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MULTIMODAL THERAPIES TO TREAT CHRONIC ARTHRITIS IN THE FETLOCK OF A RETICULATED GIRAFFE *(Giraffa camelopardalis reticulata)*

Melissa McCartney
Alison Mott
Sacramento Zoo

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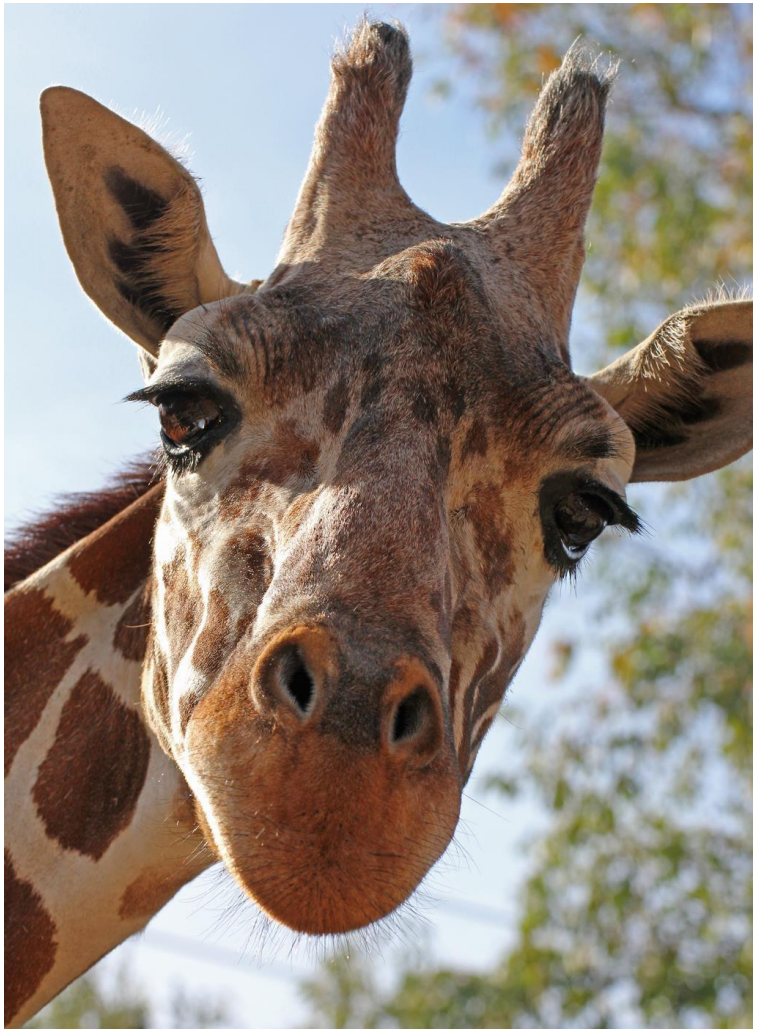

DISCLAIMER

The Sacramento Zoo does not promote routine free contact with giraffes, but moved to modified free contact in this particular case to facilitate the best possible care for the giraffe while being conscious of keeper safety.

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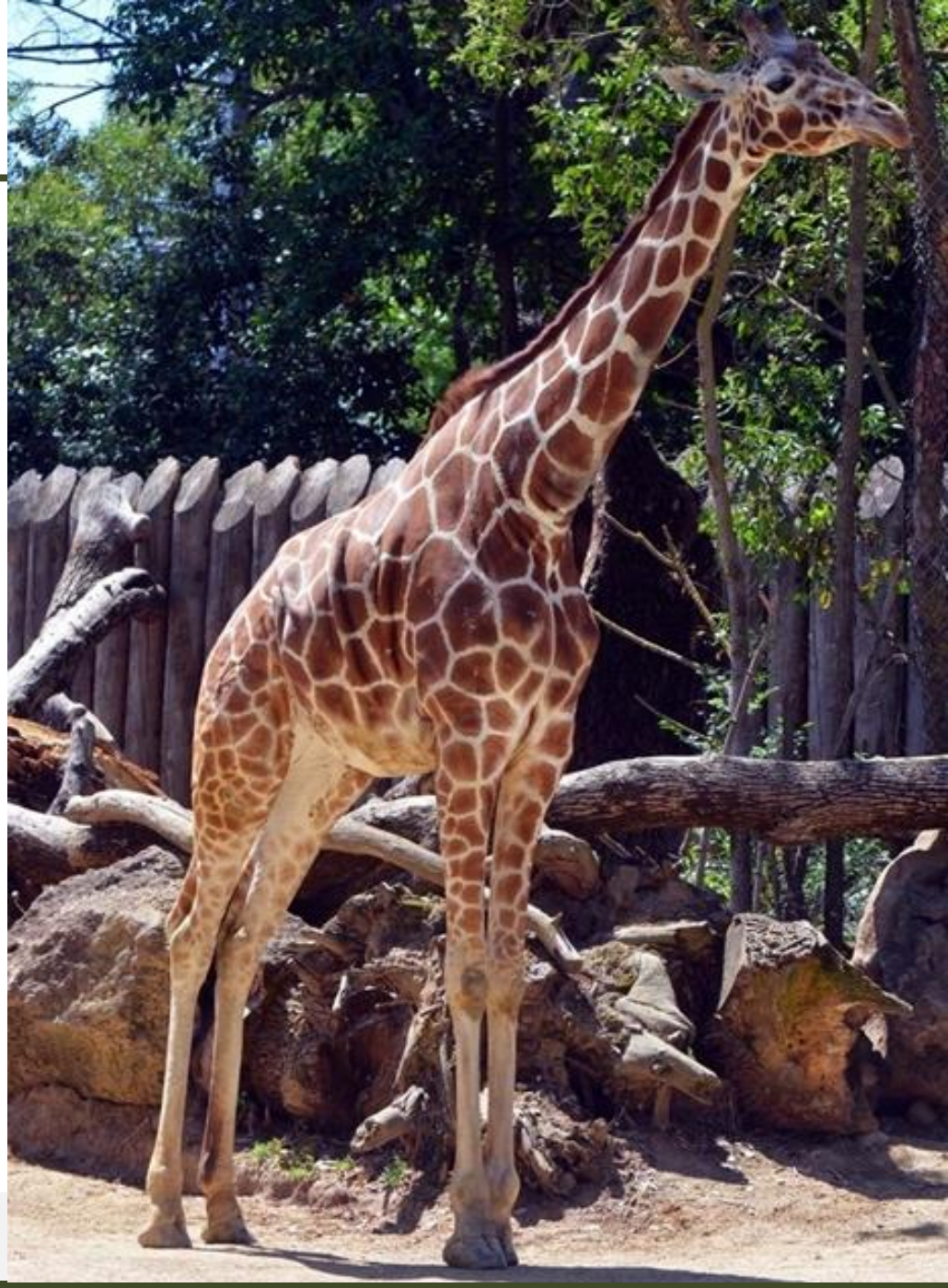
Goody

Reticulated Giraffe
Female 19 years old
History of Poor Conformation & Left Thoracic Fetlock Supination



