

Products for Neuroscientists

For 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, neuro-protectants 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.

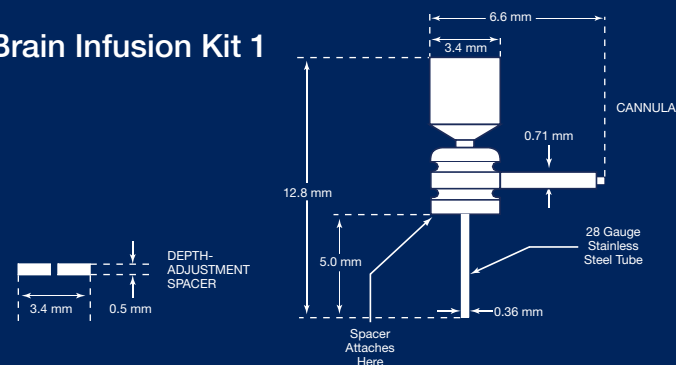


Benefits of ALZET Pumps in Neuroscience Research

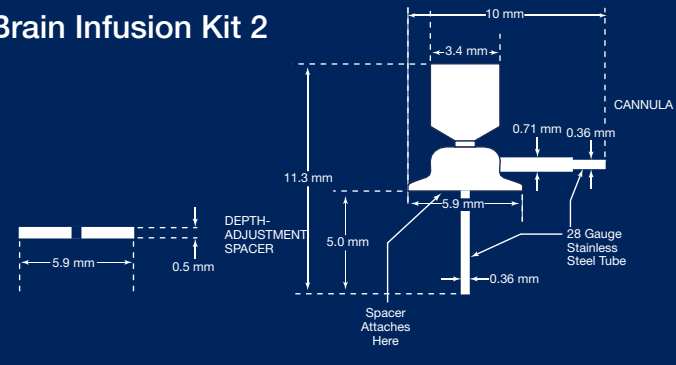
- Controlled delivery of neuroactive compounds
- Ideal for studies involving behavioral testing — no animal handling required during infusion
- Easily attached to a catheter for delivery to the brain, spinal cord, peripheral nerve, tumor or wound
- Over 28 years of published neuroscience research — well-established 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
- Small enough for use in mice and very young rats



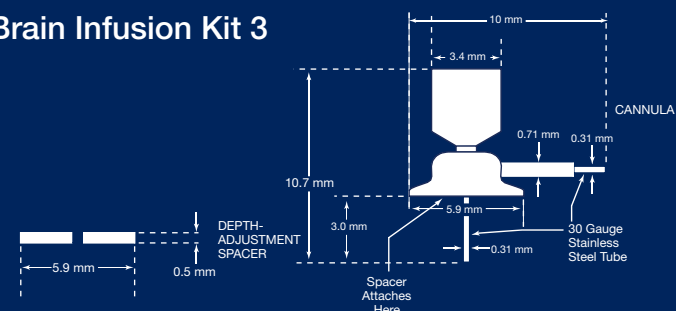
Brain Infusion Kit 1



Brain Infusion Kit 2



Brain Infusion Kit 3



Phone (781) 917-9526
Fax (978) 244-8917
info@braintreesci.com

Brain Infusion Kits

Many agents do not cross the blood-brain barrier sufficiently to evaluate their effects on the brain without administration directly into 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 see an effect. For many compounds, local infusion directly into the brain is the only 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** exposes a wide variety of brain regions to the infusate via the cerebrospinal fluid which bathes the brain.
2. **Direct microperfusion of discrete brain structures** results in localized distribution of infusate in the target tissue.

