

Abstract Submission No.: A-1052

Dietary supplementation with Bacillus Superoxide dismutase protects against kidney ischemia reperfusion injury in mice.

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Objectives : Superoxide dismutase (SOD) is a metalloenzyme that play an important role in antioxidant defense against oxidative stress. Bacillus strains are known to produce SOD activity and thus have been shown to have protective effect on gut inflammation. Based on recent data showing the important role of gut dysbiosis, aberrant gut mucosal immunity as well as well-known oxidative stress in kidney injury, we investigated the renoprotective potential of orally administered enteric-coated SOD protein purified from *Bacillus amyloliquefaciens* (SOD-BA) in kidney ischemia/reperfusion injury (IRI) in mice.

Methods : 6 week old C57BL/6 male mice were fed with SOD-BA 24 hours before IRI. Serum BUN, creatinine and histologic alterations as well as oxidative stress, inflammation in kidney tissue were determined. Gut microbiome analysis, permeability, catalase and SOD activity, and gut epithelial damage were also determined.

Results : Gut microbiota structure in SOD-BA +IRI group was clearly distinguished from that of IRI group in the principal coordinate analysis. SOD-BA + IRI group showed a significant increase in the relative frequency of family Porphyromonadaceae, Muribaculaceae and Bacteroidacea. SOD-BA administration led to decreased colon epithelial apoptosis with partial restoration of gut permeability. The gut protective effect was accompanied by significant functional, histological renoprotection. Kidney SOD was increased, and catalase was decreased in SOD-BA + IRI group. However, there was no difference in colon and kidney inflammation.

Conclusions : SOD-BA could serve as a potent antioxidant in the prevention and treatment of acute kidney injury