

Alcohol May Mislead Surgical Timing

A Loyola University Health System study has found another reason to not binge drink alcohol. Binge drinking, researchers found, could change the body's immune system response to bone injuries.

"This tremendously complicates the trauma care of these patients," said bone biologist John Callaci, PhD, senior author of the study.

The study, which was based on a rodent model, is being published in the April 20, 2011 issue of the *Journal of Bone and Joint Surgery*, now available online. An earlier study in the *American Journal of Orthopedics* found that 41 percent of patients with fractures and dislocations had alcohol in their blood and 30 percent were legally drunk.

Other studies have found that alcohol in trauma patients is associated with longer hospital stays, higher infection rates, higher injury severity scores and an increased mortality rate. Researchers have attributed these findings, in part, to changes alcohol causes in the immune response.

Following an injury, such as a broken bone, the immune system revs up, producing an inflammatory response. This is a normal response to injury. But in cases of severe injury or multiple traumatic injuries, the inflammatory response can overwhelm the body and cause life-threatening conditions such as multiple organ failure and acute respiratory distress syndrome, said orthopaedic surgeon Dr. Benjamin William Sears, first author of the Loyola study. (Sears was a Loyola resident when the study was conducted, and today is a fellow at Thomas Jefferson University.)

In emergency cases involving severe injuries or multiple traumas, orthopaedic surgery can boost the inflammatory response. One of the factors surgeons consider when determining the best time to perform surgery is the inflammatory response — if the response is too great, the surgery can be delayed. Chemical markers in the blood, such as interleukin-6 (IL-6), are a measure of the inflammatory response.

Findings from the Loyola study, however, indicate that measuring such blood markers may be misleading when alcohol is involved.

In the study one group of rats underwent the equivalent of a weekend bender. For three days in a row, they were injected with alcohol that raised their blood alcohol content to the equivalent of 2.5 times the legal limit for driving. In some of the rats, the femur bones of their hind legs were broken. (The rats were put under anesthesia and later given pain medication, and pins were placed in their legs to enable them to walk and feed.)

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Binge alcohol exposure had a contradictory effect on the immune system of the rats with broken legs. When researchers looked at chemical markers in the blood, it appeared that alcohol suppressed the inflammatory response. But when researchers looked in the lungs, they found the opposite effect — alcohol boosted the inflammatory response.

It's thus possible that measuring markers in the blood of intoxicated patients could give doctors a false sense of security, Sears said.

Callaci added: "It may look like it's safe to do surgery based on markers in the blood, even when you have a raging inflammatory response in the lungs." Of course, the timing and magnitude of the inflammatory response following injury may be different in rats than it is in humans. The study's findings "will provide a platform to design clinical-based studies to further understand this important phenomenon in critically injured patients," researchers wrote.

Callaci is an assistant professor and director of the Molecular and Cellular Bone Biology Laboratory at Loyola University Chicago Stritch School of Medicine. Other co-authors are orthopaedic surgeons Dr. Michael Stover and Dr. Dustin Volkmer, pathologist Dr. Sherri Yong, research assistant Ryan Himes and graduate student Kristen Lauing.

The study was supported in part by the National Institute on Alcohol Abuse and Alcoholism. It is among the studies conducted by Loyola's Alcohol Research Program, which includes about 50 faculty members, technicians, postdoctoral fellows and students. The program, funded by grants from the National Institutes of Health and other sources, centers on research, education and prevention.

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