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POSTER PRESENTATION Open Access

Post-operative immune suppression is reversible with interferon gamma and independent of IL-6 pathways

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Introduction

The post-operative period is characterised by increased IL-6 production and clinical features of immune suppression. *In vitro* anti-inflammatory actions of IL-6 are mediated through suppression of interferon gamma (IFNγ) [1]. The clinical significance of IL-6 in mediating post-operative immune suppression remains unclear.

Objectives

To evaluate the role of IL-6 pathways in post-operative immune suppression and the reversibility of this phenomenon.

Methods

Patients over 45 years old undergoing elective surgery involving the gastrointestinal tract and requiring at least

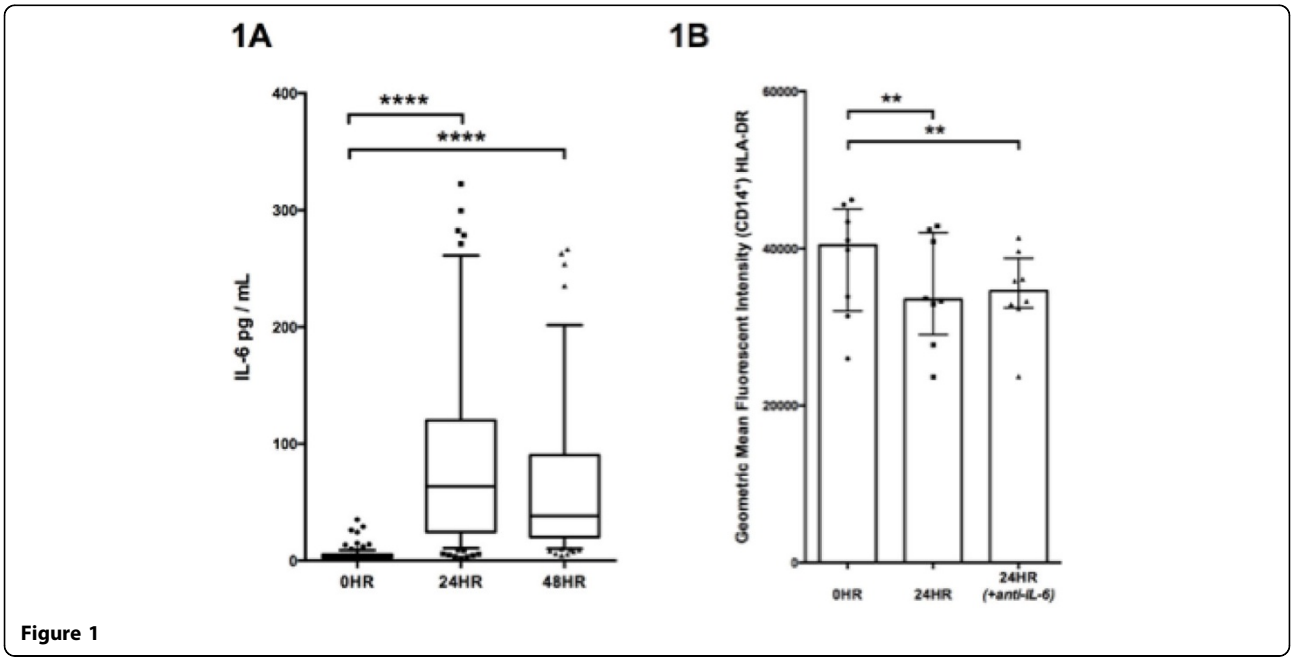

Figure 1

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Table 1 Characteristics of patients developing infections and those remaining infection free following scheduled abdominal surgery.

	Infection *N = 44 (37%)*	Infection free *N = 75 (63%)*	*P* Value
Age (years)	66 (59 - 75)	64 (56 - 71)	0.19
Male sex (%)	27 (61)	47 (63)	0.89
Diabetes (%)	8 (18)	12 (16)	0.76
Current smokers (%)	10 (23)	14 (19)	0.60
Cancer diagnosis (%)	24 (55)	53 (71)	0.07
Preoperative Immunosuppression (%)	6 (14)	10 (14)	>0.99
Duration of operation (minutes)	243 (176 - 312)	195 (142 - 295)	0.06

Data are described as median with interquartile range with percentages in parenthesis

an overnight hospital stay were recruited. The primary outcome was hospital-acquired infection. IL-6 and IFNγ levels were assayed using ELISA preoperatively and at 24 and 48 hours. Pooled healthy control peripheral blood mononuclear cells (PBMCs) were cultured in perioperative serum and $CD14^{+}$HLA-DR (mHLA-DR) geometric mean florescent intensity (MFI) measured in the presence and absence of interferon gamma (IFNγ) and IL-6 neutralising antibody. Data were analysed with non-parametric statistics.

Results

119 patients were recruited and 44 (37%) developed a post-operative infection a median of 9 (IQR 5-11) days postoperatively (Figure 1). IL-6 levels increased from baseline to 24 hours postoperatively ($P < 0.0001$, Figure 1A) but were then unchanged between 24 and 48 hours ($P = 0.06$, Figure 1B). Postoperative IL-6 levels correlated with the duration of the procedure ($P = 0.009$). Higher preoperative IL-6 levels were observed in patients with cancer ($P = 0.02$). IL-6 levels at 24 ($P = 0.0002$) and 48 hours ($P = 0.003$) were associated with the later occurrence of infectious complications. This pattern remained similar after adjustment for baseline characteristics. Healthy donor PBMCs incubated with postoperative serum downregulated mHLA-DR MFI when compared with serum from baseline (n = 8, p = 0.008). Culturing in the presence of IFNγ 250IU (n = 4) prevented this decrease whereas culturing in the presence of IL-6 neutralising antibody 15ng/ml (n = 8) did not.

Conclusions

IL-6 levels increase following major surgery and are associated with an increased susceptibility to post-operative infections. Serum obtained from post-operative patients induces an immunosuppressive response through an IL-6 independent pathways which is reversible with IFNγ treatment.

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