A Bloodspot-based Diagnostic Test for Fibromyalgia and Interstitial Cystitis/Bladder Pain Syndromes

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Fibromyalgia (FM) and Interstitial Cystitis/Bladder Pain (IC/BPS) are chronic pain syndromes that remain a diagnostic and therapeutic challenge owing to the lack of consistent laboratory and clinical findings. Because accurate diagnosis and intervention are crucial for improved patient outcomes, reliable diagnostic markers are urgently needed. Despite decades of research, FM and IC/BPS still are diagnosed by exclusion of various "confusable diseases" based on clinical symptoms.

Our aim was to investigate the ability of a rapid biomarker-based method for diagnosis of FM and IC/BPS syndromes using mid-infrared microspectroscopy (IRMS) and pattern recognition analysis to differentiate patients from those with other rheumatoid or bladder disorders and to identify molecular species associated with the spectral patterns. Under IRB approval, bloodspot samples were collected from patients, extracted, concentrated and applied onto a microarray slide for spectrum data acquisition using IRMS equipped with a slide-on attenuated total reflection (ATR) germanium crystal. Spectra were analyzed using multivariate statistical modeling (SIMCA) to differentiate groups. We have identified a biomarker "fingerprint" for FM [1] and IC/BPS [2] that correctly differentiated patients in all groups with greater than 90% accuracy. Differentiation was greatest in the 1400 to 1700 cm^{-1} range with the band centered at 1560 cm^{-1} being most important which is associated with indole NH bending vibrations from tryptophan residues. Aliquots of samples also were subjected to metabolomic analysis identifying changes in tryptophan catabolism pathway as key metabolites in differentiating patients with FM from those with other rheumatoid disorders [2]. Our data suggests that intermediate compounds in the TRP metabolic pathway might be associated with its pathophysiology, as others have suggested for chronic illness syndromes. Our rapid and reliable diagnostic test would permit earlier diagnosis and treatment, which could significantly improve patient quality of life and productivity, and release economic resources within health care systems. Additionally, these disease indicators also might be useful to monitor the effectiveness of therapeutic interventions.

References:
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