The 411 of Physical Rehabilitation
Kristen Purcell, CVT, CCRP, SAMP

Physical Rehabilitation is a combination of human physical therapy and veterinary medicine.
The goal is pain management, decreased recovery time from injuries/surgical procedures, improved strength and function, and most importantly quality of life.
This is accomplished through a multi-modal approach including proper medications and supplements, various modalities (laser, therapeutic ultrasound, etc.) manual therapy techniques, and strengthening exercises.

The Rehab Team:
The Rehabilitation Veterinarian

- Diagnoses the issue through testing such as bloodwork, radiographs, diagnostic ultrasound. If necessary, they may refer out to specialists for further diagnostic testing such as MRI's, CT scans, etc.
- Prescribe appropriate medications and supplements for pain management
- Prescribe the rehabilitation treatment plan
- If they have further credentials and training they are also able to provide additional services such as acupuncture, chiropractic adjustments, and regenerative medicine options such as joint injections, shockwave therapy, and stem cell therapy.

Physical Therapist

*You don't have to have a Physical Therapist as a part of your team, but they do offer another level of expertise that is invaluable.

- The PT is able to begin treating the patient once the veterinarian has provided a diagnosis with the appropriate test results and a completed referral form.
- The PT is able to prescribe the treatment plan then follow through with the treatments including specific modalities, massage, manual therapy, strengthening exercises, hydrotherapy, etc.

The Credentialed Rehab Veterinary Technician

The VT must have a diagnosis from the veterinarian and a prescribed treatment plan.

The treatment plan may be prescribed from either the Veterinarian or the Physical Therapist.
Once those details are established, the VT is able to perform the various services including specific modalities, massage, +/- manual therapy, strengthening exercises, hydrotherapy, etc.

State Practice Acts

*Each state practice act varies in who can do what and whether or not the VT needs to be in direct supervision of the veterinarian.
If you are planning to practice outside of Colorado I strongly encourage you to familiarize yourself with the specific state practice acts to ensure you are in compliance. For example, some states do not allow human PT's to work with animals and some states allow VT's to prescribe treatment plans as long as the diagnosis is provided.

Physical Therapy is also a protected term in human medicine. It is illegal to use it when referring to working with animals. Always refer to it as Physical Rehabilitation

When to Consider Physical Rehabilitation

Honestly, there is never a bad time to consider Physical Rehabilitation. There are the obvious times like post surgery or soft tissue injuries, but there are plenty of other times to consider as well.

It is important to ask the right questions and to listen to what the pet parent is observing at home. If you hear things like, "my pet doesn't want to jump in the car anymore" or "he has stopped going up/downstairs" If there has been a decrease in energy or interaction with the family, hanging tail, lowered head, lameness, etc. These are all red flags that the pet is experiencing some level of discomfort.

Know what lifestyle the pet has and ask the owners questions regarding their goals.
Modalities

There are a variety of modalities to consider when treating patients. We will discuss the various options, what they are, how they work, and indications vs. contraindications of each modality.

Thermotherapy

Thermotherapy is the use of superficial heat and cold as a therapeutic modality for the treatment of disease or trauma and it may be applied using many different methods.
It is one of the oldest forms of physical therapy modalities.
Superficial thermal agents are used to decrease pain, reduce swelling, promote healing, and improve flexibility.
It is the cheapest and easiest modality and is relatively safe for the owner to perform at home.

Cryotherapy

Cryotherapy is used during the acute phase after trauma or surgery, typically within the first 72 hours. It can also be used after exercise to minimize secondary inflammation.
The physiological effects include vasoconstriction, decreased blood flow, decreased swelling, reduced tissue damage, and analgesia.
The easiest type of application is ice/cold packs which include simply placing crushed ice in a moist towel or filling a plastic bag with water and rubbing alcohol at a ratio of 3:1. Once frozen it creates a slush type consistency.
Treatment time is usually 10-20 minutes and may be applied 3-4 times daily.

Heat Therapy

The effects of heat therapy are the opposite of cryotherapy excluding the fact they both relieve pain and muscle spasm.
The physiological effects include vasodilation, pain relief, increased soft tissue extensibility, and relaxation of muscle spasm.
The most common form of application is a heat pack. I strongly recommend avoiding heating pads or rice socks due to areas of extreme heat that may cause secondary burns. Instead, use a gel pack from the pharmacy. Once heated it can be mixed to evenly distribute the heat and protect the skin by placing a thin towel between the pack and patient.
Heat treatment times vary but most commonly are between 15 to 30 minutes and may be repeated 3-4 times daily.

Therapeutic Laser

LASER is an acronym for “Light Amplification by Stimulated Emission of Radiation”
This translates to light penetrating tissues via electromagnetic radiation that is monochromatic, coherent, and collimated.

Classes of Lasers typically used in the rehabilitation setting are class 3, 3b, and 4.

Classes are based on the power and wavelength of the machine.

Power is the rate of energy production and is measured in watts (joules/second).

The wavelength determines the depth of penetration and the longer the wavelength the deeper the penetration.

Light energy stimulates the energy source (ATP) of the mitochondria of cells, and increases blood flow and oxygen to the site.

Ultimately, the main reasons for use in rehabilitation are to decrease pain and inflammation, and accelerate healing.

Indications include wounds, sprains/strains, inflammation, arthritis, as well as spinal cord and nerve injuries.

Contraindications include open growth plates, neoplasia, pregnancy, epilepsy, and over the cornea.

