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**Induction of the heat shock response reduces mortality rate and organ damage in a sepsis-induced acute lung injury model.**

**Villar J, Ribeiro SP, Mullen JB, Kuliszewski M, Post M, Slutsky AS.**

Department of Medicine, Samuel Lunenfeld Research Institute, Mount Sinai Hospital, Toronto, ON, Canada.

**OBJECTIVE:** To test the hypothesis that induction of heat shock proteins before the onset of sepsis could prevent or reduce organ injury and death in a rat model of intra-abdominal sepsis and sepsis-induced acute lung injury produced by cecal ligation and perforation. **DESIGN:** Prospective, blind, randomized, controlled trial. **SETTING:** University research laboratory. **SUBJECTS:** One-hundred forty-two adult Sprague-Dawley rats (weight range 200 to 300 g). **INTERVENTIONS:** Production of intra-abdominal sepsis and exposure to heat stress. Animals were randomly divided into four groups: heated and septic, heated and sham-septic, unheated and septic, and unheated and sham-septic. **MEASUREMENTS AND MAIN RESULTS:** We evaluated the mortality rate and pathologic changes in lung, heart, and liver at 18 hrs after cecal perforation, at 24 hrs after removal of the cecum, and at 7 days after perforation. Heated animals exhibited a maximum increase in heat shock protein of 72 kilodalton molecular weight protein concentrations in the lungs and heart 6 to 24 hrs after the hyperthermic stress. By 18 hrs after perforation, 25% of the septic, unheated animals had died whereas none of the septic heated animals had died ( $p < .005$ ). Septic, heated animals showed a marked decrease in 7-day mortality rate (21%) compared with septic unheated animals (69%) ( $p < .01$ ). Furthermore, septic heated animals showed less histologic evidence of lung and liver damage than septic unheated animals. **CONCLUSIONS:** These data suggest that thermal pretreatment, associated with the synthesis of heat shock proteins, reduces organ damage and enhances animal survival in experimental sepsis-induced acute lung injury. Although the mechanisms by which heat shock proteins exert a protective effect are not well understood, these data raise interesting questions regarding the importance of fever in the protection of the whole organism during bacterial infection.

PMID: 8205824 [PubMed - indexed for MEDLINE]

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