

## Superabsorbent hydrogel supplementation prevents hepatic steatosis and insulin resistance in high fat diet-induced NAFLD pre-clinical model

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Intestinal barrier is the first line of defense that separates our body from the external environment. Its function is to maintain intestinal tissue homeostasis, regulating the passage of molecules and protecting from harmful microbes. Intestinal barrier is made up by the mucus layer, critical for the limitation of the exposure to the gut microbiota and by intestinal epithelial cells sealed by inter-epithelial tight junctions. A strong cause-effect relation between intestinal permeability alterations and both intestinal and systemic diseases (like obesity, type 2 diabetes and NAFLD) is becoming evident, suggesting that restoring proper gut permeability by targeting the intestinal epithelial barrier could represent a successful intervention. The present study proposes the use of a superabsorbent hydrogel, based on naturally derived building blocks to restore gut permeability, likely acting on the intestinal epithelial barrier, directly or indirectly.

In mouse model of HFD feeding we observed that hydrogel supplementation prevented early intestinal barrier perturbations together with adiposity, parameters related to metabolic disorders and gut microbiota dysbiosis. After 18 weeks of hydrogel-supplemented HFD, mice showed a significant reduction in body weight and white adipose tissue deposition, improved insulin sensitivity, higher serum GLP-1 and resistance to induction of hepatic steatosis. Hydrogel supplementation resulted in a significant increase in intestinal length and integrity of the intestinal barrier, thus protecting against HFD-induced metabolic disorders together with a stabilization of gut microbiota composition. The mechanisms underlying hydrogel effects on intestinal epithelial barrier are currently under investigation, but these data suggest a new therapeutic approach to ameliorate adverse manifestations of the metabolic disorders.