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In vivo quantification of intraventricular flow during left ventricular assist device support VI VU, KIN WONG, Department of Bioengineering, San Diego State University, JUAN DEL ALAMO, PABLO M.L. AGUILO, Department of Mechanical and Aerospace Engineering, University of California San Diego, KAREN MAY-NEWMAN, Department of Bioengineering, San Diego State University, DEPARTMENT OF BIOENGINEERING, SAN DIEGO STATE UNIVERSITY COLLABORATION, DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING, UNIVERSITY OF CALIFORNIA SAN DIEGO COLLABORATION, MECHANICAL ASSIST DEVICE PROGRAM, SHARP MEMORIAL HOSPITAL COLLABORATION — Left ventricular assist devices (LVADs) are mechanical pumps that are surgically connected to the left ventricle (LV) and aorta to increase aortic flow and end-organ perfusion. Clinical studies have demonstrated that LVADs improve patient health and quality of life and significantly reduce the mortality of cardiac failure. However, In the presence of left ventricular assisted devices (LVAD), abnormal flow patterns and stagnation regions are often linked to thrombosis. The aim of our study is to evaluate the flow patterns in the left ventricle of the LVAD-assisted heart, with a focus on alterations in vortex development and blood stasis. To this aim, we applied color Doppler echocardiography to measure 2D, time resolved velocity fields in patients before and after implantation of LVADs. In agreement with our previous in vitro studies (Wong et al, Journal of Biomechanics 47, 2014), LVAD implantation resulted in decreased flow velocities and increased blood residence time near the outflow tract. The variation of residence time changes with LVAD operational speed was characterized for each patient.

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