

# ALZET Neuroscience Products

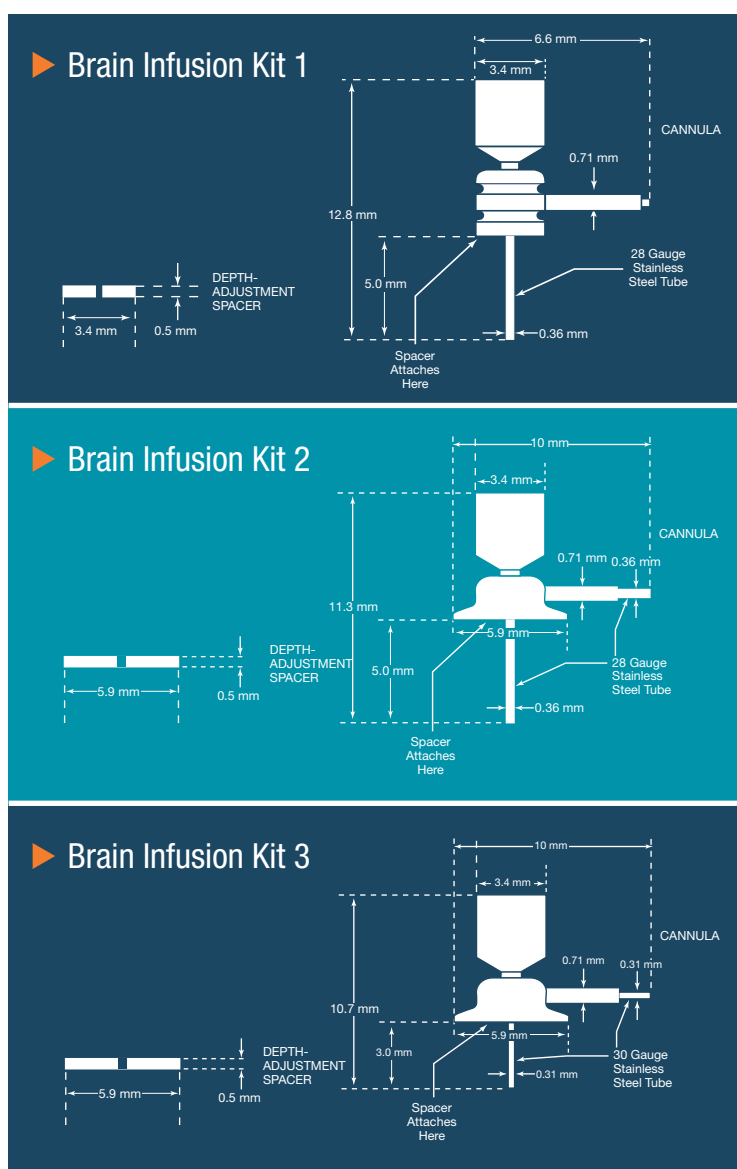
*Simplifying neuroscience research with ALZET® Osmotic Pumps.*

**For over 30 years**, neuroscientists have been creatively incorporating ALZET pumps into their research methods. The earliest studies into opioid dependence and neuronal plasticity are joined by recent, cutting edge work using ALZET pumps to deliver siRNA, neuroprotectants and new psychoactive drugs. Gathered here is a selection of infusion tools to help you achieve reliable and reproducible results. We also provide excellent technical support, a video CD demonstrating the surgical implantation of ALZET pumps, and custom searches of our comprehensive database of references on the use of ALZET pumps in neuroscience research.



## Benefits of ALZET Pumps in Neuroscience Research

- The only implantable pump available for use in mice and young rats.
- Direct delivery of agents across the blood-brain barrier.
- Continuous and controlled delivery of neuroactive compounds.
- Ideal for studies involving behavioral testing — no animal handling required during infusion.
- Easily attached to a catheter for delivery to the brain, spinal cord, peripheral nerve, tumor or wound.
- Over 30 years of published neuroscience — well-established methods for many animal models.
- Improved bioavailability of short half-life peptides and proteins.
- Convenient & cost-effective for chronic treatment in lab animals.
- Reproducible, consistent results.
- Automatic nighttime and weekend dosing.



