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## INTRODUCTION

Validated methodology to assess microvascular function in sickle cell disease (SCD) patients is not readily available, but could be of great benefit in clinical research. We explored the feasibility and robustness of two quantitative methods for microvascular function: laser-speckle contrast imaging (LSCI) and non-invasive retinal function imaging (RFI).

## OBJECTIVES

- Short- and mid-term variability of RFI and LSCI
- Comparison of cutaneous and retinal microcirculation between SCD patients and healthy volunteers
- Assessment of the effect of brachial artery occlusion-reperfusion and inspiratory breath holding on the microcirculation

## METHODS

- 8 Moderate to severe SCD patients (aged 18-65), 8 healthy volunteers matched for ethnicity, gender and smoking behavior
- RFI and LSCI were conducted twice on two study days, separated by one week
- Endpoints:
  - LSCI: basal flow, peak flow during/after brachial arterial occlusion, flow during/after an inspiratory breath holding
  - RFI: retinal arterial flow and venous flow
  - RFI: capillary perfusion, oximetry, metabolic function
- Variability was calculated between and within subjects, and contrast was assessed with a mixed model analysis of variance

Laser speckle contrast imager

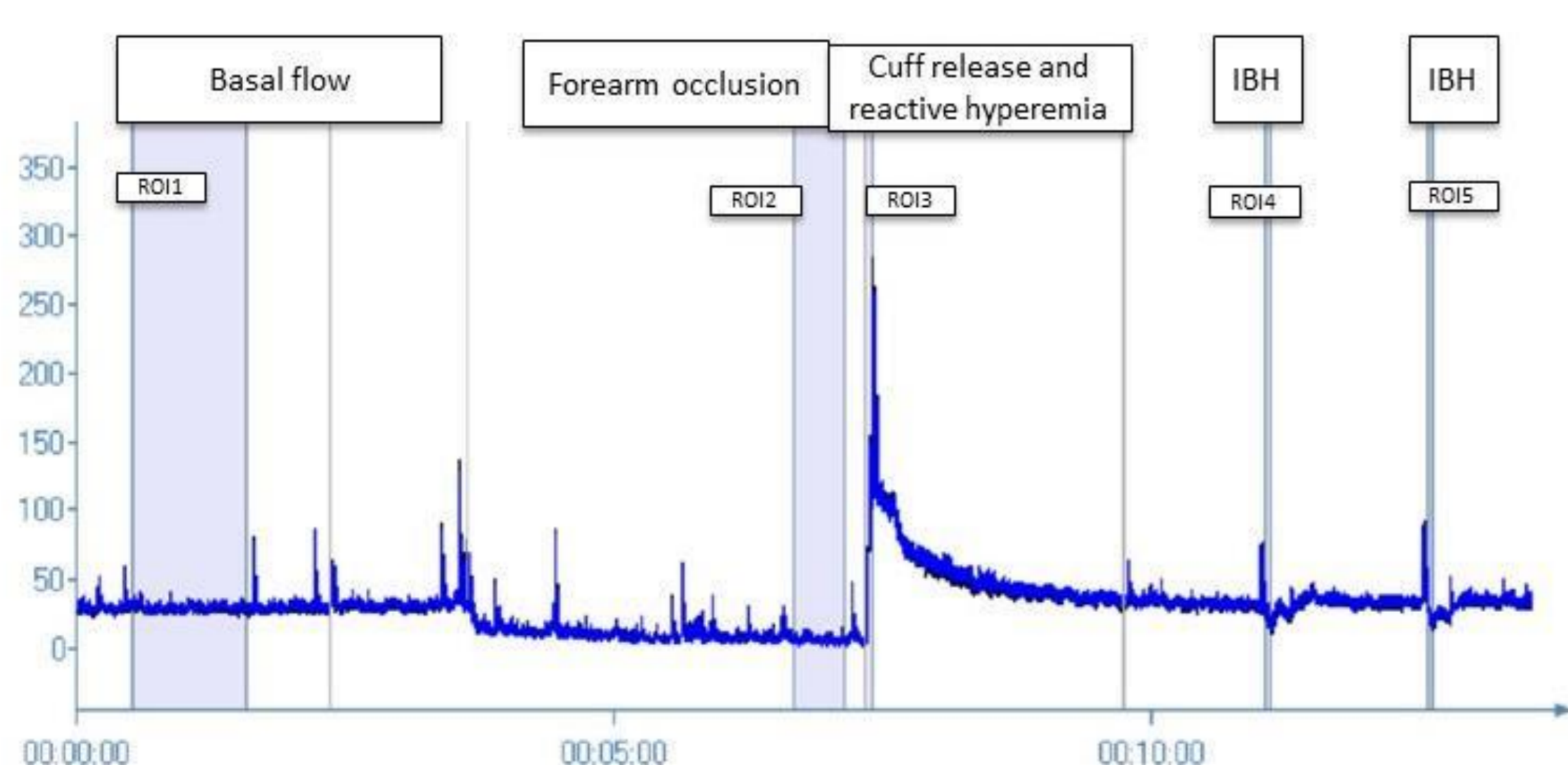


Figure 2: mapping of vessels in RFI

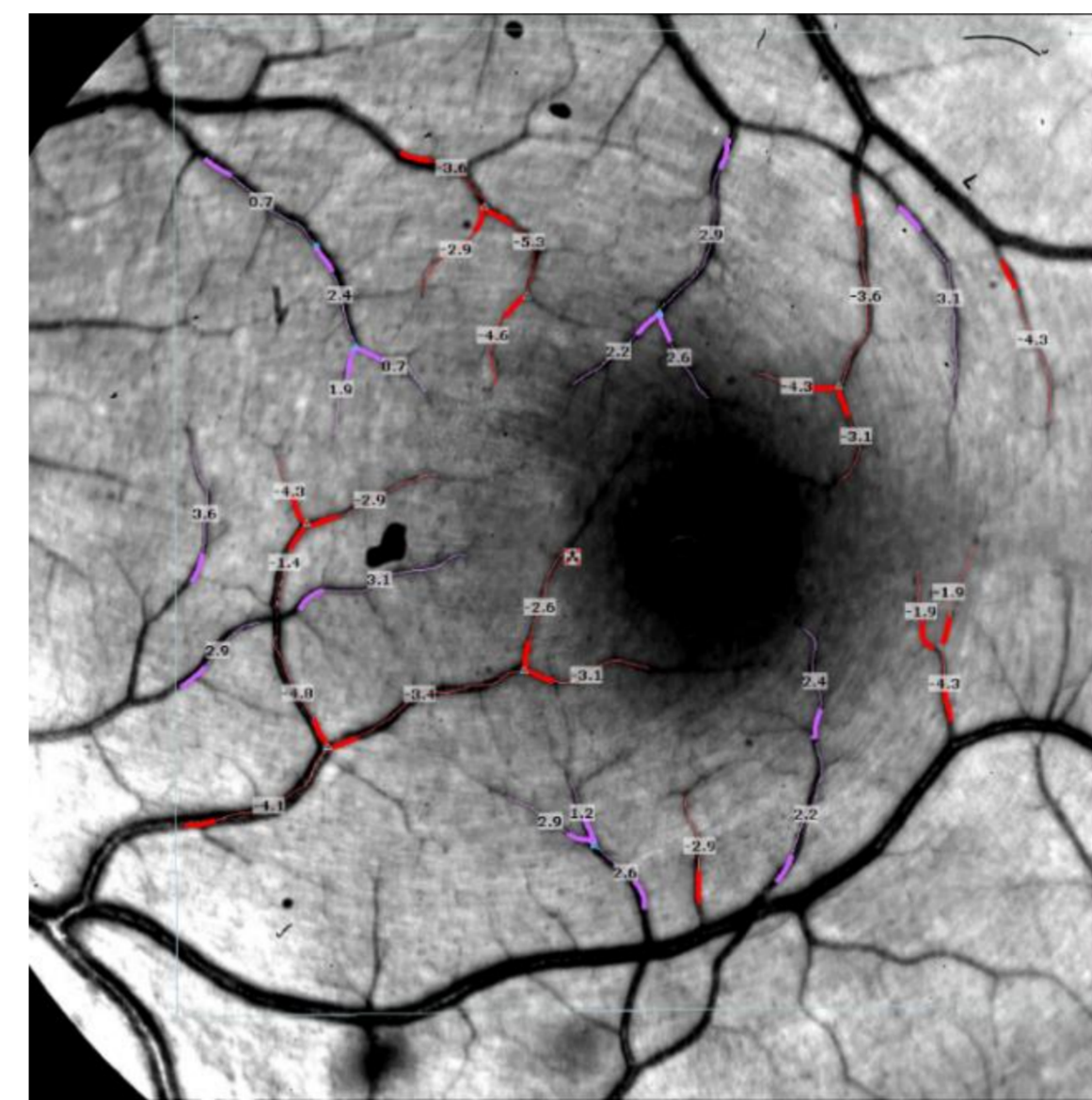
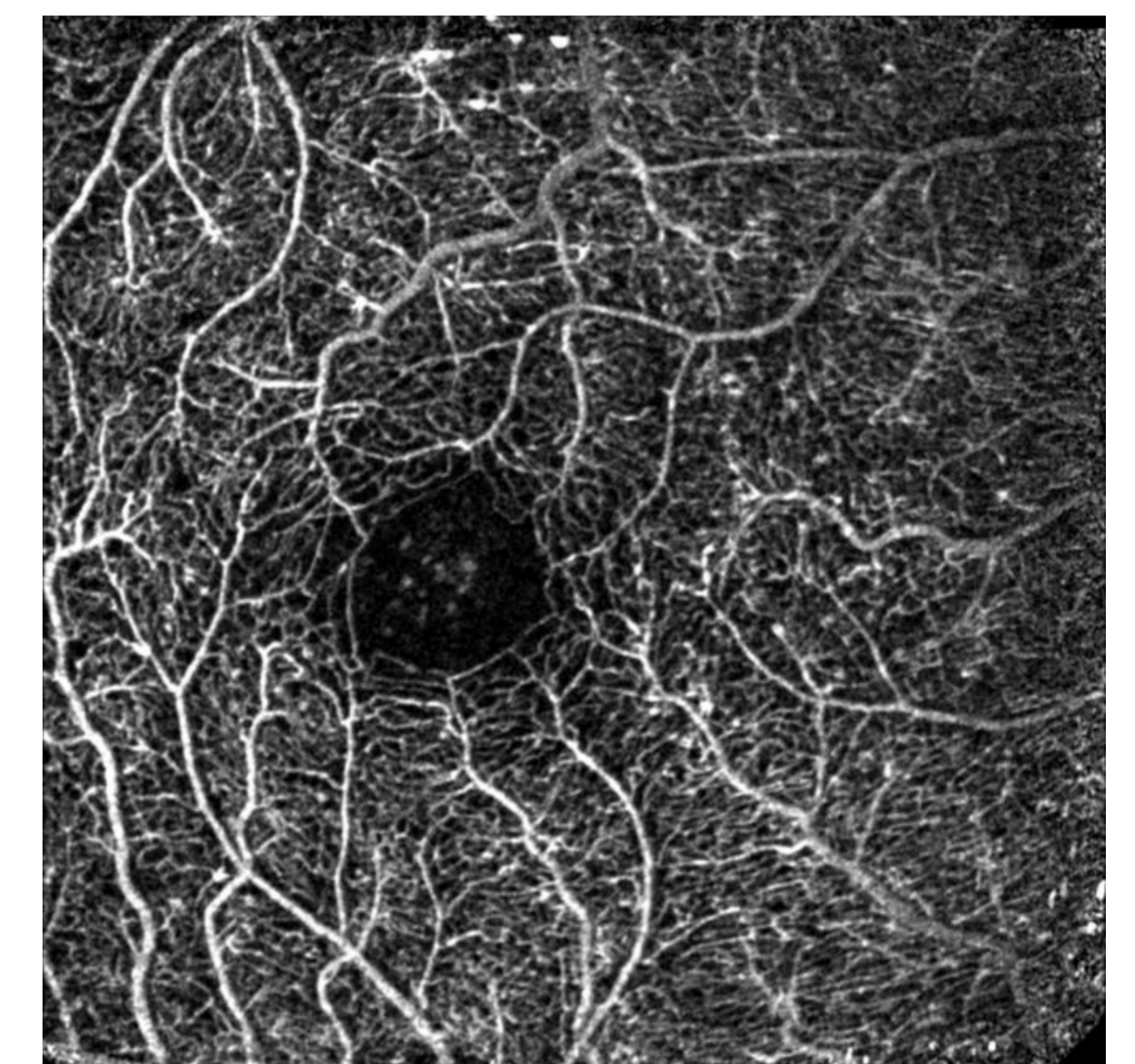


Figure 3: capillary map in SCD patient



## RESULTS

	Short-term variability (2 measurements on one day)	Mid-term variability (measurements separated by 1 week)
LSCI basal flow	7.6%	7.6%
LSCI maximal flow	4.7%	7.7%
RFI arterial flow	7.0%	8.5%
RFI venous flow	7.7%	9.5%

Parameter	SCD patients	Matched controls	Contrast
LSCI basal flow (AU)	33.4	24.5	p= $\leq$ .0001
LSCI maximal flow (AU)	93.1	76.8	p= $\leq$ .0001
LSCI delta flow before-during IBH (AU)	9.8	4.7	p= $\leq$ .0001
RFI average arterial flow (mm/sec)	3.87	3.42	p=0.0018
RFI average venous flow (mm/sec)	3.00	2.68	p=0.007

## CONCLUSIONS

- RFI and LSCI feasible for quantitative assessment of microvasculature
  - Low variability read-outs
  - Sensitive to changes
  - Detection of differences between populations
- For RFI further development for retinal oximetry / metabolic function ongoing