Gut microbiota transplantation may prevent development of diabetes and fatty liver disease

19 April 2012

Exciting new data presented today at the International Liver Congress 2012 shows the gut microbiota's causal role in the development of diabetes and non-alcoholic fatty liver disease (NAFLD), independent of obesity.(1) Though an early stage animal model, the French study highlights the possibility of preventing diabetes and NAFLD with gut microbiota transplantation - the engrafting of new microbiota, usually through administering faecal material from a healthy donor into the colon of a diseased recipient.(2)

In the 16 week study, two groups of germ free mice received gut microbiota transplants; one set from donor mice displaying symptoms of insulin resistance and liver steatosis (responders), the other from normal mice (non responders). The donor mice were selected due to their response to being fed a high fat diet.

The germ free group that received microbiota from symptomatic mice (responder receivers - RR) showed higher levels of fat concentration in the liver as well as being insulin resistant. The germ free group that received microbiota from healthy mice (non-responder-receivers - NRR) maintained normal glucose levels and sensitivity to insulin.

EASL Scientific Committee Member Dr Frank Lammert said: "The factors leading to Non-Alcoholic Fatty Liver Disease (NAFLD) are poorly understood, but it is known that NAFLD and Type 2 diabetes are characterised, respectively, by liver inflammation and metabolic disorders like insulin resistance."

"This study shows that different microbiota cause different metabolic responses in animals. By implanting microbiota from healthy mice, the study authors prevented the development of liver inflammation and insulin resistance, both indications of liver disease and diabetes. Thus, gut microbiota transplants could have a therapeutic role in the development of these diseases."

The RR mice also showed lower levels of microorganisms than usually found in the healthy gut. Lachnospiraceae was identified as the species most important in developing fatty liver and insulin resistance.

At present, the intestinal microbiota is considered to constitute a "microbial organ": one that has pivotal roles in the body's metabolism as well as immune function. Therefore transplantation aims to restore gut functionality and re-establish a certain state of intestinal flora.

More information: References:

1. Le Roy T et al. Gut microbiota transplantation demonstrates its causal role in the development of type 2 diabetes and fatty liver. Abstract presented at the International Liver Congress 2012

2. Khoruts A and Sadowsky MJ, Therapeutic transplantation of the distal gut microbiota. Mucosal Immunology 2011;4:4-7

Provided by European Association for the Study of the Liver