Rehabilitation Exam and Modalities in Veterinary Medicine

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Certified Canine Rehabilitation and Acupuncture Therapist
Veterinary Rehabilitation
Key Elements

- Referral And Direct Access
- Proper and Precise Diagnostics
- Heal & Stabilize FIRST
- Pain Management
- Build Muscle
- Condition
- Re-training
- Return to Function
Goals Of Veterinary Rehabilitation

- **Decrease pain and facilitate healing** of inflamed and injured neurological and musculoskeletal tissues.
- Maintain **normal range of motion** in affected joints.
- Prevent **soft tissue contracture** and fibrosis in weak or paralyzed limbs.
- Prevent further **disuse atrophy** of affected musculature during the healing process of neurological and musculoskeletal tissues.
- **Improve strength and function** of affected limbs.
- Maximize post-surgical **recovery and return to function** of the patient.
- Provide **positive psychological effects** for the patient and owner.
Veterinary Rehabilitation Services

- **Small Animal Orthopedics and Surgery**
  - Pre Operative Rehabilitation
  - Post Operative Rehabilitation
  - Soft Tissue Injury
  - Pain Management

- **Canine Sports Medicine**
  - Conditioning
  - Nutrition
    - Supplementation
  - Gait Analysis
  - Sport Rehabilitation

- **Alternative Therapy**
  - Non-surgical
  - Non-pharmaceutical
  - Pain Management
Rehabilitation Consultation Exam
Reasons For Referral

- **Post Surgical**
  - RACL, FHO, Elbow

- **Soft Tissue Trauma**
  - Partial RACL, Tendinopathies, Strains/Sprains

- **Multiple Problems, Arthritis**
  - Hips, Spine, Muscle Atrophy, Muscle Spasm

- **Performance Issues**
  - Work Effects on Muscles
  - Conditioning
Rehabilitation Exam
Examination and Diagnostics

- History/Patient’s Job
  - Seizures
  - Cancer
  - Heart Condition/ Pacemaker

- Gait Analysis
  - Lameness Evaluation
  - Gaitrite/Gait4Dog

- General Physical Exam
  - Underlying Medical Issues
    - Cardiac/Respiratory
    - Dermatologic
Gait Analysis

**Pressure Platforms**

- Newer technology
- Measure both temporal and spatial gait parameters
- Multiple readings in a single pass
- Function using a sensor pad that is an ultra thin (~0.1mm)
- Thousands of pressure sensing locations, or elements, arranged in rows and columns
- Allows one to measure ground reaction forces in the z-force direction
- Sensors pressure ranges
  - from as low as 0-5 psi to as high as 0-25,000 psi
Gait4Dog Gait Analysis

[Image of a data sheet with measurements and a photograph of a person walking with a dog on a walkway with markers.]
Gait Analysis

Pressure Platforms

Advantages:
- No size restrictions
- Stride and step length
- Limb placement
- Multiple readings in a single pass
- User friendly software
- Portable

Disadvantages:
- Can only measure total GRF (not x-, y-, and z-directions)
- Mat not as durable
- Cost
Gait4Dog GLS Lameness Analysis
Examination and Diagnostics

- **Neurological Exam**
  - Dorsal / Ventral Mobilizations
  - Transverse Mobilizations
  - Deficits

- **Orthopedic Exam**
  - Goniometry
  - Muscle Circumference

- **Diagnostics**
  - Radiographs
  - Musculoskeletal Ultrasound
  - MRI
Goniometry-Record Every 4 weeks

<table>
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<th>Position</th>
<th>Mean</th>
<th>SD</th>
<th>95% CI of the mean</th>
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<td>Extension</td>
<td>162</td>
<td>3</td>
<td>160–164</td>
<td>162</td>
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</table>

CI = Confidence interval.

