**Nonpharmacologic Methods**

“Nonpharmacologic approaches to pain management are appropriate when the use of pharmacological methods is contraindicated, when effective analgesic drugs are not available, or to complement drug therapy. Non-pharmacologic methods include preventive strategies that help minimize causative factors for pain, through, for example, appropriate animal handling and minimization of tissue trauma during surgery. Such techniques are important because both long-duration surgery and extensive tissue manipulation (e.g., rib retraction, prolonged tourniquet-induced limb ischemia, disproportionately long incision relative to animal size) result in increased postoperative pain. Training in proper surgical techniques coupled with knowledge of comparative anatomy is necessary to appreciate the distinct needs of each animal species before, during, and after surgery and to uphold the 3Rs principle of refinement. Moreover, nonphysiologic restraint or surgical positioning of animals may exert undue pressure on joints, nerves, or soft tissues and cause significant postprocedural pain. These sources of pain are avoidable if investigators and animal care personnel are trained to understand that *any* form of tissue pressure, damage, or ischemia is a potential cause of pain ([Martini et al. 2000](http://www.ncbi.nlm.nih.gov/books/NBK32661/#ch4.r142); [LASA 1990](http://www.ncbi.nlm.nih.gov/books/NBK32661/#ch4.r118)). Minimally invasive surgery techniques (e.g., fiberoptic technologies) reduce tissue injury and are associated with reduced postsurgical pain, stress response, and convalescence time compared to open or scalpel surgery (reviewed by [Karas et al. 2008](http://www.ncbi.nlm.nih.gov/books/NBK32661/#ch4.r100)).”

<http://www.ncbi.nlm.nih.gov/books/NBK32661/>