The investigation of microvasculature in plaque psoriasis during therapy using Videocapillaroscopy and Laser Doppler flowmetry methods

RESEARCH AND DEVELOPMENT CENTER BIOMEDICAL PHOTONICS

Dmitry Stavtsev[1], Mariya Mikhailova[1], Anna Koroleva[1], Elena Potapova[1], Nadezhda Malaya[1,2], Natalia Yakushkina[2]

OREL STATE UNIVERSITY named after I.S. Turgenev

1 Orel State University named after I.S. Turgenev, Russia
2 Orel Regional Dermatovenereological Dispensary, Russia

INTRODUCTION

Psoriasis is a socially significant disease, which pathogenesis is mostly affected by vascular disorders that occur long before the clinical manifestations of the disease. Well-known changes in the superficial microvasculature of psoriatic plaque can be evaluated *in vivo* using videocapillaroscopy (VCS) method. VCS is a non-invasive method for determining the morphological and functional parameters of the capillaries.

PATIENTS AND METHODS

The study involved 5 patients (3 men and 2 women) aged 39±24 years diagnosed psoriasis vulgaris with psoriatic plaque on the anterior forearm. The study was carried out in three stages (with 3-4 days intervals):

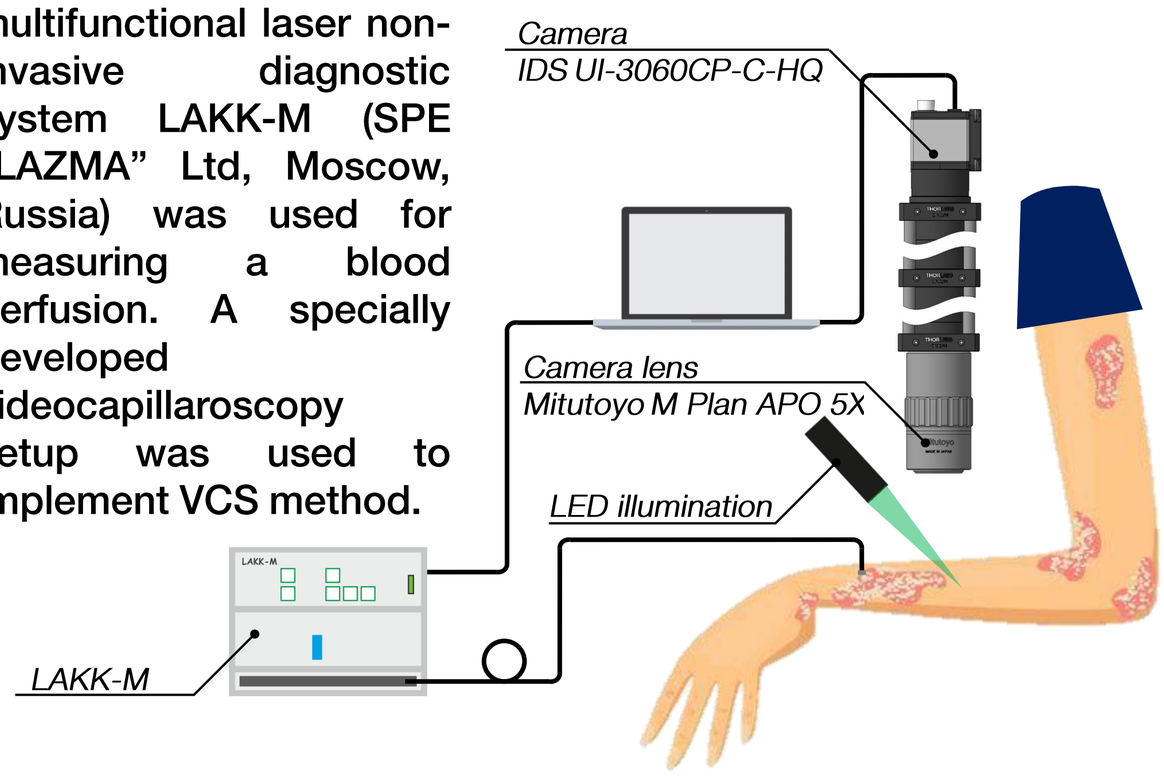
I. Before the treatment
II. On-treatment
III. After the treatment.

THE AIM OF RESEARCH

To study changes in blood microcirculation in the psoriatic plaque during the salvage therapy with VCS and LDF methods.

