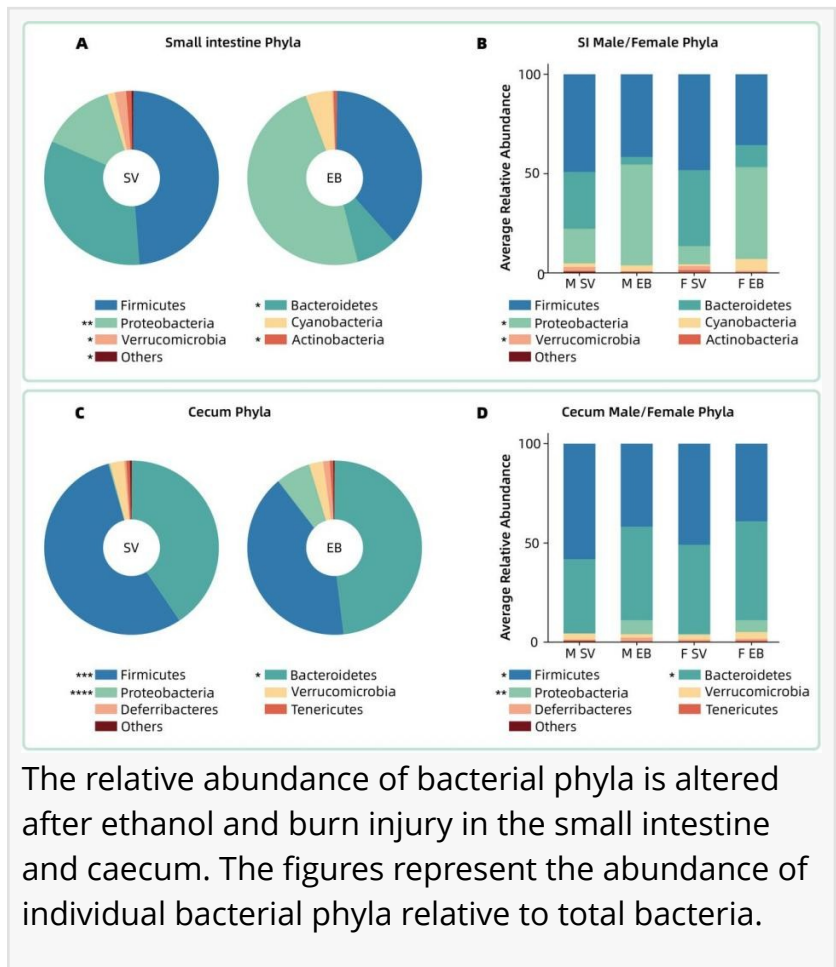


Burned and bloated: gut bacteria take a hit after alcohol and burn injuries

Alcohol and burn injuries disrupt gut bacteria and lower anti-inflammatory metabolites. Restoring butyrate may help reduce intestinal damage after trauma

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EINPresswire.com/ -- What happens in your gut after a night of heavy drinking and a severe burn injury? According to a [new study](#), it might involve more than just pain and discomfort. Researchers at Loyola University Chicago Health Sciences Division have shown that alcohol combined with burn trauma throws the intestinal microbiome into chaos, leading to inflammation and impaired gut barrier function. The work uncovers the microbial shifts and metabolic fallout of these injuries, highlighting a potential path forward: replenishing lost microbial metabolites might help protect the gut—and the rest of the body—after trauma.



Burn injuries on their own are already a serious challenge, but when alcohol intoxication is involved, outcomes become significantly worse. Patients admitted to the hospital with both conditions have higher rates of sepsis and mortality than those with burns alone. Previous work has shown that alcohol can slow down intestinal motility and damage the gut lining. Combined with the physiological stress of a burn, this leads to a breakdown in the gut barrier, allowing bacteria and their inflammatory byproducts to leak into the bloodstream.

The researchers found major disruptions in the gut microbiome one day after alcohol and burn injury. Bacterial diversity dropped significantly, especially in the small intestine. Beneficial

microbes were depleted, while populations of Proteobacteria—a group that includes many potentially harmful species—surged.

These microbial shifts were accompanied by a drop in short-chain fatty acids (SCFAs), particularly butyrate. SCFAs are crucial compounds produced by gut bacteria. They nourish intestinal cells, help maintain the integrity of the gut lining and regulate inflammation. Butyrate serves as a primary energy source for intestinal epithelial cells and is known to promote anti-inflammatory responses. In alcohol and burn injury, butyrate levels were significantly lower than in healthy controls.

To determine whether this imbalance had functional consequences, the researchers took fecal samples from the injured host and exposed them to intestinal cells in the lab. The results were striking: fecal matter from the injured group triggered much higher levels of interleukin-6 (IL-6), a pro-inflammatory cytokine, in the intestinal cells compared to samples from uninjured host. This inflammatory response was strongly correlated with the abundance of Enterobacteriaceae, a bacterial family that had flourished after the injury.

Encouragingly, when the researchers pre-treated the cells with butyrate, the IL-6 response was blunted. This suggests that the lack of butyrate in the injured gut plays a direct role in amplifying inflammation. Butyrate fuels intestinal cells and seems to keep inflammatory responses in check, acting as a kind of microbial brake on the immune system.

Although these findings were observed in an experimental model, the implications for human health are compelling. Many burn patients arrive at the hospital with alcohol in their systems. Understanding how these conditions interact to harm the gut could help explain why such patients fare worse. If similar disruptions in the microbiome and SCFAs occur in patients, restoring those microbial metabolites could become a new therapeutic strategy.

The study also highlights the importance of timing. The microbial changes and inflammation were observed just one day after injury, emphasizing how quickly the gut environment can shift. This underscores the need for rapid interventions after trauma—perhaps through SCFA supplementation, prebiotics that encourage the growth of SCFA-producing bacteria, or targeted probiotics.

The researchers note that future studies will need to explore whether boosting butyrate levels in vivo can reduce inflammation and improve outcomes. They also point out that standard post-burn care does not currently address the intestines or gut microbiome, overlooking an organ system that could offer therapeutic opportunities for burn victims.

While the gut microbiome has gained attention in recent years for its role in everything from obesity to mental health, this research adds a new layer. In the context of acute trauma, microbial health might influence recovery and resilience. If so, protecting and restoring the gut could become a key pillar of post-injury care.

Reference

Title of original paper: Bacterial dysbiosis and decrease in SCFA correlate with intestinal inflammation following alcohol intoxication and burn injury.

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See the article:

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About Prof. Mashkoor A Choudhry from Loyola University Chicago

Dr. Mashkoor A Choudhry is a Professor of the Department of Microbiology & Immunology at Loyola University Chicago.

Major Research Interests: Gut immunity and epithelial barrier in response to injury.

Intestine is the major reservoir of bacteria within the body and it maintains an effective barrier against these bacteria under healthy conditions. However, this barrier is compromised following alcohol exposure, burn injury and other traumatic insults; a compromised intestinal barrier

facilitates the entry of intestinal bacteria and their products to extra intestinal sites. These intestinal-derived bacteria or their products present a major clinical problem to burn/trauma victims as well as in patients with history of alcohol exposure and are implicated in the subsequent development of multiple organ failure. Dr. Choudhry's laboratory is interested in learning the mechanisms of impaired gut barrier following alcohol exposure and major trauma such as burn.

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