

and death in 12%. Performance of the model in the test set showed an AUC-ROC of 0.66. Probability score cutoffs were defined: low risk for disease progression (<0.197, NPV:1.0; 29% of patients), intermediate risk (0.197-0.223, NPV:0.82; 27%) and high risk (>0.223, NPV:0.78; 44%). The predictive variables included in the model were: previous use of cyclophosphamide or corticosteroids, start with immunosuppressive drugs, previous gastrointestinal progression, previous cardiovascular event, pulmonary arterial hypertension, modified Rodnan Skin Score, creatinine kinase, and diffusing capacity for carbon monoxide.

Conclusion: Our machine-learning-assisted model for disease progression enabled us to classify 29% of SSc patients as 'low risk'. In this group annual assessment programs could be less extensive than indicated by international guidelines.

Disclosure of Interests: None declared

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POS0844

EFFECTS OF SERIAL LOCALLY APPLIED WATER-FILTERED INFRARED A RADIATION IN PATIENTS WITH SYSTEMIC SCLEROSIS WITH SEVERE RAYNAUD'S SYNDROME RECEIVING PROSTAGLANDINE TREATMENT – A RANDOMIZED CONTROLLED TRIAL

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Background: More than 95% of patients with systemic sclerosis (SSc) suffer from Raynaud's syndrome (RS) leading to digital ulcerations (DU). In severe RS, intravenous application of prostaglandins is required. Moreover, these patients profit from an additional non-pharmacological treatment using hyperthermia to increase vasodilatation and perfusion, and to reduce pain.

Serial locally applied water-filtered infrared A radiation (sl-wIRAR) is a hyperthermia treatment modality using infrared heat radiation in the range of 780-1400nm with high tissue penetration and low thermal load on the skin surface [1]. wIRAR has both, temperature-dependent and non-dependent effects, which do not inherit thermal energy transfer and/or relevant temperature changes [1]. It is therefore not only used in acute and chronic wound healing as it promotes perfusion, alleviates pain and has anti-infectious effects [2], but is also used in oncology [3] and rheumatology [4].

Objectives: We conducted a randomized controlled trial with a follow-up visit after 2 weeks to evaluate the value of a high-frequency hyperthermia treatment using sl-wIRAR in comparison to a low-frequency hyperthermia treatment (our standard) in SSc patients with severe RS receiving Iloprost treatment.

Methods: Eligible patients had SSc according to the 2013 ACR/EULAR classification criteria, were 18 to 80 years old and had RS requiring treatment with Iloprost in an in-patient setting. Key exclusion criteria were contraindications to any hyperthermia treatment such as infection or heat insensitivity. The trial was conducted at Campus Kerckhoff of Justus-Liebig University Giessen. Eligible patients were equally randomized to the intervention group (IG) receiving additional sl-wIRAR treatment (2 treatments for 30min per day for 8 days) plus the standard of care (Iloprost treatment over 8 days plus daily carbon dioxide hand baths of 20min) and the control group (CG) receiving only the standard of care. Primary outcome was the between-group difference in pain measured on a numeric rating scale (NRS) after intervention. Key secondary outcomes included a change in RS frequency, RS duration, and a change in Interleukin (IL) -6 and VEGF levels.

Results: From 01.03.2020 to 31.12.2020 49 SSc patients met the inclusion criteria. 42 patients were enrolled (IG: 21, CG: 21). 38 patients (IG:19, CG: 19) completed the full trial period and were analyzed. There was no statistically significant between-group difference in pain levels (NRS) ($p=0.284$, $Z = -1.082$ (Mann-Whitney U Test)) and thus the primary outcome was not met. Therefore, all p values for secondary outcomes are nominal. Intensity (Visual analogue scale 0-100mm) and duration (min) of RS were reduced in the IG (mean \pm standard error) -14.579 ± 7.214 mm ($p=0.058$) and -2.917 ± 1.510 min ($p=0.08$), respectively. Intra- and inter-group comparison of IL-6 and VEGF levels showed no relevant change.

