PAIN MANAGEMENT in the CANINE PATIENT

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PART 8

Exercise Therapy & Chronic Pain

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Exercise Therapy

- Exercise Induced Hypoalgesia (EIH) is a recognized phenomenon
- Its mechanism of action is not entirely clear.

Exercise Therapy

Healthy Subjects

- Exercise Induce Hypoalgesia has been readily studied in healthy subjects with experimentally induced pain (ischemic, pressure, thermal and electrical).
- But is may not translate to the PAINFUL subject

Exercise Therapy

Healthy Subjects

- With *Aerobic Exercise*; Duration and Intensity appear to be important components to EIH:
  - High-intensity and Longer duration
    - (i.e. 70% VO_2 Max x 30 minutes)
    - Reduce pain ratings
    - Improved pain tolerance

Janal et al 1984; Hoffmann et al 2004; Ruble et al 2005; Bement et al 2009

Exercise Therapy

Healthy Subjects

- With Strengthening Exercises; Intensity & Duration are also important for EIH:
  - 80% max voluntary contractions to exhaustion: decrease pain ratings
  - 25% of max voluntary contraction held to failure yielded the greatest pain reduction
  - Low-intensity contractions must be held for a longer
  - Fatigue is not necessary for EIH

Bement 2009

Exercise Therapy

Painful Subjects

- Systematic reviews show exercise to be beneficial for a variety of pain conditions including:
  - neck pain
  - chronic low back pain
  - pelvic pain
  - Osteoarthritis
  - patellofemoral pain
  - intermittent claudication
  - Fibromyalgia
  - rheumatoid arthritis
  - tendonitis

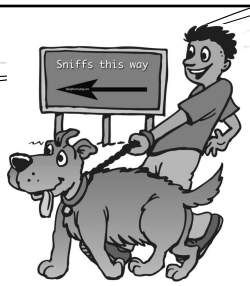
Hoeger Bement 2009

Exercise Therapy

Painful Subjects

- Many painful individuals cannot tolerate the high-intensity protocols that produce hypoalgesia in healthy adults.
  - Consequently, low-intensity programs such as walking are frequently recommended
  - The role of intensity is not clear in people with pain conditions.
- Note: Subjects with pain may experience and initial increase in pain followed by decreases in pain with regular exercise

Exercise Therapy



Painful Subjects

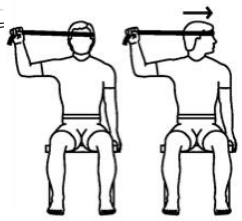
- Osteoarthritis Pain:
  - high- and low-intensities = equally effective
  - different types of exercise = beneficial (e.g. stretching, strengthening, walking, aquatics, cycling, and Tai Chi).
- Acute bouts of exercise therapy do not yield hypoalgesia over the long term (> 6 months)
- Regular exercising and/or periodic evaluations and 'booster-sessions' do obtain long-term pain benefits (as exercise adherence is better).

Exercise Therapy

Painful Subjects

- Women with fibromyalgia:
  - Experience EIH with aerobic exercise compared to stress management, but there are more benefits when the two are combined
  - However, they have an increase pain with isometric contractions

Exercise Therapy



Painful Subjects

- Chronic neck pain
  - Better managed by strength training rather than general fitness training
  - General fitness training could be used in early rehab to produce short-term pain relief
  - Exercise combined with mobilization/manipulation, and exercise alone demonstrated either intermediate or long term benefits for mechanical neck disorders.

Exercise Therapy

Painful Subjects

- Chronic low back pain:
  - May improve with high intensity aerobic exercise such as cycle ergometry (arm bike).
  - Lumbar stabilization exercise and/or lumbar extensor strengthening may improve pain.

Exercise Therapy

How does it work??

Exercise Therapy

Mechanisms of Exercise Induced Hypoalgesia

- Support for activation of the opioid system
  - Hypoalgesia is not localized to the exercising body part
  - β-endorphins are found in plasma (released from the pituitary gland)
  - β-endorphins are found in CSF (released from hypothalamus)

Exercise Therapy

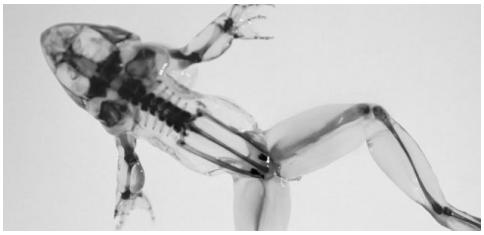
Mechanisms of Exercise Induced Hypoalgesia

- Support for Non-opioid EIH mechanisms
  - All three components of the *biopsychosocial model* of pain modification can be addressed with exercise…

Exercise Therapy

Mechanisms of Exercise Induced Hypoalgesia

- Biopsychosocial:
  - Bio:
    - Disease activity and overall physical condition are two biological factors that exercise can modify
    - Instability and poor alignment may produce mechanical abnormalities that activate nociceptors



Exercise Therapy

Mechanisms of Exercise Induced Hypoalgesia

- Biopsychosocial:
  - Psycho:
    - A persons' emotional status and pain coping skills.
    - "A runner's high" refers to the elevation in mood that frequently accompanies higher-intensity-exercise.
    - Exercise of moderate intensity enhances mood for 3 – 24 hours following exercise.

Exercise Therapy

Mechanisms of Exercise Induced Hypoalgesia

- Biopsychosocial:
  - Social:
    - Social support and response of one's' spouse, family, & friends

Exercise Therapy

Mechanisms of Exercise Induced Hypoalgesia

- Theories pertaining to non-opioid EIH:
  - Gate control theory:
    - Exercise activates large afferent fibres producing hypoalgesia and supports the idea that even general increases in physical activity can improve pain.

Exercise Therapy

Mechanisms of Exercise Induced Hypoalgesia

- Theories pertaining to non-opioid EIH:
  - Exercise activates the corticospinal tract to reduce pain:
    - Activation of the corticospinal tract decreases spinothalamic tract neuron responsiveness in the dorsal horn of the spinal cord and produces presynaptic inhibition.
    - Therefore any form of exercise could increase activity of the corticospinal tract to decrease sensitization of dorsal horn neurons thus reducing pain.

Exercise Therapy

Mechanisms of Exercise Induced Hypoalgesia

- Theories pertaining to non-opioid EIH:
  - Stress induced analgesia:
    - Changes in anxiety levels have been implicated in modulating levels of pain
    - However, changes in anxiety levels alone do not explain exercise-induced analgesia

Exercise Therapy

Mechanisms of Exercise Induced Hypoalgesia

- Theories pertaining to non-opioid EIH:
  - Cardiovascular response:
    - Changes in blood pressure may reduce pain
    - Exercise increases blood pressure
    - The influence of blood pressure changes on pain is not entirely clear

Exercise Therapy

Exercise Prescription

- Exercise should be regarded as a prescription, just as one would be prescribed medication.
- There is a correct type, dose and timing.
- Exercise progression is gradual, adding only one factor at a time: duration, rate (speed), frequency, or load.
- AND these factors will be different for each patient

Exercise Therapy

Exercise Prescription

- Considerations:
  - Warm up and cool down is extremely important.
  - Avoid rapid or major changes in intensity level.
  - Start with a program at a low intensity and gradually increase the activity level.
  - Spend more time at each level (frequency, duration, intensity).
  - Avoid bodily contact games, rapid or complicated movements, sharp turns, excessive competition and environmental extremes (heat, cold, altitude).

Exercise Therapy

- Exercise
  - It's likely important to add some sort of exercise prescription to your pain management protocol.
  - Advise wisely!!