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## Modulation of Gut Microbiota in the Management of Non-Alcoholic Fatty Liver Disease: A Preclinical Assessment

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**Objectives:** This study evaluates the impact of targeted gut microbiota modulation on the progression of non-alcoholic fatty liver disease (NAFLD) using probiotic and prebiotic interventions.

**Material and methods:** NAFLD was induced in rats through a high-fat, high-fructose diet for 12 weeks. Animals were treated with a synbiotic blend (probiotics + inulin) or probiotics alone for four weeks. Liver tissues were examined for steatosis, inflammation, and fibrosis. Serum markers including ALT, AST, triglycerides, and fasting glucose were measured. Fecal samples were analyzed through 16S rRNA sequencing to identify microbial shifts.

**Results:** Synbiotic-treated animals exhibited significant reductions in hepatic fat accumulation, inflammation, and oxidative stress. Improvements in insulin sensitivity and lipid profile were also observed. Microbiota analysis revealed increased levels of beneficial bacteria such as *Lactobacillus* and *Bifidobacterium*, accompanied by reduced abundance of pathogenic species.

**Conclusion:** Gut microbiota modulation through synbiotics offers a promising approach for preventing and managing NAFLD progression.

### Biography

Dr. Isabella Martínez-Rojas is a senior researcher in Gastrointestinal Microbiology at the University of Barcelona, Spain. Her expertise spans gut microbiome–host interactions, metabolic liver diseases, and probiotic therapy development. She has led several funded projects investigating microbiota-based interventions for obesity, NAFLD, and gut inflammation. Dr. Martínez-Rojas collaborates frequently with clinical hepatology units to translate preclinical findings into patient-centered therapeutic strategies. Her work is widely recognized in European microbiome research circles, and she actively contributes to international conferences and scientific networks promoting microbiota-based precision medicine.

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