A non-invasive method for the preparation of split brain rats using ultrasonics

A.J. LEE & P.V. TABERNER

Department of Pharmacology, University of Bristol, Bristol BS8 1TD

Severance of the corpus callosum after physical separation of the cerebral hemispheres can be performed in the cat (Myers, 1956) and the monkey (Downer, 1959). This method is not ideally suited to the rat due to the damage caused to the sinuses and the very soft cerebral hemispheres. Using a shielded-knife, good results have been obtained by Goodman & Russell (1974). However, such methods cause unavoidable neural damage in the process of inserting the cutting device through tissues on approaching the corpus callosum.

An appropriate alternating voltage supplied to a concave piezoelectric crystal produces ultrasonic waves which pass through a fixed focal point dissipating sufficient energy at that point to cause a lesion (Johnston & Dunn, 1976). Thus, ultrasonics offer a non-invasive approach and cleavage of the corpus callosum can be achieved by a series of small overlapping lesions.

Male albino rats (190–220 g) under chloral hydrate anaesthesia (500 mg/kg, intraperitoneally) were placed in a head-holder. A midline incision was made in the scalp, the underlying membranes scraped away from the skull, and a 4 mm hole trephined at a skull landmark (lambda). A rectangle of bone approximately 10 mm long and 4 mm either side of the midline suture was then removed to expose the cortex. The ultrasonic transducer was held in a micro-manipulator and coordinates of the corpus callosum determined from the intersection of the sagittal and transverse sinuses. Ultrasonic energy from the transducer is coupled into the cortex by saline (37°C) flowing through a hollow cone from the transducer and over the brain. A total acoustic power output of 2 W at 3 MHz at approximately 200 W/cm^2 is used. Approximately spherical lesions of 0.9 mm diameter are produced with a 14 s exposure. Lesions can be observed in 100 μ sections prepared using a vibratome from brains removed 48 h later.

This method has the advantage of reaching deep-lying structures without cutting surrounding tissues and is of special importance where any extra damage may be harmful or make interpretation of results difficult.

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Effects of long-term treatment with contraceptive steroids on plasma and brain tryptophan, brain 5-hydroxytryptamine, and locomotor activity in female mice

JUDITH M. BAKER, S.W. BOND & SHEILA L. HANDLEY

Department of Pharmacy, University of Aston, Birmingham

Although contraceptive steroids may have marked effects on monoamine metabolism and behaviour, little work has been carried out on animals with normal ovarian function. We have studied effects of prolonged daily injections of norethistrone acetate (200 μg/kg) alone and in combination with ethinyl oestradiol (100 μg/kg) compared with daily vehicle injection. Locomotor activity (Animex activity meter) was determined continuously for 2 oestrus cycles prior to injection, then every 7th day throughout 42 days of treatment. Free and total plasma tryptophan and brain tryptophan and 5-HT were determined on the 43rd day (Bender, Boulton & Coulson, 1975; Denckla & Dewey, 1967; Curzon & Green, 1970) and compared with dioestrus values.

Biochemical results are shown in Table 1. Locomotor activity declined after both treatments. On the final day of treatment the activity of the