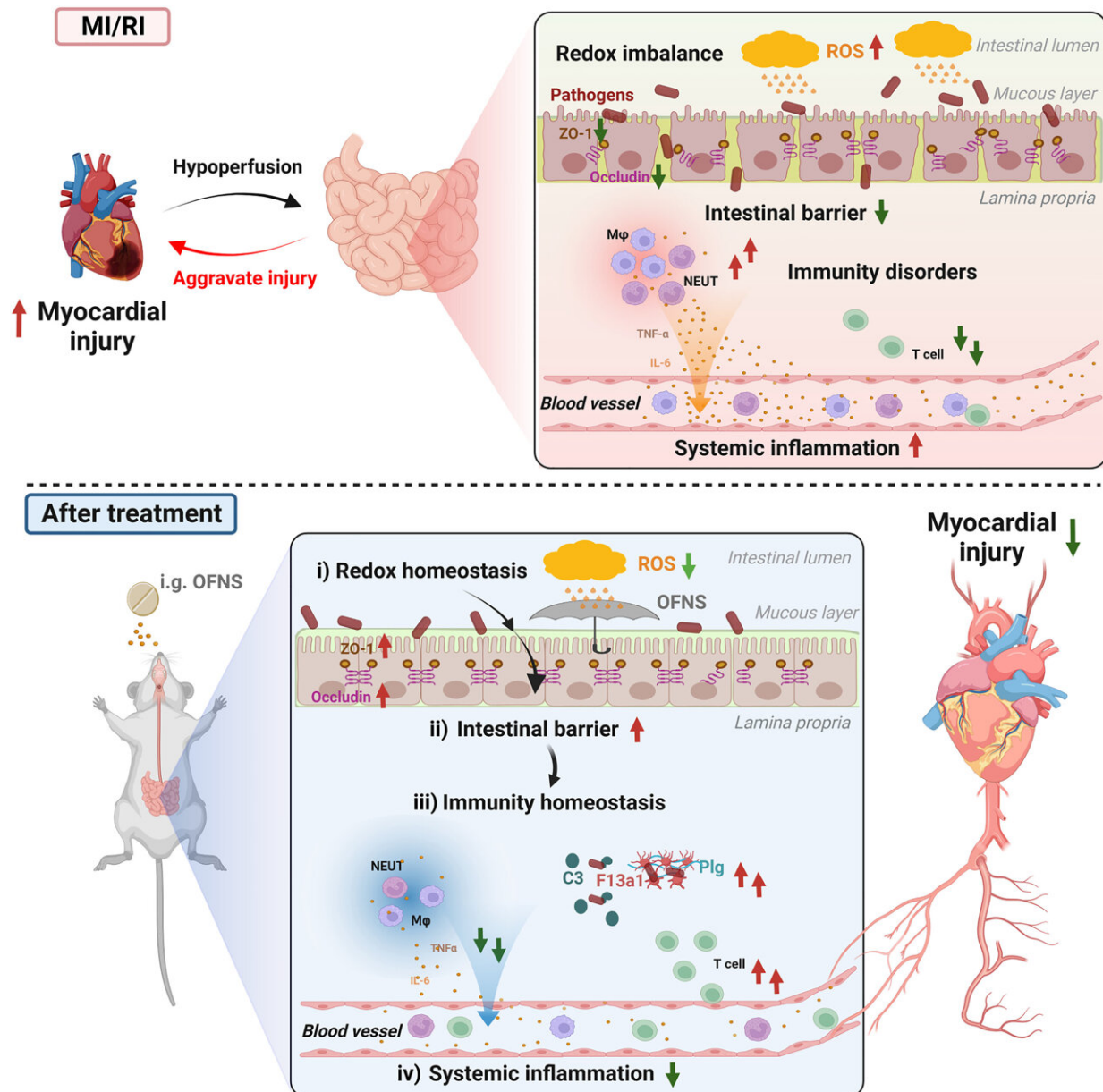


Researchers prevent myocardial ischemia/reperfusion injury with oral fullerenes

January 9 2024, by Liu Jia



The mechanism diagram of OFNS on preventing myocardial injury in MI/RI mice. MI/RI induces hypoperfusion of intestinal tissues, which leads to the intestinal redox imbalance, resulting in the damages of the intestinal barrier, intestinal immunity disorders, and systemic inflammation. All of these further aggravate the myocardial injury. After OFNS treatment, the intestinal redox homeostasis was recovered, inducing to restore the integrity of intestinal epithelial barrier and intestinal immunity homeostasis. Ultimately, these contribute to systemic inflammation attenuation and myocardial injury mitigation. Created by BioRender.com. Credit: *Proceedings of the National Academy of Sciences* (2023). DOI: 10.1073/pnas.2311673120

Myocardial infarction (MI) is a deadly disease. It can cause serious myocardial ischemic necrosis due to coronary occlusion. The most effective treatment for MI in clinic is reperfusion, e.g., interventional or thrombolytic therapy. However, reperfusion itself could induce more severe injury, called myocardial ischemia/reperfusion injury (MI/RI).

Current therapies such as edaravone, allopurinol, and sodium nitroprusside, are not always satisfactory. Developing a new strategy to achieve a safe and effective treatment remains challenging.

In a study [published](#) in *Proceedings of the National Academy of Sciences*, the research group led by Prof. Bai Chunli and Prof. Wang Chunru from the Institute of Chemistry of the Chinese Academy of Sciences developed an oral therapeutic system using a fullerene-based [reactive oxygen species](#) nanoscavenger that locally maintained intestinal redox homeostasis to reduce intestinal and systemic inflammation, thereby preventing myocardial injury.

The proposed strategy is based on the close relationship between the

heart and the gut, as well as the excellent redox homeostasis regulation of fullerenes. In vitro, the researchers assessed the regulation effects of the oral fullerene nanoscavenger (OFNS) on cellular redox homeostasis in three kinds of cell models, including epithelial, endothelial, and inflammatory cells. In vivo, they confirmed the efficacy of OFNS in treating MI or MI/RI in mice and mini-pigs.

To verify the therapeutic mechanism, the researchers conducted quantitative transcriptomics, proteomics, western blotting, immunostaining, and flow cytometry testing. The results suggested that OFNS modulated intestinal redox homeostasis and strengthened the intestinal barrier integrity to relieve systemic inflammation and immune disorder for remote cardioprotection.

This work provides a promising method for tissue injury repair by focusing on the small intestine immune axis, and sheds light on the therapy of inflammatory-driven injury in distal organs other than the heart.

More information: Wang Jia et al, Recovering intestinal redox homeostasis to resolve systemic inflammation for preventing remote myocardial injury by oral fullerenes, *Proceedings of the National Academy of Sciences* (2023). [DOI: 10.1073/pnas.2311673120](https://doi.org/10.1073/pnas.2311673120)

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