

A simple transmitter mount for short-term telemetric measurement of heart rate in the rat

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This article describes a simple technique, not involving surgery, for mounting a small telemetry transmitter on a laboratory rat. The method is useful for collecting heart-rate data in studies of 2 or 3 days' duration.

The benefits of telemetry as a means of collecting physiological and behavioral data have led to its increasing use. When the research is done with small animals, a suitable method for mounting the telemetry transmitter on the S is needed. To achieve a fairly permanent attachment, it is necessary to mount the transmitter securely enough so that prolonged scratching and rubbing against cage walls cannot remove or damage it. Longo & Pelligrino (1967) described a method for use with laboratory rats that involved securing the transmitter to the rat's skull. However, if recording for more than 3 or 4 days is not a requirement, then simpler procedures that do not involve surgery may serve as well. The following method for attaching a small telemetry transmitter (Model FM-1100-E3, E & M Instrument Co., Houston, Tex.) to a laboratory rat was found suitable for the collection of heart-rate data in short-term experiments extending over 2 to 3 days. The method described may offer the transmitter more protection against physical damage, provide a better placement of the load on the animal's body, and create less interference with responses involving the head (e.g., grooming) than the procedure reported by Longo & Pelligrino (1967).

The simplicity of this technique lies in

the use of a packet, mounted on the animal's body, that functions simultaneously as the transmitter housing and as the electrode placement. A transmitter packet suitable for use on an adult male rat weighing 300 to 400 g appears in Fig. 1 and is constructed as follows.

A cylinder consisting of the body of a 10- or 12-ga plastic shotshell is secured with adhesive tape to a 13 x 10 cm strip of light plastic material (upholstery plastic, available in any dry goods store, is ideal). An electrode wire inserted through a hole in the base of the cylinder is led beneath the plastic strip to one side of the packet and is brought up through the tape-plastic strip about 2 cm from the end. This procedure is repeated for the other side. Finally, a second strip of adhesive tape is applied to the undersurface of the plastic strip so as to secure the position of the electrode wires. The electrode wires consist of 14-cm lengths of 22-ga round copper magnet wire of the type used in the construction of fractional horsepower electric motors (obtainable from any shop where electric motors are wound). The insulation must be scraped away for 3 cm at each end and one end soldered into a transmitter input jack.

To mount the transmitter packet, the rat must first be anaesthetized (subcutaneous injection of sodium pentobarbital, 50 mg/kg body weight), after which the animal's back is shaved in a 5-cm-wide band for 7.8 cm to either side of the spine in the upper lumbar region. The underside of the tape-plastic strip is coated with Skin Bond cement (United Surgical Co., Port Chester, N.Y.) and is placed on the body with the cylinder directly over the spine. Each end of the tape-plastic strip is then clipped to a fold of skin with a pair of ordinary 16-mm wound clips. The free ends of the electrode wires are wrapped around an eyelet of one of the wound clips on each side of the body by the use of needle-nosed pliers (see Fig. 2). This simple procedure results in a tight, reliable contact which the rat is unable to chew or scratch apart. The wound clips serve as electrodes in addition to anchoring the packet to the animal. It is very important when clipping the packet to the fold of skin to be sure that the barb of the wound clip penetrates the adhesive tape. Finally, a liberal coat of Skin Bond cement should be applied over all points of animal-packet contact. This exterior coat of the cement seems to inhibit the tendency of the animals to

chew at the packet and provides some insulation for the exposed wound-clip electrodes.

After preparation with the packet, Ss should be caged singly; cage-mates may easily damage the packet. When the animal is not being tested, the transmitter input jacks may be folded back into the cylinder, and the open end, which should face rearward, should be stopped with a plug weighted to simulate the weight of the transmitter. The empty weight of the packet is about 6-g. A S may be readied for testing at any time after full recovery from the anaesthetic by simply grasping it about the upper body while the free hand plugs the jacks into the transmitter, slides the transmitter into the cylinder, and stops the opening with a suitable plug.

Extended observations of the durability of the packet have not been carried out; however, if testing occurs between 48 and 60 h after preparation with the packet, one may expect up to 10% loss of adult male rat Ss because of damage to the cylinder or electrode wires. The recordings obtained with this attachment technique are generally suitable only for a determination of heart rate and are seldom clear enough of artifact for finer analyses. Data collected on 12 adult male Sprague-Dawley rats prepared with the packet, and 12 unprepared controls, observed in an open field for 30 min under various illumination and white-noise levels, indicate that the amount of grooming was unaffected by the packet. Animals wearing packets tended to ambulate less, but the difference was not statistically significant. To date, this attachment method has been used on dozens of animals to collect over 50 h of recordings. It has proven quite reliable, and workers should find it useful for demonstration purposes and for short-term studies in which the measurement of heart rate from unrestricted rats is required.

REFERENCE

- LONGO, N., & PELLIGRINO, J. W. A simple telemetric method for monitoring cardiac function in small animals. *Perceptual & Motor Skills*, 1967, 24, 512-514.

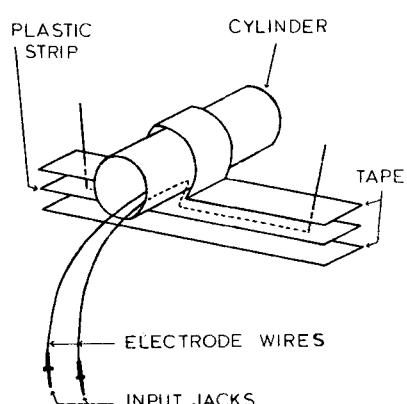


Fig. 1. Details of construction.

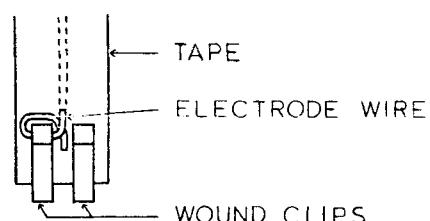


Fig. 2. Electrode wire hookup.