Possibilities in Chronic Pain Management

When it comes to chronic pain, there are many, many options.

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Pain Management

- To provide **holistic** care, veterinary hospitals must employ a **multifaceted** approach encompassing pharmacological and non-pharmacological methods, leveraging veterinary technicians for client interactions, and exploring the potential of in-house and online pharmacies.

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What type of pain are your treating?

- Veterinary medicine recognizes two distinct categories of pain: **acute and chronic.**
- Acute pain results from injuries, surgical procedures, or acute medical conditions,
- Chronic pain is often associated with long-term illnesses or age-related issues.

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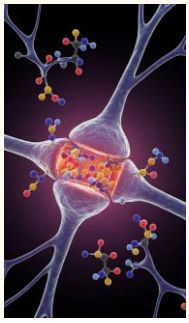
Chronic Pain Physiology

Duration: Chronic pain **persists beyond the typical healing time**, usually defined as lasting 3 to 6 months or more, often continuing even in the absence of ongoing tissue damage.

Purpose: Unlike acute pain, chronic pain often lacks a clear protective function and can become maladaptive, meaning it no longer serves the purpose of signaling current injury but instead persists unnecessarily.



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Chronic wounds

These wounds involve persistent inflammation + maladaptive neural changes. The body is no longer just responding...it's been reprogrammed.

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Chronic Pain Physiology

Pathophysiology: Chronic pain can arise from changes in both the **peripheral nervous system** (e.g., nerve damage) and the **central nervous system** (e.g., brain and spinal cord). In chronic pain, the nervous system may become "sensitized" due to prolonged stimulation.

- **Peripheral sensitization**: Injury or inflammation can cause the pain receptors and nerve endings to become more sensitive, making them more likely to send pain signals.
- **Central sensitization**: In the spinal cord and brain, neurons may become more excitable or amplify pain signals. This results in heightened pain sensitivity, where normal stimuli or even non-painful touch (allodynia) can be perceived as painful.
- **Neuroplasticity**: The nervous system undergoes structural and functional changes that sustain pain long after the original injury has healed.

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Cycle of events

Now the nervous system is amplifying signals:

Pain becomes disproportionate to the stimulus

Neuropathic component

With chronic damage:

Nerves themselves may become injured or dysfunctional

Ectopic firing, spontaneous pain, burning/tingling sensations

Pain exists even without ongoing tissue damage

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Cats Show CHRONIC Pain Through Changes in Their Behavior, Activity, Personality

Changes in Behavior

- Increased hiding
- Inappropriate eliminations
- Increased or decreased grooming
- Increased aggression/changes in temperament
- Sensitive to touch
- Decreased appetite

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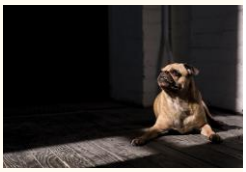
signs of chronic pain canine



Reduced Mobility: Dogs suffering from chronic pain, particularly from musculoskeletal or joint conditions (e.g., osteoarthritis), often exhibit decreased physical activity. This may manifest as reluctance to engage in previously routine behaviors such as walking, running, or jumping. This can be attributed to pain-induced inhibition of movement.

Exercise Avoidance: A marked reduction in voluntary activity or play, especially when the dog avoids specific types of exertion, is indicative of chronic discomfort, possibly stemming from degenerative or inflammatory conditions.

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Postural and Gait Changes

Limping and Lameness: A dog with chronic pain in a limb or joint may demonstrate lameness, favoring one limb over the other or showing an asymmetric gait. This is commonly seen in conditions like hip dysplasia or elbow arthritis.

Stiffness and Rigidity: A noticeable increase in stiffness, particularly upon rising or after rest, can signal chronic pain, often linked to joint degeneration or spinal pathology such as intervertebral disc disease (IVDD).

Abnormal Posture: Pain in the cervical, thoracic, or lumbar spine regions may lead to compensatory postures (e.g., a hunched back), often observed in dogs with chronic spinal conditions.

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Emotional Component to Pain

Increased Irritability or Aggression: Dogs in chronic pain may become more sensitive to handling and may display irritability or aggression, particularly when their painful regions are palpated or manipulated.

Social Withdrawal and Lethargy: Chronic pain often results in decreased social interaction and increased lethargy. Dogs may avoid previously enjoyable activities and exhibit a general decrease in interaction with family members or other pets.

Altered Interaction: A dog that previously sought attention or physical affection may become more reclusive, indicating discomfort with handling or pressure on sensitive areas.

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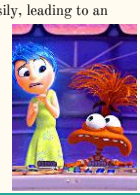
Fear, Anxiety and Stress exacerbate Pain

Prolonged anxiety reduces the brain's ability to filter out irrelevant stimuli, causing even mild discomfort to be perceived as more intense.

The brain becomes "primed" to perceive pain signals more easily, leading to an overall heightened pain experience.



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What about actually treating chronic pain?

