A Novel Peptide Inhibitor of the Polymerization of Deoxygenated Sickle Cell Hemoglobin

Timothy Broederdorf
*Illinois Wesleyan University*

Brian Brennan, Faculty Advisor
*Illinois Wesleyan University*

Follow this and additional works at: [https://digitalcommons.iwu.edu/jwprc](https://digitalcommons.iwu.edu/jwprc)

Part of the Chemistry Commons

[https://digitalcommons.iwu.edu/jwprc/2015/posters/5](https://digitalcommons.iwu.edu/jwprc/2015/posters/5)

This Event is protected by copyright and/or related rights. It has been brought to you by Digital Commons @ IWU with permission from the rights-holder(s). You are free to use this material in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself. This material has been accepted for inclusion by faculty at Illinois Wesleyan University. For more information, please contact digitalcommons@iwu.edu.

©Copyright is owned by the author of this document.
A Novel Peptide Inhibitor of the Polymerization of Deoxygenated Sickle Cell Hemoglobin

Timothy Broederdorf, Dr. Brian Brennan; Illinois Wesleyan University, Department of Chemistry

Abstract
Sickle cell disease is a genetic disorder that causes red blood cells to form sickle shapes. These sickle-shaped red blood cells cannot pass through small blood vessels, which in turn causes tissue damage and cell death. The disease is caused by the exchange of a hydrophilic amino acid for a hydrophobic residue. This exchange enables deoxygenated hemoglobin molecules to interact with each other. This interaction causes the formation of long polymeric chains of hemoglobin that cause the red blood cell to be distorted into the sickle shape. Our group focuses on discovering peptides that can inhibit the polymerization of sickle cell hemoglobin. We previously identified a peptide, ZSF-39, that shows promise in preventing polymerization. My research involves testing the effectiveness of ZSF-39 in delaying the polymerization time of sickle cell hemoglobin at varying concentrations. This was done with UV-Vis assays. The results show that ZSF-39 can delay polymerization and that the length of the delay increases as concentration increases.

Incidences of Disease
As many as 25% of the people in West and Central Africa have sickle-cell trait and 1-2% of all babies are born with a form of the disease. The disease frequency overlaps with malaria. This is because sickle-cell trait provides a defense against malaria.

Biochemical Cause of Sickle Cell Disease
The new hydrophobic residue interacts with an already existing hydrophobic pocket on the deoxygenated hemoglobin molecule. This interaction forms polymeric strands that distort the cell shape, thus leading to many of the symptoms.

Present Study
Perform UV-Vis assays with ZSF-39 to determine if ZSF-39 can inhibit polymerization and to determine the degree of this inhibition. Also to determine the effect the concentration of ZSF-39 has on the degree of inhibition.