GLUT1 is a glucose transporter that is widely expressed in many different types of cells. GLUT1 is over-expressed in cancerous cells, making it a subject of importance in the search for cancer treatments. The mechanism of GLUT1 may also be relevant to diabetes – a disease characterized by deficient glucose. We believe that by better understanding GLUT1 we can improve treatments for both of these diseases.

My project involved a new procedure called cytoskeletal fractionation. I cultured cells on 10-centimeter plates in an incubator until they were confluent, and then I pre-treated the plates with curcumin, berberine, hydroxylamine, antibodies, or glucose deprivation. Then, I would separate the plate into two fractions using a weak and strong detergent. Our rationale was that the GLUT1 sitting on the cell surface – activated GLUT1 - would be collected in the first fraction, and internal - inactivated – GLUT1 would be collected in the second fraction. To determine the amount of GLUT1 in each fraction, I prepared a protein gel. By running an electrical current through the gel, I separated the proteins by size, with the smaller proteins travelling farther than the larger proteins. Knowing the mass of GLUT1, I was able to quantify the amount of GLUT1 in each fraction via pixel amounts in our protein gel software.

I had two main objectives this summer. The first was to observe the effects of different pre-treatments on the distribution of GLUT1 in my two fractions. The second was to determine the location of the surface GLUT1 in my two fractions. Over the past 10 weeks, I have amassed a considerable amount of data concerning the first objective. I have determined that, as a rule, the majority of GLUT1 lies in the second, “harsher” fraction. The only time this changed was when I deprived cells of glucose. In this case I saw a sizeable shift from the second fraction to the first fraction. This may indicate that GLUT1 is being moved to the surface as it activated. Unfortunately, I was unable to determine if the surface GLUT1 is contained in my first fraction, so we cannot draw any definite conclusions at this time. One objective for future research in this area will be to determine the location of surface GLUT1 in the two fractions.

Summer research has been an illuminating and fruitful experience for me. Heading into my senior year, I had a dream of a career in research, but I didn’t have a handle on what research entailed or what skills it required. The careful mentorship of Professors Louters, Arnoys and Looyenga has cultivated an appreciation of research in me that I could not have found anywhere else. Together with a lively set of fellow researchers, I’ve encountered an abundantly collaborative and stimulating research environment. Calvin College has a truly special summer research program, and I am immensely thankful for my experience as a summer science fellow. Heading into senior year, I am much more confident and prepared to pursue research as a career.