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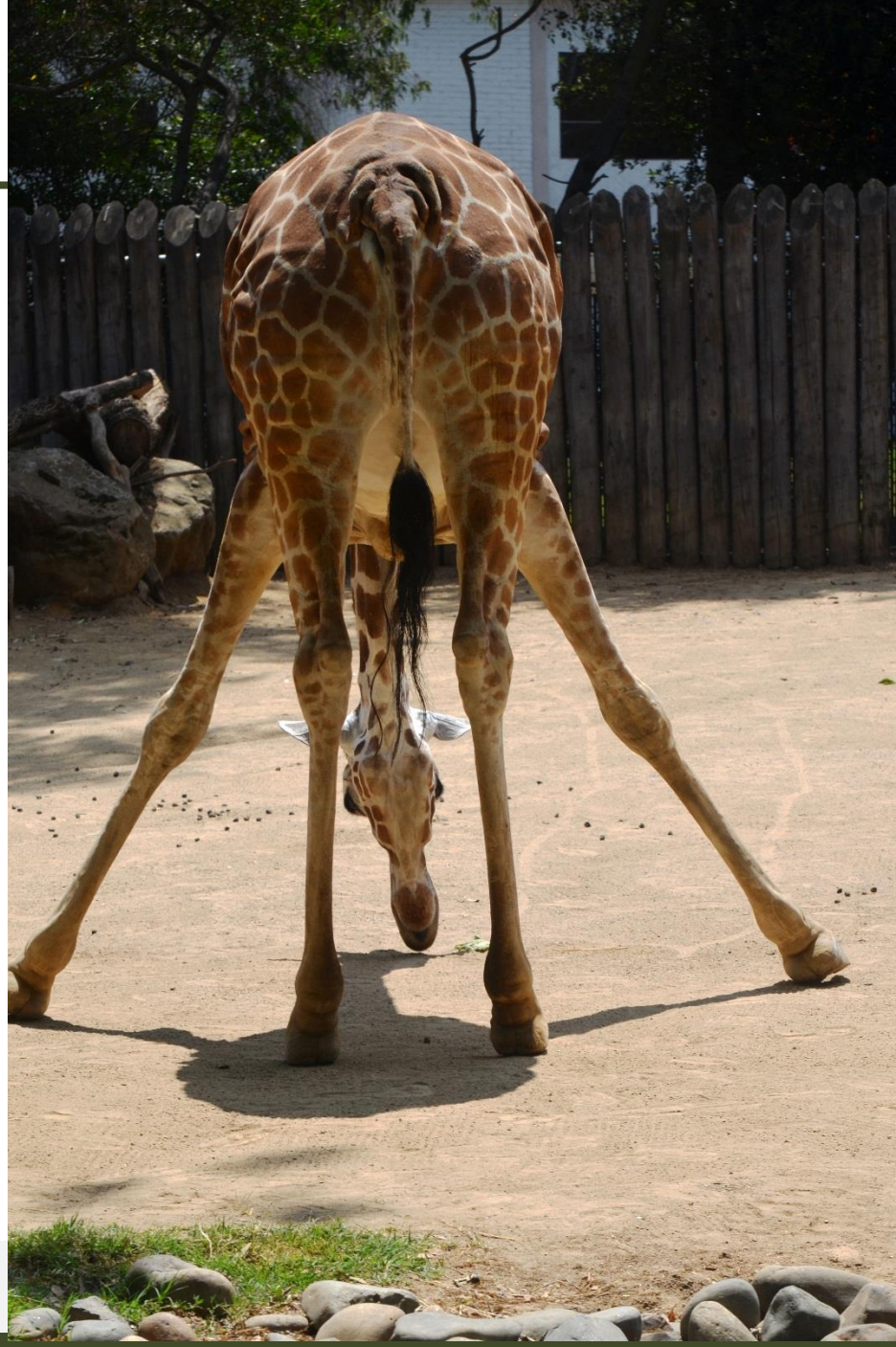
Giraffe Conformation

- Shorter body length to leg length
- Unique pacing gait
  - Hind limb moves then forelimb on the same side
  - Weight shifted to one side
- Weight shifted to forelimbs when head is down – drinking or eating



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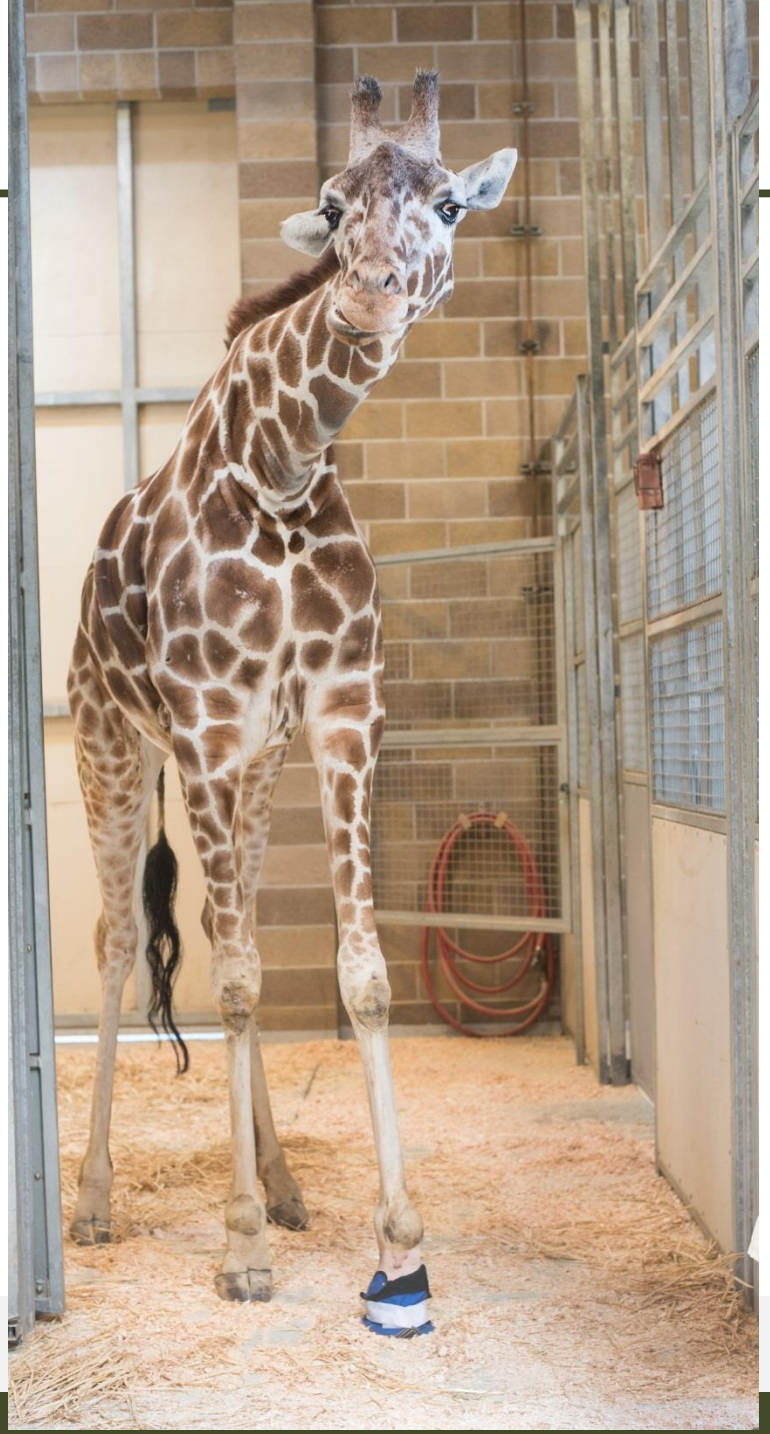
Behavioral Anomaly

- Presumed fear of doorways
  - Has not shifted through Tamer
  - Will exit barn through certain doorways but not enter
  - Utilizes only 3 of 5 barn stalls
- Operant Conditioning used in conjunction with self imposed barriers to provide treatments.



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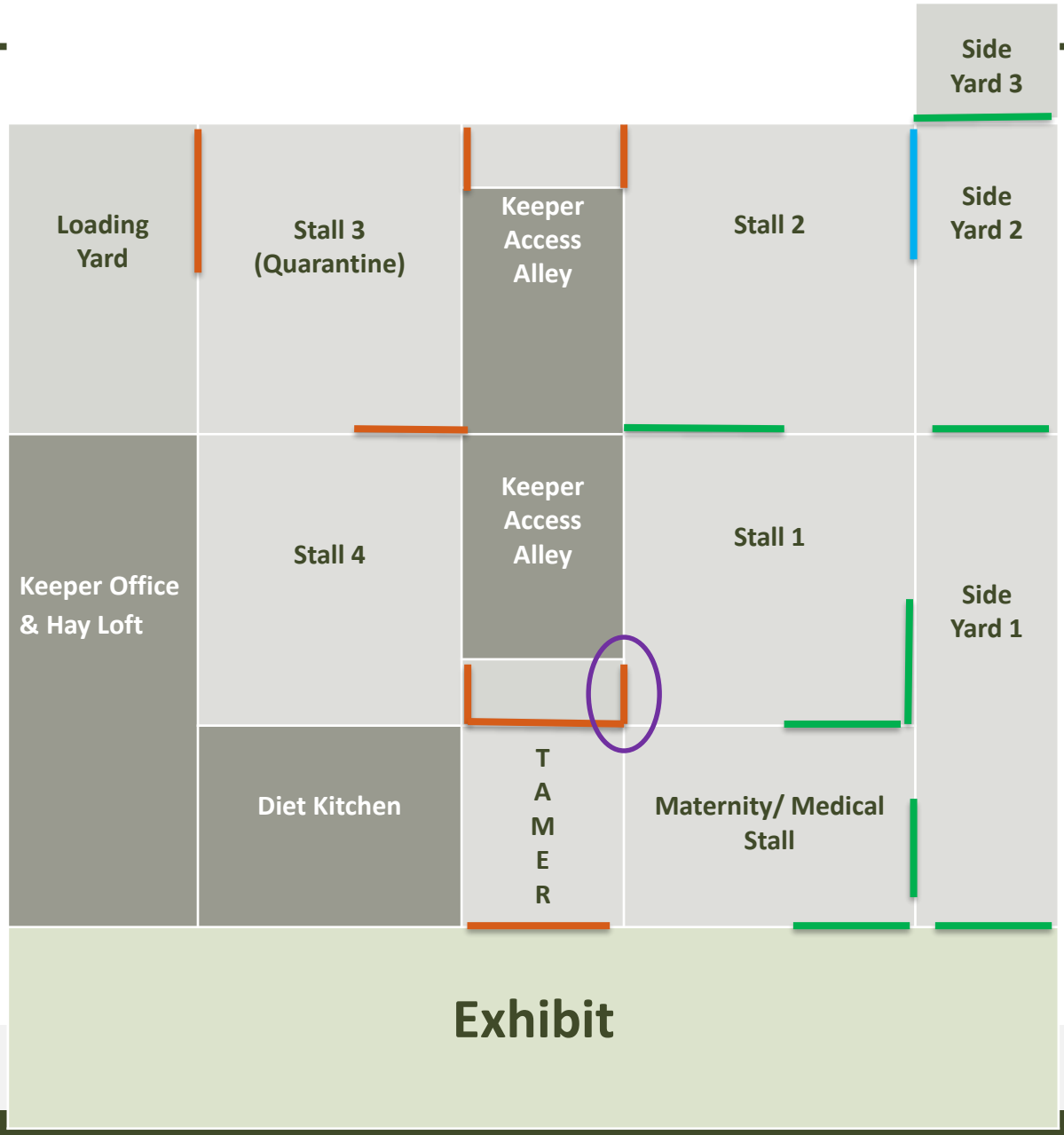
Goody will go both in and out of the barn or access exhibit.