## Brain Infusion Kits

Many agents do not cross the blood-brain barrier in sufficient quantities to evaluate their effects on the brain. Cerebral injection is one local delivery method, but it can be challenging to deliver an effective dose in a physiologically-compatible volume. In addition, the agent may not remain in the target location long enough to elicit its effects. For many compounds, local infusion directly into the brain is the only efficient way to generate reliable data.

DURECT now offers three ALZET Brain Infusion Kits in several lengths and gauges. All Kits are designed specifically for use with ALZET pumps for targeted delivery to the central nervous system. They can be used in two ways:

**1. Infusion into the cerebral ventricles**, exposing a wide variety of brain regions to the infusate via the cerebrospinal fluid which bathes the brain.

**2. Direct microperfusion of discrete brain structures**, resulting in localized distribution of infusate in the target tissue.

Each ALZET Brain Infusion Kit includes materials for 10 brain infusions:

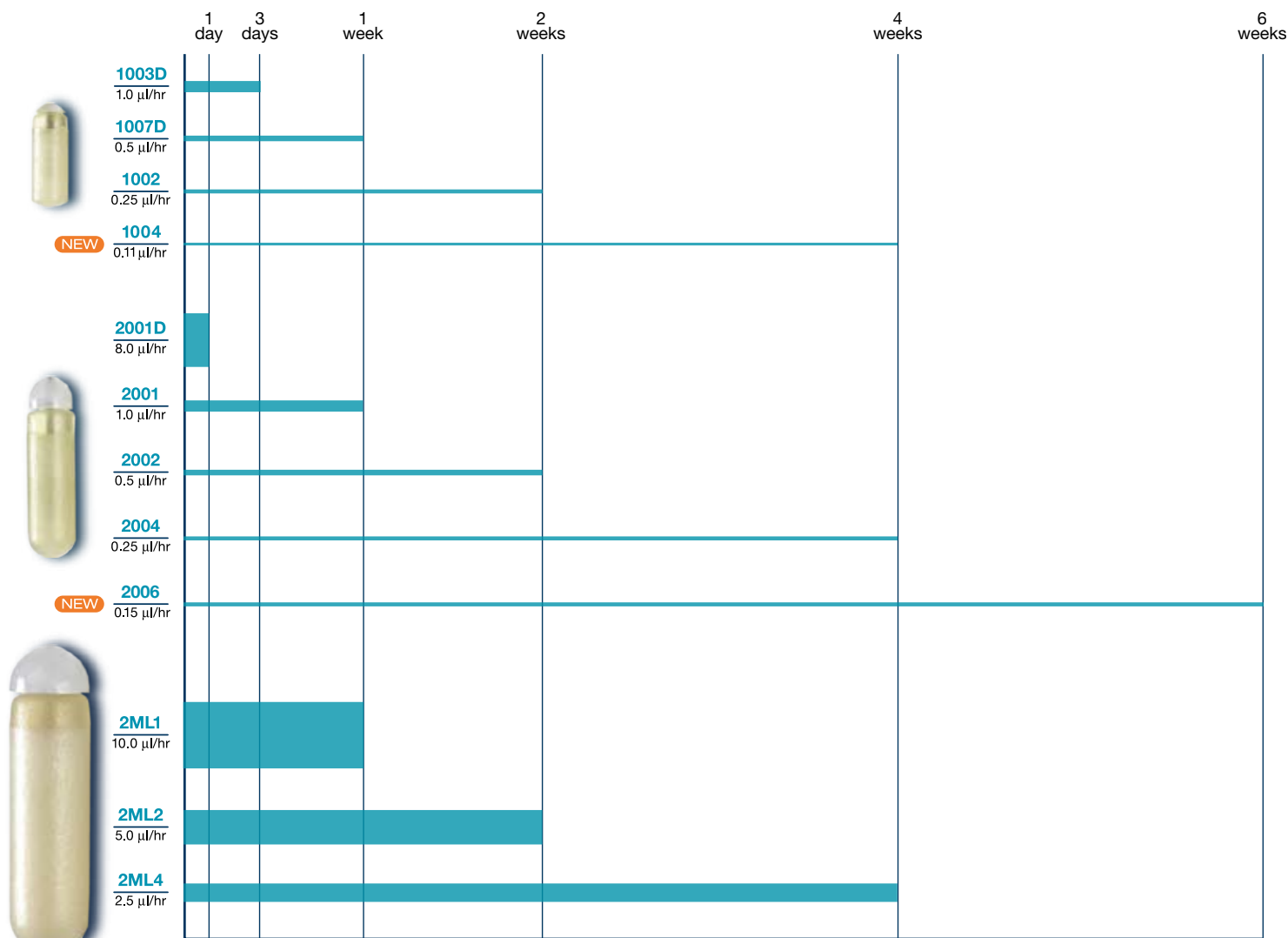
- 10 Brain Infusion Cannulae
- 10 Vinyl Catheter Tubes
- 40 Depth-Adjustment Spacers
- 1 Instruction Sheet