Jaeggerr, Marcellin-Little  
AJVR, Vol 63, No. 7, July 2002
Goniometry Hindlimb
Goniometry Front Limb
Muscle Circumference
Record Every 4 Weeks
Forelimb Muscle Circumference
Rehabilitation Modalities
Physical Rehabilitation Modalities

- Therapeutic Ultrasound
- NMES
- TENS
- LASER
  - Class 3B
  - Class 4
- Pulsed Magnetic Field
- Shock Wave Therapy
- Cryotherapy
- Thermal Therapy
- Manual Therapy
- Underwater Treadmill
- Swimming
Therapeutic Ultrasound

- Sound Waves = Pressure Waves
- Reverse Piezoelectric Effect - Contraction or expansion of a crystal in response to voltage across its face
- Effects
  - Heating = Thermal
  - Non-Heating = Non Thermal

2003 J Ultrasound Med 22:145-153 • 0278-4297,
Steiss, JE, Proceedings of 2nd International Symposium on Rehabilitation and Physical Therapy in Veterinary Medicine, Aug 2002
Properties of Therapeutic Ultrasound

- **Acoustic Streaming** - Mechanical pressure wave causes movement of fluids along the boundaries of cells. Changes ion fluxes and cellular activity. Increases cell membrane and vascular wall permeability.

- **Stable Cavitation** – Pulsing of gas bubbles within the sound field without much increase in overall amplitude. Results in diffusional changes along the cell membrane, thus altering cell function.

- **Unstable Cavitation** – Violent collapse of bubbles within the sound field which results in tissue destruction and blood vessel damage.
Biological Effects of **Non Thermal Therapeutic Ultrasound**

- Accelerate Healing
- Aid in Tissue Regeneration
- Soft Tissue Repair
- Protein Synthesis
- Swelling Reduction
- Bone Repair
- Reduction in Muscle Spasm and Pain

Physiological Effects of **Thermal** Therapeutic Ultrasound (Continuous)

- Increased Metabolic Rate
- Increased Enzyme Activity
- Increased Circulation
- Increased Extensibility and Viscoelastic Properties of Tissues
- Decreased Pain
- Increased Tissue Temperature = Increase Blood Flow = Mild Inflammatory Response
Biological Effects of Thermal Therapeutic Ultrasound

- All of Non Thermal, Healing Effects Plus……..
- Increased Joint Range
- Reduced Joint Adhesions
- Increased Tissue Healing (Chronic)
- Increased Collagen Extensibility
- Decreased Muscle Spasms
- Resolution of Chronic Inflammatory Processes
- Tendon Repair, Reduces Scar Tissue
Indications
Therapeutic Ultrasound

- Muscle Spasm
- Trigger Points
- Bursitis
- Calcified Tendons
- Chronic Synovitis
- Joint Swelling

- Muscle/Tendon Strains
- Ligament Sprains
- Adhesions, Contractures, Scars
- Fracture Healing

Contraindications

Therapeutic Ultrasound

- Neoplasia
- Infection
- Areas of reduced pain sensation
- Eyes, Heart, Viscera, Laminectomy Site
- Seizure disorders

Cutaneous burn caused by therapeutic ultrasound

Applications
Therapeutic Ultrasound

- Bicipital Tenosynovitis and Supraspinatus Tendinopathy
  - Acute or Chronic
    - Pulsed = Acute
    - Continuous = Chronic
  - 4-8 weekly treatments
  - Combined with laser, mag.field, manual therapy, home exercises
  - DO NOT USE if stem cells
Applications
Therapeutic Ultrasound

- Gracilis Muscle Contracture (continuous)
  - 4-8 weekly treatments
  - Combined with intense manual therapy, stretching
  - Variable Results
Applications
Therapeutic Ultrasound

- Post Operative Femoral Head Ostectomy (FHO)
  - 4-12 weekly treatments
  - Start w pulsed, work up to continuous (increase flexibility)
  - Combined with Laser and mag. Field, aqua-therapy
  - Intense manual therapy and Home Exercise Program
  - Can be performed prior to activity, stretching or UWT
Extracorporeal Shockwave Therapy (ESWT)

- High Energy Sound Waves
- Pulses
  - Higher energy output
  - Deeper Penetration
  - Stimulate body’s healing process similar to other modalities
- Requires heavy sedation/anesthesia
Shockwave Applications

- Arthritis
- Regenerative Medicine
  - Pre-treatment for stem cell therapy
- Gracilis Muscle Contracture
- Frozen Shoulder
  - Fibrosis of tendons and ligaments of joint
- Shock Wave and Bone Healing
  - Advances rate of TPLO osteotomy site healing

The effect of autologous endothelial progenitor cell transplantation combined with extracorporeal shock-wave therapy on ischemic skin flaps in rats.
_Zhang X1, Yan X1, Wang C1, Lu S1, Tang T2, Chai Y3._
Neuromuscular Electrical Stimulation (NMES)

