TEMPRA TECHNOLOGY INC.
BRADENTON, FL • 34203
www.tempratech.com

UTILIZATION SUMMARY AND CASE STUDIES FOR TEMPRA TECHNOLOGY'S WARM MOIST HEAT - EQUINE THERAPY SYSTEM

BACKGROUND: Warm moist heat can be utilized to treat a number of conditions in the equine athlete.

Starting with the hard tissues, there are great benefits from the application of deep penetrating heat to the traumatized or chronically inflamed joint. There is an analgesic effect, an increase in the circulation to the area and decrease in the viscosity of the joint fluid. All these benefits will speed the healing process of a traumatized joint and allow an improvement in the chronic joint.

The tendinous and ligamentous structures will also benefit from warm moist heat. Since these structures are composed of dense fibrous connective tissue arranged in longitudinal rows, any trauma, edema, degeneration, scarring or laceration thereof will greatly decrease the tensile strength, extensibility, and elasticity of these tissues. Heat is the best way to increase this tissue's extensibility and elasticity. The consequential vasodilation will bring in nutrients and oxygen to the repairing cellular structures as well as facilitate the removal of tissue waste from the repair processes and reduce the subsequent edema. The increased extensibility coupled with the analgesic effect from the heat will allow nonrestrictive movement therefore not allowing adhesions to form around these structures that would later restrict their function.

Muscle tissue will relax and become more flexible after the application of therapeutic heat. The analgesic effect of heat will decrease pain and allow a muscle that is in a state of spasm to finally relax. The vasodilation will allow an increased flow of nutrients and oxygen allowing for an increase in the healing processes. Therapeutic heat will allow greater tissue extensibility, greater flexibility and a decrease in the stiffness.

PREVENTION: Pre-event warm-up has become an important aspect of sports medicine. Performance can be increased by 10-15% which, in itself is significant. Therapeutic heat can play an important part in this warm up. Specific areas of muscle, joint or tendon will become pain free, more flexible, elastic and more extensible. This will allow for greater performance and a decreased chance for injury to these tissues.

TREATMENTS:

Joints:

1. Pre-Event -Application of 2 warm moist heat packs, laterally and medially for 15 to 20 minutes prior to exercise.
2. Chronic or acutely injured - Application of 2 warm moist heat packs laterally and medially for 30 minutes twice per day. This may be combined with cold packs; alternating treatments throughout the day.
3. Post-Event - Application of 2 cold packs, laterally and medially, for 10 to 20 minutes after exercise.

Tendons and Ligaments:

