LIVER

Plant sterols have a role in liver injury associated with parenteral nutrition

“Modifications in intravenous lipid emulsions used in parenteral nutrition might reduce the incidence and severity of liver injury and cholestasis in infants with intestinal failure who require prolonged parenteral nutrition,” says Ronald Sokol, corresponding author of a recent study investigating this issue.

Parenteral nutrition can be life-saving in patients who cannot tolerate enteral

feeding (particularly infants and young children), but it can sometimes lead to cholestatic liver damage known as parenteral nutrition-associated liver disease (PNALD). Sokol and colleagues used a mouse model to investigate this liver injury.

A previous study had demonstrated that changing the lipid source in the parenteral nutrition solution from a soy lipid to a fish-oil based lipid was able to reverse PNALD. The researchers hypothesized that plant sterols (components of the soy-oil based lipid emulsion used in parenteral nutrition) might be responsible for this effect. “This hypothesis was based on the demonstrated effect of stigmasterol (a plant sterol) in cultured hepatocytes of interfering with FXR signalling, which regulates expression of the major bile acid transport protein in the hepatocyte,” explains Sokol.

In the current study, the researchers investigated the effects of using different

lipid emulsions and oral antibiotics in their mouse model. “Removing all lipids from the parenteral nutrition solution ameliorated the cholestasis and liver injury,” reports Sokol. ‘Spiking’ a fish oil emulsion with stigmasterol replicated the liver injury, cholestasis and Kupffer cell activation observed in PNALD. Two processes seem to be involved in the pathogenesis of PNALD: intestinally absorbed lipopolysaccharides causing Kupffer cell activation in the liver, and the presence of plant sterols in the parenteral nutrition solution. “Our future work will focus on the effects of lipopolysaccharides and plant sterols on the biology of hepatocytes and the immune system and how these interact to cause cholestasis,” concludes Sokol.

Isobel Leake

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