Learning Session. June 2016 COLD WITH INTERMITTENT COMPRESSION THERAPY FOR ORTHOPEDIC RECOVERY IN THE ELITE ATHLETE AND EVERYDAY PATIENT

Learning Session Provided By



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The Role of Rehab In Orthopedic Recovery

 Surgeons and Physicians are increasingly recognizing that the quality of post-surgery/post-injury rehabilitation is a critical factor in successful outcomes



Peter Millett, MD Steadman Clinic, Vail CO

"A patient's recovery is impacted by three things: motivation of the patient, the type of surgery performed, and the rehab that is done. With the Game Ready System, we can positively affect the rehab part of the equation. Patients recover at least 20% faster ... it varies from patient to patient"

Game Ready® Is Award-Winning Technology

- 22 US patents
- 2014: Won the UK's prestigious Sports Technology Award
- The judges described it as *"a fantastic product that rapidly increases the recovery process, giving athletes the best possible chance to get back on track".* Source: sportstechnologyawards.com





Dec 2015 Issue: Training Secrets Of Aging Pro Athletes

3. They Recover as Intensely as They Play

Getting off the plane after every away game, Steve Smith, 36, makes sure to call his wife — not just to say hello, but to remind her to prepare his favorite recovery tool, his Game Ready. Hugely popular among pros, the \$2,500 device is a compression sleeve for armsorlegs, which is filled with ice water that circulates in variable levels of compression. The cold and compression reduce inflammation, which helps reduce musclesoreness, repair micro-traumas, and lower the chance of injury. Most athletes wear the device for 30- or60-minute sessions.





"Without a doubt the best surgeries are made even better by the best rehab tools and regimens. For my patients, Game Ready is a huge part of a faster, better recovery"

Kenneth Akizuki, MD SOAR, San Francisco CA San Francisco Giants Baseball, Team Physician

Nashville Sports Medicine and Orthopedics

Orthopedic Surgical Consultant, Various MLB Clubs



J W Thomas Byrd, MD

"We call Game Ready 'the athlete's best friend, because of its popularity and critical role in a more effective recovery"



S

Christian McCaffrey, Stanford's Mr. Everything



This being Stanford ... football players get no special accommodations. Three raised beds stand on an old brown carpet. McCaffrey's is against the far wall, under a Breaking Bad poster and next to a <u>Game Ready icer</u>. (McCaffrey pretends he is impervious to physical ailments, but coaches say his success is due in part to commitment to recovery, in particular icing and sleep.)



- 'Take Me Home' Rental Model
- Prescription (Class II device)
- Device designed for ease of use
- Used for many types of surgeries, injuries and patients



Learning Session Contents

- Musculoskeletal Injury & Conditions Quick Facts
- The Sports Injury Model
- Evolution Of Treatment Principles
 - Cryotherapy
 - Intermittent Compression
- The Game Ready[®] Injury Treatment System
- Post Market Clinical Studies for Game Ready® Cold And Compression Therapy

Musculo-skeletal Injuries & Conditions: Quick Facts

- Sports Injuries requiring medical attention: 4.5 Million
- Physician visits for KNEE problem: 12 Million
- Physician visits for SHOULDER problem: 7.5 Million
- ACL cases per year: 200,000
- Office visits for Musculo-skeletal conditions: 132 Million
- Most common causes of musculoskeletal injury
 - Falls
 - Military
 - Sports
 - Workplace
- Lost Work Days: 440 Million
- Number of Orthopedic Surgeons: 20,000



Source: AAOS. aaos.org

Goal

Improve <u>Speed</u> And <u>Quality</u> Of Recovery To Return Player To Competition As Soon As Possible







- CELLS PLOOD VESSELS HEMATOMA NERVES
- 1. Cryotherapy and Sport Injury Management. KL Knight. Indiana State University.1995

Sports Injury Model¹: Physiological Response

Torn nerves send pain signals to brain	•	SIGNS:
Hematoma presses on undamaged pain neurons		Hurting
PAIN RESPONSE	i.	Nausea
Body protects the injury to prevent further damage	•	SIGNS:
'SPLINTS' THE INJURY		Muscle spasm
		Inhibition of muscular strength
		Reduction in range of motion
Chemicals send signal to body -	•	SIGNS:
"There is an injury. Remove this hematoma"		Redness
INFLAMMATORY RESPONSE		Heat
		Pain
		Swelling: Edema
		Loss of function

