Blocking the transmission of painful signals via nerve fibers is one of the most effective ways of managing pain. Many techniques can be easily and safely performed in veterinary medicine including dental, declaw and epidural blocks. In addition to direct regional blockades, using lidocaine as a systemic blocking agent by constant rate infusion is becoming increasingly popular.

There has been a great deal of work recently reviving the use of local or regional analgesia. Applying analgesia directly to the affected nerve endings can provide excellent pain control while reducing the overall need for systemic drugs. Local anesthetics work by totally disrupting neural transmission of information by axons at the treatment site and provide true analgesia. This is extremely effective in managing pain associated with procedures where specific nerves can be identified such as oral surgery.

There are several blocking agents available. Choice of blocking agent is typically made based on onset of action, duration of action and route of administration:

- Lidocaine, the most widely used local anesthetic, takes effect in 3 to 5 minutes and is effective for 60-90 minutes. Lidocaine can be used topically, regionally or as an IV infusion in dogs.
- Mepivacaine (Carbocaine) has a medium duration of action 2-3 hours and fairly rapid onset of about 10 minutes.
- Bupivacaine (Marcaine) takes longer to take effect (15 to 20 minutes), but its anesthetic and analgesic effects last 6 or more hours. Bupivacaine is not effective as a topical analgesic, but is an excellent choice for local infiltration.

All local anesthetics cause vasodilation that decreases their duration of action. The duration of blocking agents can be extended by combination with a 1:200,000 dilution of epinephrine. Epi “washing” the syringe prior to drawing up local anesthesia provides sufficient vasoconstriction to extend the block and reduce bleeding in the area. Epinephrine should NEVER be used in circumferential limb block such as feline declaw.

Local anesthetics are safe if correctly administered. Most cases of toxicity in small animals occur as a result of accidental overdose or inadvertent intravenous administration. Signs of toxicity include seizures, coma, neurotoxicity, and cardiovascular collapse.

Topical
Application of topical analgesia to the surface skin or mucosa can reduce pain associated with minor procedures such as wound suturing, venipuncture, arterial puncture, nasal cannulization and urinary catheterization. Solutions of lidocaine or tetracaine with or without epinephrine can be used alone or in various combinations to provide desensitization at the application site. Gauze pads soaked with solutions can be applied directly to the site. Alternately, there are several commercially prepared topical anesthetic creams and jellies that can be applied as a thick paste however 20 to 30 minutes of direct contact time is required to insure effective analgesia.

Local Infiltration
Injection of lidocaine or bupivacaine into local tissue can reduce pain associated with various painful procedures. This technique is useful for small mass removal, digit amputation, arterial catheter placement, thoracocentesis, abdominocentesis, bone marrow sampling, etc. The entry area is infiltrated with small amounts of anesthetic prior to tissue penetration. An appropriate waiting time must be observed to insure adequate desensitization of the area as described above.

Circumferential ring block
This block is especially effective for use in cat declaws and involves SQ injections of bupivacaine or bupivacaine/lidocaine combination. Injections are made just above the carpal bend on the top side of the paw and just above the accessory carpal pad on the under side. The skin is tented horizontally and the needle in fed under the skin. Then, as then needle is withdrawn, drug is injected slowly to leave behind a “line”. When this is done on both surfaces the lines will connect creating a bracelet or ring block around the limb. This 4 injection technique provides regional nerve block sufficient to eliminate pain for up to 8 hour post surgery. The dosage is 1
cc of 0.5% bupivacaine per 10 lbs of body weight divided among the injection sites. Sterile saline can be added to achieve sufficient coverage for smaller cats.

