

# Study documents toll of smoke inhalation injuries

November 16 2011

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A study of burn patients has found that those who suffered the most severe smoke inhalation also had more inflammation and spent more time on ventilators and in intensive care.

The study, led by researchers at Loyola University Chicago Stritch School of Medicine, is published ahead of print in the journal [Critical Care Medicine](#). It is the first to show that the severity of smoke-inhalation injury may play a role in the overall pulmonary [inflammatory response](#).

[Inflammation](#) occurs in response to injury. It includes the release of proteins that can trigger [wound healing](#). But too much inflammation can damage healthy tissue.

Researchers wrote that their findings could "serve the purpose of better understanding the [biological mechanisms](#) behind smoke inhalation injury."

In the United States, about 40,000 people are hospitalized for burn injuries each year. As many as 20 percent of fire victims also have smoke-inhalation injuries.

At Loyola, smoke inhalation is rated from 0 (no injury) to 4 (massive injury). Researchers conducted an observational study of 60 adult burn patients, including nine patients who had Grade 0 inflammation, 15 who had Grade 1, 15 who had Grade 2, 18 who had Grade 3 and three who

had Grade 4.

The study included an examination of proteins called cytokines contained in fluid flushed out of patients' lungs. (Cytokines are the so-called hormones of the immune system.) Researchers looked at 28 cytokines associated with inflammation, and found that 21 were at their highest in patients with the most severe smoke inhalation injuries. (The [inflammatory proteins](#) included interferon- $\gamma$ , granulocyte-macrophage colony-stimulating factor, monocyte chemotactic protein-1 and several interleukins.)

Patients who had low smoke-inhalation injuries (Grades 1 or 2) spent a median of seven days on the ventilator, while patients with high-inhalation injuries (Grades 3 or 4) spent a median of 23 days on the ventilator. Low-inhalation-injury patients spent a median of 13 days in intensive care; high-inhalation-injury patients spent 24 days. Thirty-three percent of low-inhalation-injury patients required a tracheotomy, compared with 52 percent of high-inhalation-injury patients. However, the degree of inhalation injury did not have a significant effect on subsequent pneumonia, sepsis, hospital length of stay or mortality.

Senior author of the study is Elizabeth J. Kovacs, PhD, director of Loyola's Burn and Shock Trauma Institute. First author is Joslyn M. Albright, MD, a research fellow in the Burn and Shock Trauma Institute. "This study is an excellent example of clinicians and basic scientists working together," Kovacs said.

Provided by Loyola University Health System

Citation: Study documents toll of smoke inhalation injuries (2011, November 16) retrieved 25 April 2024 from <https://medicalxpress.com/news/2011-11-documents-toll-inhalation-injuries.html>

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