

Surface-Enhanced Raman Scattering (SERS) as a new tool for the study of Tendinopathic Human Rotator Cuff.

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Device and producing company:

MEDISPEC / ORTHOSPEC

Introduction:

Symptomatic Tendinopathic Rotator Cuff is the main cause of medical consultation for shoulder pain or upper girdle disabilities, and their biochemical features are present long before the clinical settings. It is then possible, during the natural history of this condition, to observe progressive derangement of the Rotator Cuff, ending in its rupture. Histological(1) and immunohistochemical studies do not completely characterize the different phases of the disease or tissue damage. However, SERS as an analytical tool can help to bring to light more specific and complementary features improving tissue analysis at different stages. The SERS Technique has several advantages which allow the study of biological materials in physiological and physiopathological conditions for direct comparison(2). A far less sensitive technique, FT-Raman Spectroscopy, has been used in an attempt to classify the degenerative grade of lesions of supraespinatus rotator cuff tendons(3).

Methods: In this first communication we report preliminary studies including 1016 SERS spectra of 52 biopsies of tendinopathic tissues. The SERS spectra were obtained using Ag and Au nanostructures formed in colloidal solutions(4).

Results: The spectra analysis allowed the identification of aminoacids, collagens, elastin, lipids and carbohydrates. Spectral differences, in particular from collagen signals, were observed depending on the spatial location excited within the tissue.

Discussion: The spectral mapping seems to suggest that collagen structure is sensitive to the pathology. Related research efforts include FT_Raman Spectroscopy following a tendinopathic tendon treated with shockwaves.

Conclusion: References. (1)Brañes M., Guiloff L., Brañes J., Contreras L. ISMST News Letter vol 3, May 2007, pp:9-10. (2)Kneipp J., Kneipp H., Kneipp K. Surface-Enhanced Raman Spectroscopy-Based Optical labels deliver Chemical Information from Live Cells. Chapter 13 in New Approaches in BioMedical Spectroscopy. Eds. Kneipp K., Aroca R., Kneipp H., Wentrup-Byrne E. ACS Symposium Series 963, American Chemical Society, Washington DC, 2007. (3)Palma Fogazza B., C. Da Silva C., Pentead S.G., Meneses C.S., Martin A.A., Da Silva Marthino H. Proc SPIE, 6445 (2007)64450S. (4)Aroca R. Surface- Enhanced Vibrational Spectroscopy, 2006, John Wiley & Sons Ltda.Inc., Chichester, England. (5) Wang C-J., Wang F-S., Yang K.D. ISMST News Letter vol 1, 2005, pp:5-11.