- Use of an electrical current to stimulate muscle tissues located under a stimulation patch
- Electrical current facilitates a muscle contraction of a particular muscle or muscle group

Levine, D., Millis, D. Proceedings of 1st International Symposium on Rehabilitation and Physical Therapy in Veterinary Medicine, Aug 1999
NMES Indications

- Improper Muscle Firing Sequences
- Muscle Disuse Atrophy
- Circulatory Disorders
- Tendon and Fracture Healing
- Facilitate Normal Contraction of a Muscle Post Injury or Disease

- Pain
- Protective Muscle Spasm
- Neurological Atrophy
  - Weekly treatments lasting months to year
  - Combined with Laser, mag.field, water therapy, manual, home exercises
NMES Contraindications

- Contraindications
  - Skin Infections
  - Neoplasia
  - Seizure Disorders
  - Active Inflammation
  - Decreased Pain Sensation
Trans-Cutaneous Electrical Neuromuscular Stimulation (TENS)

- Utilizes different frequencies for pain relief and anti-inflammatory effects
- Treat both acute pain and chronic pain
- Stimulate release of endorphins into blood stream and cerebral spinal fluid
- Acupuncture Points
- Effects of pain relief
  - Believed to be short
  - More support of longer effects
Canine Applications
TENS

- IVDD
- Paraspinal Muscle Spasm
- LS disease
  - 4 weekly treatments to control pain and spasm
  - Monthly treatments to maintain
  - Combined with Laser, mag. field, massage, traction, stretching exercises
Canine Applications

TENS

- Joint Effusion/Pain
  - Stifle/Elbow
    - Post Operative
    - Partial CCL Tear
      - 4 weekly treatments
      - Combined with Laser, mag. Field, manual, exercises
  - Arthritis
    - Above with monthly maintenance
Microcurrent Massage

- Low Volt Pulsed Microamp Stimulation
- Works with millionths of an ampere
- Subsensory – Cannot be felt as compared to TENS or NMES
Microcurrent Massage
Physiological/Biological Effects

- Increases ATP by 500%
- Increases Protein Synthesis
- Increases Waste Product Removal
- Increases Amino Acid Transport

- Promotes Healing
- Softens Scar Tissue
- Increases Circulation
- Increases Cellular Metabolism
- Relieves Pain
- Increases Lymphatic Flow
Microcurrent Massage Applications

- **Indications**
  - Arthritic Joints
    - Hip Dysplasia
    - Elbow
  - Muscle Spasms

- **Treatment Protocol**
  - Weekly treatments until pain resolved and increased range of motion
  - Combined with Laser and magnetic field for their anti-arthritic properties
  - Home exercise Program
  - Monthly maintenance
Use of light energy to affect underlying tissues

Influence lymph, circulation, nervous system and wound/surgery healing

Acupuncture/Trigger Points

Therapeutic window 600-1000nm

Dyson, M. Proceedings of 1st International Symposium on Rehabilitation and Physical Therapy in Veterinary Medicine, Aug 1999
Light/Laser Therapy

- Wavelengths of light (nm)
  - Determine potential depth of penetration into tissue
  - 800nm
    - <scatters into tissue
    - >absorbs→heat
- Cells have unique light absorption wavelengths
Therapeutic Wavelengths

Defines the range of wavelengths where light has its maximum depth of penetration in tissue

- Skin (600-700nm)
- Connective tissue (700-800nm),
- Muscle and spinal cord (750-850nm),
- Blood (800-900nm)
- Nerves (900-1100nm)

Wavelength pre-determines depth and target tissue penetration

POWER DOES NOT

LLLT units in Class 3B range have enough power to drive all currently known important therapeutic tissue wavelengths.
LASER Classes

- **Class 1** <0.5mW no heating, no healing, visible and non-visible, used for some pointers, car entry and remotes
- **Class 2** <1mW visible, non-heating/healing
- **Class 3a(3R)** 1mW to 5mW, eye caution
- **Class 3b 5mW to 500mW (Most Therapeutic lasers)**
  - $$$
  - Healing, target tissue depends upon the wavelength (600-1000 nm)
  - Most research based on Class 3b
  - Eye Danger
- **Class 4 lasers** - traditionally “cutting”, “surgical”, “hot” lasers >500mW. $$$$$
  - New class of Lasers 4A developed as high powered ‘cold’ lasers. Current research is improving!!
  - Eye and tissue danger
Laser Debate Discussion

