Comparative profiling of serum biomarkers and ATR-FTIR spectroscopy for differential diagnosis of patients with rheumatoid and psoriatic arthritis − a pilot study

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Streszczenie

Rheumatoid arthritis (RA) and psoriatic arthritis (PsA) are chronic inflammatory diseases in which innate and adaptive responses of the immune system are induced. RA and PsA have complex signaling pathways. Despite the differences in their clinical presentation, there is a great demand for fast and accurate diagnosis of diseases to implement treatment and plan an individual therapeutic strategy quickly. In this report, we present the results of differential diagnosis of patients with RA and PsA and healthy subjects (C, control group), allowing for reliable differentiation of groups of rheumatoid patients based on biochemical parameters, attenuated total reflection Fourier-transform infrared (ATR-FTIR) spectra, and combined data sets. Biochemical analyses, ELISA (enzyme-linked immunosorbent assays), and multiplex assays were conducted for blood sera from patients with RA (*n* = 32), patients with PsA (*n* = 28), and the control group (*n* = 18). ATR-FTIR spectra were collected for lyophilized sera.The combination of six biochemical parameters (WBC, ESR, RF, CRP, HCC-4/CCL16, and HMGB1/HMGB) allowed the development of the partial least squares discriminant analysis (PLS-DA) model with an overall accuracy (OA) of 80% for test samples. The best separation between RA, PsA, and the control group was obtained utilizing spectral data. Using the interval PLS algorithm (iPLS) specific spectral ranges were selected and a classifier characterized by OA value for test set equal to 88% was obtained. This parameter, for the hybrid PLS-DA model constructed using selected biochemical parameters and a significantly reduced number of spectral variables, reached the level of 84%.PLS-DA models developed on the basis of spectral data enable effective differentiation of patients with RA, patients with PsA, and healthy subjects. They appeared to be insensitive to existing inflammation processes which opens interesting perspectives for new diagnostic tests and algorithms for identification of patients with RA and PsA.

Słowa kluczowe

rheumatoid arthritis (RA), psoriatic arthritis (PsA), ATR-FTIR, diagnostics, PLS-DA, PCA

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