1. Cryotherapy and Sport Injury Management. KL Knight. Indiana State University.1995

Sports Injury Model¹: Inflammatory Response

INFLAMMATORY RESPONSE

Hemodynamic Change

Blood vessels activate to increase overall blood flow; leukocytes adhere to endothelium (blood vessel walls)

Permeability Change

Gaps appear in blood vessel walls in preparation for leukocytes to move through to injury site

Leukocyte (White Blood Cell) Migration

Neutrophils and macrophages move to the injury site. Aggressive enzymes are released which may destroy healthy tissue

Phagocytosis

Leukocytes digest cellular debris and foreign materials and remove them via the lymph system. This process causes edema



Edema accumulates because the lymphatic system depends on external forces such as a muscle contraction to squeeze on it and move fluid upstream toward the junction with the blood system

1. Cryotherapy and Sport Injury Management. KL Knight. Indiana State University.1995

Secondary Injury Model¹

- Primary traumatic damage leads to further tissue damage, around the primary injury. This is known as secondary Injury
- Caused by
 - Slower blood flow in the injured area; Hematoma and debris
- 2 Types of Secondary Injury
 - Secondary Ischemic Injury (Formerly Hypoxic Injury)
 - Lack of oxygen; Lack of fuel/nutrients; Inadequate waste removal
 - Enzymatic Injury
 - Enzymes breaking down waste/debris may also digest live cells
- Further research is being carried out

1. Cryotherapy and Sport Injury Management. KL Knight. Indiana State University.1995

Evolution Of Treatment Principles and Technology



P/PROTECTION = BRACING. SPLINTING ETC

Cryotherapy: Evolution

1. Cold Therapy (Ice)



2. Cold + Static Compression





3. Active Cold + Intermittent Compression (ex: Game Ready[®])



Cryotherapy: Theorized Effects

• Reductions In²

- ↓ Tissue/Joint Temperature
- ↓ Hematoma due to vasoconstriction
- ↓ Inflammatory Response
- ↓ Blood Flow
- ↓ Edema
- ↓ Cellular Metabolic Rate/Demand
- ↓ Muscle Spasm
- •↓ Pain
- Minimize Secondary Injury

2. Physical Agents In Rehabilitation. MH Cameron. Samuel Merritt College, Oakland CA. 2003



Limitations Of Ice and Cold Packs:

Traditional ice and/or cold therapies such as ice bags and cold packs:

- Deficiencies of current solutions:
 - Inconsistent temperature
 - Uncontrolled temperature
 - Begins to warm when applied
 - Poor coverage of the injured area
 - Topical effect: limited depth effect; risk of skin damage
 - Leaking: risk of wound infection



Limitations Of Static Compression

Traditional wraps and bandages:

- Deficiencies of current solutions:
 - Lack of control of precise application of pressure
 - Provides static pressure which may restrict blood flow to healthy tissue
 - Treats symptoms, does not assist the body's own healing systems
 - Will not remove edema which is already present



Static compression with an ace bandage

Problems Caused By Edema³

• Prolonged edema is clinically relevant and can compromise desired rehabilitative outcomes, as it results in:

- Pain
- Joint Stiffness
- Loss of joint range of motion
- Loss Of Tissue Motion
- Reduced wound closure



- Scar Adhesions (fibrin around the injury site)
- Continued edema in the interstitium can lead to scar tissue
- Prolonged high protein edema can cause an environment receptive to infection

3. Treatment Of Post-Surgical Edema In The Orthopedic Patient – A Case Report. J Rodrick. Vital Care Therapy Services. Morris, IL. 2006

Intermittent Compression: Background and Solution

- Acts like a natural muscle contraction, creating pressure in tissue space and stimulating the lymph system to remove edema
- Enhances the effect of cryotherapy contouring cold around the injured area





Game Ready[®] Injury Treatment System

- Active cryotherapy with intermittent pneumatic compression
- Settings controlled to individual tolerance
 - Temperature
 - Pressure
 - Time
- Automatic On/Off cycles for easy application of R-I-C-E protocols (30 mins on-30 off or 30 on-60 mins off)
- Portable system with a battery pack