Goody will go out of the barn, but not back into the barn.

Goody has never crossed through these doors.

Training & Treatment Station



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Lameness Scoring System

Score	Description	Rest Analysis	Gait Analysis	Movement in Pen/Exhibit	Comment
Grade 0	Sound	Normal at rest	Normal	Moves around normally	Normal
Grade 1	Inconsistently lame	Normal at rest	Subtle, occasional inconsistent limp,	Freely moves with rare lameness noticed by keepers	Normal posture at rest and walk, difficult to tell which limb affected
Grade 2	Slightly lame	Normal at rest	Consistent subtle limp at walk or run	Freely moves with frequent subtle limp	Bears full weight on all 4 limbs
Grade 3	Mildly lame	Occasional shift weight or lift of leg	Slight head nod or quick gait, back may be arched when walking	Moves around freely with persistent mild lameness	Occasional change in posture, may need to exercise to see lameness
Grade 4	Lame		Head bob and/or arched back, consistently seen at any gait	Still active in exhibit, decreased weight bearing	
Grade 5	Moderately lame	Shifts weight off of leg	Signs that are consistent and obvious, short striding	Mildly reluctant to move, bears moderate weight when moving	Abnormal posture at least during walk
Grade 6	Very lame	Holds leg off ground at rest	Carries leg at times, difficulty turning, back arched at rest	Reluctant to move without stimulus, attempts to put some weight on leg	Abnormal posture, bearing a little weight on leg
Grade 7	Severely lame	Does not bear weight on leg	Consistently carries leg but able to rise	May toe touch but minimal weight bearing	'3-legged lame' deliberate steps one at a time
Grade 8	Catastrophically lame	Prefers to lay down, may be unable to rise	3-legged lame plus stopping frequently, depressed or distressed	Inability to or very reluctant to move, unable to bear any weight on the leg	Severe pathology likely, behavior and well-being are affected

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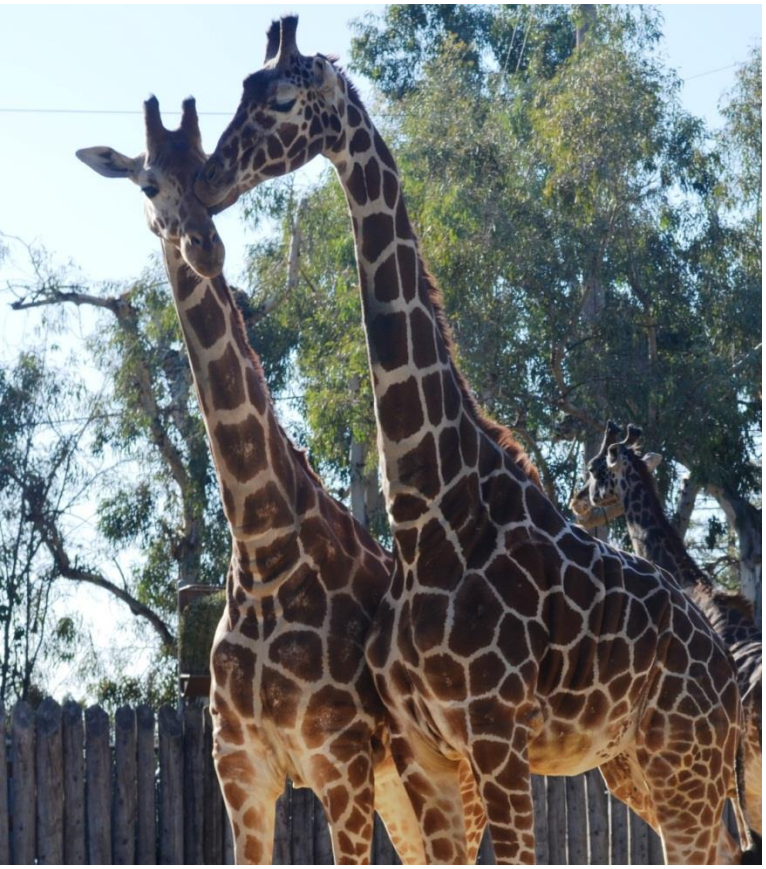
Case Presentation



Goody presented with acute progression of left thoracic limb lameness April 28, 2014 with overgrowth of the lateral claw and irregular plantar surface of the left thoracic hoof.

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April 28, 2014

Grade 3	Mildly lame	Occasional shift weight or lift of leg	Slight head nod or quick gait, back may be arched when walking	Moves around freely with persistent mild lameness	Occasional change in posture, may need to exercise to see lameness

- Flunixin meglumine (Banamine) 750 mg (1 mg/kg) orally for two days.
- Start hoof trimming

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July 8, 2014

Grade 1	Inconsistently lame	Normal at rest	Subtle, occasional inconsistent limp,	Freely moves with rare lameness noticed by keepers	Normal posture at rest and walk, difficult to tell which limb affected

- Left forelimb lameness considered resolved
- Persistent Grade 1 lameness

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July 15, 2014

Grade 6	Very lame	Holds leg off ground at rest	Carries leg at times, difficulty turning, back arched at rest	Reluctant to move without stimulus, attempts to put some weight on leg	Abnormal posture, bearing a little weight on leg

Goody presented with Grade 6 acute right thoracic limb lameness and Grade 2 left thoracic limb lameness following breeding attempts by 1.0 Masai.