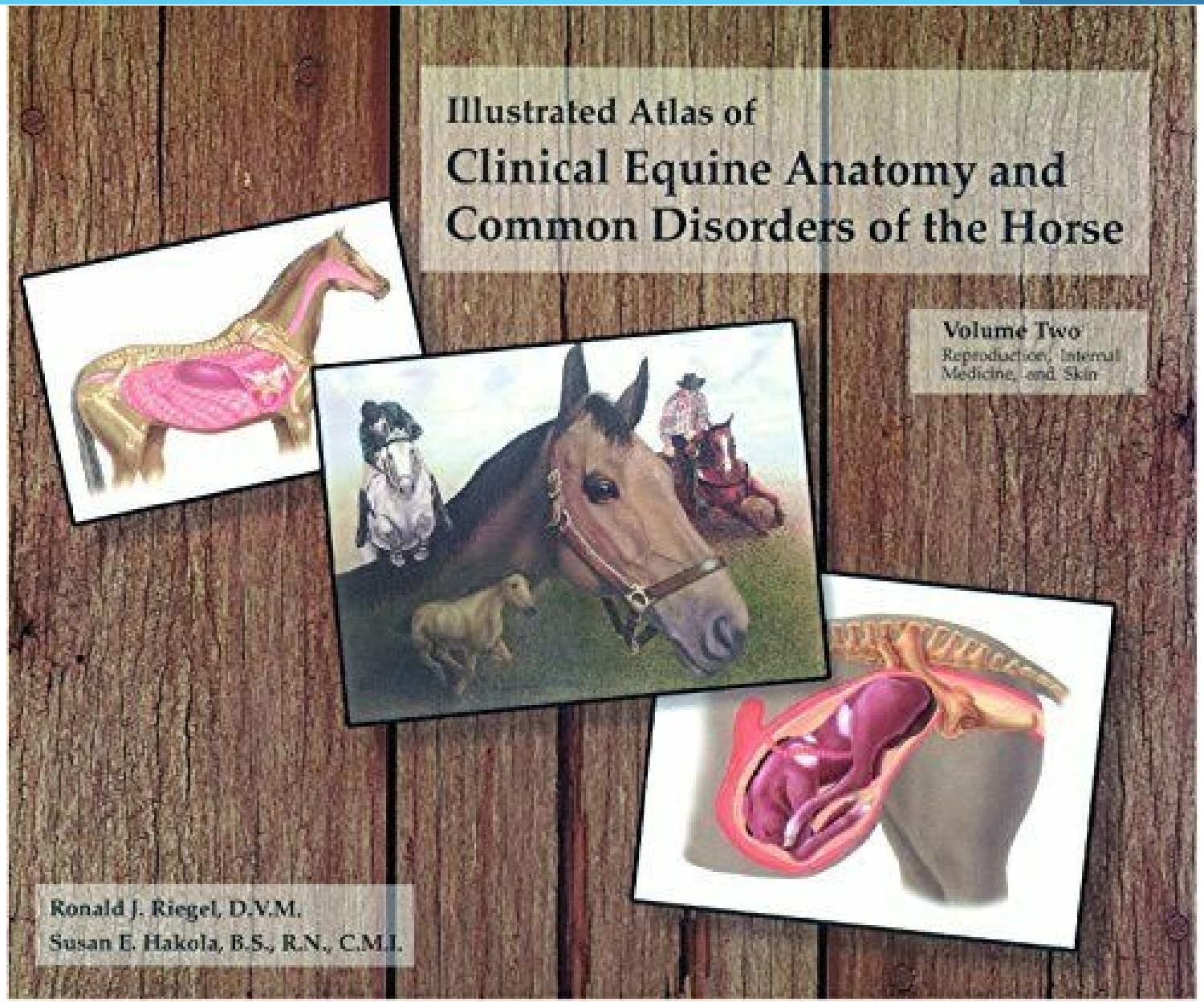
1. Pre-Event - Application of 2 to 4 warm moist heat packs, laterally and medially, depending on the desired treatment area. for 20 minutes prior to exercise to prevent injuries such as bowed tendons, bucked shins, suspensory and ligament injuries.
2. Acute or chronic Injuries: Initially, 2 to 4 packs are applied to the affected area three times per day. As the treatment progresses, this is reduced to a twice a day application.
3. Post-E vent - Initially a brief treatment, 5 to 1 0 minutes with cold therapy and then when the animal is cooled out, a 20 to 30 minute application with warm moist heat using 2 to 4 packs.

Muscle Tissues:

1. Pre-Event - Primarily the back, longisimus, the shoulders, the gluteals, the semi-membranosis and semi-tendinosis and gastrocnemius muscles will benefit from 4 to 8 packs for thirty to forty minutes before exercise.
2. Acute or Chronic Injuries: Three or four treatments per day using 4 to 8 packs per treatment each lasting 30 to 40 minutes. Unless the injury is really in the acute phase, there would be little benefit to cold therapy.
3. Post-Event - After the animal is cooled out, an application of 4 to 8 packs for thirty minutes will allow a good level of therapeutic heat to these tissues.

SUMMARY: Heat versus cold; an age-old basic quandary. The only reason the therapeutic heat has not been utilized more frequent is that until Tempra Technology's warm moist heat packs were developed, there hasn't been an economical and effective and portable way to apply warm moist heat. Veterinarians and Equine Physical Therapists now have a source of therapeutic heat and only the limitations of their current knowledge will limit the number of uses for this new product.

Source: Illustrated Atlas of Clinical Equine Anatomy and Common Disorders of the Horse
Ronald J. Riegel, D.V.M., Susan E. Hakola, B.S., R.N., C.M.I.



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INFRARED THERMOGRAPHS
CASE #1

A four year old standardbred pacer with 18 starts this year. Record of 1:58 1/5 on a 5/8 track. This animal was diagnosed with tarsitis and has been injected intra-articularly with hylauronic acid eight weeks ago. The day before the race and eight hours before the race, Butler Heat Packs to provide warm, moist heat were applied over both hocks and kept there until cool. The following thermographs were taken the day before this animal raced.

