CORRELATIONS BETWEEN MICROCIRCULATION PARAMETERS MEASURED BY LASER DOPPLER FLOWMETRY AND RESULTS OF LABORATORY AND CLINICAL EXAMINATION IN PATIENTS WITH DIABETES

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Background and aim: Disorders of microcirculation in diabetes mellitus not only lead to the development of microangiopathic complications, but also can cause metabolic disorders due to hypoxia, disruption of transport of nutrients, vasoactive substances, hormones, etc.
The study aim was to investigate the relationship between the microcirculatory reactivity and the patient's clinical condition.

Methods: The study included 221 DM patients: 145 men (65.6%) and 76 women (34.4%). Blood microcirculation was measured on the right forearm's skin by laser Doppler flowmetry using the diagnostic complex LAKK-02. To assess the reactivity of the microvasculature heating to 42°C at a speed of 2°C/s and following occlusion were used. Calculated parameters are: baseline perfusion, slope of the microcirculation curve during heating, local thermal hyperemia (LTH), post-occlusive reactive hyperemia during heating (PORHH). Spearman's rank correlation coefficients were calculated to analyze the relationship between examination data and microcirculation parameters. An example of the perfusion graph is shown in figure 1

Figure 1. Scheme of combined functional test.

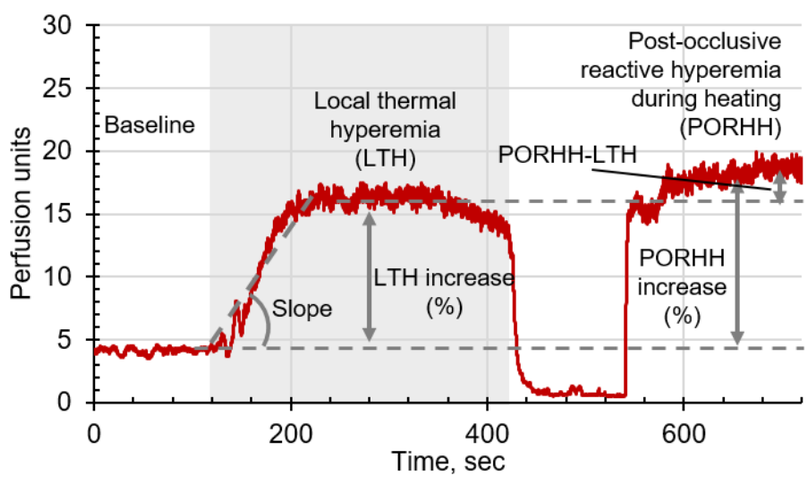

Table 1. Analysis of the correlation between the data of patients' clinical examination and microcirculation parameters. Statistically significant Spearman rank correlation coefficients are given (n.s. – not statistically significant).

Parameter	Baseline	Slope	LTH	LTH increase (%)	PORHH	PORHH increase (%)	PORHH-LTH
Age (years)	0,18	-0,22	-0,24	-0,34	-0,23	-0,35	-0,2
Body weight (kg)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
BMI (kg / m2)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Systolic blood pressure (mmHg.)	n.s.	n.s.	n.s.	n.s.	n.s.	-0,17	-0,17
Diastolic blood pressure (mmHg.)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Diabetes duration (years)	n.s.	-0,20	n.s.	-0,20	n.s.	-0,20	n.s.
HbA1c (%)	n.s.	-0,18	n.s.	n.s.	-0,15	n.s.	n.s.
The HbA1c target (%)	n.s.	n.s.	-0,17	-0,15	-0,17	-0,21	n.s.
Mean vibration perception (points)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Hemoglobin (g / l)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Erythrocytes (10^12/L)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Hematocrit	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Mean cell volume (MCV)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Platelets (10^9/L)	-0,14	n.s.	n.s.	0,15	n.s.	0,16	n.s.
Leukocytes (10^9/ L)	n.s.	n.s.	-0,16	n.s.	-0,14	n.s.	n.s.
Erythrocyte sedimentation rate (mm / h)	n.s.	n.s.	n.s.	-0,16	n.s.	-0,14	n.s.
Total cholesterol (mmol / l)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Creatinine, μmol / L	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Triglycerides, mmol / l	n.s.	-0,20	-0,26	-	-0,24	-	n.s.
High-density lipoproteins, mmol / l	n.s.	0,30	-	0,32	-	0,33	n.s.
Low density lipoproteins, mmol / l	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Coefficient of atherogenicity, unit	n.s.	-0,35	-0,31	n.s.	n.s.	n.s.	n.s.
GFR (EPI) (ml / min)	n.s.	n.s.	n.s.	n.s.	n.s.	0,16	n.s.

Results: The results are shown in table 1. Age increase is associated with baseline perfusion rise and a decrease of the vasodilation response after tests. Vascular reactivity (Slope, LTH, PORHH, LTH increase (%), PORHH increase (%)) in DM patients increases if "favorable" clinical parameters (HDL, GFR) rise. It decreases if indicators of the impaired clinical condition increase: systolic blood pressure, experience of diabetes, HbA1c level, HbA1c target, erythrocyte sedimentation rate, triglycerides, atherogenic coefficient, white blood cell count.
Conclusion: The vascular reactivity decrease is associated with a deterioration of the patient's clinical condition.

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