Porous brain infusion catheter

“Whole-brain” infusions have emerged as a potential need with the promise of disease-modifying therapies for neurodegenerative diseases. In addition, several current clinical trials in brain cancer utilize direct delivery of drugs that are required to fill large volumes. Such requirements may not be well served by conventional single port catheters with their “point source” of delivery. Our aim is to examine infusions into large volumes of heterogeneous tissue, aiming for uniformity of distribution.

A porous catheter (porous brain infusion catheter, PBIC), designed by Twin Star TDS LLC, for brain infusions was developed for this study and compared with another convection-enhanced delivery catheter (SmartFlowTM NGS-NC-03 from MRI Interventions, a step end-port catheter, SEPC) in current use in clinical trials. The studies were in vivo in porcine brain. A total of 8 pigs were used: the size of the pig brain limited the porous length to 15 mm. The placements of the tips of the two catheters were chosen to be the same (at the respective brain hemispheres).

The PBIC and SEPC both performed comparably and well, with the PBIC having some advantage in effecting larger distributions: $p \sim 0.045$, with 5 infusions from each.

Given the performance of the PBIC, it would be highly appropriate to use the device for therapeutic infusions in human clinical trials to assess its capability for large-volume infusions [1)].

1)
Brady ML, Raghavan R, Mata J, Wilson M, Wilson S, Odland RM, Broaddus WC. Large-Volume Infusions into the Brain: A Comparative Study of Catheter Designs. Stereotact Funct Neurosurg. 2018 Jul 18:1-7. doi: 10.1159/000488324. [Epub ahead of print] PubMed PMID: 30021213.