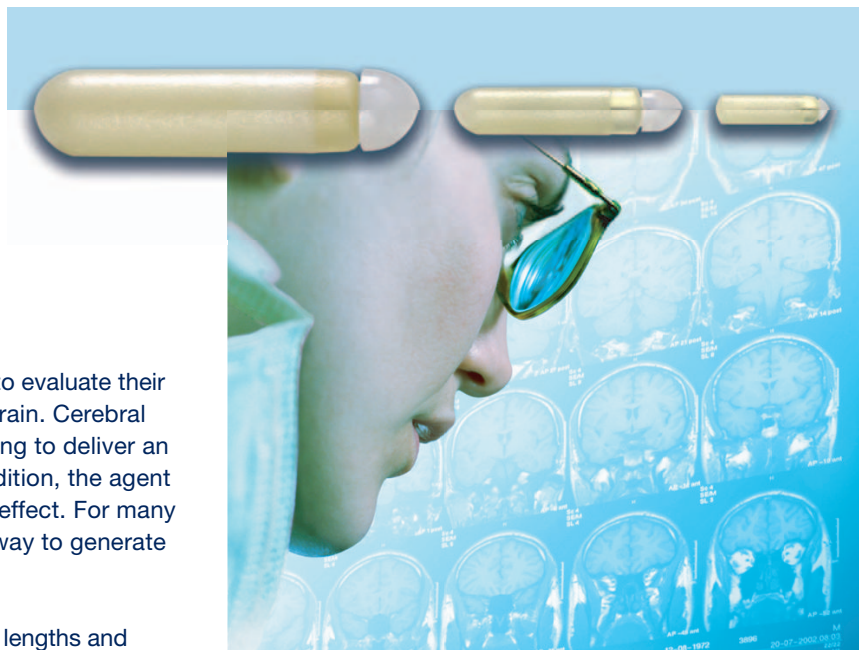
Each ALZET Brain Infusion Kit includes materials for 10 brain infusions, including:

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

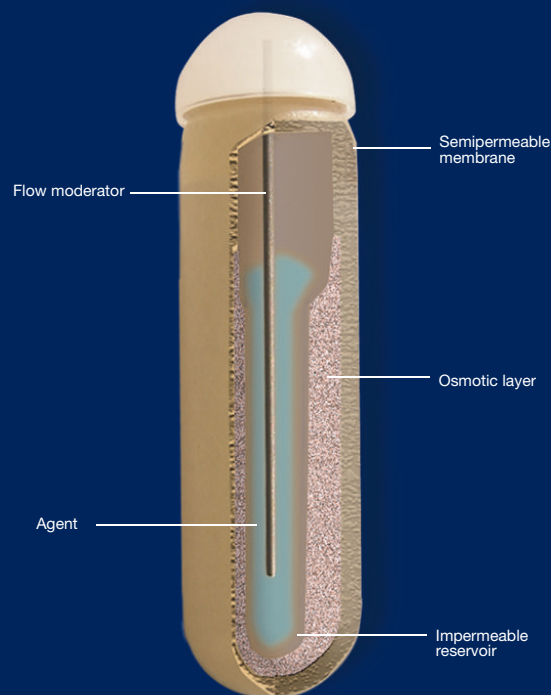


Features of Brain Kits

- **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.

