



Norway Grants

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2017

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Establishment of bilateral cooperation and exchange of experience in the field of medical infrared thermography

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Infrared thermography as a diagnostic tool in vascular surgery

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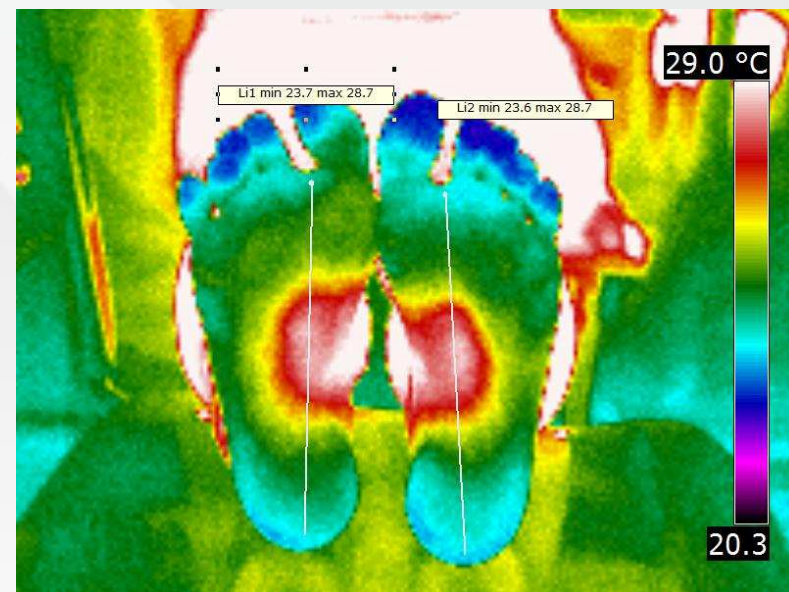
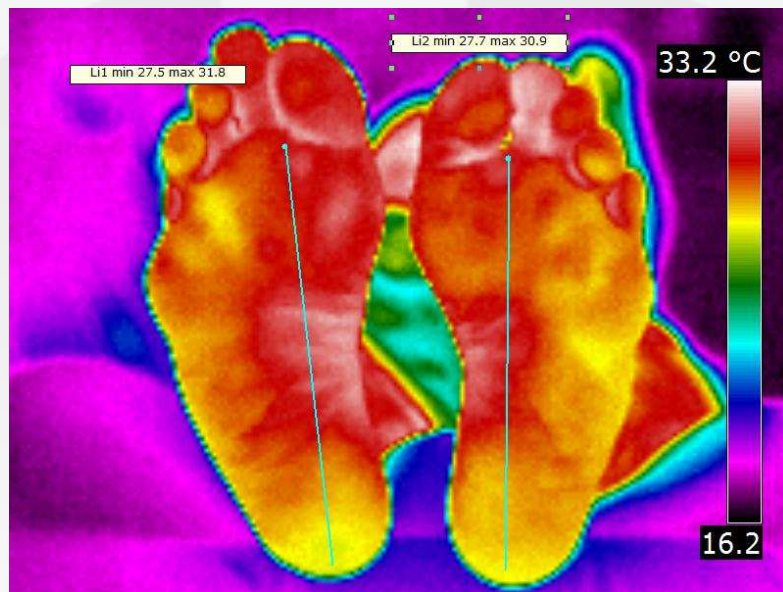
collaboration with 2nd Department of Surgery, Center for Vascular Disease, St. Anne's University Hospital, Masaryk University

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HEALTHY VOLUNTEERS

74 Participants (mean age 34.6 ± 12.1 years)

How looks thermal image of the soles by healthy group?



The median temperature difference of contralateral foot soles was $\leq 0,4$ °C



Who are patients of Center for Vascular Disease in Brno?

