

AUTOIMMUNE CONNECTIVE TISSUE DISEASES

ACCURACY OF BIOMECHANICAL ASSESSMENT OF SCLEROTIC CHRONIC GRAFT-VERSUS-HOST-DISEASE

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Background: Skin sclerosis results in significant morbidity in chronic graft-versus-host disease (cGVHD). However, the current clinical gold standard (NIH skin score) to assess sclerotic cGVHD suffers low reproducibility and only provides coarse grading ability. Therefore, there is an urgent void for the development of quantitative measures of skin sclerosis to assist in the tracking of disease progression.

Objective: We investigated the potential of the commercially available Myoton device to directly measure cGVHD sclerosis in a quantitative manner. We compare the diagnostic sensitivity of five simultaneously measured tissue biomechanical properties: dynamic stiffness, mechanical stress relaxation time, tissue oscillation frequency, logarithmic decrement, and creep.

Materials and Methods: Healthy controls (n=14) and sclerotic cGVHD patients (NIH skin score 2-3) (n=13) were measured with a Myoton device modified for selection of cutaneous tissue. Each subject was measured on 10 bilateral body sites (shin, dorsal forearm, volar forearm, upper arm, shoulder, chest, abdomen, upper back, lower back, calf), resulting in 20 total measurements per subject. For each biomechanical property, the overall value per subject was calculated as the average over all 20 measurement sites.

Results: Sclerotic cGVHD patients showed significant increases (p<0.05) in stiffness and frequency and decreases (p<0.05) in relaxation time compared to controls. The receiver operating characteristic (ROC) and area under the curve (AUC) analysis reveals that the overall stiffness (sensitivity: 91%; specificity: 93%; AUC: 0.95), frequency (sensitivity: 91%; specificity: 93%; AUC: 0.94), and relaxation time (sensitivity: 100%; specificity: 82%; AUC: 0.92) values allow for high accuracy in the differentiation of sclerotic patients and controls.

Conclusions: The Myoton device demonstrates excellent potential in the accurate classification of sclerosis and healthy skin. Further study is warranted to assess the ability of











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the Myoton to track sclerotic progression and treatment response longitudinally.



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