.26) in patients with HLD than in those without HLD (1.17 ± 0.20) (R<sup>2</sup>= 0.12 p = 0.02). Other risk factors (HTN, smoking, gender and diabetes) did not correlate with ASL. Age is a significant predictor of log(ASL) (p < 0.05). For every year increase in age there is a 1.7% increase in ASL. ABI, however, was not associated with either hyperlipidemia or age.

## Conclusions

Tissue microvascular perfusion in PAD as measured by ASL has different determinants than the macrovascular disease measured by ABI. Older PAD patients with HLD may primarily suffer from the macrovascular aspects of the disease, rather than the microvascular.



<sup>1</sup>Cardiology, University of Virginia, Charlottesville, VA, USA  
Full list of author information is available at the end of the article

#### Authors' details

<sup>1</sup>Cardiology, University of Virginia, Charlottesville, VA, USA. <sup>2</sup>Biomedical Engineering, University of Virginia, Charlottesville, VA, USA. <sup>3</sup>Radiology, University of Virginia, Charlottesville, VA, USA. <sup>4</sup>Division of Translational Research and Applied Statistics, University of Virginia, Charlottesville, VA, USA.

Published: 27 January 2016

doi:10.1186/1532-429X-18-S1-P356

**Cite this article as:** Gonzalez et al.: Determinants of exercise calf muscle perfusion in Peripheral Arterial Disease (PAD). *Journal of Cardiovascular Magnetic Resonance* 2016 **18**(Suppl 1):P356.

**Submit your next manuscript to BioMed Central  
and take full advantage of:**

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at  
[www.biomedcentral.com/submit](http://www.biomedcentral.com/submit)