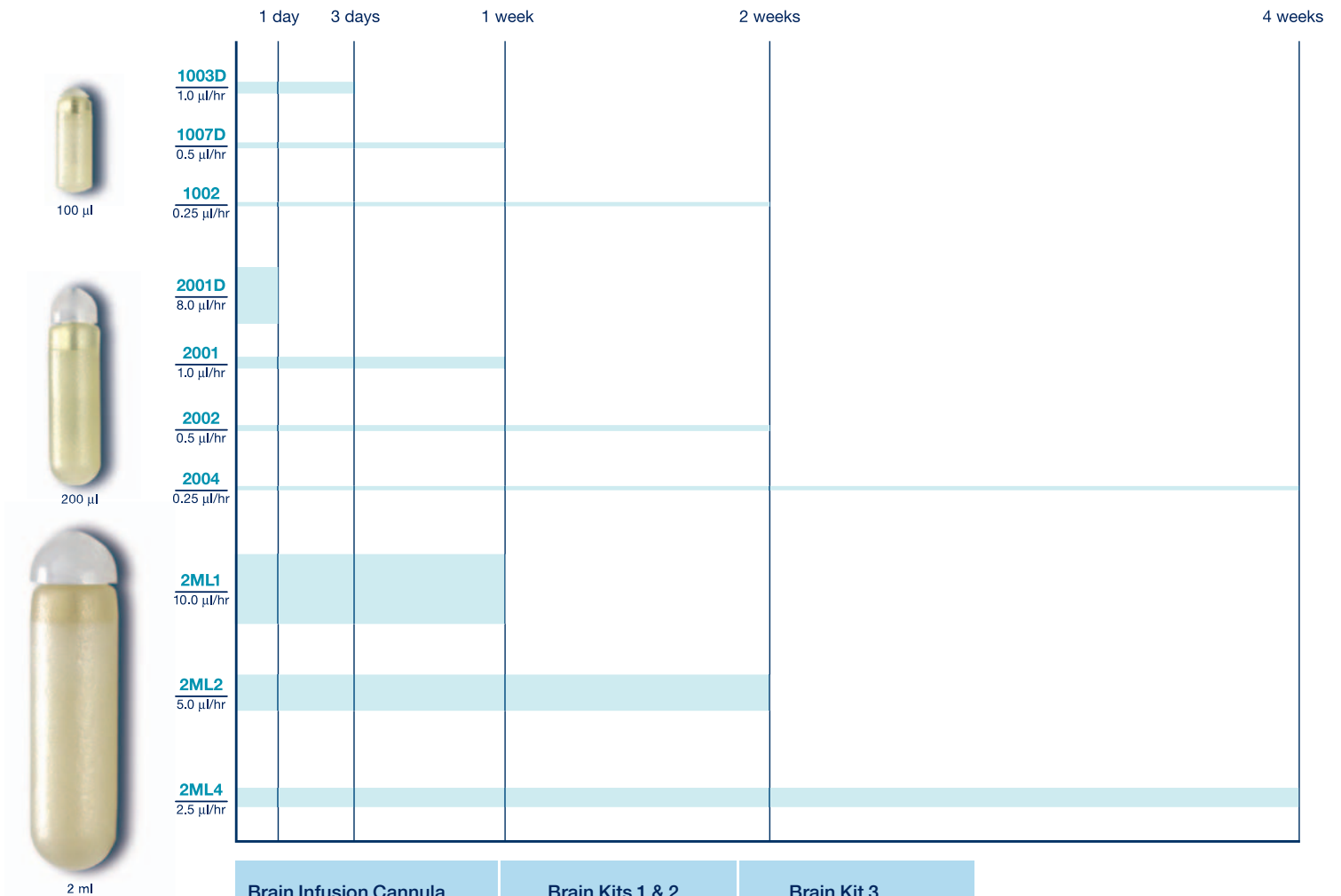


How does it work?



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.

Rates and Durations



Brain Infusion Cannula	Brain Kits 1 & 2	Brain Kit 3
Material (tube)	Stainless steel	
Gauge (tube)	28 gauge	30 gauge
Dimensions (steel tube)	ID = 0.18 mm OD = 0.36 mm	ID = 0.16 mm OD = 0.31 mm
Material (elbow stop, flange)	Polycarbonate	
Volume inside tube	0.32	0.23
Height Adjustment Spacer		
Material	Polycarbonate	
Catheter Tubing		
Material	Polyvinylchloride (medical grade)	
Length	15 cm (approx.)	
Inside diameter	0.69 mm (+/- 0.08)	
Outside diameter	1.14 mm (+/- 0.08)	
Volume per 15 cm	56 µl (3.7 µl/cm)	

Catheter Tubing

Appropriate for use with all ALZET pump models, our catheter tubing is sterile, medical grade, individually packaged and pre-cut to 15 cm.

Description	Item No.	Length	Outside Diameter	Inside Diameter	Volume
Vinyl Tubing (10 per bag)	0007760	15 cm (6 in)	1.14 mm (0.045 in)	0.69 mm (0.027 in)	3.74 μ l/cm
Polyethylene Tubing (10 per bag)	0007750	15 cm (6 in)	1.22 mm (0.048 in)	0.72 mm (0.030 in)	4.566 μ l/cm

Loctite

Loctite 454 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
Comes as: 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*
K	2.6	3.1	4.4	2.9*
Ca	1.1	1.4	1.4	1.24*
Mg	1.1	1.0*	0.7*	0.9*
P	0.8	0.4*	—	—
Cl	119	122	147	99
HCO ₃	23.3*	25.8*	24.6*	22*

*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.

Cerebrospinal Volumes and Production Rates in Different Species

Species	Volume (ml)	Production Rate (ml/hr)
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, New York.



P.O. Box 850498
Braintree MA 02185
www.braintreesci.com

Phone (781) 917-9526
Fax (978) 244-8917
info@braintreesci.com