The Clinical Significance of Multiplex Analysis of Antinuclear Antibodies in Systemic Lupus Erythematosus

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Abstract: Background: The term antinuclear antibodies (ANA) refers to a large family of antibodies that react with nuclear constituents of cells, such as the nuclear membrane, nucleoplasm, nucleoli, and nuclear organelles. The measurement of ANA is useful for the diagnosis of systemic lupus erythematosus (SLE).
Objective: To evaluate the clinical significance of multiplex bead-based immunoassay for the detection of ANA profile and evaluation of activity and severity of SLE.
Methods: 94 sera from SLE patients (pts) (SLICC, 2012 classification criteria) (80 F, age 35.9 [16.0-65.0] years, disease duration 113.5 [2.0-576.0] months), 50 sera from patients with other systemic autoimmune rheumatic diseases, 20 pts with non-autoimmune rheumatic diseases, and 30 sera from healthy controls were collected. Disease activity was assessed by SLEDAI-2K – 9.7 (0-40), and chronicity was assessed by SLICC damage index (SDI) - 1.6 (0-18). Serum samples were analyzed for SLE-associated ANA (anti-dsDNA, anti-Sm, anti-Chromatin, anti-SS-A/Ro 52 kDa and 60 kDa, anti-SS-B/La, anti-RNP-70, anti-Rib P) using automated multiplex bead-based immunoassay system BioPlex® 2200 (ANA Screen; Bio-Rad Laboratories Inc., USA). The following ANA values were considered positive: anti-dsDNA≥10.0 IU/mL, other antigen-specific ANA≥1.0 AI (Antibody Index).
Results: The detection of anti-dsDNA, anti-Sm, anti-Rib P antibodies by BioPlex assay demonstrated the highest overall specificity (0.95, 0.97, 0.99, respectively), and positive likelihood ratio (LR) (10.40, 9.67, 15.0, respectively) for diagnosis of SLE. BioPlex assay for anti-RNP-70, anti-SS-A/Ro, anti-Chromatin antibodies was a useful diagnostic test in SLE (positive LR 2.80, 2.31, 4.15, respectively). Anti-SS-B/La antibodies testing had no value in SLE diagnosis (positive LR 1.20). The frequency of 1 ANA in SLE pts was 79.8%, 2 ANA – 28.7%, 3 ANA – 15.6%, 4 ANA – 10.6%, 5 ANA – 5.3%, 6 ANA – 1.1%. Simultaneous detection of ≥3 ANA increased the specificity of multiplex immunoassay up to 0.98-1.00, and positive LR – to a maximum value. SLEDAI-2K was positively correlated with serum concentration of anti-dsDNA (r=0.55; p<0.05), anti-Chromatin (r=0.65; p<0.05), anti-Rib P (r=0.32; p<0.05), anti-Sm (r=0.36; p<0.05) antibodies. Not found significant association between production of ANA and SDI.
Conclusions: The detection of ANA profile by multiplex bead-based immunoassay has a high specificity and positive likelihood ratio for diagnosis of SLE. Levels of anti-dsDNA, anti-Chromatin, anti-Rib P and anti-Sm in the serum were positively correlated with disease activity.

Key words: antinuclear antibodies, multiplex immunoassay, systemic lupus erythematosus