Conclusion: The additive and frequent use of sl-wIRAR in the treatment of SSc patients with RS requiring Iloprost treatment does not improve outcomes regarding pain levels, RS intensity or frequency nor IL-6 and VEGF levels when compared to Iloprost treatment and low-frequency hyperthermia application.

REFERENCES:

- [1] Hoffmann G. Clinical applications of water-filtered infrared-A (wIRA) – a review. *Phys Med Rehab Kuror.* 2017;27(05):265–274.
- [2] Hoffmann G, Harte M, Mercer JB. Heat for wounds – water-filtered infrared-A (wIRA) for wound healing – a review. *GMS Ger Med Sci.* 2016;14:Doc08.
- [3] Notter M, Thomsen AR, Nitsche M, et al. Combined wIRA-hyperthermia and hypofractionated re-irradiation in the treatment of locally recurrent breast cancer: evaluation of the therapeutic outcome based on a novel size classification. *Cancers (Basel).* 2020;12(3): 606.
- [4] Klemm P, Eichelmann M, Aykara I et al. Serial locally applied water-filtered infrared a radiation in axial spondyloarthritis – a randomized controlled trial, *International Journal of Hyperthermia*, 37:1, 965-970.

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SCLERODERMIC HAND SENSOR: SMART TECHNOLOGY APPLIED TO RHEUMATOLOGY

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Background: Systemic Sclerosis (SSc) is an autoimmune rheumatic disease characterized by excessive production and accumulation of collagen in the skin and internal organs and by injuries to small arteries.

Impairment of the musculoskeletal system is one of the main causes of disability in SSc, indeed, about 90% of these patients have a loss of hand function. To date, the degree of skin involvement is evaluated through a semi-quantitative method called Rodnan Skin Score (RSS) or Modified-RSS (MRSS). However, MRSS is a method that has limitations related to the operator and his experience and does not provide information on joint mobility.

Arduino® is an open source integrated online platform based on easy to use hardware and software. It is a system for creating interactive projects by inserting a special configuration code, using the Arduino® development environment. Through this platform it is possible to create electronic devices with specific purposes to lead the possibility of integrating different kits (eg types of sensors) in relation to the object of study.

Objectives: We have therefore created an electronic instrument (Sclerodermic Hand Sensor - SHS) independent operator and easily reproducible in order to measure the degree of mobility (flexion) of the hand in patients with SSc (Fig.1). The aim was to evaluate whether the SHS was able to highlight significant differences between patients with SSc and healthy patients.

Methods: We recruited 20 female patients with SSc according to ACR criteria with a mean age of 50.8 ± 15.5 years and 20 healthy (HC) patients with a mean age of 44.3 ± 10.8 years (Tab.1), in order to test the effectiveness and sensitivity of the SHS tool.

Results: The results showed a significant difference between the two groups of patients (SSc vs HC) independent of the measurement method used as expected (Goniometer SSc / HC: $\Delta 45.80^\circ$ p: 0.003 SHS SSc / HC: $\Delta 65.17^\circ$ p: 0.002, Fig.1c), however the device created with Arduino® proved to be more sensitive than the goniometric measurement in detecting the degree of joint flexion (p: 0.002). The flexion sensor, indeed, unlike the goniometer, evaluates the simultaneous articular excursion of the entire finger (MCF, IFP and IFD) and not just one segment (Fig.1).

Conclusion: This technology application, thanks to the creation of dedicated electronic devices, allows the physicians to be supported in clinical practice with independent operating tools.

Table 1. SSc Patients Characteristics

Characteristics	SSc
Patients (n°, subset D=Diffuse; L=Limited)	20 (9D/11L)
Age, mean \pm SD years	50.8 ± 15.5
Duration of Raynaud's Phenomenon (mean \pm SD years)	12.8 ± 4.4
Duration of SSc (mead \pm SD years)	8.4 ± 3.6
MRSS (mean \pm SD years)	15.9 ± 5.3

Fig.1. Comparison between the use of the goniometer and SHS in SSc patients

