Influence of restricted blood flow training with cooling on acute angiogenic and endothelial response. The pilot study results.

Maga M.^{1,2}, Wachsmann A.², Schonborn M.³, Trynkiewicz A.³, Cebenko M.³, Maga P.², Nowobilski R.¹

¹ Department of Rehabilitation in Internal Medicine, Jagiellonian University Medical College

² Angiology Department, Jagiellonian University Medical College

³ Students Scientific Group of Clinical Angiology, Angiology Department, Jagiellonian University Medical College

Background

Peripheral artery occlusive disease (PAOD) is a common atherosclerosis manifestation, which affects over 20% of Europeans above 55 years old. One of the most important non-invasive forms of PAOD treatment, the physical training, has been recently improved by adding vein blood flow restriction (BFR) and cooling.

The aim of the study was to evaluate **acute endothelial** and **angiogenic response** to BFR training in young, healthy volunteers.

Methods

Study population:

- 35 healthy volunteers
- age: $24,6 \pm 2,4$ y.o.
- 51,4% males

Day I

imaging examinations

laboratory parameters

21-minutes interval training

Vasper Unit used for BFR training

Day II

21-minutes interval training

20-30 min

laboratory parameters

imaging examinations

Examination of endothelial functions

Angiogenesis biomarkers:

- VEGF
- CD31
- CD34

Endothelial parameters:

- Flow Mediated Dilation
- Reflexion Index
- Stiffness Index
- Reactive Hyperaemia Index

Results

CD31 increased significantly after training
(9.61 vs 10.71, $p < 0.0001$)

CD34 increased significantly after training
(0.031 vs 0.371, $p < 0.0001$)

VEGF increased significantly after training (32.20 vs 39.62, $p = 0.0002$)

Conclusions

- 1) BFR training significantly stimulates acute angiogenic response influences and moderately affects endothelial functions.
- 2) Results from this pilot study will be implemented into larger randomised research project including patients with PAOD to confirm these findings and check the long term effects.