

Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Integrating bio-prosthetic valves in the Fontan operation - Novel treatment to control retrograde flow in caval veins¹ MARIJA VUKICEVIC, TIMOTHY CONOVER, JIAN ZHOU, Clemson University, TAIN-YEN HSIA, Great Ormond Street Hospital, London, UK, RICHARD FIGLIOLA, Clemson University — For a child born with only one functional heart ventricle, the sequence of palliative surgeries typically culminates in the Fontan operation. This procedure is usually successful initially, but leads to later complications, for reasons not fully understood. Examples are respiratory-dependent retrograde flows in the caval and hepatic veins, and increased pulmonary vascular resistance (PVR), hypothesized to be responsible for elevated pressure in the liver and disease of the liver and intestines. Here we study the parameters responsible for retrograde flows in the inferior vena cava (IVC) and hepatic vein (HV), and investigate two novel interventions to control retrograde flow: implanting either a Medtronic Contegra valved conduit or an Edwards lifescience pericardial aortic valve in the IVC or HV. We performed the experiments in a multi-scale, patient specific mock circuit, with normal and elevated PVR, towards the optimization of the Fontan circulation. The results show that both valves can significantly reduce retrograde flows in the veins, suggesting potential advantages in the treatment of the patients with congenital heart diseases.

¹Fondation Leducq

Marija Vukicevic
Clemson University

Date submitted: 03 Aug 2012

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