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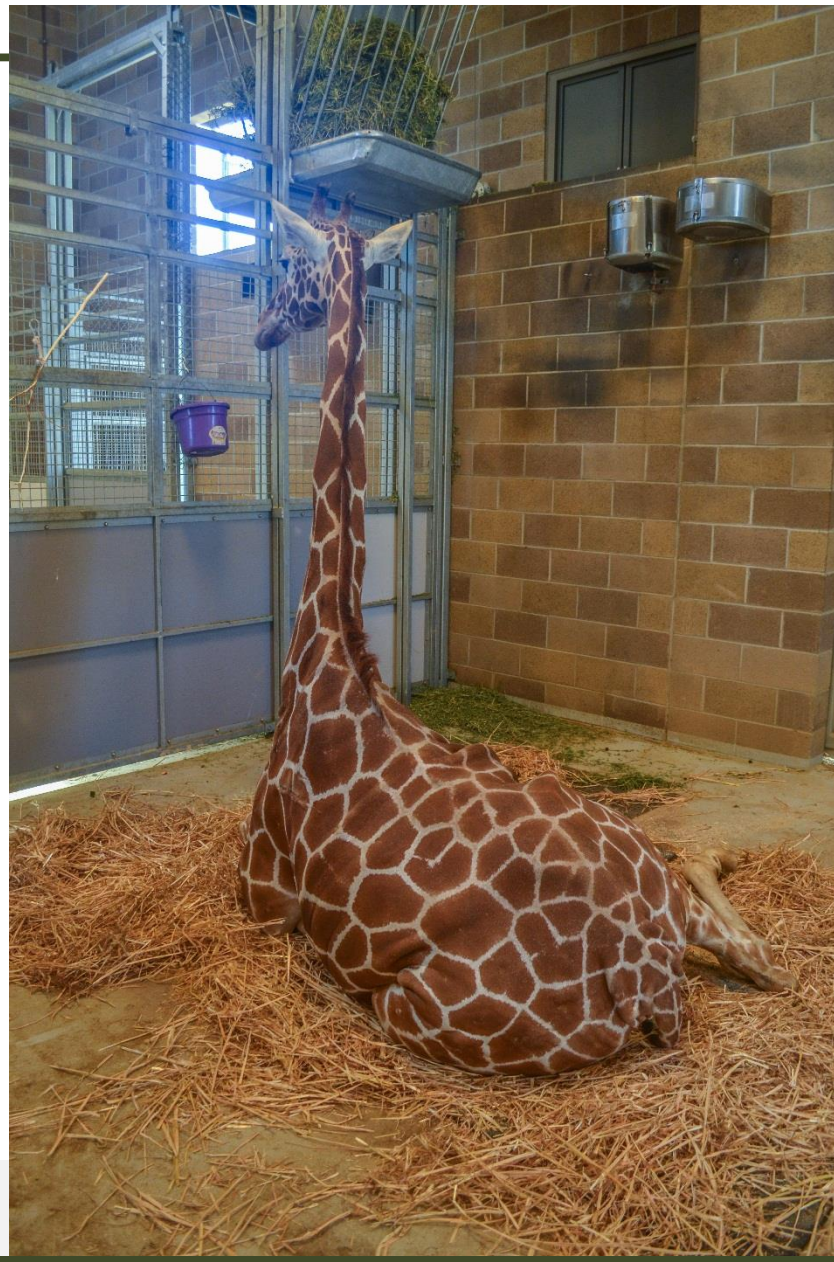
Treatment

- Loading dose Phenylbutazone (Bute) 3000 mg (4.24 mg/kg), July 15, 2014
- 2000 mg (2.83 mg/kg) Phenylbutazone orally twice daily
- July 19, 2014 - Increased Phenylbutazone to 2500 mg (3.53 mg/kg) orally twice daily for 30 days
- Stall Rest



- Corrective hoof trimming continued
- Weight shifted to left forelimb to compensate for right forelimb lameness
- Added stress on the left forelimb caused increased supination of the left fetlock

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Goody Walking – Left Fetlock Supination

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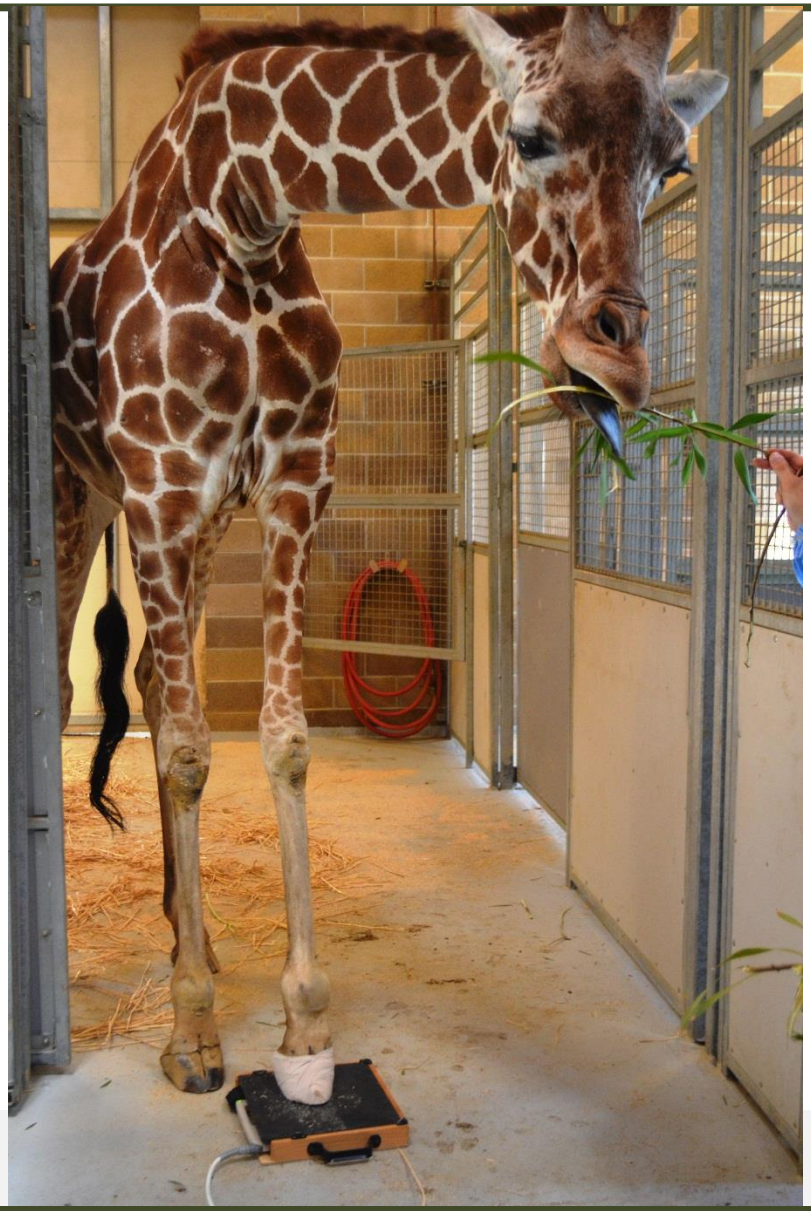

Training for radiographs started July 23, 2014.

Radiographs were obtained August 25, 2014.

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August 25, 2014

Right Front Fetlock

Left Front Fetlock

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Right Front Fetlock

Left Front Fetlock

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Grade 3	Mildly lame	Occasional shift weight or lift of leg	Slight head nod or quick gait, back may be arched when walking	Moves around freely with persistent mild lameness	Occasional change in posture, may need to exercise to see lameness

Medical Consult with Dr. Marilyn Koski: Possible Therapies

- Oral Analgesics
  - Meloxicam (0.5 mg/kg (360 mg) to 1mg/kg (720mg); Carlsbad Technology, Inc., Carlsbad, California, 92008) PO SID
  - Gabapentin (4 mg/kg (2800 mg); Solco Healthcare US, LLC, Cranbury, New Jersey, 08512) PO BID
- Ice Therapy
- Low-Level laser Therapy
- Acupuncture
- TENS unit
- Pulse Electromagnetic Field Mat
- Lidocaine Topical Patch
  - (50 mg; Lidoderm®, Lidocaine patch 5%, Hind Health Care, Inc., Endo® Pharmaceuticals Inc., Malvern, Pennsylvania, 19355) PRN
- Diclofenac Topical Patch
  - (13 mg; Flector® Patch, diclofenac eploamine 1.3%, King Pharmaceuticals Inc., Bristol, Tennessee,

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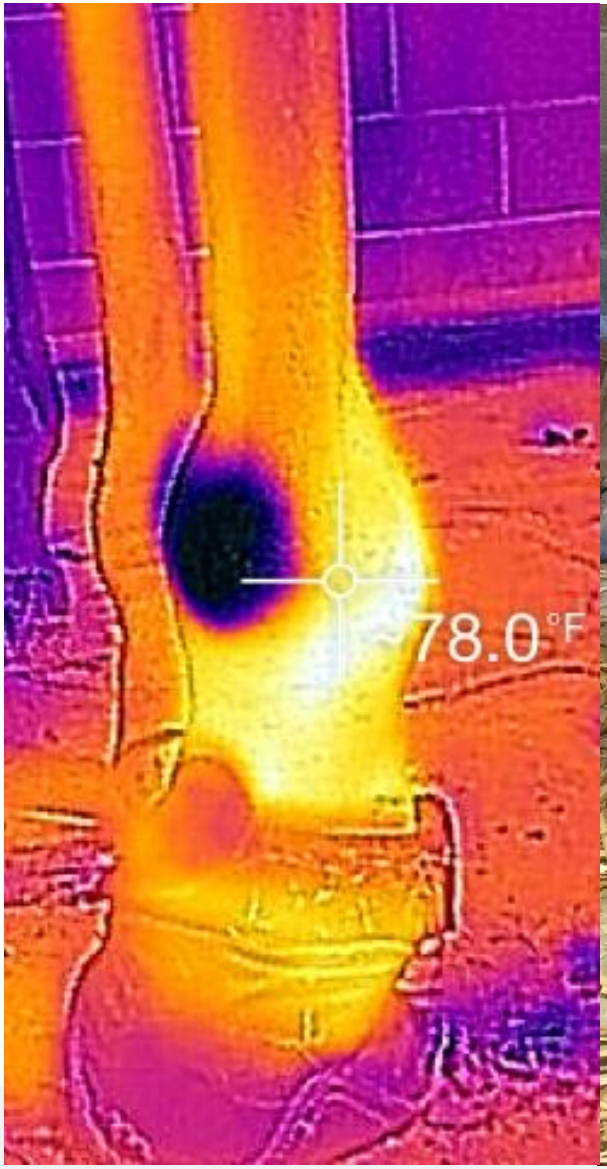
Cold or Heat Therapy

