Temporal changes in cytokine/chemokine profiles and pulmonary involvement in severe acute respiratory syndrome.

Chien JY, Hsueh PR, Cheng WC, Yu CJ, Yang PC.

Department of Internal Medicine, National Taiwan University Hospital (Yun-Lin Branch), Douliu, Taiwan.

Abstract

OBJECTIVE AND BACKGROUND: Pathological changes in severe acute respiratory syndrome (SARS) suggest that SARS sequelae are associated with dysregulation of cytokine and chemokine production. To improve understanding of the immuno-pathological processes involved in lung injury associated with SARS, the temporal changes in cytokine/chemokine profiles in the sera of SARS patients were compared with those of patients with community-acquired pneumonia (CAP), according to the degree of lung involvement.

METHODS: Serum levels of 11 cytokines and chemokines, in 14 patients with SARS and 24 patients with CAP, were serially checked using a bead-based multiassay system. Sera from 12 healthy subjects were used as normal controls.

RESULTS: The serum levels of interferon-gamma-inducible protein-10 (IP-10), IL-2 and IL-6 were significantly elevated during SARS infection. In patients with CAP, but not in those with SARS, the levels of interferon-gamma, IL-10, IL-8 and monokine induced by interferon-gamma (MIG) were significantly elevated compared with the levels in healthy controls. Among the chemokines/cytokines, IL-6 levels correlated most strongly with radiographic scores ($r=0.62$). The elevation of IP-10 and IL-2 antedated the development of chest involvement and reached peak levels earlier than the radiographic scores. In contrast, the dynamic changes in IL-6, C-reactive protein and neutrophils occurred synchronously with the changes in radiographic scores. The mean ratio of IL-6 to IL-10 in SARS patients (4.84; range 0.41-21) was significantly higher than that in CAP patients (2.95; range 0.02-10.57) ($P=0.04$).

CONCLUSIONS: The early induction of IP-10 and IL-2, as well as the subsequent over-production of IL-6 and lack of IL-10 production, probably contribute to the main immuno-pathological processes involved in lung injury in SARS. These changes in cytokine/chemokine profile are remarkably different from those observed in CAP patients.

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