
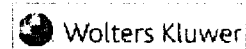


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[Shock](#). 2017 Dec 29. doi: 10.1097/SHK.0000000000001098. [Epub ahead of print]

Hydrogen-Rich Saline Regulates Intestinal Barrier Dysfunction, Dysbiosis and Bacterial Translocation in a Murine Model of Sepsis.

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Abstract

Bacterial translocation is a major cause of multiple organ dysfunction syndrome in critical illness, and its management is an important therapeutic strategy. In this study, we focused on the key factors responsible for bacterial translocation including the intestinal microbiome and investigated the impact of molecular hydrogen therapy as a countermeasure against bacterial translocation in a murine model of sepsis. The experimental protocols were divided into the sham, saline treatment (control) and hydrogen treatment (H2) groups. In the H2 group, 15 mL/kg of hydrogen-rich saline (7 ppm) was gavaged daily for 7 days following cecal ligation and puncture (CLP). In the control group, normal saline was gavaged in the same way. In the results, the 7-day survival rate was significantly improved in the H2 group versus the control group (69% vs 31%, $p < 0.05$). The incidence of bacterial translocation at 24 hours after CLP as assessed by cultivation of mesenteric lymph nodes and blood was significantly decreased in the H2 group versus the control group. Administration of hydrogen-rich saline also prevented the expansion of facultative anaerobic Enterobacteriaceae and ameliorated intestinal hyperpermeability at 24 hours after CLP. Intestinal tissue levels of inflammatory mediators such as inducible nitric oxide synthases, tumor necrosis factor α , interleukin (IL)-1 β , IL-6 and oxidative stress marker malondialdehyde at 6 hours after CLP were down-regulated in the H2 group. These results suggest luminal administration of hydrogen-rich saline, which prevents intestinal dysbiosis, hyperpermeability and bacterial translocation, could potentially be a new therapeutic strategy in critical illness.

PMID: 29293174 DOI: [10.1097/SHK.0000000000001098](https://doi.org/10.1097/SHK.0000000000001098)

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