CLASS 3B
- Cost – Less Expensive
- Most laser research use class 3b
- Low probability of tissue destruction
- Always direct placement of probe
  - Depresses tissue
  - Decreases energy absorption into blood

CLASS 4-HI POWER(10W+)
- Cost – More Expensive
- No specific research showing class 4 better than 3B
- Now current specific Class 4 research
  - Key Opinions – Better Efficacy
- Can easily damage tissue if not used correctly
  - Education on use negates risk
- Most have to be waved over site to avoid thermal effects
  - Companion Laser Direct Contact
- Power does not solely dictate depth

BUT….in combination, light propagation in tissue as a function of wavelength and applied skin Power Density (brightness) does assist in precise depth delivery.
PhotoBioModulation

- Light exciting or activating cells
- Using light to produce beneficial effects on animals

Assumptions:

- Absorption of at least one photon by mitochondrial chromophores is required to initiate the PBM cascade
- Mitochondria chromophores absorb light throughout the visible and near-infra-red (NIR) spectrum
- Mitochondria of different cells, e.g., neurons, glia, fibroblasts, muscle, etc., all have the same “initial response” to a photon absorption
PHYSICS IN PHOTOBIOMODULATION

INPUT BEAM PARAMETERS
Beam Diameter: 20mm (Gaussian $1/e^2$)
Power (W): 0.5, 5, 15

EPIDERMIS – 1mm Thick
DERMIS – 2mm Thick
FAT – 3mm Thick

Enough power?? at this level to continue to drive the light into its target tissue depth
For PBM to be **EFFECTIVE**

“ENOUGH” Photons must reach the Target Tissues, **AND** ...

... be absorbed by Target Tissue chromophores ...

**NIR wavelengths**
For PBM to be **EFFECTIVE**

“ENOUGH” Photons must reach the Target Tissues, **AND** ...

... be absorbed by Target Tissue chromophores ...

**WITHOUT** DAMAGING the Coat or “intervening tissues” of Skin / Fat / etc. ...
TAKE AWAY FROM the Physics of Light Transport in Tissue

DESIGNING a Practical, Safe, and Effective PBM Device Requires Considering ...

“Depth” of the Target Tissues to be treated ...
✓ Animal’s Size and Weight
Take AWAY FROM the Physics of Light Transport in Tissue

DESIGNING a Practical, Safe, and Effective PBM Device Requires Considering ...

COMPANION’S “PERFECT PROTOCOL” must travel to reach the target tissues ...

✓ Animal’s Skin Color
✓ Animal’s Fur Color and Thickness ...
Class 4 laser burns

- Incorrect settings
- Incorrect treatment probes
- Depending on brand
  - Occurs when probe not continuously moved around
- Education on Use
LASER
Physiological Effects

- Changes cell membrane permeability
- Increase ATP levels
- Increase cellular proliferation
- Increase collagen synthesis
- Increase myofibroblast activity
- Alters Pain Threshold

Dyson, M. Proceedings of 1st International Symposium on Rehabilitation and Physical Therapy in Veterinary Medicine, Aug 1999
Edge-Hughes, L. Canine Rehabilitation Program Module Two Program Design, April 2005
LASER
Biological Effects

- Accelerates inflammation stage of wound healing
- Enhances immune cells to combat invading pathogens
- Increases vascularity of healing tissue
- Decrease in micro-organisms
- Pain reduction due to endorphin release
- Fibroblast productions
- Cartilage Stimulation
- Acceleration of collagen synthesis

Great Reference

The New Laser Therapy Handbook
Jan Tuner & Lars Hode
Prima Books
**LASER**

**Indications/Contraindications**

**Indications**
- Tendon/Ligament Injuries
  - Shoulder Tendinopathies
- Muscle Strain
  - Iliopsoas, Gracilis
- Muscle Spasm/Trigger Points
- Wounds (OK for infections)
- Edema
- Arthritic Disorders
- Carpal, Stifle, Hip
- Tendonitis, Bursitis, Fasciitis, Capsulitis

**Contraindications**
- Epiphyseal Plates
- Injection areas
- Neoplasia
- Active Hemorrhage
- Eye, Heart, Viscera

Laser Treatments

- Muscle Spasm/Trigger points
  - Weekly treatments when secondary to injury
  - Combine with massage and manual therapy
  - Use as maintenance, help treat and prevent precursors to injury, post trial treatment
Laser Treatments

- **Wounds**
  - 1-2 times weekly until resolved

- **Iliopsoas**
  - 4-8 weekly treatments
  - Combined with rest, massage, PROM, home exercises

- **Arthritis**
  - Weekly treatments until pain resolved then maintain
Effect of low-level laser irradiation on osteoblast proliferation and bone formation.

