The Effect of 17beta Estradiol on Glut1 Expression In The Right Ventricle Of Rats With Severe Pulmonary Hypertension

Vannessa N. Taylor[1], , Tim Lahm[2], Irina Petrache[2], Anthony Cucci[2], Marjorie E. Albrecht[2], Mary Beth Brown[3] , Tsungai J. Chingombe[3], Richard Gaidoo[3]

Bridges to Baccalaureate Program[1], Ivy Tech Community College[1], Pulmonary and Critical Care[2], Department of Medicine[2], Indiana University School of Medicine[2] , Indiana University School of Medicine Department of Physical Therapy, Indiana University School of Health and Rehabilitation Sciences[3]

Pulmonary hypertension (PH) is a devastating disease that is characterized by a rise of blood pressure in the blood vessels of the lung. This puts significant strain on the right ventricle (RV) of the heart. If untreated, PH can lead to right heart failure and death. One of the hallmarks of right heart failure in PH is the development of cytoplasmic glycolysis in the cardiac muscle cells (myocytes) of the RV. This describes a compensatory process where glucose uptake into the mitochondria is inhibited, thereby leading to its conversion to lactate in the cytoplasm. Importantly, cytoplasmic glycolysis is associated with an increase in a protein called glucose transporter 1 (Glut 1). 17beta estradiol (E2) can ameliorate experimental PH, but its effects on RV glut 1 expression are not yet known. The aim of this project is to determine the RV expression of Glut 1 in a rat model of severe PH, and to investigate whether this is decreased by E2 treatment. We assessed Glut 1 via immunofluorescence staining in cryosections of RV tissue from control rats, untreated PH rats, and E2-treated PH rats. Cell nuclei were stained with DAPI (Diamidinophenyl-indole), cell membranes were stained with WGA (wheat germ agglutinin), and Glut1 was stained with a Glut1 antibody conjugated to a red immunofluorescent dye. Nuclei are stained blue; cell membranes are stained green. Glut 1 quantification occurs via visual inspection and determination of red staining via specific software (Metamorph). We were able to successfully establish the protocol for Glut1 staining. In pilot experiments, there was little Glut1 staining present in normal RVs, but we detected up-regulation of Glut 1 in the RV of animals with PH. Whether this is affected by E2 is currently under investigation.

Mentor: Tim Lahm, Pulmonary and Critical Care, Department of Medicine, Indiana University School of Medicine