- Research isn't as plentiful
- But MULTIMODAL is key

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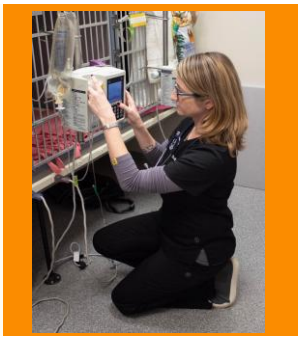
Analgesia options

Pain management should be a priority with these patients to reduce discomfort and improve quality of life.

Non-steroidal anti-inflammatory drugs (NSAIDs)
NMDA receptor antagonists
Gabapentinoids such as Pregabalin
Monoclonal antibodies

Supplements such as GLM/HA and OMEGA 3's.

Physical therapy modalities- massage and PROM



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Neuropathic pain (nerve dysfunction/damage)

What's happening:
Ectopic nerve firing
Altered signal processing
Burning, shooting, spontaneous pain

Drug classes:
Gabapentinoids
Gabapentin
Pregabalin
Tricyclic antidepressants (less common in vet med but relevant)

Mechanism:
Bind α2δ subunit of calcium channels → ↓ excitatory neurotransmitter release

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Pregabalin and analgesia

By dampening the transmission of pain signals, pregabalin helps to:

- **Decrease neuropathic pain**: This is particularly relevant in conditions like **intervertebral disc disease (IVDD)**, **nerve injuries**, and **neuropathies**.
- **Reduce central sensitization**: Pregabalin helps mitigate the process of central sensitization, where the spinal cord and brain become hypersensitive to pain signals, leading to exaggerated pain perception (e.g., in chronic osteoarthritis).

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Central sensitization ("wind-up" / spinal amplification)

What's happening:
NMDA receptor activation
Dorsal horn neurons become hyperexcitable
Pain amplification and persistence

Drug classes:
NMDA antagonists
Ketamine
Amantadine

Mechanism:
Block NMDA receptors → reduce central amplification

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Amantadine

targets central sensitization

As an NMDA receptor antagonist, it **helps reduce this abnormal pain amplification**, making it particularly useful in cases where pain persists despite appropriate anti-inflammatory and neuropathic therapy.

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Descending inhibitory pathway dysfunction

What's happening:
The brain's natural "pain brake" system is offline
Reduced serotonin/norepinephrine modulation

Drug classes:
SNRIs / TCAs
Duloxetine
Amitriptyline

Mechanism:
Increase serotonin + norepinephrine → enhance descending inhibition

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what about NSAIDS for chronic pain canine patients?

Traditional NSAIDs, such as **carprofen**, **meloxicam**, **phenylbutazone**, and **flunixin meglumine**, inhibit both **COX-1** and **COX-2** enzymes to varying degrees.

By blocking the production of prostaglandins, these drugs reduce the inflammatory response and thus **reduce pain**.

In veterinary species, chronic conditions such as **osteoarthritis (OA)**, **hip dysplasia**, and **degenerative joint disease (DJD)** often involve long-term inflammation of the joints.

In these conditions, prostaglandins contribute to **pain**, **joint stiffness**, and **swelling**. By inhibiting COX enzymes, NSAIDs help to **reduce the inflammatory component**, easing pain and improving mobility.

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EP4 receptor options- Grapiprant

Grapiprant works by selectively **blocking** the **EP4 receptor**, preventing PGE2 from binding to it. This reduces the pain and inflammation caused by PGE2 signaling via the EP4 pathway.

Unlike traditional NSAIDs that broadly inhibit COX-1 and COX-2 enzymes (which lead to the production of prostaglandins), grapiprant specifically targets the EP4 receptor, leading to a more **targeted anti-inflammatory** effect. By blocking EP4, grapiprant can **reduce pain** and **inflammation** without the broader side effects often associated with COX inhibition, such as gastrointestinal ulceration or kidney issues

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Hot/Cold Therapy

- **Cryotherapy**, the therapeutic use of ice or cold packs lowers the temperature of the injured tissue, constricting blood vessels, reducing blood flow and the tissue's metabolic rate. This can decrease inflammation and swelling.
- In general, cold packs are used in the first stage after the procedure (first few days) and later on heat packs are applied.

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Thermotherapies

Cold therapy (cryotherapy) is **most helpful when there is active inflammation**, swelling, or flare-ups. It causes vasoconstriction, which reduces blood flow, decreases edema, and helps blunt inflammatory mediator activity. In chronic wounds like lick granulomas that become acutely irritated, short periods of cold therapy can help "dial down" peripheral sensitization and discomfort.

Heat therapy (thermotherapy) is **more useful in later or more stable phases of healing.** It promotes vasodilation, which increases local blood flow, oxygen delivery, and nutrient supply to tissues. This can support tissue repair and help resolve more chronic, stagnant inflammation once infection and acute flare components are controlled.

