Abstract Submitted
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Wall Shear Stress Restoration in Dialysis Patients Venous Stenosis: Elucidation via 3D CFD and Shape Optimization[1] S. M. JAVID MAHMOUDZADEH AKHERAT, PhD, KEVIN CASSEL, MARY HAMMES, Professor, MICHAEL BOGHOSIAN, PhD, ILLINOIS INSTITUTE OF TECHNOLOGY TEAM, UNIVERSITY OF CHICAGO TEAM — Venous stenosis developed after the growth of excessive neointimal hyperplasia (NH) in chronic dialysis treatment is a major cause of mortality in renal failure patients. It has been hypothesized that the low wall shear stress (WSS) triggers an adaptive response in patients' venous system that through the growth of neointimal hyperplastic lesions restores WSS and transmural pressure, which also regulates the blood flow rate back to physiologically acceptable values which is violated by dialysis treatment. A strong coupling of three-dimensional CFD and shape optimization analyses were exploited to elucidate and forecast this adaptive response which correlates very well topographically with patient-specific clinical data. Based on the framework developed, a medical protocol is suggested to predict and prevent dialysis treatment failure in clinical practice.

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