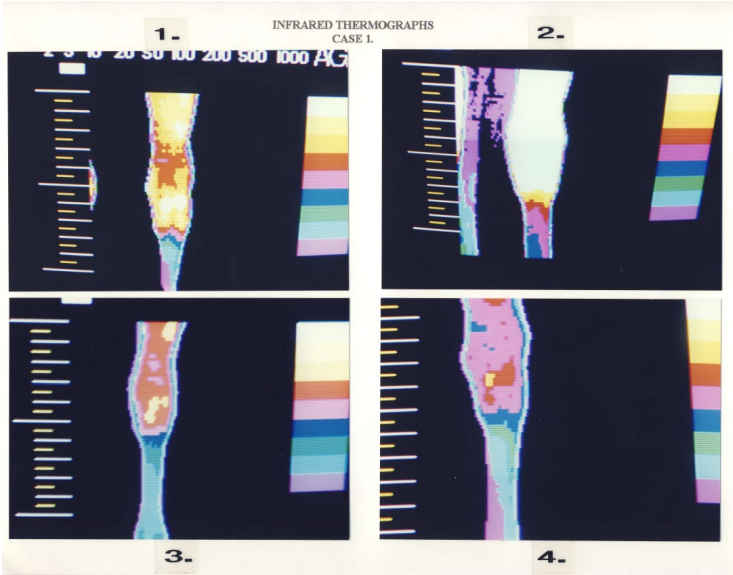
1. Initial thermograph of the left hock depicting an increased thermal gradient throughout this anatomical area with a particularly increased isothermic level within the joint spaces.

2. This infrared thermograph was taken immediately post treatment and as expected, it depicts a large increase in thermal gradient throughout the area of application.

3. This was taken four hours post treatment and this represents a decrease in all of the isothermal gradients throughout the entire anatomical area.

4. This thermograph was taken 24 hours post treatment and these thermal measurements reveal a greatly decreased thermal gradient throughout the entire area.

The animal was wrapped again with two Heat Packs placed over each hock eight hours before post time. The animal drew the fifth post position and finished second in a time of 1:59 1/5.



INFRARED THERMOGRAPHS
CASE #2

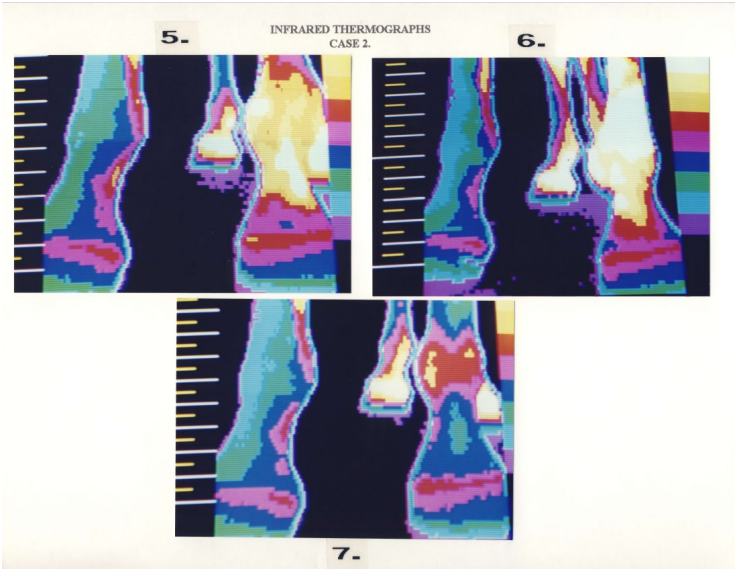
This animal is a six year old jumper that has jumped 3'6" to 4'2" most of the season. Competition is approximately every three to four weeks with training three times per week over fences while the rest is flat work. Radiographically and ultrasonically the anatomical areas of the right front ankle are clean. However, after jumping an increased thermal gradient is noted on the thermograph due to the conformation of the right front foot. After jumping, the animal exhibits some tenderness upon flexion of this joint. The morning after a competition in which the horse jumped four rounds, thermographs were taken of the right front ankle and Butler Heat Packs (moist) were applied until the Wrap was cool to the touch. The following series of thermographs were taken:

5. Initial thermograph which depicts an increased thermal gradient throughout the ankle.

6. This thermograph was taken immediately post treatment and reveals a large increase in the thermal gradients throughout the area.