Low-level laser therapy in meniscal pathology: a double-blinded placebo-controlled trial.
Malliaropoulos N, Kiritsi O, Tsitas K, Christodoulou D, Akritidou A, Del Buono A, Maffulli N.

Low-level laser therapy (LLLT) in human progressive-intensity running: effects on exercise performance, skeletal muscle status, and oxidative stress.
De Marchi T, Leal Junior EC, Bortoli C, Tomazoni SS, Lopes-Martins RA, Salvador M.

Red (660 nm) and infrared (830 nm) low-level laser therapy in skeletal muscle fatigue in humans: what is better?
Effect of phototherapy with light-emitting diodes (890 nm) on tendon repair: an experimental model in sheep
Luiz Henrique Lima de Mattos · Luis Emílio Cunha Ávila · Ana Lídia Mihazzé Yamada · Carlos Alberto Hanoni · Celso Antonio Rodrigues · Marcus Joa Watanabe · Ana Líza Garcia Alves

Low-level laser therapy in IL-1β, COX-2, and PGE2 modulation in partially injured Achilles tendon
Julio Fernandes de Jesus · Diva Denelle Spadacci-Morena · Nayara Deise dos Anjos Rabelo · Carlos Eduardo Pinfildi · Thiago Yukiho Fukuoka · Helio Plagé

Synergistic effects of ultrasound and laser on the pain relief in women with hand osteoarthritis
Alessandra Rossi Pauillo · Fernanda Rossi Pauillo · Jessica Patrícia João · Herbert Alexandre João · Vanderlei Salvador Bagnato

Fluence-dependent effects of low-level laser therapy in myofascial trigger spots on modulation of biochemicals associated with pain in a rabbit model
Yun-Chi Huang · Chang-Zern Hong · Li-Wei Chou · Shih-An Yang · Chen-Chia Yang

Effect of high-intensity laser therapy in the management of myofascial pain syndrome of the trapezius: a double-blind, placebo-controlled study
DOI 10.1007/s10313-014-1634-0

Effects of low level laser therapy on attachment, proliferation, and gene expression of VEGF and VEGF receptor 2 of adipocyte-derived mesenchymal stem cells cultivated under nutritional deficiency
Tabata Saaten de Oliveira · Audrey Jorge Serra · Martha Trindade Murchíski · Vitória Basancon · José Eduardo Krüger · Paulo de Tarso Camillo de Carvalho · Daniela Espíndola Antunes · Danilo Sales Baraishi · Paulo José Ferreira Tocci · José Antônio Silva Jr

Phototherapy with combination of super-pulsed laser and light-emitting diodes is beneficial in improvement of muscular performance (strength and muscular endurance), dyspnea, and fatigue sensation in patients with chronic obstructive pulmonary disease
Eduardo Focchiini Miranda · Luís Vincente Franco de Oliveira · Fernanda Calella Antoniali · Adriana Azer Vasín · Paulo de Tarso Camillo de Carvalho · Ernesto Cesar Pinto Leal-Junior
Magnetic Field Therapy

- Mechanism of Action – Unknown
- Damaged Cells→Altered Membrane Rest Potential→Ion Exchange→Oxygen Utilization
- Altered oxygen utilization found in delayed healing and arthritic joints
- Ions are influenced by the rhythm of pulsation
- Magnetic pulsation returns Ion Exchange and Oxygen Utilization back to normal

Steiss, JE, Proceedings of 1st International Symposium on Rehabilitation and Physical Therapy in Veterinary Medicine, Aug 1999
Magnetic Field Therapy
Physiological/Biological Effects

- Enhanced cartilage repair
- Tendon Fibroblasts increase collagen synthesis
- Stimulates cell proliferation, GAG synthesis

