

Abstract Submitted
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Assessing Chaos in Sickle Cell Anemia Crises WESLEY HARRIS, FRANCOIS LE FLOCH, Massachusetts Institute of Technology — Recent developments in sickle cell research and blood flow modeling allow for new interpretations of the sickle cell crises. With an appropriate set of theoretical and empirical equations describing the dynamics of the red cells in their environment, and the response of the capillaries to major changes in the rheology, a complete mathematical system has been derived. This system of equations is believed to be of major importance to provide new and significant insight into the causes of the disease and related crises. With simulations, it has been proven that the system transition from a periodic solution to a chaotic one, which illustrates the onset of crises from a regular blood flow synchronized with the heart beat. Moreover, the analysis of the effects of various physiological parameters exposes the potential to control chaotic solutions, which, in turn, could lead to the creation of new and more effective treatments for sickle cell anemia. .

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