

# Cytokine Storm Following Tooth Extraction: An Alternative Hypothesis for Fever and Hypotension in the Immediate Postoperative Period

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An injury or infection leads to local production of signaling peptides, proteins, or glycoproteins which are called cytokines. These are secreted by many cell types, including immune, epithelial, endothelial, and smooth muscle cells and allow white blood cells to home in on the infection and migrate from the blood stream into the affected area. Cytokines normally help to stimulate and to regulate the immune system and are required for proper immune system function.

The term “*cytokine storm*” which was firstly used to describe observations in graft-versus-host disease in 1993 by a group in Boston [1], is now used in popular culture as an explanation for the distinctly unpleasant feeling at the general onset of flu [2]. This pathology leads to increased numbers of immature antigen presenting cells sharing properties of dendritic cells or macrophages [3]. It is known that a cytokine storm can make the entire body look inflamed, injured, infected and can lead to a widespread inflammatory reaction with white blood cells infiltrating and damaging adjacent structures and

severe organ failure.

Patients after tooth extraction also sometimes develop mild fever and / or hypotensive episodes immediately postoperatively. We hereby hypothesize that, dento-alveolar surgical procedures in inflamed and hypervascularized tissues could lead to an excessive endotoxin and cytokine release into the blood circuit resulting in unexpected fever, hypotension or dizziness. Different factors such as gram-positive toxins, fungal toxins or glycosylphosphatidylinositol are known to stimulate a cytokine release. The RIG-1 gene seems to be essential for regulation of the cytokine profiles and kinetics [2]. Until today, the detailed mechanism and the cytokine release following oral surgical interventions have not yet been evaluated. However, the identification of the distinct cytokines that are released systemically after oral surgery could possibly help to prevent severe immunologic reactions in the dental practice especially while treating patients with additional risk factors.

## References

1. Ferrara JL, Abhyankar S, Gilliland DG. Cytokine storm of graft-versus-host disease: a critical effector role for interleukin-1. *Transplantation Proceedings* 1993; **25**: 1216-1217.
2. Clark IA. The advent of the cytokine storm. *Immunology & Cell Biology* 2007; **85**: 271-273.

3. Schneider EM, Flacke S, Liu F, Lorenz MR, Schilling P, et al. Autophagy and ATP-induced anti-apoptosis in antigen presenting cells (APC) follows the cytokine storm in patients after major trauma. *Journal of Cell Communication and Signaling* 2011; **5**:145-156