# European Young Lipid Scientist Award: Coordinate Transcriptional Regulation of Lipid Homeostasis in the Gut-Liver Axis by Nuclear Hormone Receptor FXR

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Nuclear Receptors are gaining increasing importance in the lexicon of functional biology, since they represent a well characterized, powerful, and fast-track bridge between pharmacology and physiology. The focus of our studies is to elucidate the role and molecular mechanisms whereby lipid sensing nuclear receptor drive lipid homeostasis in hepato-biliary and gastro-intestinal systems. In details, we are deciphering the molecular genetic programs controlled by the bile acid receptor Farnesoid X Receptor (FXR). FXR is the intracellular ‘‘sensor’’ of bile acids, highly expressed in the enterohepatic system, where it regulates the expression of genes involved in the maintenance of cholesterol, bile acid and triglyceride homeostasis. In the liver, FXR up-regulates the expression of transporters and enzymes responsible for bile acid detoxification and secretion, thus being a suitable pharmacological target for the treatment of hepatic conditions such as cholestasis and cholelitiasis. Although the majority of researches focused on the role of the liver, experimental data point out to a direct role of the intestine in regulating bile acid and lipid metabolism. Indeed, bile acid homeostasis is a complex multi-organ effort which requires an integrated flux of information between liver and intestine. We will present the direct role of FXR in regulating the bile acid-induced endocrine signals in the gut-liver communication with relevance for the interprandial and postprandial lipid homeostasis. FXR is able to temper the phase, amplitude and frequency of a gene expression network, disposing the fine tuning of bile acid, cholesterol and triglyceride metabolism. In addition, FXR is involved in intestinal and hepatic fitness and in the cellular response to inflammatory and xenobiotic insults. The discovery of FXR pleiotropic actions, and the daily reports addressing new roles for FXR in pathophysiological conditions, set this moment as one of the most thrilling in the history of cholesterol and bile acid field.