

Research Week Abstract

Title – The G13D KRAS mutation's contribution to structural and functional changes of the endoplasmic reticulum and mitochondria in colorectal cancer cells.

Program of Study – Biomedical Studies, Special Programs in Biology

Presentation Type –Physical Poster

Subtype –Basic

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Abstract: *KRAS* is a gene that codes for the production of the KRAS GTPase, an important protein responsible for transducing signals downstream of G protein-coupled receptors and tyrosine kinases to control many pathways responsible for a cell's fate. The importance of the KRAS GTPase has been highlighted by the discovery that activating mutations to the gene that encodes this protein are found in up to 40% of colorectal cancer, sparking further research into its role in oncogenic transformation. Because many KRAS functions are regulated by Ca^{2+} levels, the interaction between fluctuating Ca^{2+} levels and mutated KRAS in colorectal cancer have been researched by comparing isogenic cell lines that differ in the inclusion of an oncogenic *KRAS* allele, namely $KRAS^{G13D}$. By comparing the differences in these mutated cell lines (HCT 116 cells), researchers were able to gain results that suggest reduced store-operated calcium entry (SOCE) is a feature of colorectal cancer cells containing mutated KRAS. While this discovery is critical to the understanding of oncogenic KRAS, the mechanism that mutated KRAS employs to alter the structure and function of primary organelles, specifically the endoplasmic reticulum (ER) and mitochondria, is largely unknown. By comparing the G13D

mutation in KRAS in both HCT 116 G13D/- and +/- cell lines, we hope to gain a better understanding of this mechanism by observing the physical changes that lead to a reduction in Ca⁺ release from the ER and subsequent mitochondrial Ca⁺ uptake.

Christian worldview integration: As a Christian, I believe that everything you do should glorify God, and point to Christ. This means that I may be growing cell lines in a lab, but the manner that I go about conducting my research, treating others around me, and explaining my results should reflect my Christian worldview. When conducting research, I have a responsibility to make sure that my actions are completely ethical and do not give others a reason to question the morality of what I am doing. I believe that this is essential for Christian researchers, even if it means asking difficult questions to the people we work for. Also, the manner that I treat others that are researching alongside me should point to Christ, who is the ultimate example of what it looks like to love one another. In addition to this, the results of my research should be presented accurately and honestly, so that nothing in them causes others to question the integrity of my work. This includes being upfront with the successes and failures of a research project, along with giving proper credit to others that influenced the research. Not only has my research on colorectal cancer cells allowed me to grow in all of these areas, it also has been teaching me about using the career path that God has placed me on to influence others for good. Whether it is continuing with cancer research, or working as a practicing physician, I believe that it is important to take advantage of the area God has placed you to draw others to Him.