- Heat: Increases circulation and joint flexibility, and it will decrease stiffness, pain, muscle spasms, and inflammation.
- Cold: acute injuries and may provide relief from pain and inflammation.
- IceHorse® Tendon Wraps
  - 20- 40 minute therapy session daily



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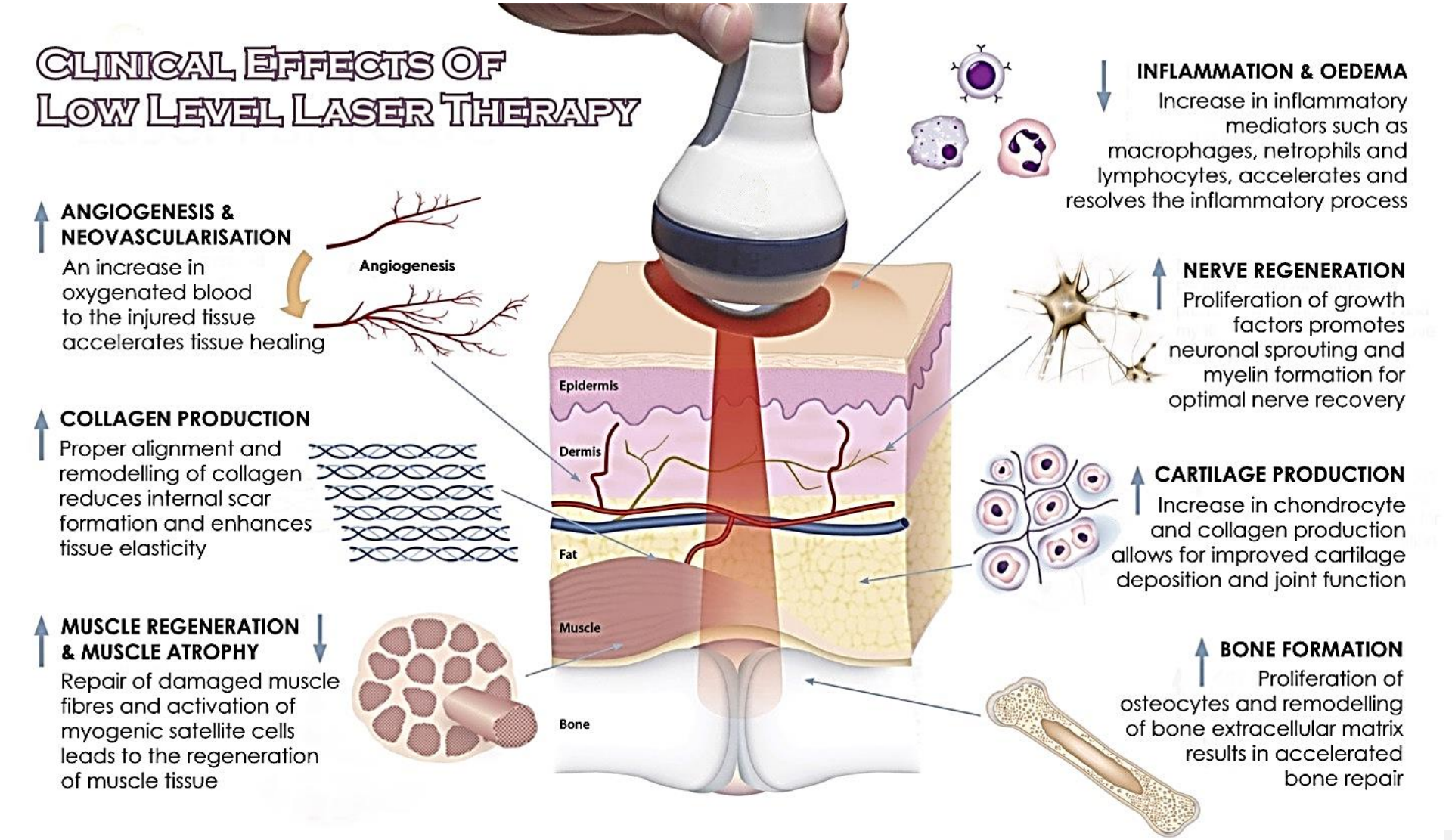
Low-Level Laser Therapy



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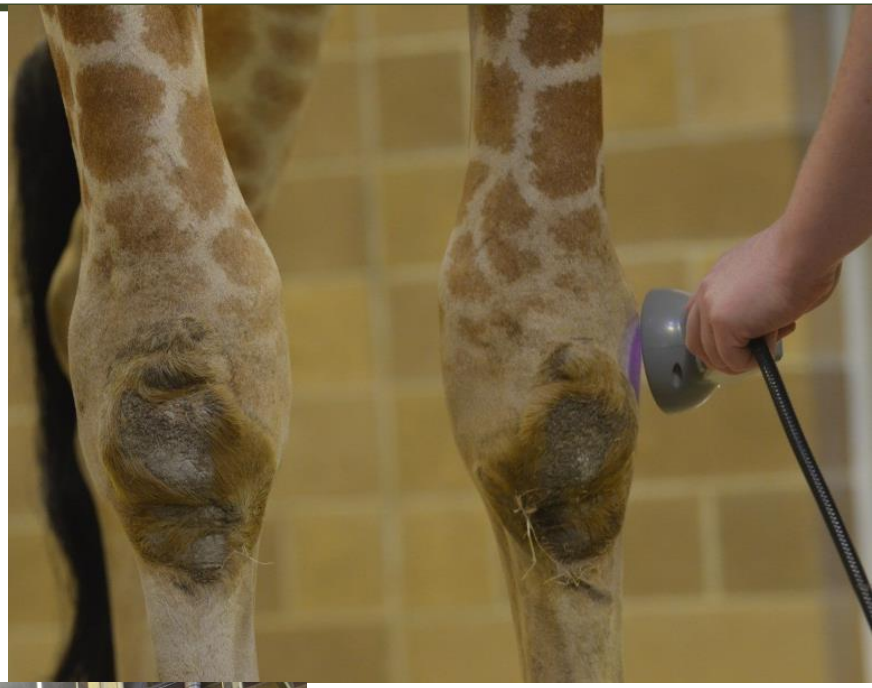
Low-Level Laser Therapy