7. This thermograph was taken six hours post treatment and measures the generalized decrease in thermal gradients throughout the tissues.

The animal six hours post treatment was no longer positive to a flexion test of this right front ankle.





METACARPAL DISORDERS

Dorsal Metacarpal Disease: "Bucked Shins"



Direction of concussive force.



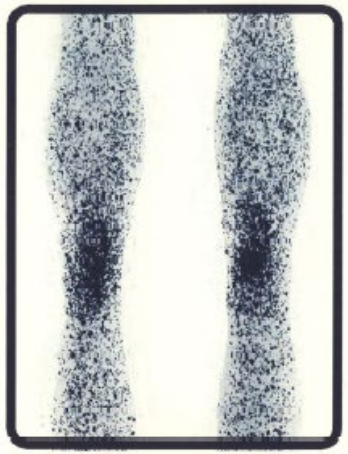
Subperiosteal bone formation and resultant inflammation creates a convex silhouette



Infrared thermography showing increased thermal gradient.



Radiograph showing subperiosteal bone formation. Microfractures are too small to be seen.



Nuclear scintigraphy showing increased radioisotope uptake in areas of subperiosteal bone formation and microfractures.









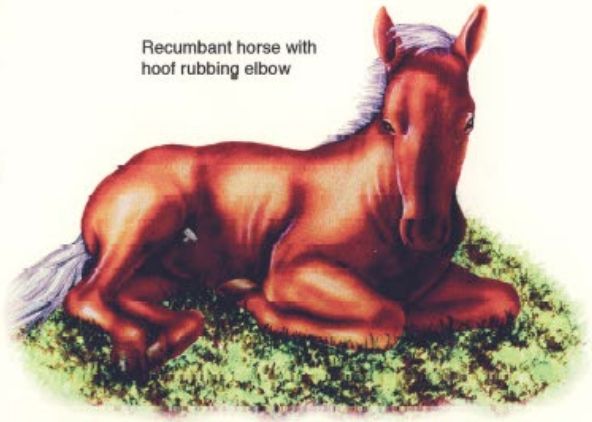


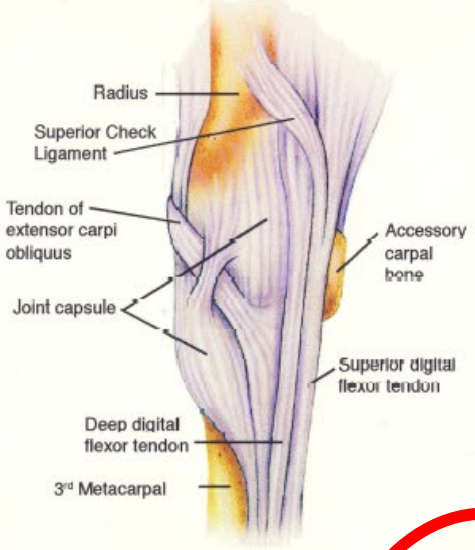
Corrective shoeing with pad.

FORELARM DISORDERS

Hygroma of the Elbow, Superior Check Ligament Strain

Hygroma of the Elbow "Shoe Boil"





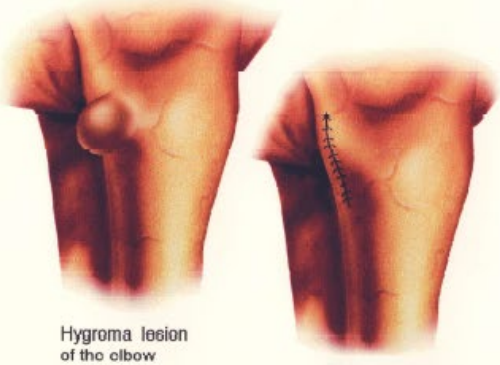


Infrared thermograph showing an increased thermal gradient in area of superior check ligament.



Radiograph showing active periostitis in regions of the superior check ligament.

Superior Check Ligament Strain



Hygroma lesion of the elbow

Surgical incision after removal of hygroma



Lesion in superior check ligament

3rd Metacarpal

Diagnostic ultrasound for superior check ligament strain



Before exercise, heat

Cold water therapy after exercise



Topical application of capsaicin ointment

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