Steiss JE, Proceedings of 1st International Symposium on Rehabilitation and Physical Therapy in Veterinary Medicine, Aug 1999
Magnetic Field Therapy

Indications

- Bone Healing
- Inflammation
- Muscle Spasm
- Disorders of Neurological System
- Arthritis
- Circulatory Diseases

- Post Operative Inflammation
- Infection
- Pain
- Degenerative Diseases
- Burns and Wounds
- Neuropraxia

Relaxation!!
Simple & Inexpensive Modalities
Cryotherapy
Mechanism Of Action/Physiological Effects

- Constriction of Blood Vessels – Decrease local circulation
- Decreased tissue metabolism may inhibit inflammatory mediators
- Reduces nerve conduction – Decrease pain
- Decrease Tissue extensibility
Cryotherapy
Indications

- Pain Relief
- Inflammation
- Reduce Swelling
- Hemorrhage
- Fever
- Acute injury
- <24-48 hours (if hot still use ice)
Cryotherapy Precautions

- Impaired Circulation
- Impaired sensation
- Hypertension
- Directly Over Acute wounds 1-2 weeks
Thermal Therapy
Mechanisms of Heat Exchange

- **Conduction** – Direct Contact – Heating Pads
- **Convection** – Circulating air or water
- **Radiation** – Warm to Cool – Infrared Lamp to skin
- **Conversion** – Energy is altered – Therapeutic Ultrasound
- **Evaporation** – Fluid changes to vapor - Perspiration
Thermal Therapy
Physiological Effects

- Increase Local Circulation
- Decrease Pain
- Increase Tissue Extensibility
- Decrease Muscle Spasm
- Muscle Relaxation
Thermal Therapy

Indications

- Pain Relief
- Increase Circulation
- Prepare stiff joint or muscle for exercise
- Chronic Edema
- Muscle spasm
- Facilitate tissue healing
- Tissue Scarring
- >72 hours
Thermal Therapy
Contraindications

- Areas with Poor Circulation and Decreased Pain Sensation
  - Skin/Tissue burns
- Cancerous lesions

www.firstcoastnews.com orangecountyregister.com
Massage Therapy Techniques

- Opening/Closing
  - Effleurage
  - Compression

- Locating TrP, MTrP
  - Palpation
  - Zig Zag

- Treating
  - Direct Pressure
    - Trigger Point Release
  - Cross Frictional Massage

- Myofascial Release
Manual Therapy

- **Joint Mobilizations**
  - Definition: passive by the therapist, slow, patient can stop the movement, oscillatory or sustained, aimed at decreasing pain and/or increasing mobility
  - Maitland Scale Grade I-V
  - Exception - Grade V = Manipulation
    - High Velocity, low amplitude at Limit of Range

- **Joint Manipulations**
  - Definition: high velocity, low amplitude thrust (non-oscillatory) performed by the therapist
  - Maitland Grade V – Chiro - Adjustment

Digit Mobilization/Manipulation
Manual Therapy

**Accessory Movements**
- Joint Lubrication, Pain Relief, Aid for Full ROM
- Glide
  - Same point on one articular surface encounters new points on opposing articular surface
  - Move the joint surface parallel to the treatment plane
- Compression
  - Decreased space between articular surfaces
  - Move the joint surface perpendicular to the treatment plane
- Traction
  - Separation of bony surfaces

**Physiological Movements**
- Stretching/PROM

Tomberlin & Saunders, 1995; Hertling & Kessler, 1996
Carpus and Scapula Mobilization
Most Famous Veterinary Rehab Modality
Hydrotherapy
Properties of Water

- **Buoyancy**
  - Decrease joint load

- **Hydrostatic Pressure**
  - Reduce Edema
  - Decreases hypersensitive pain receptors

- **Resistance/Viscosity**
  - Strengthening
  - Cardiovascular
  - Sensory Awareness
Hydrotherapy Benefits