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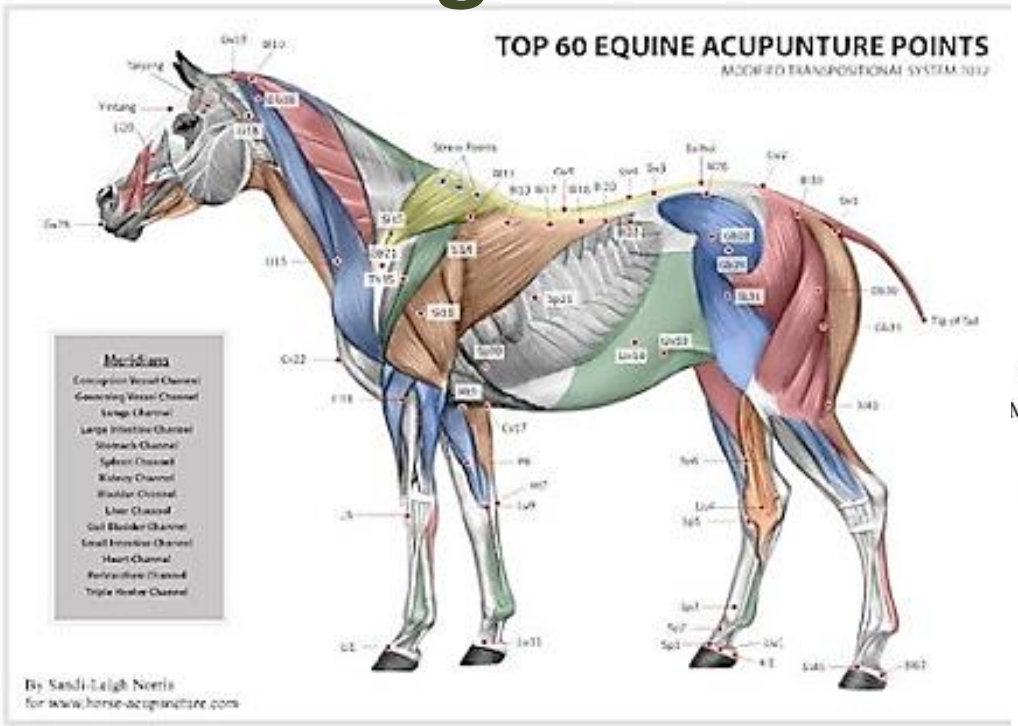
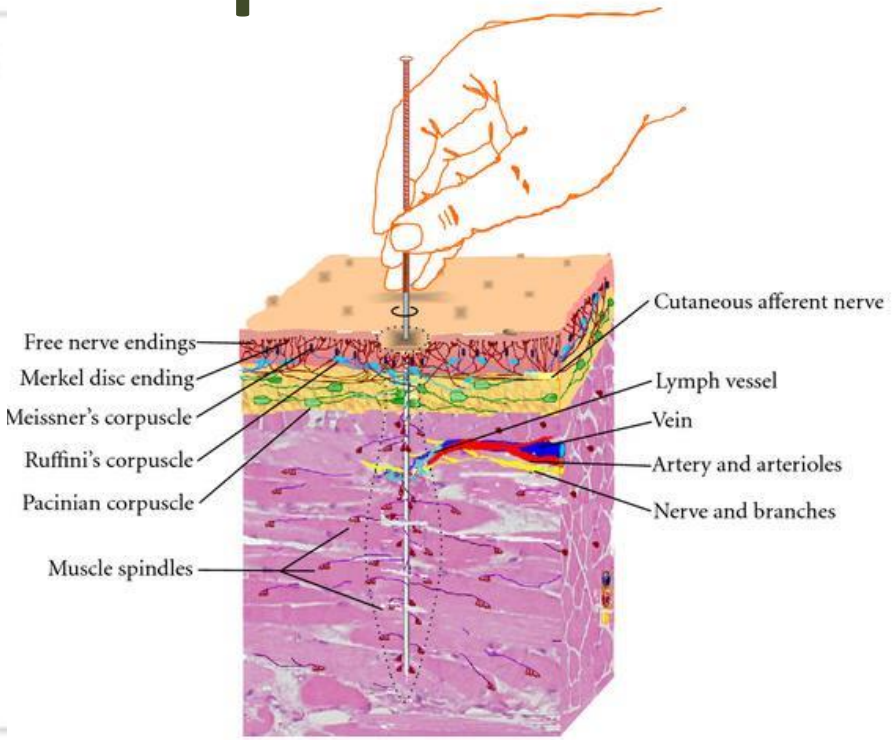
Analgesic Effect of Acupuncture





- Chinese Medicine believes acupuncture releases the blocked qi (chee) providing pain relief.
- Western Medicine sees it as inhibiting pain signals by triggering a secondary signal resulting in the release of endorphins

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10 Minute Sessions Once Weekly

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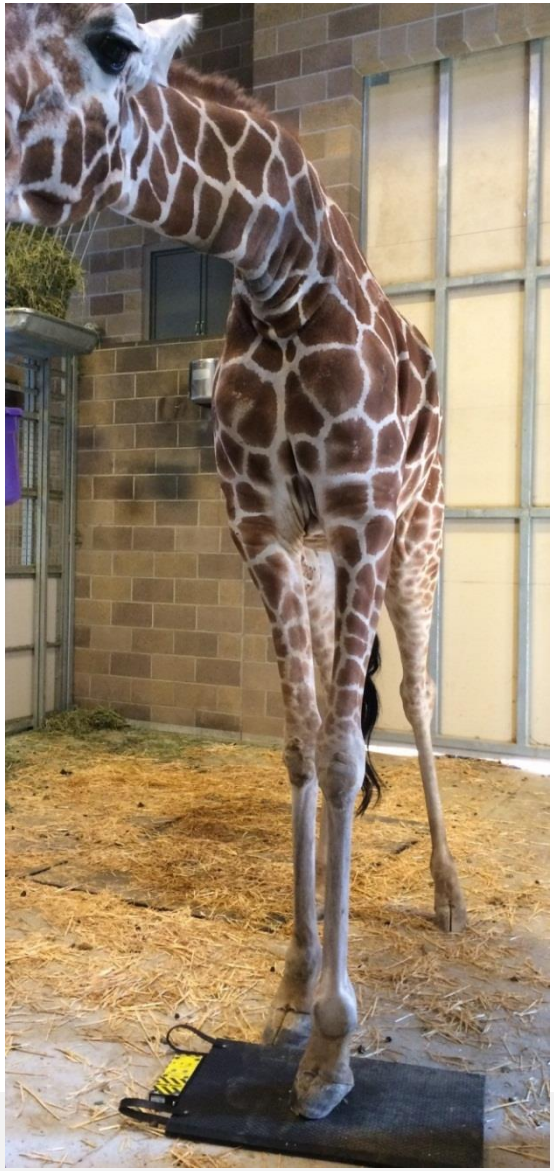
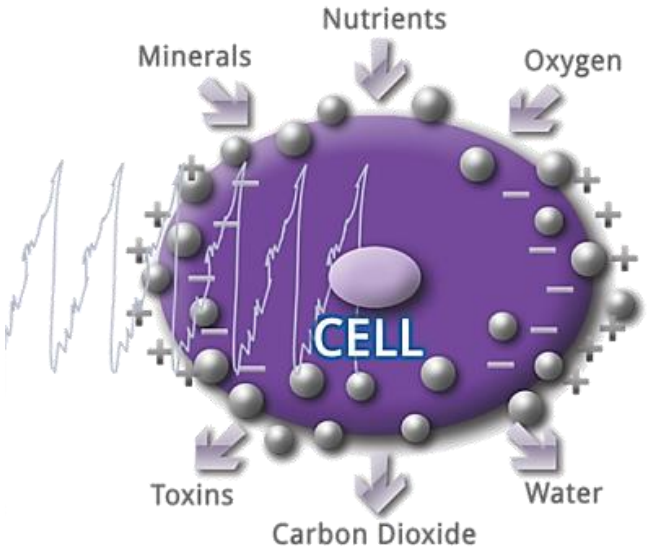
Pulse Electromagnetic Field Mat





Pulsing electromagnetic fields create a dipole formation at the cell membrane.

This allows the cells to circulate fluid more efficiently and helps cells reduce oxidative stress

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TENS Unit

Transcutaneous Electrical Nerve Stimulation

Stimulating impulses to surface of skin and nerve strands

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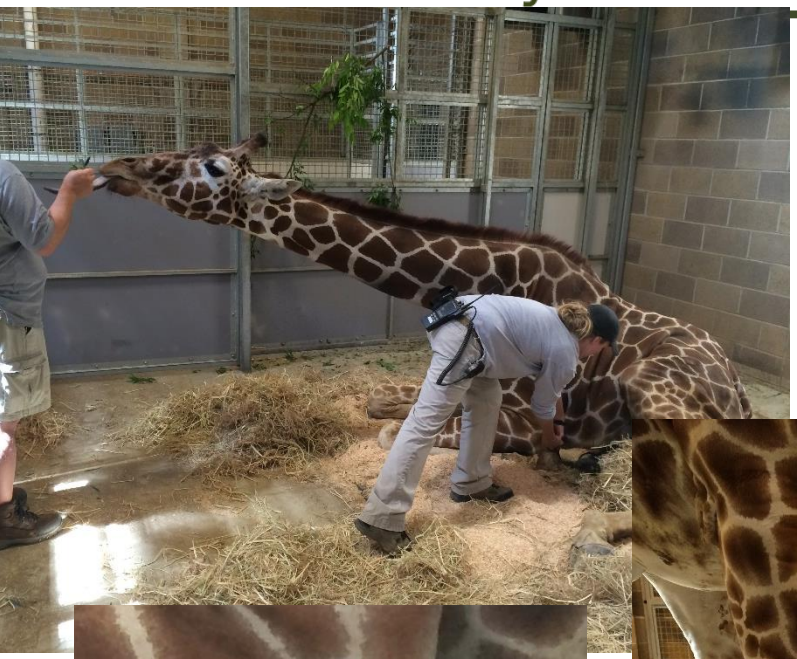
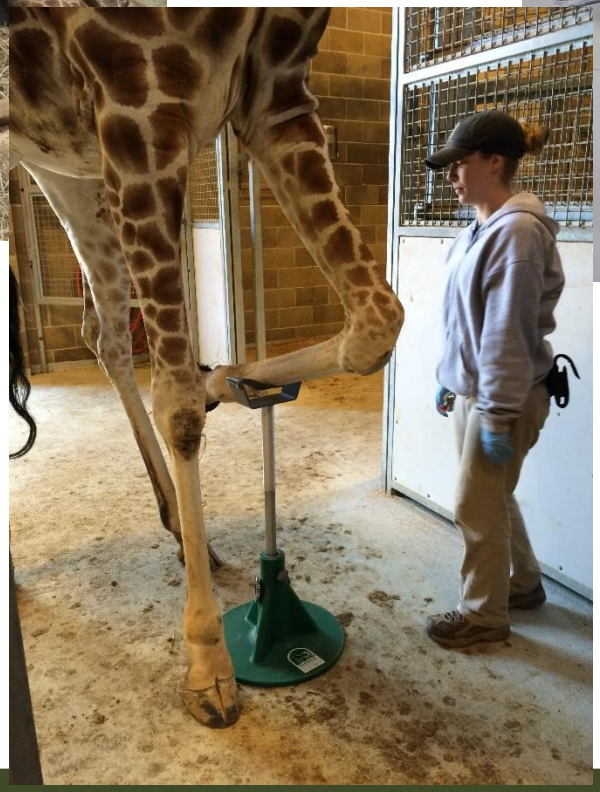
Additional Tools