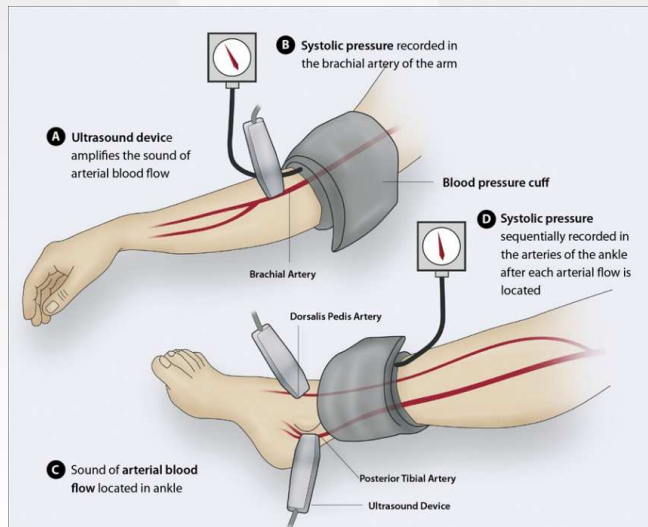
- Patients with diabetes (diabetic neuropathy, angiopathy)
 - Patients with peripheral arterial diseases
 - Combination of both

Which kinds of treatments are possible to do for these patients?

➤ Prevention and prediction!

Prevention – food, life style, no smoking

Examination – claudication, doppler examination, ankle-brachial index (ABI), transcutaneous oxygen



<http://www.bpac.org.nz/BPJ/2014/April/img/systolic-pressure.jpg>

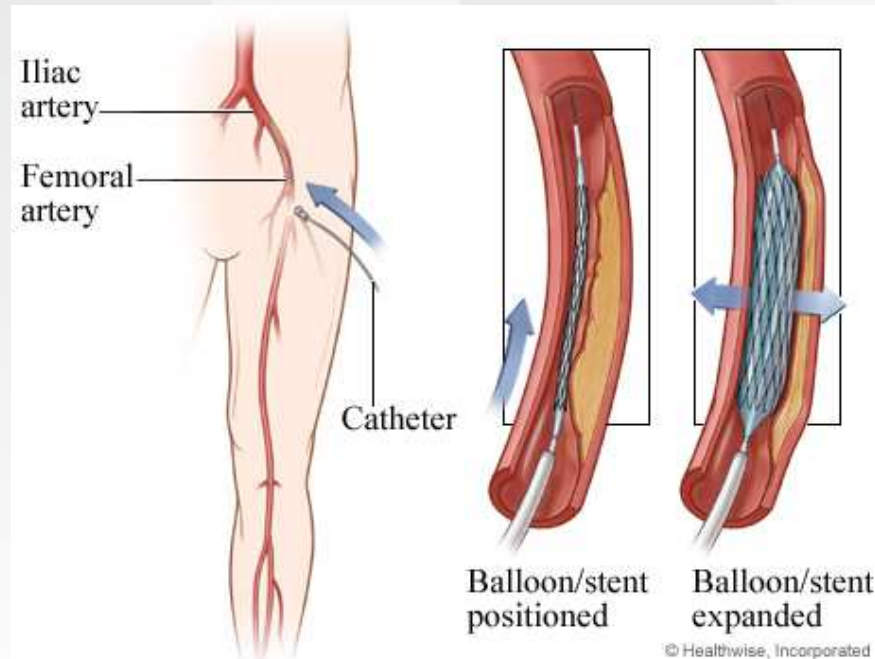


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➤ Vascular or endovascular intervention