## Feature of Brain Kits

- Compatible with all ALZET pumps models. (Pumps and kits are sold separately.)
- Target lateral ventricles: Without modification, Brain Kits 1 & 2 will penetrate 5 mm below the surface of the skull. When affixed to the skull in the stereotaxically correct location, this will put the tip of the cannula in the region of the cerebral ventricles of a 250-300 g rat. Brain Kit 3 will penetrate 3 mm below the skull surface, which is appropriate for targeting the lateral ventricles in an adult mouse.
- Easily customized to target different brain regions or adjust for differences in animal size. Uniquely designed depth adjustment spacers allow the depth of the cannula tip within the brain to be adjusted in 0.5 mm increments. Note that the cannula can easily be trimmed to target more superficial structures.
- Design minimizes local trauma: Fine gauge stainless steel cannula minimizes trauma to the brain during cannula placement. (Brain Kits 1 & 2 are 28 gauge. Brain Kit 3 is 30 gauge.)
- All components provided sterile.
- Biocompatible: All materials in the Kits meet U.S. Pharmacopoeia (USP) Class VI standards for the biocompatibility of medical plastics.

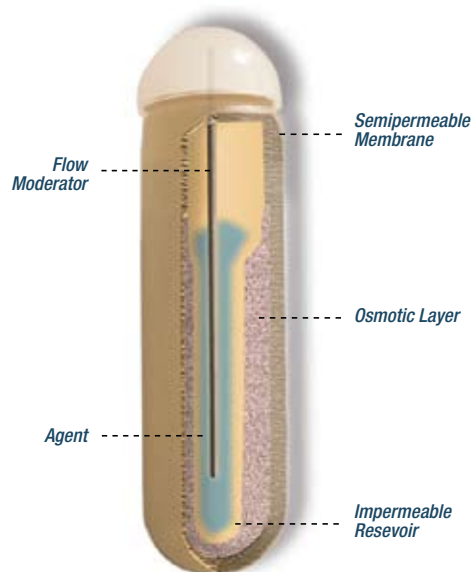
Brain Infusion Cannula	Brain Kit 1	Brain Kit 2	Brain Kit 3
Item No.	0004760	0008663	0008851
Material (tube)	Stainless Steel		
Gauge (tube)	28 Gauge	28 Gauge	30 Gauge
Dimensions (steel tube)	ID=0.18mm OD=0.36mm	ID=0.18mm OD=0.36mm	ID=0.16mm OD=0.31mm
Material (elbow stop, flange)	Polycarbonate		
Volume Inside Tube	0.32	0.32	0.23
Height Adjustment Spacer			
Material	Polycarbonate		
Catheter Tubing			
Material	Polyvinylchloride (medical grade)		
Length	15 cm (approx.)		
Inside diameter	0.69mm (+/-0.08)		
Outside diameter	1.14mm (+/-0.08)		
Volume per 15cm	56 µl (3.7 µl/cm)		

## Rates and Durations\*



\*Nominal specifications shown. Individual lots of pumps may vary from this target within acceptable limits. Actual values are listed on the instruction sheet included with the pumps.

