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The Synthesis of a Cyclic Peptide Library for the Discovery of Sickle-Cell Hemoglobin Ligands

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THE SYNTHESIS OF A CYCLIC PEPTIDE LIBRARY FOR THE DISCOVERY OF SICKLE-CELL HEMOGLOBIN LIGANDS

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Sickle Cell Disease is a genetically inherited blood disorder that leads to the aggregation of hemoglobin, the oxygen transport protein in the body. This aggregation leads to the formation of the characteristic sickle shape of the red blood cells, which is the cause of the symptoms of the disease. There are currently few treatments for this disorder, with the only cure being a risky bone marrow transplant. My research is focused on trying to find compounds that bind to Sickle Cell hemoglobin in such a way that this aggregation is prevented. One method is to use peptides that bind at the interface of the aggregated hemoglobin. Unfortunately, the use of linear peptides suffers from many drawbacks, including low cell permeability and poor stability in the cellular environment. To circumvent these problems, my work focuses on the use of cyclic peptides to inhibit hemoglobin aggregation. In order to discover cyclic peptides that bind to Sickle Cell hemoglobin, I am synthesizing a focused, cyclic peptide library of 160,000 different peptide sequences. After synthesizing the library, an assay will be performed to determine if any of the constructed cyclic peptides bind to hemoglobin. These ligands may represent the next generation of therapeutics for this debilitating disorder.