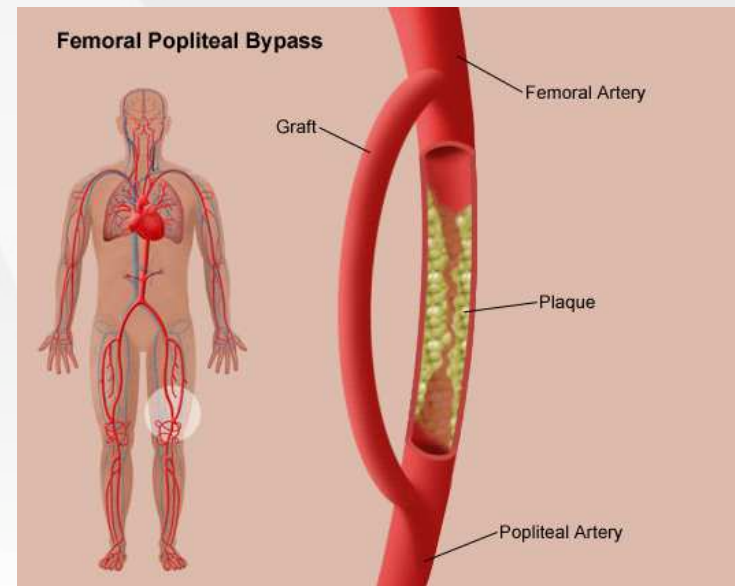
There are two main possibilities of the vascular (endovascular) treatment

Percutaneous transluminal angioplasty (PTA)



https://myhealth.alberta.ca/Health/_layouts/15/healthwise/media/medical/hw/h9991299_003.jpg

Pedal bypass

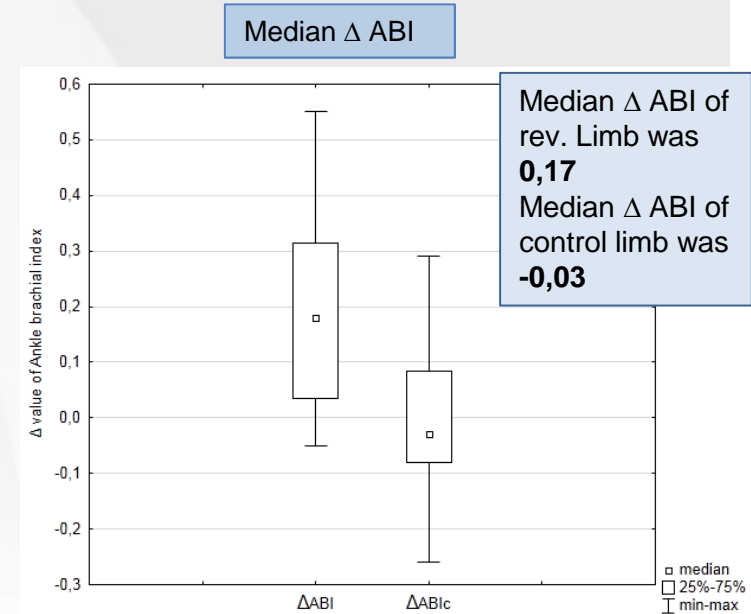
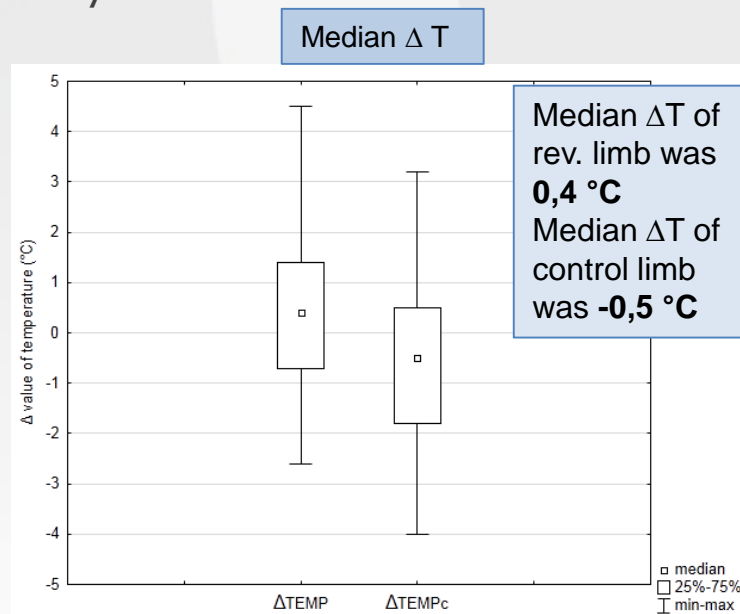


