Propfol suppresses macrophage functions and modulates mitochondrial membrane potential and cellular adenosine triphosphate synthesis

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摘要

Abstract

Background: Propofol is an intravenous anesthetic agent that may impair host defense system. The aim of this study was to evaluate the effects of propofol on macrophage functions and its possible mechanism. Metbods: Mouse macrophage-like Raw 264.7 cells were exposed to propofol, at 3, 30 (a clinically relevant concentration), and 300 μM. Cell viability, lactate dehydrogenase, and cell cycle were analyzed to determine the cellular toxicity of propofol to macrophages. After administration of propofol, chemotactic, phagocytic, and oxidative ability and interferon-y mRNA production were carried out to validate the potential effects of propofol on macrophage functions. Mitochondrial membrane potential and cellular adenosine triphosphate levels were also analyzed to evaluate the role of mitochondria in propofol-induced macrophage dysfunction. Results: Exposure of macrophages to 3 and 30 μM propofol did not affect cell viability. When the administered concentration reached 300 μM, propofol would increase lactate dehydrogenase release, cause arrest of cell cycle in G1/S phase, and lead to cell death. In the 1-h-treated macrophages, propofol significantly reduced macrophage functions of chemotactic and oxidative ability in a concentration-dependent manner. However, the suppressive effects were partially or completely reversed after 6 and 24 h. Propofol could reduce phagocytic activities of macrophages in concentration- and time-dependent manners. Exposure of macrophages to lipopolysaccharide induced the mRNA of interferon-y, but the induction was significantly blocked by propofol. Propofol concentration-dependently decreased the membrane potential of macrophage mitochondria, but the effects were descended with time. The levels of cellular adenosine triphosphate in macrophages were also

reduced by propofol. Conclusions: A clinically relevant concentration of propofol can suppress macrophage functions, possibly through inhibiting their mitochondrial membrane potential and adenosine triphosphate synthesis instead of direct cellular toxicity.