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OPTICAL SPECTRAL TRANSMISSION TO ASSESS THERAPY RESPONSE IN PATIENTS WITH ARTHRITIS: A COMPARATIVE STUDY WITH CLINICAL, LABORATORY AND ULTRASONOGRAPHIC ACTIVITY MARKERS.

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Background: Valid assessment of disease activity leads to outcome improvement in patients with rheumatoid arthritis (RA) (1). Optical spectral transmission (OST) is a modern diagnostic tool able to assess the blood-specific absorption of light transmitted through a tissue, promising quantification of inflammation in the finger and wrist joints of RA patients (commercial device: HandScan - Hemics, The Netherlands) (2).

Objectives: To our knowledge, there are no data regarding the diagnostic value of OST in the evaluation of inflammatory activity changes during arthitis follow up. Thus, aims of this study were to examine the ability of OST to detect response to anti-inflammatory therapy in patients with arthritis and to explore OST associations with clinical, laboratory and ultrasonographic (US) activity markers.

Methods: OST measurements were performed in patients with active arthritides of the wrist and finger joints before and after administration of glucocorticoids (GC), during a disease flare. For the same points in time (a and b) patients and healthy controls underwent clinical, laboratory and joint US [Grey Scale (GSUS) - Power Doppler (PDUS)] examinations. OST-values before and after therapy were subsequently compared with their corresponding DAS28- and US-values. The distributions of Delta-PDUS und OST-values between the two time points were compared by Bayesian statistics. Moreover, OST diagnostic performance was tested by Receiver Operating Characteristics (ROC).

Results: We recruited 54 patients with active inflammatory arthritis: 39 RA, 4 gout, 7 peripheral spondylarthritides and 4 other miscellaneous arthritides (66.7% females) and 114 controls.

Previous to therapy with GC, median OST was [OST(a): *8.75* (*5.38-16.25*, IQR)] and after therapy [OST(b): *4.75* (*2.38-8.63*, IQR)] ($p<0.05$). Similarly, DAS28 dropped significantly after GC therapy [DAS28(a): *5.12* (*4.33-6.10*, IQR) vs. DAS28(b): *3.85* (*3.40-4.82*), $p<0.05$)]. OST correlated moderately with PDUS at both time points: (a) *rho=0.449* and (b) *rho=0.414*, respectively (both; $p<0.01$). Moreover, OST correlated significantly with swollen joint count at both time points (a) *rho=0.379* and (b) *rho=0.382*, $p<0.01$ respectively.

OST and US performed similarly in the assessment of inflammatory changes caused by the administration of GC (same tendency in the change of OST values in *83.2%* of the cases). Furthermore, Bayesian statistic revealed no significant differences between OST and US for all 3 examined joint categories (MCP: $p=0.81$; PIP: $p=0.74$; wrists: $p=0.60$).

In addition, ROC revealed that OST is a very good tool to distinguish patients with arthritis from healthy controls at both examination points [AUC(a): *0.883*(*95% CI=0.83-0.94*) and AUC(b): *0.811*(*95% CI=0.74-0.881*)].

Conclusion: OST was able to assess response to therapy in arthritis patients comparable to US. Moreover, OST correlated with disease activity markers and could effectively differentiate between arthritis patients and controls. Therefore, OST could prove to be a valuable non-interventional time- and resource-saving diagnostic tool to assist arthritis monitoring.

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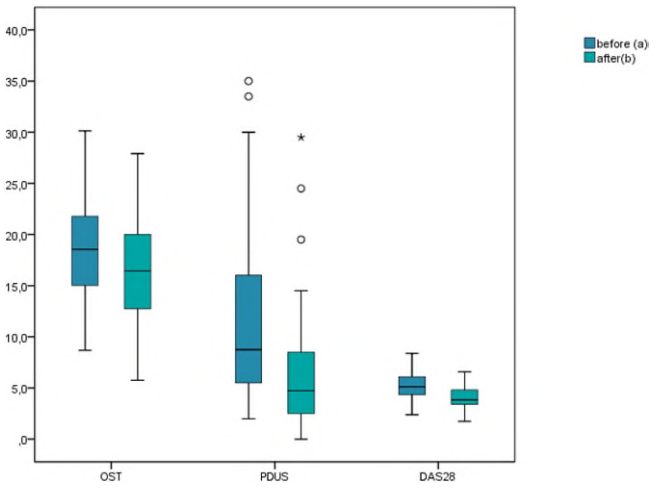

Figure 1. OST-, PDUS- and DAS28- values before and after GC therapy.

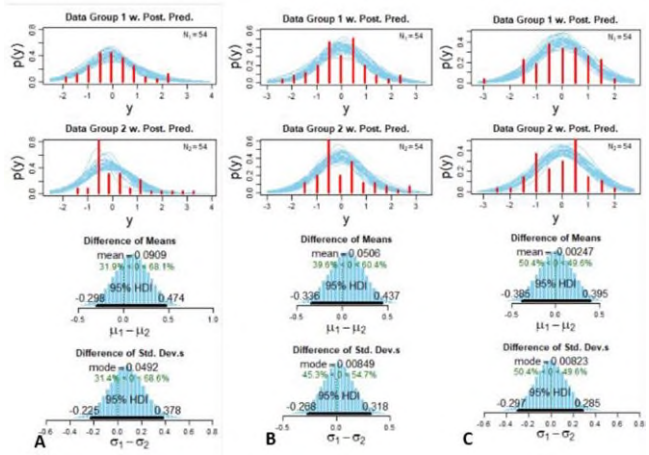

Figure 2. OST- (group 1) und Ultrasound- (group 2) Bayesian distributions, means- and standard deviation-differences for MCP (A), PIP (B) and wrists (C).