<https://stanfordhealthcare.org/content/shc/en/medical-treatments/f/femoral-popliteal-bypass/jcr:content/tab-nav-component/tab-nav-parsys/imagewithcaption/imageimg.620.high.gif/1389266689271.gif>

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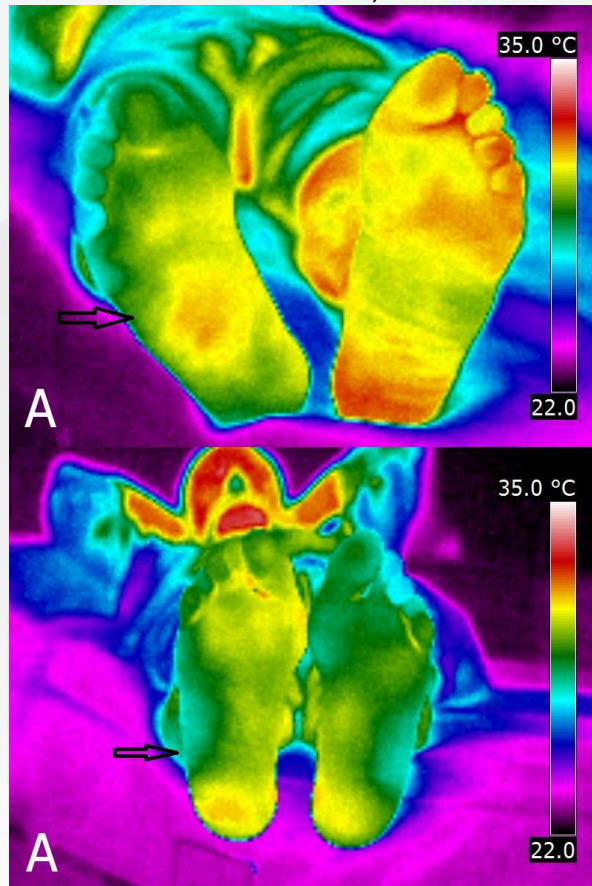
TREATMENT BY PERCUTANEOUS TRANSLUMINAL ANGIOPLASTY

- 21 Patients (mean age 60.2 ± 19.7 years), 17 smokers
- Patients underwent endovascular treatment by PTA
- The images and ABI were recorded before and the next day after the treatment by PTA



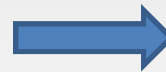
We have found that the increase of ABI index is associated with increase of temperature in the limbs treated by PTA.

