The pathology of hepatic cirrhosis: analyzing cytokine signaling, hepatocytes, and collagen.

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Chronic cirrhosis takes the lives of approximately 41,000 individuals each year in the United States. This disease is a result of either chronic alcohol abuse, fatty liver, genetic disorders, and hepatitis. Liver disease leads to excessive fibro-genic scarring due to cytokine signaling, hepatocyte apoptosis, and replacement of collagen type III by collagen type I. The purpose of this study is to present a systematic review of the available evidence based on histological pathology slides and the literature surrounding Hepatic Cirrhosis. The research investigated is: to assess the role of the hepatocytes when a liver is cirrhotic, pathway of Hepatitis C, how/why fibrosis happens by analyzing cytokine signaling, hepatic cellule cells (HCS) activation, and to analyze the types of collagen affected. The research conducted was through an analysis of histological slides ranging from normal liver histology to cirrhotic hepatitis C pathology. The pathology slides of exhibited signs of cirrhosis indicated by multiple areas where parallel fields of collagen I fibers cut off nutrients from sinusoids to the surrounding hepatocytes. The fibrous areas are linked to portal tracts and therefore no nutrients can reach the hepatocytes. According to the literature, excessive cytokinin signal production alters fibroblasts to myofibroblasts, which then produce excessive amounts of linear Type I collagen. Cytokine signaling, hepatic cellulite cells (HCS) activation, and to analyze the types of collagen affected.

Materials and Methods
The materials used were two slides cut from Dr. Paul Edmonson from CellNetix of Hepatitis C liver slides in late stages of liver disease (Cirrhosis). Also my project collection included one normal liver slide and one cirrhotic liver slide from unknown etiology. The methods on analysis were performed using an ACCU-SCOPE 3000 compound light microscope with 100X-400X magnification.

Results
Between the slides i analyzed, i saw areas on constricted fibrous areas that cut off nutrients to the surrounding hepatocytes. The fibrous patterns characteristic produce connective tissue that fills up the perisinusoidal space and can interfere with the metabolic exchange between the hepatocytes and sinusoids (Mescher, 2013). The fibrous areas are linked to portal tracts and therefore no nutrients can reach the hepatocytes.

Healthy Liver Tissue

Cirrhosis of the Liver

(subin, 2012)

Cellular Mechanisms of hepatic injury due to hepatocyte apoptosis (Mali, Guicciardi, & Gores, 2010).

In normal everyday function when the liver has damage, they release a cytokine that activates Kupffer cells (= hepatic macrophages). If the individual has a chronic infection, then the Kupffer cells (which move freely in and out of the endothelium) send a cytokine signal to the HSCs. The areas that contain fibrils are called the perisinusoidal space (Space of Disse). They are lined by HCS which become activated by cytokine signaling from Kupffer cells. HCS normally function as Vitamin-A fat storing cells but when activated turn into myofibroblasts and migrate to the site of injury. These now "stellate cells" proliferate from being stimulated by platelet-derived growth factor (PDGF), tumor necrosis factor (TNF) is a potent stimulant of the change to a myofibroblastic phenotype. Contraction of the activated stellate cells is stimulated by endothelin-1 (ET-1). Deposition of extracellular matrix is stimulated by transforming growth factor-β (TGF-β). Chemotaxis of activated stellate cells to areas of injury, such as where hepatocytes have undergone apoptosis, is promoted by PDGF and monocyte chemoattractant protein-1 (MCP-1) (Kumar, Abbas, & Fausto, 2005).

Conclusion
Cirrhosis despite its etiology is a disease that many individuals suffer from. In recent research there has been a connection between cirrhosis and liver carcinoma. My future research will be trying to connect cirrhosis and liver carcinoma as well as looking at blood panels and blood smears of individuals with both cirrhosis and liver carcinoma to try to make a connection with a far less evasive technique than a biopsy.

References

Future Research
Cirrhosis due to hepatitis C is a disease where many individuals suffer from. In recent research there has been a connection between cirrhosis and liver carcinoma. My future research will be trying to connect cirrhosis and liver carcinoma as well as looking at blood panels and blood smears of individuals with both cirrhosis and liver carcinoma to try to make a connection with a far less invasive technique than a biopsy.

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