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Shoes & Shims

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Metal Support Plate

Lateral Support Wall

Lateral Support Flange

Durable

Able to fit it to one claw to allow natural claw separation while walking

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Addition of Putty for Support

Used to fill in space between hoof wall and metal support plate

Easily molded to hoof

Added support while hoof wall grew out

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Reminder of Goody Walking – without shoe

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Goody walking with full shoe – metal plate, putty, and boot

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Progression of Arthritic Changes

August 24, 2014

September 28, 2015

June 16, 2016

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August 24, 2014 September 28, 2015 June 16, 2016

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Next Step in Treatments

Current Treatment

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Monitoring Quality of Life

Sacramento Zoo
Functional Assessment Worksheet

Date: _____

Species: _____Giraffe_____

ISIS #: _____101011_____ **House name:** ____Goody_____

Section: _____Ungulates_____ **Supervisor:** ____Leslie_____

Primary keeper contact: _____Melissa & Lindsey_____

Primary complaint: _____Breaking down in the left front fetlock_____

Veterinary exam, current medications? ___Weekly visual exam by vet staff, quarterly radiographs of Left front fetlock, Meds: 720 mg Meloxicam PO SID (1 mg/kg), Gabapentin 2700 mg (3.8 mg/kg) PO BID, Glucosamine 64 g PO SID, ice PRN, Lidocaine or Diclofenac Patch PRN, Magnet Mat, acupuncture, Cold laser therapy, Shoe with insert and boot, TENS unit (awaiting dose)

_____

Describe up to 5 behaviors that are compromised due to the animal's pain.

Score each behavior from 0 (normal activity) to 4 (impossible to perform)

1. Able to walk across the exhibit yard_____ Score: ___
2. Able to get up and lay down normally_____ Score: ___
3. Putting weight on left front leg at rest (standing) _____ Score: ___
4. Appetite _____ Score: ___
5. Amount of time spent laying down _____ Score: ___

Please provide still photos or video of each posture or behavior along with this sheet.
Please interoffice mail or email this form to the vet staff.

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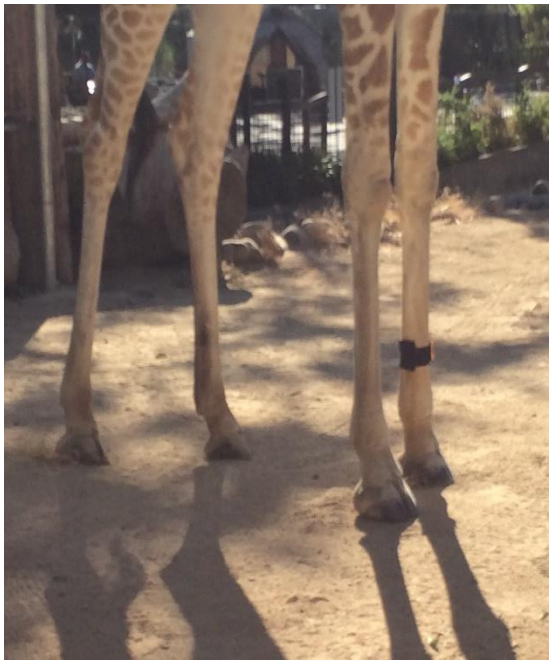
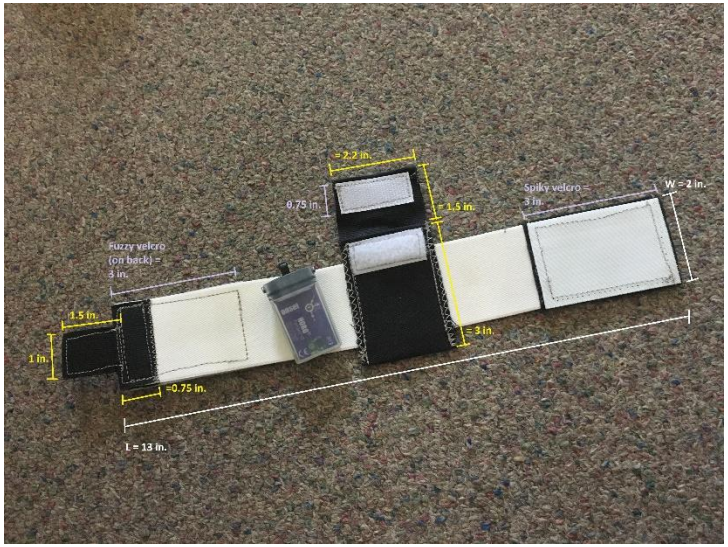
the “FitBit”





X, y, z axis datalogger

Use pair bonded female of same age with “normal” conformation and activity for control

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Media Attention

More than 30 media mentions, local and national

Arthritis Today article, celebrity honoree

ABC News link shared over 5,000 times

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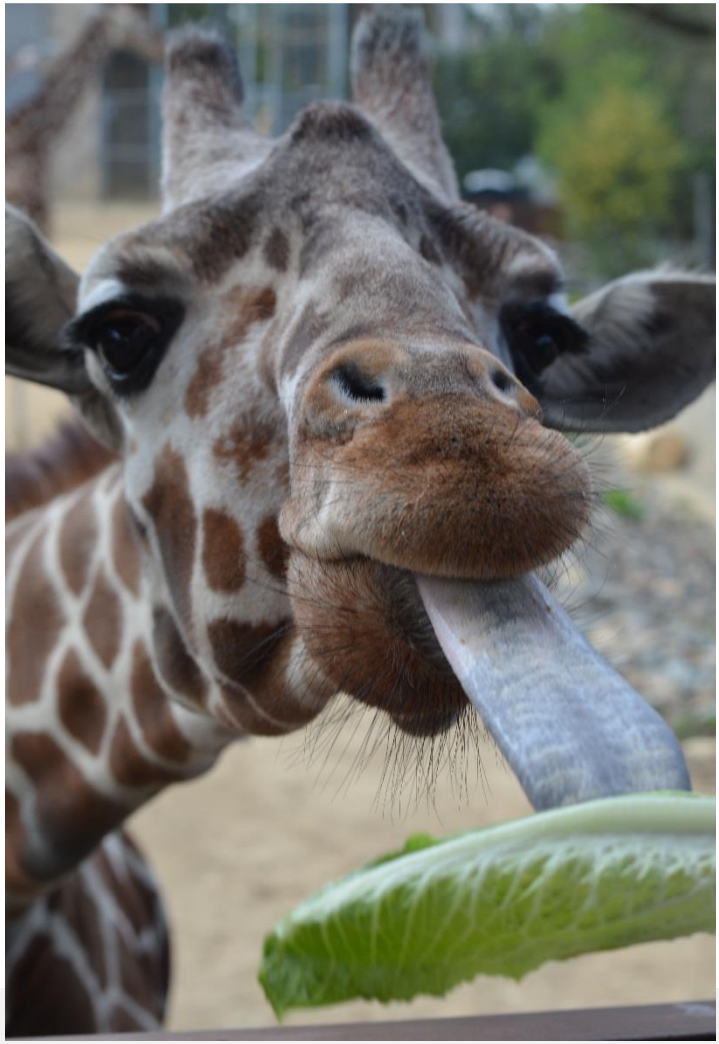
Grade 4	Lame		Head bob and/or arched back, consistently seen at any gait	Still active in exhibit, decreased weight bearing	

Conclusion:

Goody's lameness is static at Grade 4.