RLL: mean T= 30,8 °C
LLL: mean T= 31,5 °C

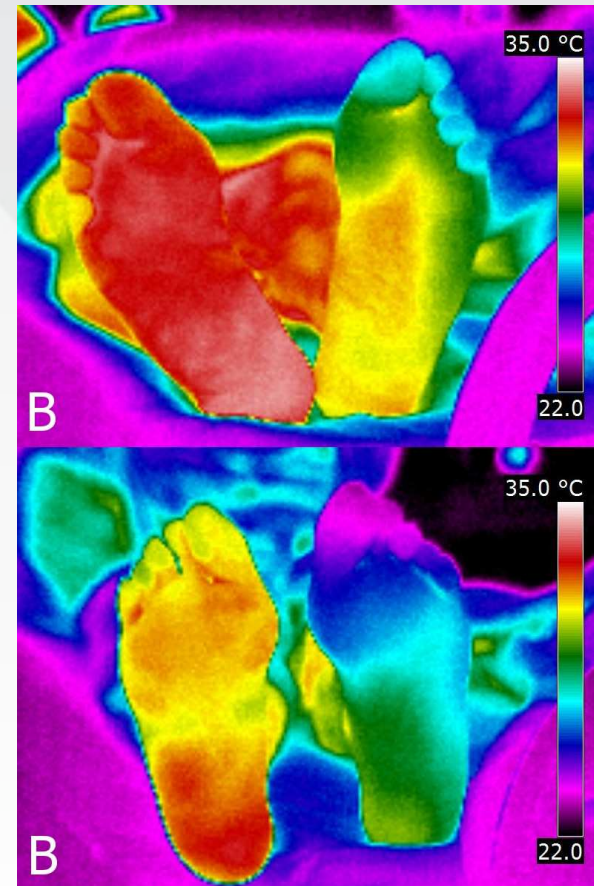


RLL: mean T= 30,3 °C
LLL: mean T= 29,6 °C

PTA



RLL: mean T= 33,3 °C
LLL: mean T= 30,9 °C

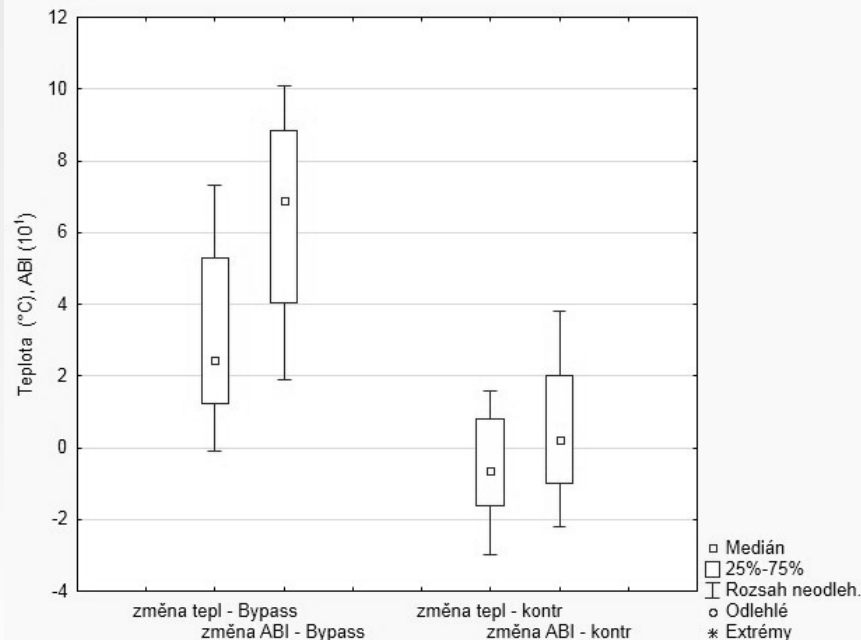


RLL: mean T= 31,6 °C
LLL: mean T= 28,0 °C

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TREATMENT BY FEMOROPOPLITEAL BYPASS

- 14 Patients (mean age 67.8 ± 5.7 years), 9 smokers
- Patients underwent treatment by femoropopliteal bypass
- The IR images, ABI and TcPO₂ were recorded before and second day after the revascularization