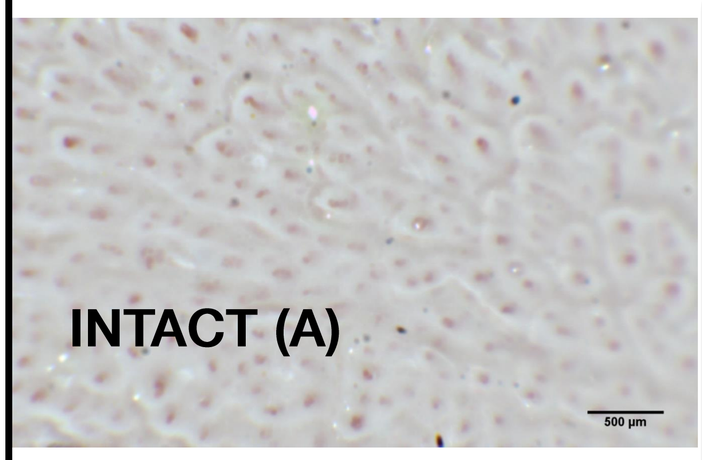
EXPERIMENTAL SETUP

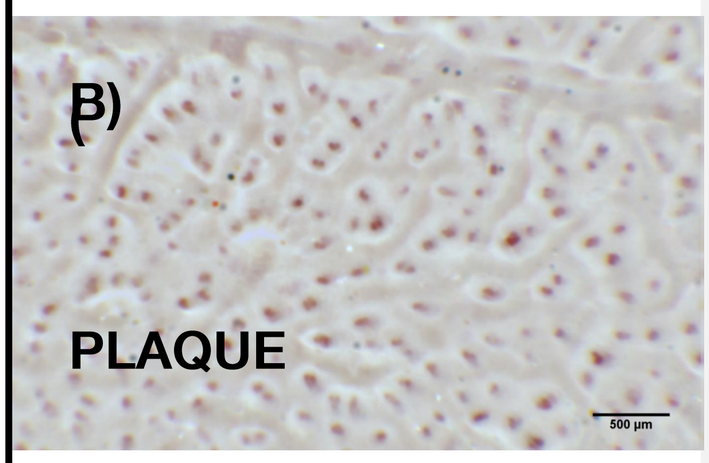
The LDF channel of the multifunctional laser non-invasive diagnostic system LAKK-M (SPE "LAZMA" Ltd, Moscow, Russia) was used for measuring a blood perfusion. A specially developed videocapillaroscopy setup was used to implement VCS method.



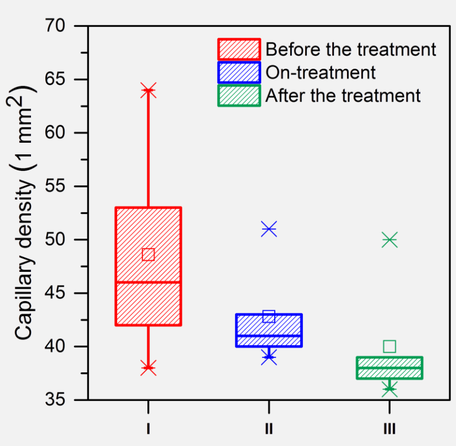
RESULTS

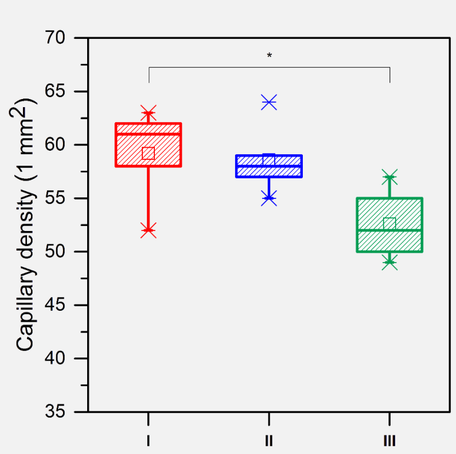
VCS images of an intact tissue (A) and a psoriatic plaque (B) (dilated, elongated, bushy capillaries):



