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Isha completed her Bachelor of Science with Honors in Physiology at the University of Alberta in 2019. Shortly after, she began her PhD with Dr. Maria Ioannou in the Department of Physiology at the University of Alberta in 2019.

Throughout her PhD, Isha worked to uncover the mechanisms of neuronal lipid release during oxidative stress. During oxidative stress neurons release lipids that are internalized by glia. The process is protective as failure to transfer lipids to glia results in neurodegeneration. While the mechanisms of lipid transport from neurons to glia are not fully understood, there is a clear role for apolipoprotein E (ApoE). ApoE is a lipid-transport protein found on lipoprotein particles and this protein “escorts” fats safely through the brain. There are three major ApoE variants: E2, E3 and E4. ApoE4 is a major risk factor for Alzheimer’s disease, and therefore, most research has been directed towards understanding its detrimental effects. ApoE2 and a rare variant ApoE3 Christchurch (ApoE3Ch) confer resistance to disease, yet little is known regarding how these variants protect the brain.

Recently, the article *Protective ApoE variants support neuronal function by effluxing oxidized phospholipids* published by Dr. Ioannou’s team, led by Isha uncovered the difference between ApoE4 and the team of ApoE2 and ApoE3Ch. They discovered that ApoE2 and ApoE3Ch protect neurons by extracting oxidized lipids, those damaged by oxidative stress. They do this via a transporter called ABCA7 on the neuronal surface. By reducing the oxidized lipid burden, ApoE2 and ApoE3Ch restore defects in neuronal activity caused by excitotoxicity. Conversely, ApoE4 causes these toxic lipids to accumulate within neurons, leading to cell death by ferroptosis.

This work sets the stage for future research focusing on the protective effects of ApoE and how they can be leveraged to protect the brain.