- Increased Mobility and Flexibility of muscles
- Increased Range of Motion of Joints
- Full Body Workout/Conditions
- Re-Education of Balance
- Increases Overall Circulation - Heat
- Pain Relief - Heat
<table>
<thead>
<tr>
<th>Swimming</th>
<th>Under Water Treadmill</th>
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<tbody>
<tr>
<td>Strengthens Muscles with little pressure on joints</td>
<td>Strengthens Muscles with regulated pressure on joints</td>
</tr>
<tr>
<td>Uncontrolled Gait</td>
<td>Controlled Gait</td>
</tr>
<tr>
<td>Limited Range of Motion of Certain Joints</td>
<td>Increase Range of Motion of Joints</td>
</tr>
<tr>
<td>Good Neuro Benefits</td>
<td>Great Neuro Benefits</td>
</tr>
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Underwater Treadmill Therapy Variables

- Water Depth
- Speed
- Turbulence
- Temperature
- Assistance Devices
Underwater Treadmill Therapy
Water Depth

- **Carpus** (91% weight bearing)
  - Increase ROM of carpus and hock
- **Elbow** (85% weight bearing)
  - Significant Resistance
  - Minimal Buoyancy
- **Shoulder** (38% weight bearing)
  - Greatest Buoyancy
  - Minimal Load

Underwater Treadmill Therapy

Speed

- **0.1-0.6 MPH**
  - Neurological Patients
- **1.0-2.0 MPH**
  - Warm up Athletes
  - Post Surgical
- **2.2-5.0 MPH**
  - Advanced Patients
  - Conditioning

Jurek, C., McCauley, L. Hydro-Treadmill Therapy as an Adjuvant to Clinical Practice
Underwater Treadmill Therapy

- 30-34.4 °C (86-94°F)
- Jets
  - Resistance
  - Therapeutic
- Assistance Devices
  - Walk A Bouts
  - Noodles
  - Floaties

Hydrotherapy Contraindications

- Unregulated Heart Failure
- Respiratory Dysfunction
  - Disease
  - Brachiocephalic breeds
- Skin Infections
- Open Wounds
- Diarrhea – Pool Contamination
Integrative Therapies

- Acupuncture/Acupressure (TENS, Laser)
- Chiropractic/Veterinary Ortho Manipulation (Direct)
- Osteopathy/Cranio-Sacral (Indirect)
- Reiki (Energy)
- Homeopathy
- Nutraceuticals/Herbal Medicine
  - Cosequin/Dasuquin
  - Omega 3’s, MSM
- Aromatherapy
A Good Nutraceutical

- Basic Science Evidence
- In-Vivo Evidence of Efficacy
  - Preferable in species
- Approved Source
  - Specific research showing gets to area needing treatment
- Product actually has content

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Nutraceuticals

Stages of Therapy

- Prophylactic / Prevention
  - Dasuquin
    - Glucosamine/Chondroitin/ASU/MSM
  - Welactin
    - Omega – 3 fatty acids
  - Oral HA products
    - Current research
- Early intervention
  - Dasuquin/MSM/Welactin
  - Post surgical
    - Proviable – Probiotic
    - Intestinal health
  - UWT
    - Crananidin
    - Urinary tract health

- Maintenance / End stage treatment
  - Management of current osteoarthritis (OA)
  - Weight Management
    - Quinicarn
    - L-Carnitine
    - Weight loss
  - NSAIDS
    - Liver Supplements
      - Marin/Denamarin
      - SAME
      - Milk Thistle
      - Vit E
      - Zinc
Rehabilitation Plan

- Modalities
- Frequency
- Session Time
- 4 week treatment plan
- Stair Step/Additive Improvement
Treatment Session

- Quiet/Relaxing
- +/- Owner Present
- Aromatherapy/Music
- Orthopedic Cushion/Mat
- Low lighting
- Treats
- Magnetic Field Therapy Blanket
Home Exercise Program

- **Exercise Restrictions!!!**
- **Ice/Heat**
- **Therapeutic exercises**
  - 2-3 sessions/day
- **PROM**
- **Stretching**
- **Strengthening**
- **Healing Occurs ➔ Build**
  - ↑ Repetitions
  - ↑↑ Time of static weight bearing exercises
- **Retraining**
  - Intro movements common in sport
- **Graduating/Return to Function**
Long Term Plan
Conclusion

- Weekly Reassessments
- Gait Analysis
- Formal Rechecks
  - Every 4 weeks
  - If not progressing normally
  - Before return to function
- Continued Care/Athletes
  - Bi-monthly
  - Every 1-2 Months
  - Maintenance
- Re-Training
  - Dr. Chris Zink
  - Sports Retrainer
- Discharge
THANK YOU