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# Pulsed Electric Field (PEF) Selectivity of Mammalian Cells

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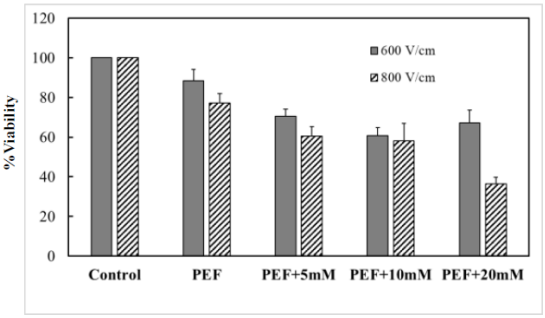
## Abstract

The focus of this research project is to investigate the reason why cancerous cells are harder to target via clinically used pulsed electric field modality when compared to their non-cancerous counterparts. The central hypothesis of this project is that cancerous cells have a distinct membrane reorganization event that is controlled by the cholesterol dynamics on the lipid membrane bilayer, when they are exposed to a pulsed electric field. Answering this question is clinically relevant in cases where the traditional gold-standards of cancer therapeutics fail (for example, cases with perineural invasion and/or tumors in critical areas such as the brain) and in which alternative modalities such as the pulsed electric field are highly effective. Current progress in the Verbridge lab has shown that cellular signaling pathways and phenotypic changes can be brought about by altering the membrane dynamics through the depletion of cholesterol in the lipid bilayer. This depletion of cholesterol, results in a lower viability of malignant cells when compared to their noncancerous counterparts under similar electric field conditions, however the cellular and molecular signaling pathways by which pulsed electric fields cause cell death, remain unclear.




Decreased viability of malignant triple (-) breast cancer cells MDA.MB.231 when exposed to IRE after cholesterol depletion with MβCD

## Biography

Robert Bielitz is currently a Master of Engineering student (M. Eng.) in the Materials Science and Engineering department at Virginia Tech. Robert graduated magna cum laude with a B.S. degree in Materials Science and Engineering from Virginia Tech in 2018, in addition to a B.S. degree in Molecular Biology and Biotechnology that he received from California State University, Fullerton in 2012. He is expected to graduate in May 2019 thanks in part to his enrollment in the accelerated masters program, which he began in the Fall of 2018 during his senior year at Virginia Tech. Robert's research has been through the Laboratory of Integrative Tumor Ecology (LITE) in the department of Biomedical Engineering and Mechanics. Robert's general research area has been to better understand the biological process by which Irreversible Electroporation (IRE) triggers cellular death