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## **Prognostic value of plasma cytokine levels in solid organ transplantation**

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Cytokines are essential for induction or suppression of an immune response against viral antigens during a virus infection or non-self human leukocyte antigens (HLA) after solid organ transplantation. Increases of certain plasma cytokines precede clinical symptoms of posttransplant complications and may be early predictors of either transplant rejection, acute tubular necrosis (ATN), or virus infection and virus replication.

In a retrospective study, 13 different plasma cytokine levels of transplant recipients and virus-infected patients were analyzed and compared with clinical events.

**ATN:** Patients with ATN had significantly higher pretransplant sIL-6R plasma levels than patients with normal biopsy and higher posttransplant sIL-6R plasma levels than patients with acute rejection (AR) and patients with normal biopsy. Moreover, ATN patients had lower pretransplant sgp130 plasma levels than patients with AR and immediate graft function (IGF) suggesting an association of pretransplant monocyte activity with posttransplant ATN.

**Good graft function, AR, chronic rejection (CR):** Recipients with good graft function showed significantly higher IFN- $\gamma$  plasma levels 12 and 24 months posttransplant than healthy control individuals (HCs) whereas IL-4 plasma levels were slightly lower 12 months and significantly lower 24 months posttransplant, suggesting high activation of Th1 and low activation of Th2 late posttransplant. Patients with acute rejection showed similar IFN- $\gamma$  and IL-4 plasma levels 12 and 24 months posttransplant as recipients with good graft function. In contrast, patients with CR had lower IFN- $\gamma$  and higher IL-4 plasma levels 12 and 24 months posttransplant than recipients with good graft function. In another study we showed that 12 and 6 months before CR, sIL-6R urine levels were higher than in stable recipients.

**BK-virus positive patients:** Patients with high viral load (VL) viruria had higher urine IL-6, sIL-6R and sIL-1RA levels than BK-virus negative patients.

**CMV infection:** Compared to previremia, during CMV viremia sIL-2R and IL-6 increased. After successful antiviral therapy, IFN- $\gamma$  plasma levels increased in CMV-DNA-positive patients.

Certain plasma and urine cytokine patterns were associated with particular clinical events in kidney transplant recipients and were predictive of posttransplant complications in certain clinical situations.