Assessment of Distal Penetration, Radiopacity, and Biological Safety Response of NeoCast, a Unique Solvent-Free, Non-adhesive Embolic Material

[1]Chander Sadasivan, [1]David J. Fiorella, [2]Adam S. Arthur, [3]Quynh P. Pham, [3]Jeffrey V. Groom II

[1]Neurosugery, Stony Brook University Medical Center, Stony Brook, NY; [2]Semmes Murphy Clinic, Memphis, TN; [3]Arsenal Medical, Inc., Waltham, MA

BACKGROUND

- NeoCast™ is an *in situ* curing, solvent-free, non-adhesive, and shear-responsive embolic
- NeoCast is designed for complete casting and occlusion at the level of the microvasculature
- Objective: Evaluate embolization performance and biological safety response of NeoCast *in vivo*

METHODS

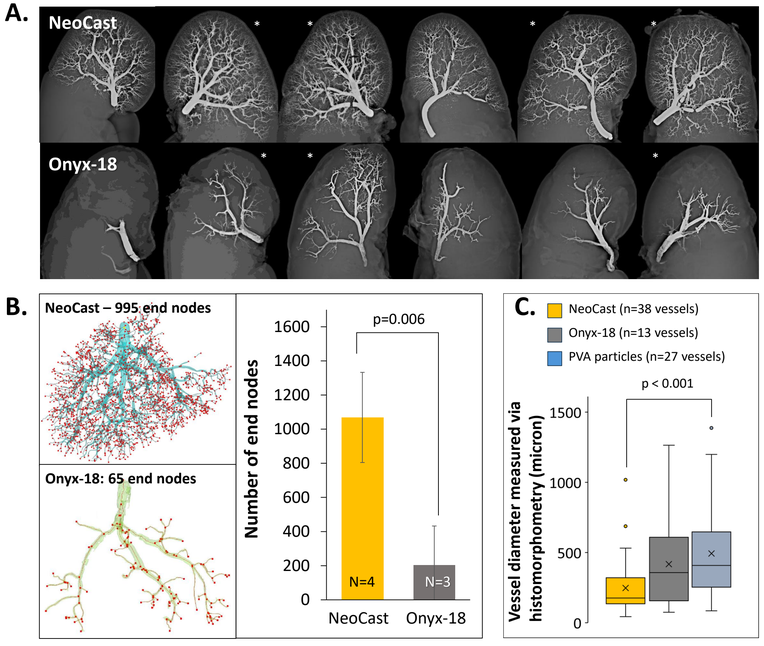
- Embolization performance was evaluated in a swine kidney model at 7, 30, and 90 days
- Distal penetration was assessed via micro-computed tomography (μCT) and histomorphometry through diameter measurement of vessels containing embolic material in representative sections
- Radiopacity was assessed via μCT using grayscale value analysis
- Neurotoxicity was assessed by injecting NeoCast directly into rabbit brain tissue for 7 and 90 days (negative control = high density polyethylene rods)

CONCLUSIONS

- NeoCast exhibited deep and consistent distal penetration with uniform radiopacity
- NeoCast elicited safe vascular and brain tissue responses
- Future studies evaluating NeoCast in human subjects are warranted

RESULTS

NeoCast exhibits deep and consistent distal penetration

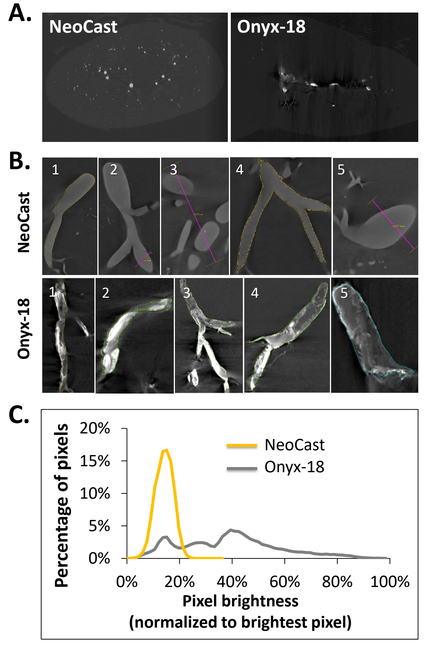


A: microCT sections of embolized kidneys qualitatively showed superior and more consistent distal penetration with NeoCast compared to Onyx-18™ (Medtronic, Minneapolis, MN)

B: NeoCast penetrated into > 5.2x as many vessel branches as Onyx-18 as determined through an end-node (representative of a vessel branch) analysis of embolic casts (denoted with asterisks) (Synopsys, Inc.) 1069 ± 264 vs. 204 ± 229 end-nodes for NeoCast and Onyx-18, respectively (p = 0.006)

C: Histomorphometry (CVPath, Gaithersburg, MD) showed that NeoCast was found in smaller vessel diameters compared to PVA particles (p < 0.001) and Onyx-18 (p=0.149)

NeoCast exhibits uniform radiopacity

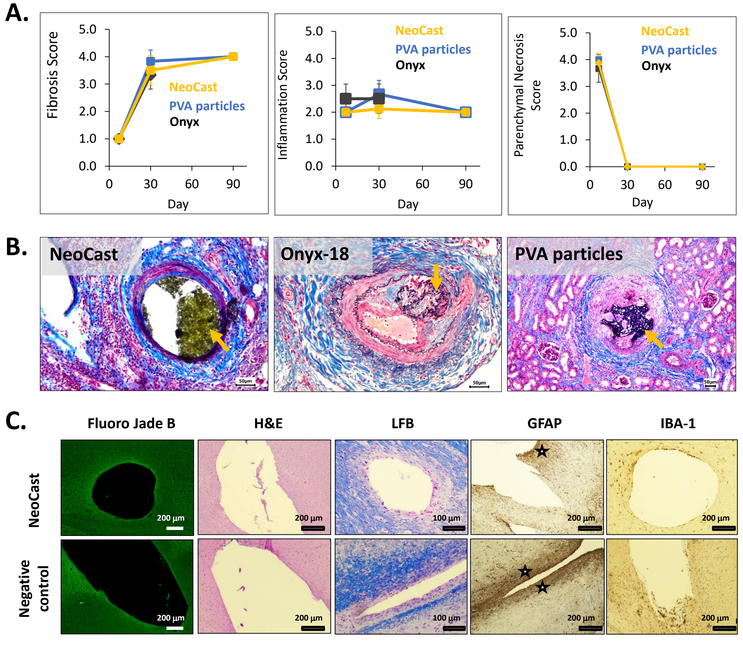


A: NeoCast exhibited minimal streak artifact under μCT

B: Longitudinal μCT sections showed that NeoCast radiopacity was more homogeneous versus Onyx-18

C: NeoCast has a narrow band of pixel brightness compared to multi-modal distribution with Onyx-18

NeoCast elicits a safe biological response in arteries and brain tissue



A: NeoCast elicited a stable, mature response through 90 days in kidney arteries comparable to existing agents

B: Histology sections showed full casting of lumen vessels by NeoCast without thrombus formation (arrows point to embolic material)

C: Histopathology of NeoCast in brain tissue at 7 and 90 days showed absence of neurotoxicity with a local response that was more mild than high density polyethylene negative control. LFB: Luxol fast blue (demyelination); GFAP: glial fibrillary acidic protein (astrogliosis); IBA-1: Ionized calcium-binding adaptor molecule 1 (Gitter cells)