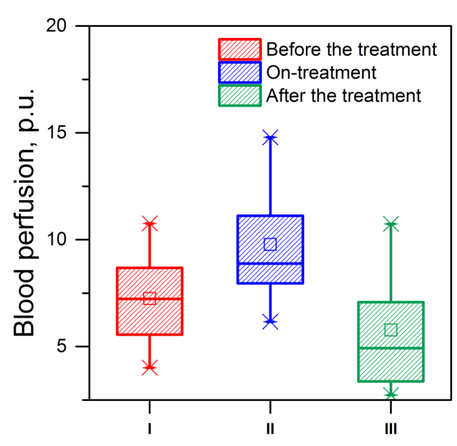


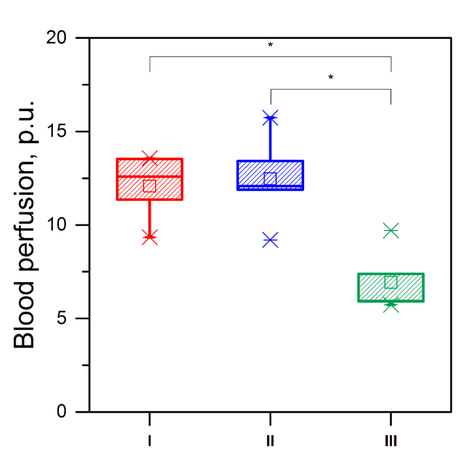
*Confirmed statistically significant differences. The level of significance was estimated using the Mann–Whitney test ($p < 0.05$)



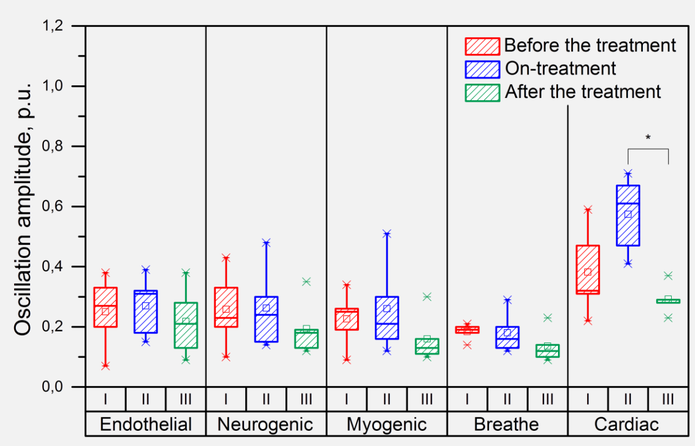


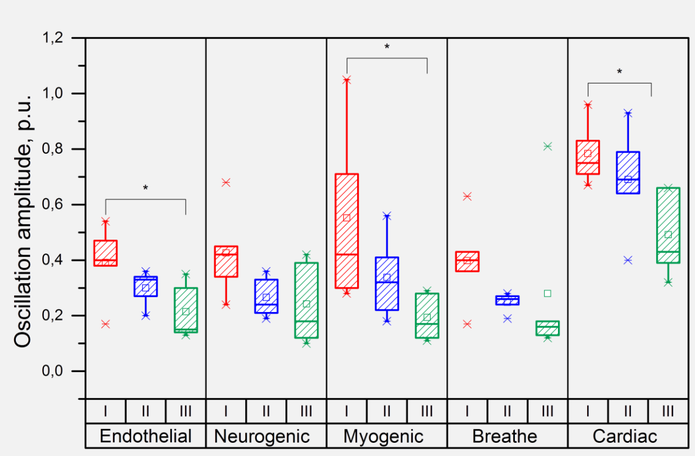
Quantity of capillaries per 1 mm^2 in the intact tissue and the psoriatic plaque at the every stage of treatment





Mean blood perfusion in intact tissue and psoriatic plaque in every stage of treatment





The amplitudes of the blood flow oscillations in the intact tissue and the psoriatic plaque at the every stage of treatment

CONCLUSION

Increasing of visualized capillaries number in the psoriatic plaque was recorded during salvage therapy. Measurements of blood perfusion by LDF method showed a decrease of blood perfusion in psoriatic plaque in the end of the treatment. Comparing with the start of the treatment, increasing of amplitudes of endothelial, myogenic and cardiac oscillations was observed. Thus, VCS and LDF methods can be used to assess the quality of treatment of patients with psoriasis.

CONTACT DETAILS

stavtsev.dmitry@gmail.com
+7 953 611 80 23
http://bmecenter.ru/en

ACKNOWLEDGEMENTS

This work was supported by the RFBR (project 17-41-590560).

RUSSIAN FOUNDATION FOR BASIC RESEARCH
RFBR