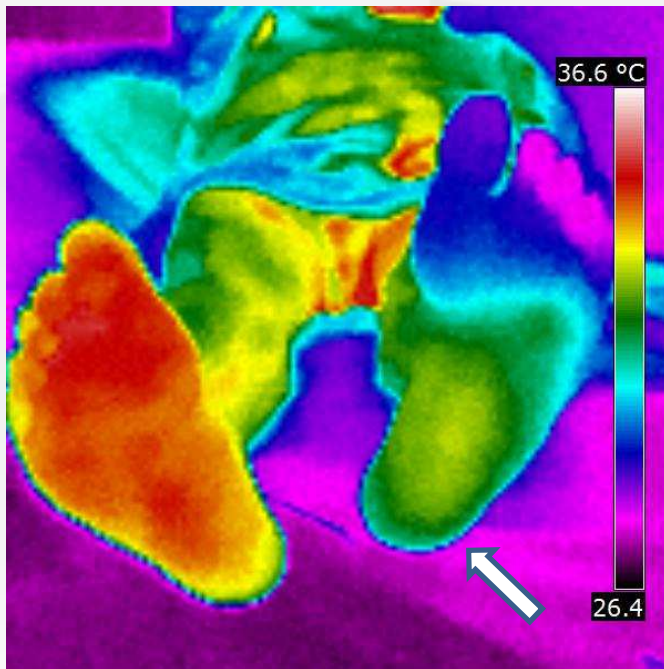
Median ΔT of rev. limb was **2,2 °C**.
Median ΔT of control limb was **-0,2 °C**.

Median Δ ABI rev. Limb was **0,65**.
Median Δ ABI control limb was **0,05**.

TcPO₂ of rev. limb increased by **20 mmHg** and decreased by **-5,5 mmHg** in control limb.



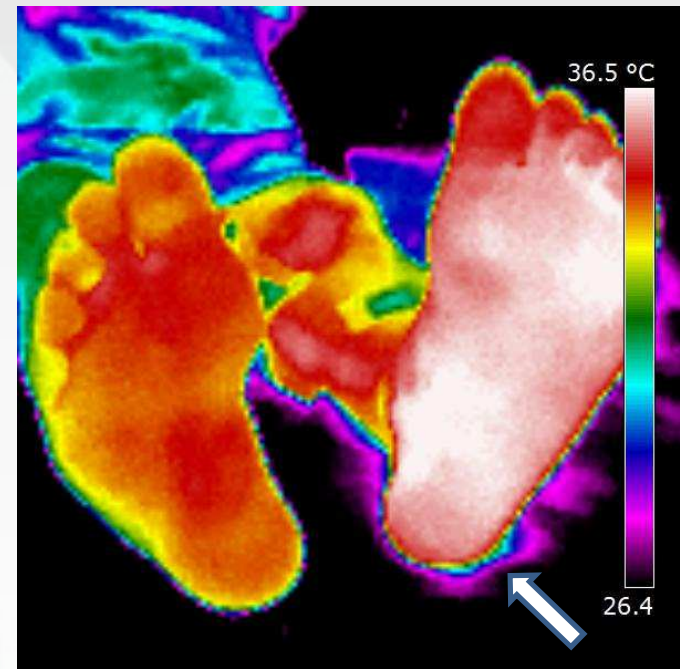
RLL: mean T= 34,3 °C
LLL: mean T= 31,4 °C