► **ALZET pumps** operate because of an osmotic pressure difference between a compartment within the pump, called the salt sleeve, and the tissue environment in which the pump is implanted. The high osmolality of the salt sleeve causes water to enter the pump through the semipermeable membrane, which covers the outer surface of the pump. As the water enters the salt sleeve, it compresses the flexible reservoir, displacing the test solution from the pump at a controlled, predetermined rate.



## ALZET Catheters

Medical grade polyethylene and vinyl catheters are available for multiple targeted delivery applications. Also available are a variety of specialized catheters, customized for a specific target and animal species. They incorporate useful features, such as retention beads or suture patches to facilitate placement and stabilization in a vessel or tissue. They are conveniently available sterile and individually packaged.

Description	Item No.	Length	Outside Diameter	Inside Diameter	Volume
Vinyl Tubing (10 per bag)	007760	15 cm (6 in)	1.14 mm (0.045 in)	0.69 mm (0.027 in)	3.74 µl/ cm
Polyethylene Tubing (10 per bag)	007750	15 cm (6 in)	1.2 mm (.048 in)	0.72 mm (.030 in)	4.566 µl/ cm

Description	Item No.	Length	General Features
Rat Intrathecal Catheter	0007740	23.7 cm	Polyurethane, includes 10 cm of very fine tubing (28G; OD 0.36 mm); teflon-coated, stainless steel stylet
Rat Intrathecal Catheter Short	0007741	15 cm	Shorter length for non-occipital approach. Polyurethane, includes 10 cm of very fine tubing (28G; OD 0.36 mm); teflon-coated, stainless steel stylet

Additional catheters are available for other targeted delivery applications. Visit our website at [www.alzet.com](http://www.alzet.com), or contact us to request a complete list of catheters.

### Cerebrospinal Volumes and Production Rates in Different Species

Species	Volume (ml)	Production Rate (ml/h)
Mouse	0.035	0.018
Rat	0.15	0.18
Rabbit	2.3	0.6
Cat	4.4	1.2
Monkey	-	2.5
Dog	12.5	3.0
Sheep	14.2	7.1
Human	100	21

Pardridge WM. (1991) Transnasal and intraventricular delivery. In: Peptide drug delivery to the brain, p. 112. Raven Press, NY

## Cyanoacrylate Adhesive

Cyanoacrylate Adhesive is an instant adhesive gel for use with ALZET® Brain Infusion Kits and other brain infusion cannulae. It offers a convenient alternative to cranioplastic and dental cements. A very thin layer on the base of the pedestal adheres the cannula to the skull. Researchers have found it to be ideal for use in mice and other small animals when using short pedestal cannulae. One 3 gram tube is enough for 10 brain infusion cannulae implantations.



Item Number: 0008670  
Available in a 3 gram tube

### Composition of Cerebrospinal Fluid in Various Species

Ion/Compound	Human (mM)	Dog (mM)	Cat (mM)	Rabbit (mM)
Na	187.5	153.5	160	149 <sup>+</sup>
K	2.6	3.1	4.4	2.9 <sup>+</sup>
Ca	1.1	1.4	1.4 <sup>+</sup>	1.24 <sup>+</sup>
Mg	1.1	1.0 <sup>+</sup>	0.7 <sup>+</sup>	0.9 <sup>+</sup>
P	0.8	0.4 <sup>+</sup>	-	-
Cl	119	122	147	99
HCO <sub>3</sub>	23.3 <sup>+</sup>	25.8 <sup>+</sup>	24.6 <sup>+</sup>	22 <sup>+</sup>

•Note: A value for this ion/species could only be found in one reference.

Ion concentrations (except those with an asterisk) are an average of the data listed in Davson H. Physiology of the Cerebrospinal Fluid, J. & A. Churchill, Ltd., London, 1967 and Biology Data Book, Volume III, 2nd ed., FASEB, Washington D.C., 1974.



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