

## 2016 Research Week Proposal Instructions and Template Posters and Presentations

### **Research Proposal Instructions**

Write a concise summary of the key points of your research. This proposal needs to represent your research well as it could be used as part of the judging criteria during the event. Your proposal should contain a strong literature review or introduction to your research topic, hypothesis or research questions, methods, results, and conclusions. You should also include possible implications of your research and future work you see connected with your findings. Your abstract should be a single paragraph double-spaced. Your abstract should be *between 250 and 500 words*. The second paragraph should address how your research is informed by a Christian worldview. **In 250-500 words**, describe how your Christian worldview has informed your research design and communication of your results.

### **Proposal**

**Title** – Elucidating the Molecular Mechanisms behind the Progression from Hepatic Steatosis to Hepatocellular Carcinoma

**Program of Study** – Biomedical Sciences

**Presentation Type** – PowerPoint

**Mentor(s) and Mentor Email** – Dr. Ben Kalu ([bnkalu@liberty.edu](mailto:bnkalu@liberty.edu)); Dr. Mark Blais ([mblais@liberty.edu](mailto:mblais@liberty.edu)); Dr. Beate Straub ([Beate.straub@med.uni-heidelberg.de](mailto:Beate.straub@med.uni-heidelberg.de));

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**Category** – Experimental (Applied)

**Abstract:** This presentation will focus on my Fulbright research with Dr. Beate Straub of Heidelberg University in Germany. The research focuses on the molecular changes between common hepatic steatosis (fat accumulation in the liver) and hepatocellular carcinoma (a rare, aggressive tumor). Rates of both hepatic steatosis and hepatocellular carcinoma are on the rise in the world; it is imperative to gain a greater understanding of this disease process before it becomes even more widespread. While some insights have been made into the differences in these conditions, a comprehensive view of the metabolites, lipids, and proteins associated with these pathologic changes has not been accomplished. In order to better understand this disease process, Dr. Straub and I will use liver cell co-cultures, human tissue specimens, and murine subjects looking for minute changes in the chemical messengers, protein production, and gene

expression levels. Samples will be taken from these three groups in four different conditions: 1) healthy, control group; 2) steatotic liver tissue; 3) steatohepatitis tissue; and 4) hepatocellular carcinoma tissue. To detect these changes we will use electron microscopy, immunofluorescent microscope, as well as MALDI-MS (Matrix Assisted Laser Desorption/Ionization Mass Spectroscopy), all of which are essential to track the molecular changes that occur during the progression to hepatocellular carcinoma. Lipids and proteins of interest can be stained with fluorescent dyes, allowing for visualization of how they localize within the cells. Additionally, the MALDI-MS can be used to identify unknown lipids and to calculate the change between healthy and diseased cells in the three different experimental conditions.

**Christian worldview integration:** Ever since my father died, I have been on a mission to cure this disease process. He worked hard to be a good father, husband, and member of the church, never putting himself before anyone. As Christians, we are reminded again and again to honor our parents and God with our lives. I know that God's plan for me was to see what this disease could do to those who did not deserve it, those who should never have endured such an agonizing disease. Even in his suffering, dad was the most polite and thankful patient the hospital staff had ever encountered. His doctors constantly instructed all of his clinical staff that if there was any patient who did not deserve this disease, it was him. And, of course, as a Christian I know that God has given everyone the exact skill set or experience required to fulfill His plan for our lives. In my case, he has given me experiences to fuel my desire to help those afflicted by liver maladies and the tools to do so. In the last year, He has provided research opportunities, entrance to medical school, professional contacts and opportunities, and Liberty faculty who are all too happy to help me in this quest. Though I may feel the hole that my dad's

passing left in my life, I know that God has a purpose for all things and I believe that this is the direction He has planned for me. "I can do all things through Christ, who strengthens me."