bypass



RLL: mean T= 34,5 °C
LLL: mean T= 36,1 °C

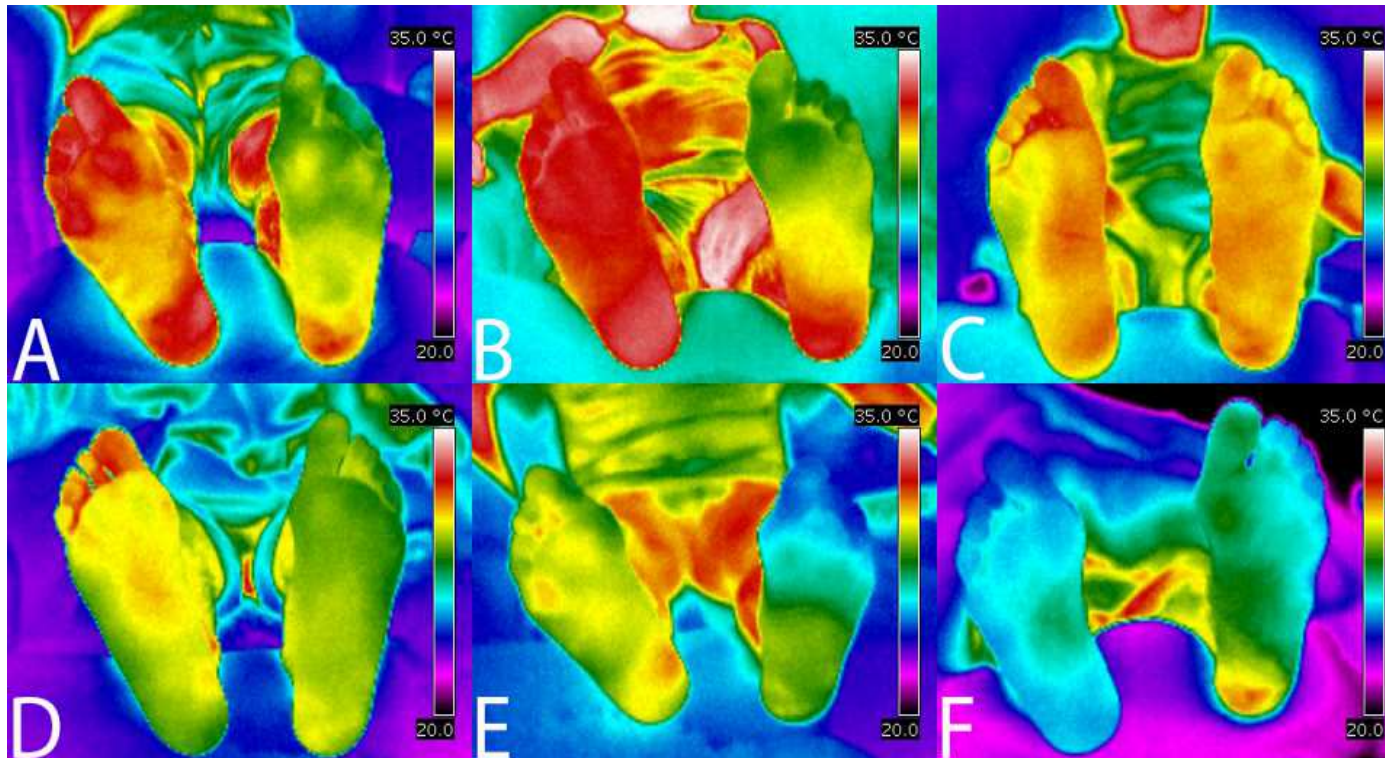


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LONG-TERM MONITORING IN A PATIENT WITH DIABETES MELLITUS

- The purpose was to describe the long-term IRT findings and overall clinical outcomes of a patient with DM and peripheral vascular disease.
- Foot temperature measurements using IRT were obtained slightly more than 1 year of a 76-year-old man, a nonsmoker with type 2 DM and hypertension



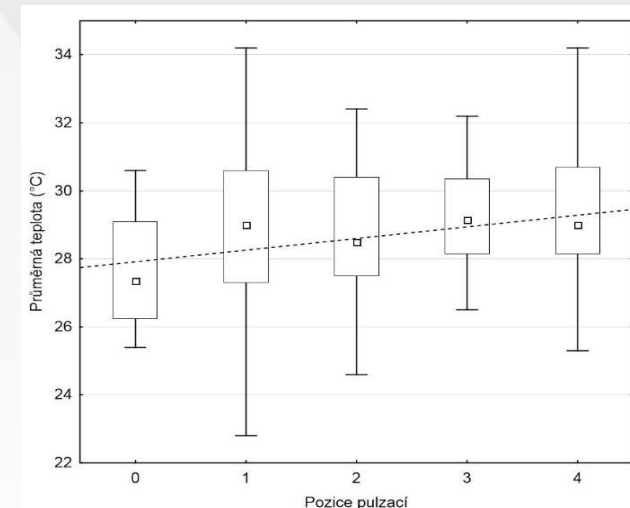
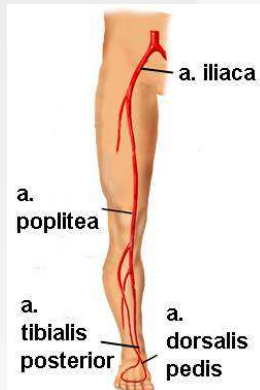
Although he was asymptomatic, the infrared measurement showed an average temperature difference of 2.3 °C between the left and right foot until he developed a small, trauma-induced wound on the left foot, at which time left foot temperature increased.

