

Example of good practice in writing materials and methods sections of biotelemetry publications

This document was produced by the BVA(AWF)/FRAME/RSPCA/UFAW* Joint Working Group on Refinement, to accompany its report on refinements in telemetry procedures (Part A, Morton et al. 2003) and husbandry (Part B, Hawkins et al. 2004).

The Working Group believes that it is essential to disseminate good practice by including details of refinements in both procedures and husbandry within the materials and methods section of scientific papers. This will help to ensure the rapid uptake of new developments that will benefit animals, enabling others to reduce suffering and to improve both animal welfare and science. In order to facilitate this, the Group has set out a worked example to demonstrate how materials and methods sections should be written within biotelemetry publications.

Note that Parts A and B of the telemetry report address the ethical and welfare issues associated with the use of telemetry in greater depth and the Group strongly recommends that the whole report is read in conjunction with this document.

The example below sets out how the recommendations in Parts A and B of the report would be implemented and written up when the report was published (October 2003). **As definitions of best practice with respect to surgery and husbandry are subject to continuous change, the protocols summarised below should be critically reviewed in conjunction with the attending veterinarian before use.**

Implanting a device to transmit ECG and body temperature in Han Wistar rats

Animals

Han Wistar rats of either sex weighing between 225 and 275g (8 – 10 weeks old) were brought at least 1 week before surgery and housed in groups of 4 in solid-floored cages of area 2400 cm² and 40 cm high. Cages contained sawdust substrate (5 cm deep), a refuge, nesting material, cardboard tubes and chew blocks. Animals had *ad libitum* access to standard diet in hoppers, scattered forage and fresh, UV sterilised water. They were checked twice daily, handled every day and cleaned out weekly. Full clinical examinations were carried out the day before surgery and only healthy animals of sound temperament were used in procedures.

Materials

The system consisted of an implantable telemeter weighing 7g, volume 3cm³ (i.e. under 3 % of body mass), with a bi-polar electrode configuration to detect ECG, an internal thermistor to detect body temperature and a small transmitter to broadcast to the receiver plate located under the cage. The activity of telemetered animals was determined by changes in relative signal strength. Data from multiple receivers was collated by a multiplexer (BCM 100) and relayed to an ALTA 386 IBM compatible computer running MS-DOS 5.0 and Datacol III data acquisition software. The devices could be switched on and off *in situ* so that animals could be group housed.

Surgery

Rats were weighed immediately before surgery, then anaesthetised with halothane in an induction chamber and maintained on a scavenged mask system and Bain's tube (induction: 4 - 6% halothane at 4 L O₂ min⁻¹; maintenance: 2-3% halothane at 1 L O₂ min⁻¹). Operations took place between 08.00 and 12.00 h. Each animal was laid on a heat pad with a surface temperature of 35 – 40 °C maintaining a body temperature of at least 35°C. The incision site was clipped and cleaned with chlorhexidine solution and sprayed with surgical spirit and an ocular lubricant (Hypromellose Eye Drops 0.3 % w/v) was applied. A sterile drape was placed over the surgical area and a small area cut away to enable a 3 cm incision to be made through the skin along the abdominal midline immediately caudal to the xyphoid cartilage. The peritoneal wall was raised using ridged (DeBakey) forceps and a 3cm incision made along the midline using blunt ended scissors.

The sterile transmitter was pre-soaked in sterile saline at 30 °C then inserted into the caudal end of the peritoneal cavity and sutured with 4/0 Nurolon (Ethicon) to the ventral wall. One ECG lead was tunnelled through the abdominal wall using a 14G needle as a trochar and then tunnelled subcutaneously to one side of the heart, taking extreme care not to compromise asepsis. The other lead was similarly tunnelled into the groin. Telemeter function was checked before 4 ml of glucose saline warmed to 37 °C was introduced into the peritoneal cavity. The midline was closed with 4/0 coated Vicryl, and the skin with 4/0 Prolene (Ethicon) or metal staples. Surgery lasted a maximum of 30 minutes from induction of anaesthesia and the success rate was 100 % for uneventful recovery from anaesthesia and surgery but 14 % of transmitters did not give a signal for the whole of the 16 week observation period and so this required further investigation.

Analgesia and postoperative care

Subcutaneous injections of Buprenorphine (0.03 mg/kg) and Carprofen (5 mg/kg) were given immediately after anaesthesia. Further doses of Buprenorphine were routinely administered every 12 hours for 2 days and Carprofen (5 mg/kg) was given in the drinking water for 3 days. If animals were still displaying signs of pain-coping behaviour (e.g. twitch, writhe, stagger or back arch) after this more analgesia was given and the attending veterinarian consulted.

Post-operative care

Rats began to move a few minutes after surgery, and they were immediately placed in a quiet recovery room (ambient temperature of 24 ± 2°C) in a standard holding cage with a refuge, a sheet of artificial fleece and *ad-libitum* access to strawberry jelly, mash (soaked dry pellets) and water in bowls on the floor. They were checked every 30 minutes and water administered by pipette to any who failed to drink after the first hour. When they were fully ambulant (normally an hour or so) they were placed with their original group in the cage they had shared before surgery. Each animal was weighed once a day and checked twice daily using a score sheet for the first 4 days post-op. Sutures were removed after 7 to 10 days. Animals underwent a full clinical examination weekly for the first month following surgery and then monthly for the duration of the study.

References

Morton DB, Hawkins P, Bevan R, Heath K, Kirkwood J, Pearce P, Scott E, Whelan G, Webb A (2004): Refinements in telemetry procedures. *Laboratory Animals* **38**, 1-10

Hawkins P, Morton DB, Bevan R, Heath K, Kirkwood J, Pearce P, Scott E, Whelan G, Webb, A. (2003) Husbandry refinements for rodents, dogs and non-human primates used in telemetry procedures. *Laboratory Animals* **37**, 261-299

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