AbstractID: 1284 Title: Dye Dilution Angiographic Measurement of Flow Modification in Aneurysm Models with Asymmetric Stents

Analysis of flow modification by devices may guide future interventional treatments of aneurysms. We have developed techniques to parameterize flow modification and have used these techniques to evaluate a new device, an asymmetric stent created by micro-welding a low-porosity mesh patch onto a commercial stent. The low porosity mesh is positioned over the aneurysm orifice, and the high porosity stent holds the low-porosity mesh in place while minimizing the probability of jailing important small vessels (perforators). With this asymmetric stent, the goal is to reduce blood flow in the aneurysm and initiate thrombogenesis. Because radiographic contrast media due to its higher density may give inaccurate results in x-ray angiographic flow evaluation under low flow conditions, optical dye dilution experiments were performed where the density of the dyed carrier fluid was matched with that of simulated blood. Four phantoms (one untreated and three treated with different asymmetric stents) were compared. Morphologies of the aneurysm models and flow parameters simulated physiological conditions. We calculated time-density curves from the aneurysm region and then calculated the peak value (Pk) and washout rate ($1/\tau$) using curve fitting. Stents with low-porosity mesh patches reduced Pk and $1/\tau$ respectively down to 23% and 7% of the untreated case. Flow in the aneurysm was substantially reduced by asymmetric stents, suggesting a promising future for such stents in the endovascular treatment of aneurysms. (Partially supported by NIH Grants #R01NS38746 and R01EB02873, an equipment grant from Toshiba Corp., and stents from Guidant Corp.)