Game Ready® Injury Treatment System

- Delivers gentle, uniform, controllable cooling with intermittent compression through a series of wraps
 - Comfortable, anatomically designed with 360° coverage
 - Ability to pause treatment, quickly remove hose while leaving the wrap on the body, reapply wrap and re-start treatment
- Dry delivery with no leakage
- Can be used over dressings



'Active' (Moving) Cold: Technology

- Game Ready[®] wraps are based on NASA flexible garment technology
- Circulates ice cold water in a low profile wrap around specific joints and injuries
- Adjustable cooling level to personal tolerance
 - 34° F to 50° C (1° C to 10° C)
 - Change in 2°F (1°C) increments
- Patented microdot technology offers high treatment efficacy
- Fast circulating cold carries heat away





Intermittent Compression Enhances Cold

Head to head infrared thermal imagery shows that Game Ready[®]'s patented active compression technology enhances the delivery of cold therapy, helping Game Ready[®] to provide faster, deeper, and longer lasting cold than other cryotherapy products.

** Side view shown. First skin temperature measurement immediately after completing 30 minutes of treatment, and subsequent images at ten and thirty minutes post treatment. All devices applied per Manufacturer's instructions and all measurements taken from uniform distance. All devices applied on different days allowing full recovery for "test joint."



Intermittent Compression: Effectiveness

- Game Ready® Adjustable Intermittent Pneumatic Compression (IPC):
 - 15 75 mm Hg
 - Controlled to personal tolerance
- IPC
 - Mimics effect of muscle contractions
 - Stimulates the lymphatic system to remove edema, accelerating the body's natural recovery process
- Lymphatic Drainage Of Breakdown Products (Metabolites)
- Improved Microcirculation
 - Nutrient flow
 - Oxygenation
- Improved Venous Return





step 8

Select pressure and time settings in Manual Mode or select a program in Program Mode.

Press the play/pause button to start.



Sources: Van Grinsven KSSTA 2010 Dahl J Orthop Res 2007 Knobloch Am J Sports Med 2008 Capps Human Kinetics 2009

Cold And Intermittent Compression Contraindications

- Contraindications for cold include patients who have:
 - Vascular impairment in the affected region
 - Acute Paroxysmal Cold Hemoglobinuria
 - Cryglobulinemia
- Contraindications for compression devices include patients who have:
 - Inflammatory Phlebitis
 - History or risk of DVT/Pulmonary Embolus
 - Arteriosclerosis or other vascular ischemic disease
 - Decompensated hypertonia
 - Conditions in which increased venous or lymphatic return is not desired
- There are contra-indications for the Game Ready® system. Read the user manual and review the contra-indications carefully prior to use

Game Ready® Post Market Clinical Studies

- There are four Game Ready® clinical studies which demonstrate that the device is clinically effective
- These clinical studies point to 9 different Game Ready® specific clinical benefits
- There are also many case studies and testimonials (level 5 expert opinion) explaining the benefits of Game Ready®



Game Ready® Clinical Study Results

- 1. Reduces patient narcotic consumption A,C,D
- 2. Allows earlier discontinuation of narcotic pain meds ^B
- 3. Improves key measurable physical therapy milestones A,D
- 4. Increases patient satisfaction with recovery process A, D
- 5. Reduces likelihood for blood transfusion ^D
- 6. Shortens patient hospital admission time D
- 7. Provides less wound discharge D
- 8. Reduces risk of infection ^D
- 9. Decreases pain ^{B,D}



Game Ready® Clinical Studies Referenced

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- B. Waterman, B., Walker, J.J., Swains, C., Shortt, M., Todd, M.S., Machen, S.M., & Owens, B.D. (2012). The Efficacy of Combined Cryotherapy Compression Compared with Cryotherapy Alone Following Anterior Cruciate Ligament Reconstruction. The Journal of Knee Surgery 25 (02): 155-160
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Thank You!

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Presentation References

- 1. Cryotherapy and Sport Injury Management. KL Knight. Indiana State University.1995
- 2. Physical Agents In Rehabilitation. MH Cameron. Samuel Merritt College, Oakland CA. 2003
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