

neuroinfuse™ intraparenchymal drug delivery system



About the *neuroinfuse* drug delivery system

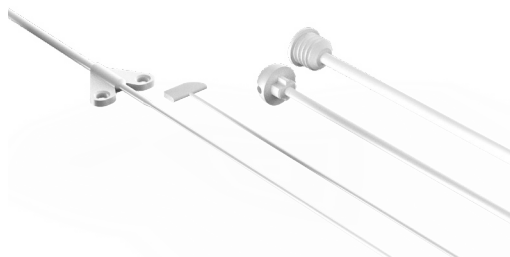
Renishaw is developing an intraparenchymal drug delivery system which will offer a practical method of bypassing the blood-brain barrier. The *neuroinfuse* system is currently in the clinical investigation phase of development and shows great promise in providing a next step change in the treatment of neurodegenerative, neuro-oncology and other debilitating neurological conditions.

Our product intends to deliver the following features:

- 3 tube configuration (outer guide tube, inner guide tube and catheter) to allow the neurosurgeon to create a recess-step feature which aims to reduce backflow.
- A novel hub on the guide tubes to allow the product to push fit into a pre-drilled feature, without the need for further adhesive.
- 3D printed titanium transcutaneous port to allow the patient to remain in the MRI scanner during infusions, reducing overall scanner time.
- Independent fluid paths and flow rates through each catheter to allow the clinician to control and customise the therapy regime.
- Same, or similar, product to be used throughout each stage of preclinical and clinical testing, so that the translational path is as risk-free and cost effective as possible.

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- The outer and inner guide tubes are delivered within their chosen trajectories through precisely machined (drilled) features in the skull along pre-formed tracks in the parenchyma.
- A radiopaque stylette can be passed through the guide tubes along the preformed track to act as a CT position verification surrogate prior to catheter delivery or simply to keep the track open until the catheter is primed and ready for implantation.
- Stylettes are then removed and catheters are implanted.



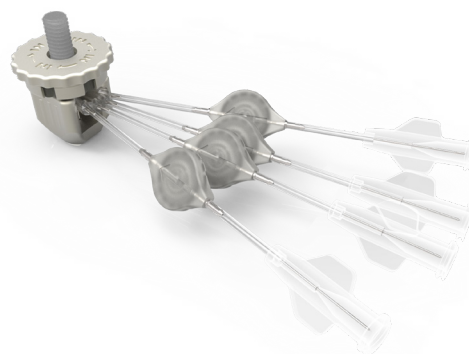
Transcutaneous bone-anchored port

- The 3D printed titanium port is implanted behind the patient's ear.
- The port connects the internal catheters to the external administration kit and is designed to allow intermittent chronic re-administration of therapeutics without the need for further surgery.



Port attachment device and drug giving set

- A 4-needle application set is designed to kinematically locate and lock onto the transcutaneous port.
- The application set is attached to pre-filled drug infusion lines and then primed. The lines are attached to standard syringes which, in turn, are loaded into infusion pumps.



Silicone cap

- Immediately following surgery a silicone cap is pressed over the port and sterile dressing applied. The purpose of the cap is to prevent thickening of the skin around the port for easy application set connection.

Drug development opportunities

- At present, the Renishaw neuroinfuse™ drug delivery system can only be used in the setting of an approved clinical trial. Renishaw is currently seeking academic, clinical and industrial partners across a wide range of indications, from oncology to neurodegenerative diseases. The purpose of this document is only to obtain partners and not to make the device generally available.

For worldwide contact details, visit www.renishaw.com/contact