IRT evaluation showed a hot spot on the left heel. Skin breakdown in that area was observed 2 months later, and the wound continued to increase in size and depth.

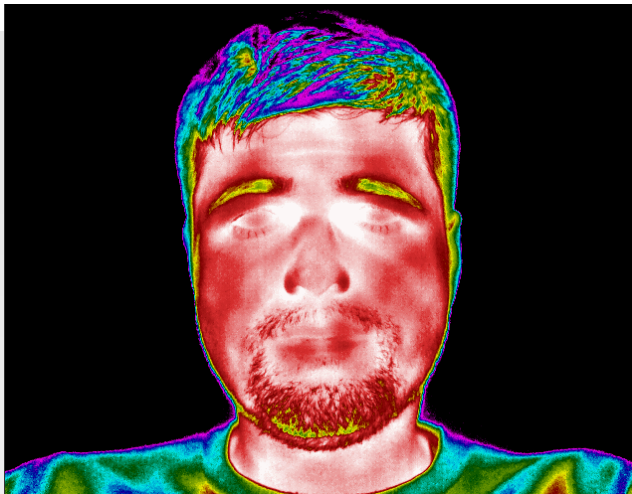
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Non-invasive Vascular Examination in ambulant patients

- 102 Patients (mean age 69.9 ± 9.5 years), 47 with DM2
- The palpable pulsations of lower limb were correlated with surface temperature of the soles
- Groups 1-4 → 1. a. iliaca (AI)
→ 2. a. poplitea (AP)
→ 3. a. tibialis posterior (ATP) nebo a. dorsalis pedis (ADP)
→ 4. ATP i ADP

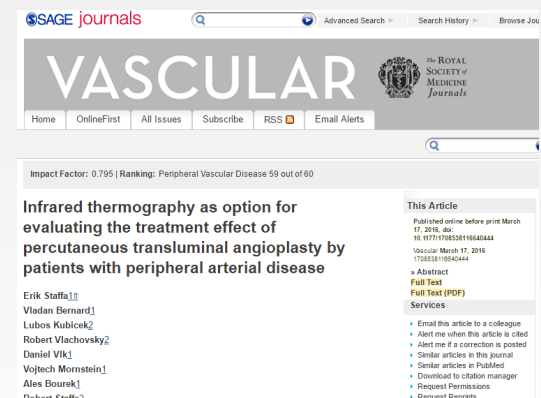
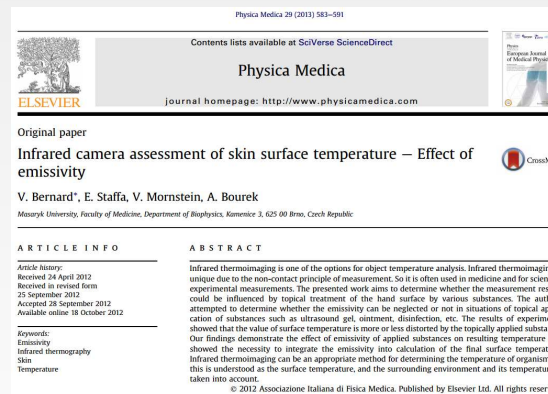


- The surface temperature of the soles is increasing with pulsation in group 4
- Mean temperature difference between soles was **1,84 °C**



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Thank you for your attention



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