

**UNIVERSITY OF CALIFORNIA, SAN DIEGO  
INSTITUTIONAL ANIMAL CARE AND USE COMMITTEE**

**Policy on the Use of Neuromuscular Blocking Drugs  
in Animal Research**

When neuromuscular blocking (NMB) drugs are used on animals in experimental research, it is critical that the animals be adequately anesthetized. NMB drugs paralyze muscles, thereby making it possible for animals to experience pain or discomfort without being able to move or withdraw from a painful stimulus. The following guidelines for the use of NMB drugs are designed to paralyze muscles for the shortest time possible, once adequate dose or depth of anesthesia has been assured.

**INDICATIONS**

NMB drugs may be used for specific indications, such as preventing animal motion:

- i) during surgery which is technically delicate
- ii) during physiological recordings where muscle activity would seriously impair the precision of the measurements.

NMB drugs are not indicated for routine endotracheal intubation, positive pressure ventilation, or abdominal or thoracic surgery.

When it is unclear if a NMB is necessary for a project, the investigator should consult with the UCSD veterinarians at the Animal Care Program. In some instances a pilot procedure may be required following committee approval to determine whether these drugs are necessary for the study and what an adequate depth of anesthesia would be. An alternative to the pilot procedure is a modification in the experimental design; e.g., where surgery/instrumentation is performed without NMB drugs, and data collecting post-instrumentation is performed under an adequate level of anesthesia with NMB drugs.

**DEPTH OF ANESTHESIA**

The most important determination is whether the depth or dose of anesthesia is adequate for a given type of surgery or investigative procedure. Since animals will not be able to move in response to pain, their blood pressure (BP) and heart rate (HR) must be carefully monitored and the anesthetic dose adjusted appropriately. Both the upper and lower range of acceptable BP and HR values need to be specified in the proposal. The parameters of any other signs (e.g., pupil size) which might be used for depth assessment also need to be specified. These values should be determined before NMB drug administration; e.g., during preparatory surgery, pilot studies, or from previous experimental procedures not using NMB drugs.

A detailed anesthesia record must be completed for each investigative or surgical procedure utilizing NMB drugs. The anesthesia record should document: i) timing and dose of anesthetic and NMB drug administration, ii) vital signs and depth of anesthesia signs obtained during the procedure, and iii) neuromuscular response to the peripheral nerve stimulator (see Paragraph 5 below). A copy of each anesthetic record must be maintained by the Principal Investigator, and should be readily available for review or inspection at all times.

**ADMINISTRATION**

The kind and quantity of dose of NMB drugs should be chosen to provide only brief periods (e.g., 20 minutes) of neuromuscular blockade, so that adequacy of anesthesia (lack of movement in response to a noxious stimulus) can be assured on a frequent and regular basis.

## **MONITORING NEUROMUSCULAR BLOCKADE**

When NMB drugs are used for experimental procedures in which NMB drugs are used for more than a single short event, peripheral nerve stimulation (PNS) tests are recommended to document that neuromuscular function has recovered during the non-paralyzed periods of anesthesia-depth assessment. Note: If animal subjects are to recover from the experimental procedures, clinical signs of neuromuscular recovery should complement the above nerve stimulation tests (e.g., normal breathing pattern, sustained head lift, or ability to stand).

## **SPECIAL EQUIPMENT**

The proper use of the following equipment is required:

1. mechanical ventilator
2. reliable means of quantifying heart rate and blood pressure

## **PROTOCOL APPROVAL**

Approval of an Animal Use Protocol with the use of NMB drugs depends on whether the above provisions have been satisfied. If there is a question as to whether these provisions have been satisfied, or whether the indications are appropriate, the Principal Investigator will be asked to address these questions at a regularly scheduled meeting of the UCSD IACUC. Specific research requirements that necessitate a variance from these general guidelines will be reviewed on an individual basis by the UCSD IACUC.