

Editorial

FTIR Spectrophotometry and Electrophoresis in Cellulose Acetate as an Effective Biomarker for Burns

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Abstract

Serum is an important component of blood and can be separated from human body easily. The metabolites of cells cause the component changes of biomolecules in serum and detecting these changes with FTIR spectroscopy may provide a new method for diagnosis of diseases.

METHODS AND CASE PRESENTATION

Our research [art. 2016, Spectr Acta 185 (2017), manuscript. doc z DMSO] involved assessment with the use of the electrophoresis method in cellulose acetate (CAE) of the influence of modifiers (orthosilicic acid, L-ascorbic acid, sodium ascorbate) [1-3] of the burn process on the electrophoretic picture of the modified serum. FTIR spectra were recorded from frozen specimens of serum modified by the above antioxidant solutions; an analysis of shifts in the amide I band position was conducted. The appearances of a new band for frozen samples modified by above antioxidants were observed (Figure 1).

A summary of this type of analysis will be an electrophoretic-spectroscopic examination of serum samples taken from the patient. It was found that the samples routinely collected during treatment show variable electrophoretic expression and variability in the range of IR molecular interactions (Figure 2).

It is known that the common clinical difficulties in wound healing are variations in glucose content (e.g., diabetic patients). The next step in our research was the electrophoretic-spectroscopic comparison of serum samples from a glucose-modified patient. It has been found that the addition of glucose to the serum from the patient results in shifting previously exposed

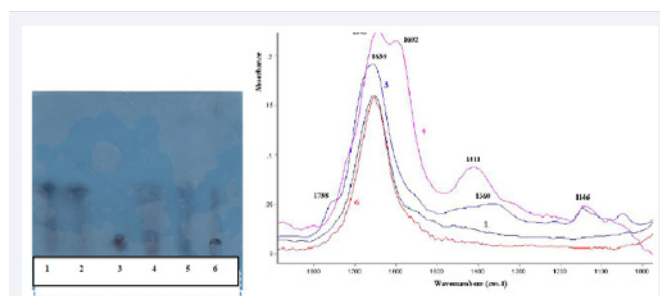


Figure 1 Cellulose acetate membrane electrophoresis and FTIR spectra in analysis of HAS samples: untreated HAS from human burn injury samples (1); HSA in presence of human burn injury samples incubated in 7% orthosilicic acid solutions (2); HSA in presence of human burn injury samples incubated in L-ascorbic acid solution (3); HSA in presence of human burn injury samples incubated in 7% sodium ascorbate solution (4); HSA in presence of human burn injury samples incubated in 7% sodium ascorbate solution and 7% orthosilicic acid solutions (5); HSA in presence of human burn injury samples incubated in DMSO (6).

glucose bands. An increase the intensity as well as the appearance of the new characteristic bands can be specific biomarkers of the tissue regeneration process.

In vivo spectral studies of serum collected under clinical treatment conditions will be the subject of the authors' subsequent work.

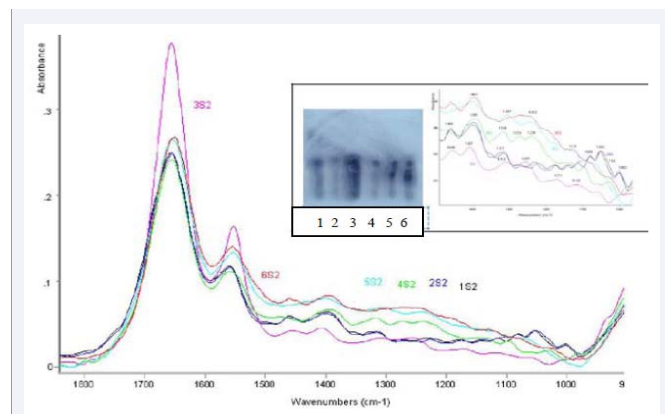


Figure 2 Cellulose acetate membrane electrophoresis and FTIR spectra in analysis of HAS samples: HSA in presence of 1mg glucose (1=1S2); HSA in presence of 4.4 mg glucose (2=2S2); concentrated serum from the patient (sample 1: content of 1.17 mg glucose) (s1=3=3S2); diluted serum from the patient (content of 1.17 mg glucose) (4=4S2); concentrated serum from the patient (samples 4 and 3) (s4=5=5S2) (s3=6=6S2).

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