Therapeutic Ultrasound (TUS)

TUS uses soundwaves to effect biologic tissues and the absorption is greatest in tissues with high protein content (tendons and ligaments). It is best for heating tissue 3-5 cm deep without causing damage to more superficial tissues.

Thermal effects can increase blood flow, collagen extensibility, metabolic rate, and pain threshold, in addition to decreased muscle guarding and spasm.

Parameters of treatments include frequency, intensity, and continuous/pulsed modes.

Frequency (hertz) determines the depth of the sound energy penetration. The machine offers two frequencies: 1 MHz - heating depth of 2-5 cm, or 3MHz - heating depth of 1-2 cm.

Intensity (W/cm2) determines the degree and rate of temperature increase during the treatment. The range is 0.25-3.0 W/cm2, but in my experience it is usually 1.0-1.5 W/cm2 unless it is an acute injury (which is lower intensity).

Continuous/Pulsed modes refer to the duty cycle of flow of energy. Continuous refers to a constant flow. Pulsed refers to the percentage of time energy is being emitted. Duty cycles usually range between 5-50% and are chosen when wanting none thermal or minimal thermal effects.

Indications include muscle spasm , non acute soft tissue injury such as tendinitis or iliopsoas strain, combatting scar tissue, and joint restrictions associated with periarticular structures.

Contraindications include pacemakers, pregnancy, growth plates, spinal cord after surgery, malignancy, infection sites, or bleeding.

Neuromuscular Electrical Stimulation (NMES)

NMES is most often used for muscle weakness and stimulating muscle contractions. It is often used in patients who are unable to actively contract a muscle independently.

Parameters include amplitude, pulse duration, frequency, on/off cycle, and ramp. Amplitude is the intensity of electrical wave being delivered, measured in milliamperes (mA). The level varies per the patient's response.

Pulse duration is the time of one pulse, measured in microseconds (us). 100-400 us
Frequency is the number of pulses per second, measured in hertz (Hz) 25-50 Hz

On/off cycle is the time the current is being delivered and the time it is stopped, known as the duty cycle. 1:3 or 1:5 based on the patient's response.

Ramp is the time when the current is gradually increased or decreased to improve patient comfort, measured in seconds. 2-4 seconds

Transcutaneous Electrical Nerve Stimulation (TENS)

TENS is when electrical stimulation is used for pain relief. It stimulates sensory nerves rather than motor nerves.

This technique is not often used in rehabilitation and research results are mixed in regards to how effective it is for pain relief.

Settings: Pulse 50-100us, Frequency 30-150, Amplitude dependent on patient response

Contraindications for both NMES and TENS include over the ears, pacemakers, pregnancy, neoplasia, infections, and seizures.

PEMF/Assisi Loop

Pulsed Electromagnetic Fields (PEMP) is an approved therapy by the US FDA
.
The PEMF signal target's the body's own anti-inflammatory process and stimulates nitric oxide production which accelerate the healing of soft and hard tissue such as skin, tendons, ligaments, bones, and organs.

Other benefits include reduced pain and inflammation, improved circulation, improved mobility, and no side effects.

It is a fantastic addition to a multi-modal approach. Treatments are 15 minutes long and can be performed several times throughout the day.

Therapeutic Exercise and Exercise Equipment

Therapeutic Exercises focus on proprioception, balance, muscle strengthening, endurance, and gait reeducation.

These exercises can be used by manipulating and encouraging the pet to move the body in specific ways, but can also incorporate pieces of equipment.

Proprioceptive exercises focus on stimulating the body to know where it is in space, most commonly focusing on the limbs.

Some exercises include toe pinching, sweeping paws on textured surfaces, bouncing over the pelvis, joint compressions, stepping over cavaletti poles, etc.

***Videos of exercises provided for toe pinching, paw sweeping, bouncing, and cavaletti's

Balance exercises are simply that, working on balance, stability, core, and overall strength.

These exercises can be as simple as 3 legged standing, cross legged standing, nose to ribs/hips, and Sit Up Pretty

More challenging exercises include using pieces of equipment that offer unstable surfaces such as discs, balance boards, BOSU balls, peanuts (Physioballs), etc.

*Videos for balance exercises include 3 legged standing, cross legged standing, nose ribs/hips, sit up pretty,, and stability exercises with various pieces of equipment

Muscle strengthening falls under the umbrella of every exercise and piece of equipment used.

Some exercises include Sit to stand, Backwards and side stepping, commando crawling.

*Videos for muscle strengthening exercises include tummy tickles, sit to stand, dog burpees, backwards and side stepping, commando crawling, and weight shifting

Hydrotherapy (Underwater Treadmill/Pool Swimming)

There are many benefits of hydrotherapy including:
The buoyancy of the water supports and protects the animal.
Warm water assists with muscle and soft tissue relaxation.
Hydrostatic pressure assists with inflammation and edema.
The viscosity of the water requires more effort to move through in addition to the resistance of the movement of water.

Pool vs. Underwater Treadmill

The pool allows the following:

- Completely non weight bearing
- Full active ROM
- Improved core strength
- Cardiopulmonary conditioning
- Endurance for cross training
- Facilitating PROM

The underwater treadmill allows for the following:

- Partial weight bearing
- Improved active ROM compared to land
- Proprioceptive gait training
- Improved balance while walking
- Cautious fracture loading
- Builds lean muscle in limbs
- Speeds gait reeducation