

IN VITRO STUDY ON THE VIABILITY FOR USE OF 3D PRINTED VALVES FOR TREATMENT OF CHRONIC VENOUS INSUFFICIENCY

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Chronic venous insufficiency (CVI) is a venous disease caused by the failure to reduce venous pressure during exercise as a result of incompetent vein valves, a condition which is estimated to affect in the range of 2.5 million to over 6 million Americans, and is estimated to cause over \$1 billion annually in the United States alone for medical treatment and diagnosis. The symptoms from the disease can range from a minor case in which blood pools in the feet, causing swelling and discomfort, to more severe cases in which include venous ulcers; potentially leading to disability for patients. Treatment options for patients with less severe cases include compression sleeves for the affected areas, exercise, medication, and some minimally invasive, outpatient procedures.

Unfortunately, for patients in which these treatment methods are not effective include more aggressive surgeries to attempt to repair, replace, or transplant new valves to the affected area; however, these procedures can be technically difficult to perform and are not always effective. Another option for treatment of CVI that has been improving over recent years is the manufacturing of prosthetic vein valves for implantation into individuals; one of which is using 3-D printing technology to produce bio-compatible valves composed of a PEGDA pre-polymer solution. These valves are being tested for the capability to produce desirable time and pressure related results when tested in a Mock Circulatory System (MCS); which simulates the clinically measured pressure conditions measured in the human venous system.

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