E-017 METHOD OF INTRA-ARTERIAL ADMINISTRATION IN A TRANSIENT MCAO RAT MODEL TO MIMIC THE TREATMENT OF THE HUMAN THROMBECTOMY PATIENT

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Endovascular thrombectomy is routinely performed in patients undergoing a large vessel occlusion. This process not only allows for the removal of a blood clot but also for the selective delivery of potential therapeutics directly to the site of injury. The intra-arterial (IA) route of drug administration in the mouse was developed to bridge the gap between animal stroke treatments and clinical stroke therapy. We have previously shown this delivery method targets the site of injury while blunting systemic effects that have proven problematic with intraperitoneal routes. Here, we adapted the IA method for use in rats, combining it with a clinically relevant large vessel occlusion stroke model (MCAO). Our goal was to characterize variances in the model in order to optimize potential therapeutic delivery methods to the ipsilaterally affected hemisphere. Male and female Sprague-Dawley rats (4 months of age) were subjected to placement of micro-angio tubing at the bifurcation of the common carotid artery (CCA), with delivery through the internal carotid artery (ICA). We then determined the optimal infusion rate and volume using injection of India ink and evaluation of vascular distribution within the brain and the liver. Importantly, we found the infusion rate and volume varied depending on sex and body weight. India ink was selectively delivered to the ipsilateral side of the brain in males (370–460 g) at 4 µl/min with a max volume of 25 µl and in females (250–300 g) at 2.5 µl/min with a max volume of 25 µl. Following these guidelines, no ink was observed in the liver of these animals, indicating reduced systemic circulation of administered compounds. We then performed a 5-hour transient MCAO, on male and female Sprague-Dawley rats (4 months of age), to mimic human stroke, since 5 hours is the average time from the clinical presentation of stroke to the thrombectomy procedure. A silicone coated monofilament was advanced until resistance was felt, occluding the MCA territory. At the 5 hour time point, we removed the monofilament and inserted the micoangio tubing at the same entry point on the bifurcation of the CCA. We performed variant injections using different volumes and rates, measuring delivery of dye (India Ink) and rate of induced subarachnoid hemorrhage. A rate of 4 ul/min with a max volume of 25 ul was optimal in males, and a rate of 2.5 ul/min with a max volume of 25 ul was optimal in females. The results showed that, even with a large vessel occlusion, and removal of the monofilament (recanalization), the IA injection using these sex-specific rates and volumes resulted in appropriate limited dye delivery without ruptured subarachnoid hemorrhage. This IA method is ideally suited for combination with the MCAO stroke model and mirrors the human patient undergoing an endovascular thrombectomy. This model provides an investigative opportunity to test neuroprotective drugs and other pharmacotherapies.

Disclosures S. Goodwin: None. **J. Roberts:** None. **K. Pennypacker:** None. **J. Fraser:** None.

E-018 A NOVEL 8FR ASPIRATION CATHETER SIGNIFICANTLY INCREASES THE FIRST PASS EFFECT IN COMPARISON WITH INDUSTRY STANDARD 6FR DEVICES IN AN *IN-VITRO* HUMAN VASCULATURE MODEL

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Introduction/Purpose Achieving complete reperfusion from a single mechanical thrombectomy attempt, termed First Pass Effect (FPE), is associated with significantly improved outcomes. Increasing the lumen of aspiration catheters to 6Fr has previously been shown to increase the reperfusion rates in comparison to smaller lumen catheters. We evaluated the performance of a novel large bore (0.088'' ID) 8Fr aspiration catheter (Millipede 088, Perfuze Ltd.) and compared its performance against current industry standard 6Fr aspiration catheters (ACE68, Penumbra and SOFIA Plus, Microvention) in an *in-vitro* human vasculature model.

Methods Following National University of Ireland Research Ethics committee approval human whole blood and platelet donations were obtained from the Irish Blood Transfusion Service. Three clot analogue phenotypes representative of clots retrieved from patients were created; Red Blood Cell-Rich, Mixed and Fibrin/Platelet-Rich. Histopathological analysis was performed using Martius Scarlet Blue (MSB) staining to confirm clot composition. The *in-vitro* model comprised a peristaltic pump, aortic arch and circle of Willis. Flow rates and pressure were controlled to replicate *in-vivo* conditions. Clot analogues of each phenotype were inserted into the ICA and lodged under pulsatile flow. Clot volume was optimized to mimic the clinical scenario; 10 mm clots reliably lead to a Distal M1+MCA Bifurcation Occlusion and 20 mm clots reliably lead to an ICA-T + Proximal M1 occlusion covering both the Posterior Communicating Artery and Anterior Cerebral Artery. Five replicates of each test were performed. Endpoints were FPE and Second Pass Reperfusion Success (>90% Retrieved).

Results Histological composition was confirmed as RBC-Rich (RBCs:92.9%, WBCs:0.1%, Fibrin/Platelets:7.0%), Mixed (RBCs:79.7%, WBCs:0.3%, Fibrin/Platelets:20.0%) and Fibrin/Platelet-Rich (RBCs:51.8%, WBCs:0.3%, Fibrin/Platelets:47.9%). The 8Fr (Millipede 088) catheter performed better for each clot phenotype and in both occlusion locations (ICA-T & M1) compared to the 6Fr (0.068'' & 0.070'' ID) devices. In 10 mm M1+Bifurcation occlusions the 8Fr catheter achieved 100% FPE compared to an average of 40% in 6Fr devices ($p>0.001$*). In longer 20 mm ICA-T+Proximal M1 occlusions the Millipede 088 achieved 100% removal success within two passes in each clot phenotype compared to an average of 27% in the 6Fr devices ($p>0.001$*).