Dental (oral) nerve block
The entire muzzle can be anesthetized by blocking the infraorbital and mandibular foramen. Mandibular and maxillary nerve blocks provide excellent analgesia for pain anywhere in the muzzle. Tooth extraction is the obvious indication for these blocks but they are also quite effective for gingival surgery, mandibulectomy, maxillectomy, jaw fracture repairs, nasal surgery or biopsy. Small amounts of bupivacaine (not to exceed 1cc of 0.5% bupivacaine per 10lbs of body weight) are injected near or into the infraorbital and mandibular foramina anesthetizing the main nerve branches. This technique is relatively easy to perform by a skilled veterinary nurse and has minimal associated risks.

The addition of epinephrine to dental blocks causes local vasoconstriction. The benefits are twofold. First, the anesthetic is held in place longer increasing its duration of action and second, local bleeding is controlled. Epinephrine can be added to the syringe by simply “washing” with epi prior to drawing up local anesthetic.

Intra-articular (joint space)
Effective analgesia in pre and post-operative orthopedic cases has been achieved by injection of local anesthetics directly into the joint space such as in cruciate ligament repair. Intra-articular morphine has also been shown to effectively reduce joint pain. The effectiveness of this technique when used pre-operatively is evident in the smooth plane of anesthesia maintained when the joint capsule is incised. This is in sharp contrast the spike in heart rate and “lightness” that is observed when the capsule in entered without anesthetic. No doubt, these responses are due to pain.

Pleural space
Interpleural bupivacaine infusion following thoracotomy surgery may have some analgesic benefit. Bupivacaine (1.5-2 mg/kg) is injected via an indwelling chest tube into the pleural space. Analgesia is thought to occur by direct blocking of the intercostal nerves. For maximum coverage, patients are held in sternal recency for 5-10 minutes post injection and gently rolled from side to side. Drug absorption through the pleural tissue should be considered. The addition of 0.1cc/10cc of NaBicarbonate may reduce the stinging sensation in awake patients.

Epidural Nerve Blocks
Injection of local anesthetics and/or opioids directly into the epidural space is a fairly simple and safe technique to provide long duration analgesia to the caudal half of the body while minimizing systemic side effects. Epidural analgesia can be very effective for managing pain associated with procedures such as cesarean sections, thoracotomies, pelvic or pelvic limb fractures, amputations, orthopedic procedures, and surgery of the tail or perineum. Successful epidurals may reduce gas inhalant as well as post op pain medication requirements. Local anesthetic epidurals provide excellent muscle relaxation and short-term analgesia. They are inexpensive and do not require the use of scheduled drugs. The disadvantages include the potential for overdose, hypotension, excessive muscle relaxation, temporary loss of motor function, and injection site discomfort. Injection is generally made at the lumbosacral junction just caudal to the termination of the spinal cord. Epidural catheters can be inserted to allow long-term analgesic administration.

Transdermal
Most recently has the Lidocaine transdermal patch (Lidoderm®) gained widespread acceptance in human medicine for management of neuropathic pain associated with back injury or surgery. Work is underway to investigate the use of transdermal lidocaine patches in veterinary medicine for specific conditions and procedures.

Intravenous
IV administration of lidocaine by constant rate infusion (CRI) is an effective technique for managing a variety of pain states. At the cardiac dose of 30-80 micrograms per kg per minute, lidocaine provides excellent analgesia for visceral pain (e.g. pancreatitis, parvo virus) as well as in procedures with extensive nerve involvement such as limb amputation. Because it is safe for use in patients with GI disturbances lidocaine is a good choice for analgesia in patients with gastric dilatation volvulous (GDV) or other similar disorders. Lidocaine seems to have benefit in patients undergoing procedures with excessive nerve trauma such as complicated back surgeries or limb amputations. IV lidocaine is extremely short acting and can be discontinued without residual effect almost immediately. Lidocaine CRI should be discontinued if the patient shows signs of toxicity including muscle tremors, seizures, nausea or vomiting.

The CRI dose for lidocaine is: Dog: 1-2 mg/kg IV followed by 30-50 ug/kg/min.
There are reported lidocaine CRI dosages for cats but typically lidocaine is not recommended for use in cats due to potential for severe cardiotoxic effects.