

# Surprising finding from smoke inhalation study

April 1 2011

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An award-winning Loyola University Health System study includes some unexpected findings about the immune systems of smoke-inhalation patients.

Contrary to expectations, patients who died from their injuries had lower inflammatory responses in their lungs than patients who survived.

"Perhaps a better understanding of this early pulmonary [immune dysfunction](#) will allow for therapies that further improve outcomes in [burn care](#)," researchers reported.

Results were released at the 43rd annual meeting of the American Burn Association. The project won the 2011 Carl A. Moyer Resident Award for the best study submitted by a resident physician.

First author of the study is Christopher S. Davis, MD, a general surgery resident at Loyola University Hospital. Corresponding author is Elizabeth J. Kovacs, PhD, associate director of the Burn & Shock Trauma Institute at Loyola University Chicago Stritch School of Medicine.

Researchers followed 60 burn patients at the Loyola University Hospital Burn Center. The severity of inhalation injury was categorized into one of five grades (0, 1, 2, 3, and 4), with zero being the absence of visible injury.

As expected, patients with the worst combined burn-and-smoke-inhalation injuries required more time on the ventilator, in the intensive care unit and in the hospital. They also were more likely to die, although this finding fell just short of being statistically significant.

Also according to expectations, patients who died were older and had larger injuries than patients who survived.

But the [immune system](#) findings were unexpected. Researchers measured concentrations of 28 immune system modulators in fluid collected from the lungs of patients within 14 hours of burn and smoke-inhalation injuries.

These modulators are proteins produced by leukocytes (white blood cells) and other cells, including those that line the airway. Some of the modulators recruit leukocytes to areas of tissue damage or activate them to begin the repair process that follows tissue injury.

Based on studies conducted at Loyola and other centers, researchers had expected to find higher concentrations of modulators in patients who died, because sicker patients tend to have more active inflammatory responses. But researchers found just the opposite: patients who died had lower concentrations of these modulators in their lungs.

Why do some patients mount robust immune responses in the lungs while others do not? The reason may be due to age, genetics, differences in patients' underlying health conditions or anything that might disrupt the balance between too much and too little inflammation, Davis said.

Survival of burn patients has significantly improved since the 1950s, due to advancements such as better wound care and improved prevention and treatment of infections. But progress has somewhat stalled in the last 10 years.

"It appears that the inflammatory and immune response to injury remains incompletely understood and that additional effort is required to further improve survival of the burn-injured patient," researchers wrote.

Provided by Loyola University Health System

Citation: Surprising finding from smoke inhalation study (2011, April 1) retrieved 27 April 2024 from <https://medicalxpress.com/news/2011-04-inhalation.html>

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