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Computational Fluid Dynamics in Prognosis of Autoimmune Disorders

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Abstract—*In various autoimmune disorders, CICs (Circulating Immune Complexes) are formed as a result of autoantibody response to ubiquitous soluble cellular antigens of nuclear or cytoplasmic origin. The deposits of such complexes in tissues and organs cause a variety of vasculitis, inflammatory and immune disorders such as type III hypersensitivity disorders, Rheumatoid Arthritis and SLE(systemic lupus erythematosus). Detection of these complexes is done using a variety of techniques such as Raji Cell Assay, Single Radial Immunodiffusion, etc .Currently majority of these detection techniques are invasive methods which often are capable of detection at very late stages of disease progression. A major setback to the therapeutic strategies which are incorporated for treatment of such autoimmune disorders is that the immunosuppressive agents such as non-steroidal anti-inflammatory drugs (NSAIDs), and steroids such as Prednisone are broad spectrum in nature and can cause chronic suppression and concurrent infection when used for a prolonged period. CICs being insoluble substances should influence fluid dynamics of the blood flow and hence computational fluid dynamics can be used for detecting disease progression.*

Early detection and evaluation of disease prognosis will help in the implementation of better therapeutics strategies.

In the present study, we study the use of computational fluid dynamics for disease progression and evaluation of vascular and cardiac complications at early stages of the disease.