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Laser Therapy

- The laser stimulates mitochondria for ATP photosynthesis.
- Laser therapy is non-invasive
- Requires minimal patient restraint
- Short treatment period
- Most have an acupuncture setting that you can use to stimulate acupuncture points.

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Physical Therapy Exercises

- In a passive range-of-motion exercise, the therapist creates the motion.
- An example is using gentle flexion and extension of the stifle in a postoperative anterior cruciate ligament repair patient.
- Keep in mind that it may or may not be possible to restore a "normal" range of motion depending on the lesions affecting the joint.

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Hydrotherapy

- Hydrotherapy can speed recovery after operations or slow the progression of degenerative conditions.
- It may be used as a pre-operative fitness regime in order to allow a patient to lose weight and strengthen muscles before an operation if it can not exercise normally.

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- Well-trained team members' tasks may include manual work, the use of modalities, therapeutic exercise, hydrotherapy, and client home exercise instruction.
- In addition, maximum use of the rehab team's time may be made by scheduling multiple appointments at once, with a cushion built in for the more complex cases

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Gut Biome considerations

Pro-inflammatory cytokines, which are molecules that signal inflammation, are often elevated in states of **gut dysbiosis**. These cytokines can enter the bloodstream and reach tissues outside the gut, including **joints**, **nerves**, and **muscles**, contributing to **chronic pain** through mechanisms like **central sensitization** (an amplification of pain signals).

In veterinary species, conditions such as **inflammatory bowel disease (IBD)** or **intestinal dysbiosis** may be linked to increased systemic inflammation, which could worsen conditions like **osteoarthritis** or **musculoskeletal pain**.

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NSAIDS but what else has been shown to work??? What does the evidence say?

Hielm-Björkman A, Tulamo RM, Salonen H, Raekallio M. *Evaluating Complementary Therapies for Canine Osteoarthritis Part I: Green-lipped Mussel (Perna canaliculus).* Evid Based Complement Alternat Med. 2009 Sep;6(3):365-73. doi: 10.1093/ecam/nem136. Epub 2007 Oct 29. PMID: 18955269; PMCID: PMC2722199.

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GLM products for both canine and feline patients

In some formulations green-lipped mussel, glucosamine and chondroitin are combined with eicosatetraenoic acid (ETA) which is a long-chain polyunsaturated omega-3 fatty acid, and a precursor of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

These fatty acids are known for their anti-inflammatory properties

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🐟 **Omega-3 fatty acids (EPA/DHA)**

Fish oil–derived

Compete with arachidonic acid → ↓ pro-inflammatory eicosanoids

Clinical impact:

👉 Helps "turn down the volume" of chronic inflammation

👉 Useful in otitis, dermatitis, lick granulomas

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Neuropathic / central sensitization support (emerging evidence)

🌿 Palmitoylethanolamide (PEA)

Endogenous fatty acid amide

Mechanism:

Modulates mast cells + glial cells

Reduces neuroinflammation

Clinical impact:

👉 One of the more promising supplements for chronic/neuropathic pain

👉 Can complement gabapentin/amantadine

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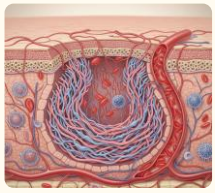
Why collagen + amino acids matter in chronic wounds

Chronic wounds (*lick granulomas, chronic otitis, non-healing skin lesions*) often get **"stuck"** in the inflammatory phase instead of progressing to repair.

Two big problems:

- **Protein breakdown > protein synthesis**
- **Poor substrate availability** for tissue rebuilding

That's where amino acids come in!



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Collagen

Provides a matrix for fibroblasts to migrate

Supports angiogenesis (new blood vessel formation)

Helps transition wounds into the proliferative phase

Supplementation (oral or topical)

Hydrolyzed collagen = broken into peptides → better absorbed

May stimulate fibroblast activity indirectly

Not a direct pain reliever—but less inflammation = less pain over time

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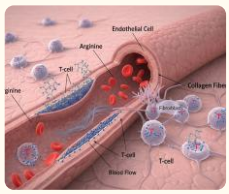
Arginine: The "Wound Healing Amino Acid"

Mechanisms of Action

- **Nitric Oxide Precursor:** Converts to NO to improve local blood flow and nutrient delivery.
- **Immune Support:** Enhances T-cell activity, critical for managing wound infection and inflammation.
- **Collagen Synthesis:** Acts as a building block for the structural matrix of new tissue.

In Chronic Wounds

- Wounds are often **deficient** due to extreme metabolic demand.
- Supplementation helps ***"unstick"*** stalled healing processes.



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Client support

home care involves giving all medications exactly as prescribed, preventing licking or chewing of the affected area (using an e-collar, recovery suit, or bandaging if directed), and following wound cleaning instructions carefully.

Progress should be monitored with photos every few days to help track subtle improvements that may not be obvious day to day.

Good nutrition supports tissue repair, and any recommended supplements are intended as supportive therapy over time.

Regular recheck appointments- treatment plans may need adjustment as healing progresses.

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