Treatments are on going and ever changing as the Sacramento Zoo provides her the best possible care and quality of life. We will continue to offer multimodal therapies.



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Thank You!!!

This has been a combined effort to care for Goody and we would like to thank the following people:

Veterinary Staff, past and present, at the Sacramento Zoo: Dr. Ray Wack, Dr. Jenessa Gjeltema, Dr. Tara Harrison, Dr. Anne Burgdorf and Lori Tierney, RVT

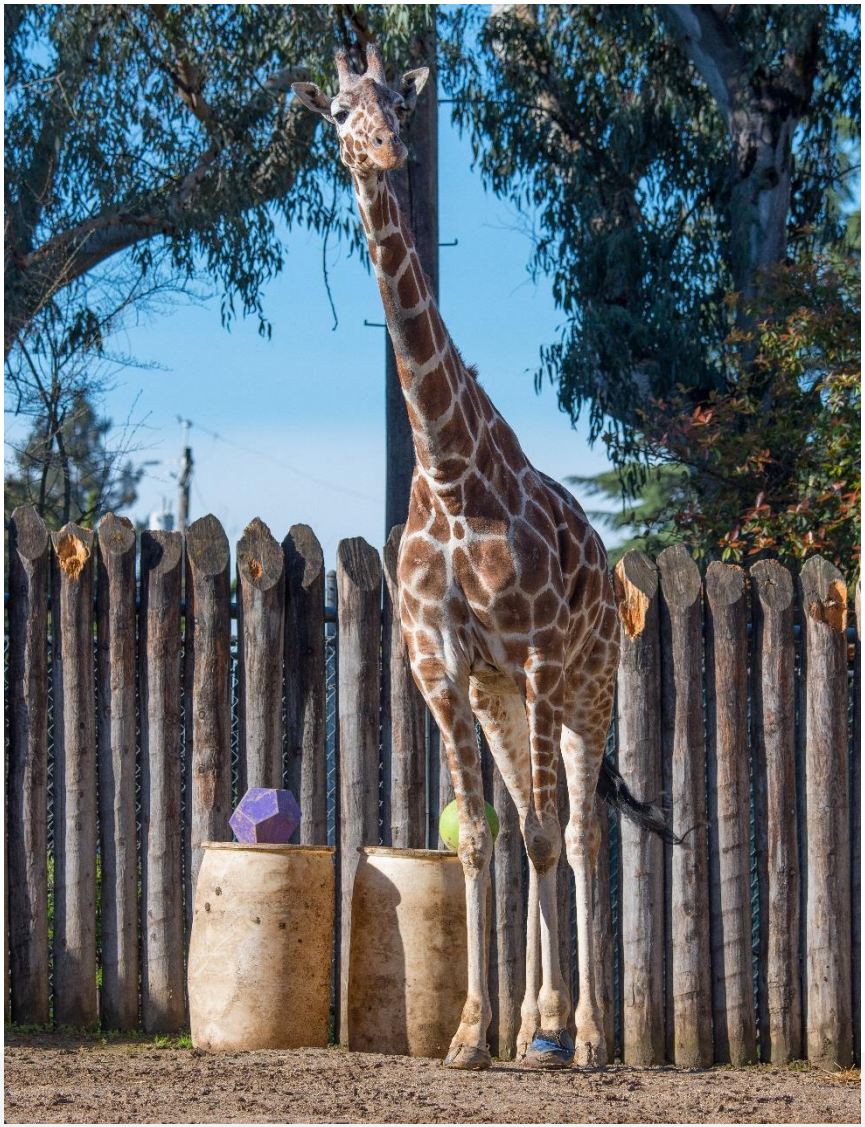
Sacramento Zoo Veterinary Medicine Residents Dr. Sean Brady, Dr. Mary Thurber, Dr. Matt Marinkovich

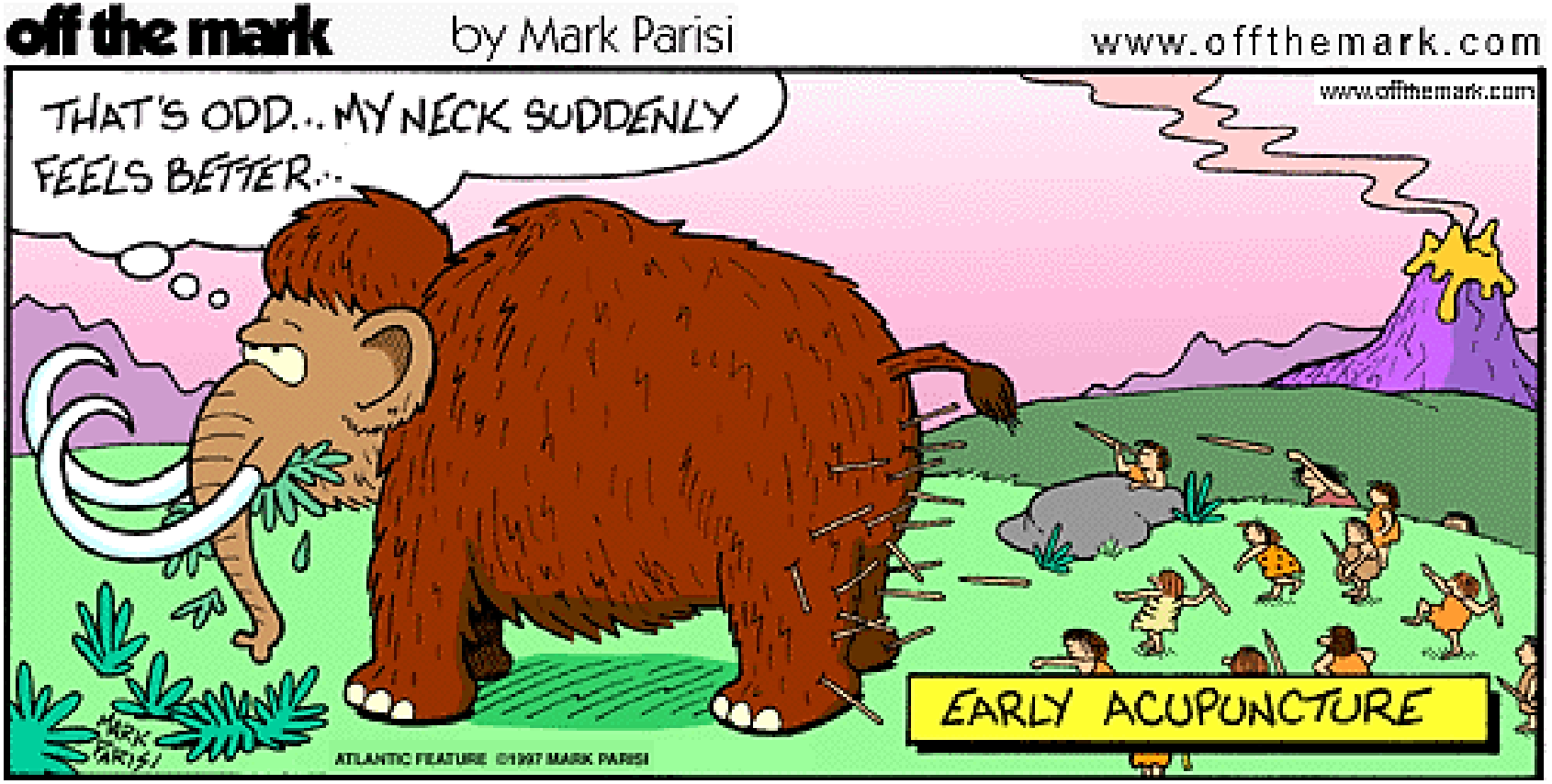
UC Davis Companion Animal and Exotic Pet Services Residents Dr. Noémie Summa, Dr. Sarah Gardhouse, Dr. Molly Gleeson

Integrative Medicine Therapist Dr. Marilyn Koski

Animal Care team at the Sacramento Zoo: Lindsey Moseanko, Leslie Field and Matt McKim and all relief Ungulate Keepers

Photographs by Alison Mott, Melissa McCartney, and Sacramento Zoo staff photographer





Questions???