The Effect of Cryotherapy on Inflammation and Myofiber Regeneration following Acute Skeletal Muscle Injury: A Critically Appraised Topic

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Introduction

Goals of the presentation

• Clinical Scenario
• Search Strategy
• Quality Assessment of the Evidence
• Clinical Bottom Line
• Implications for Practice, Education, and Future Research
Clinical Scenario

- Skeletal muscle injuries occur at an incidence rate between 10 - 55% (Hotfiel, 2018)
- Signs of inflammation
  - Pain
  - Heat
  - Redness
  - Loss of function
  - Swelling
Clinical Scenario

- Is inflammation after acute muscle injury bad?
  - No!

Clinical Question: In patients with acute skeletal muscle injury, how does treatment with cryotherapy compare to no treatment impact the inflammation process and myofiber regeneration?
Cryotherapy

**Purpose:**
- Decrease pain
- Decrease inflammation
- Decrease secondary hypoxic injury (Bleakley, 2019)

**Types**
- Ice bags/packs
- Cold water immersion
- Whole Body Cryotherapy
Wound healing process

- Skeletal muscles heal in 4 overlapping phases (Sass 2018, Laumonier 2016, Li 2018)
  - **Hemostasis**
    - Stop the bleeding
  - **Inflammation**
    - Clear area of damaged tissue
  - **Proliferation**
    - To repair damaged tissue
  - **Remodeling**
    - Develop final scar tissue formation
- Guided and regulated by:
  - Cytokines
  - Growth Factors

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**Search strategy**

**PICO**
- **Patient/Population**
  - Patients with acute skeletal muscle injury
- **Intervention**
  - Cryotherapy
- **Comparison**
  - No treatment (sham)
- **Outcome**
  - Changes in inflammatory markers, growth factors, myofiber regeneration

**Sources/Search Terms**
- MEDLINE
- Search Terms: Search included the keywords, “cryotherapy” or “Ice” or “cold therapy” and “muscle recovery” or “muscle damage” or “muscle regeneration” and “growth factor.”

**Inclusion/Exclusion Criteria**
- **Inclusion**
  - Articles that investigated direct comparison between cryotherapy and placebo for muscle recovery after muscle damage
  - Articles with inflammatory markers and/or growth factors
  - Evidence that is level 2 or higher
  - Published after 2010
- **Exclusion**
  - Articles published before 2009
Results of Search

- 4 Total Studies
  - 1 Randomized Control Trial
  - 3 Translational Animal Studies
- Key findings
  - All 4 of the studies showed a significant decrease in inflammatory cytokines and growth factors after the use of cryotherapy compared to a control group.
  - 3 of the 4 studies showed no significant difference in myofiber regeneration between the cryotherapy group and the group with no treatment.
  - 1 of the 4 studies showed a decrease in myofiber regeneration in the cryotherapy group when compared to no treatment.
Quality Assessment

- SYRCLE risk of bias tool for animal studies
- PEDro Scale

![Quality of Reporting Diagram](chart1)

![Risk of Bias Diagram](chart2)
Cryotherapy does not accelerate myofiber regeneration and even shows that it may decrease the wound healing process when compared to no treatment. (Zembron-Lacny 2018, Singh 2017, Takagi 2011, Ramos 2016)
Future Research

- Human participants
- New modalities for treatment of soft tissue injury
- Set cryotherapy protocol
- Studies that investigate effects of cryotherapy on tendons, ligaments and bone
Different approach for the treatment of acute soft tissue injury is needed

**PEACE**
- Protection
- Elevation
- Avoid anti-inflammatories
- Compression
- Educate

**LOVE**
- Load
- Optimism
- Vascularization
- Exercise

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