Indian Institute of Science

Centre for BioSystems Science and Engineering

BSSE Seminar

13th September 2019, 11:00 AM, Friday, MRDG Seminar Hall, 1st floor, Biological Sciences Building

Understanding How Therapeutic Plasma Exchange is Beneficial in Patients with Acute Liver Failure / Acute on Chronic Liver Failure

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ABOUT THE SPEAKER

Dr. C.E. Eapen MD, DNB, DM, MRCP is Professor and Head of the Department of Hepatology at Christian Medical College, Vellore. He got his M.B.B.S, M.D. (in General Medicine) and D.M. (in Gastroenterology) from CMC, Vellore. He has worked in the liver units of hospitals, both in the U.K and Australia. He has published extensively on Viral Hepatitis, Liver disorders in Pregnancy and Chronic liver disease. He has several honours and awards to his credit including the Indian Society of Gastroenterology – 'Young Clinician Award' in 2001 and the Sheila Sherlock Fellowship Award by the European Association for Study of Liver in the year 2004, for the study of pathogenesis of non-cirrhotic intrahepatic portal hypertension. He has also served as the Medical Superintendent of Christian Medical College, Vellore between 2012 and 2017.

ABSTRACT

Thrombotic Thrombocytopenic Purpura (TTP) is a serious microangiopathy characterized by low platelets, high levels of plasma Von Willebrand factor (VWF) and deficiency of VWF cleaving protease (called ADAMTS13). Therapeutic plasma exchange, by removing ultra-large VWF multimers and by supplementing ADAMTS13, dramatically improves survival in patients with TTP. Therapeutic plasma exchange is recently being employed to treat patients with liver failure. Our research team has been focusing on the hypothesis that plasma exchange is beneficial in patients with acute liver failure and with acute on chronic liver failure, by removing large molecules like VWF. It is possible macromolecules (like VWF) block / clog the microcirculation in the liver and kidney in these patients. VWF is the largest sized protein circulating in human plasma. Circulating VWF is seen as dimers, high molecular weight multimers and ultra-large multimers (500 to 20,000 kDa in size). Currently, we do not have an accurate method to assay plasma VWF as per its molecular weight / size. The VWF assays commonly used are antigen assay as well as activity assays (collagen binding activity and Ristocetin co-factor assay). It is postulated that collagen binding activity of VWF reflects the presence of high molecular weight VWF multimers. VWF is an endothelial protein. It plays a crucial role in hemostasis and inherited deficiency of VWF is termed Von Willebrand disease – affected individuals present with recurrent bleeding episodes throughout life. Recently, high plasma VWF levels have been shown to predict survival in patients with liver disease. In patients with cirrhosis, plasma VWF levels are 2-fold elevated and predict survival over a 2-year time period. In contrast, we have documented that in patients with acute liver failure and with acute on chronic liver failure, plasma VWF levels are (5-7) fold elevated and predict survival over 1 week.

Our current attention in this topic of research are:

1) To find ways to assay macromolecules like VWF in circulation in patients with liver failure.

2) To look for these macromolecules in the filtrate removed from these patients, by therapeutic plasma exchange.