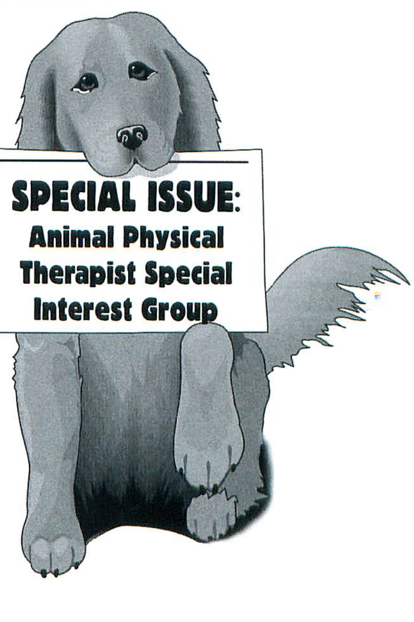
ORTHOPAEDIC PHYSICAL THERAPY PRACTICE

THE MAGAZINE OF
THE ORTHOPAEDIC SECTION, APTA

VOL. 15, NO. 2 2003



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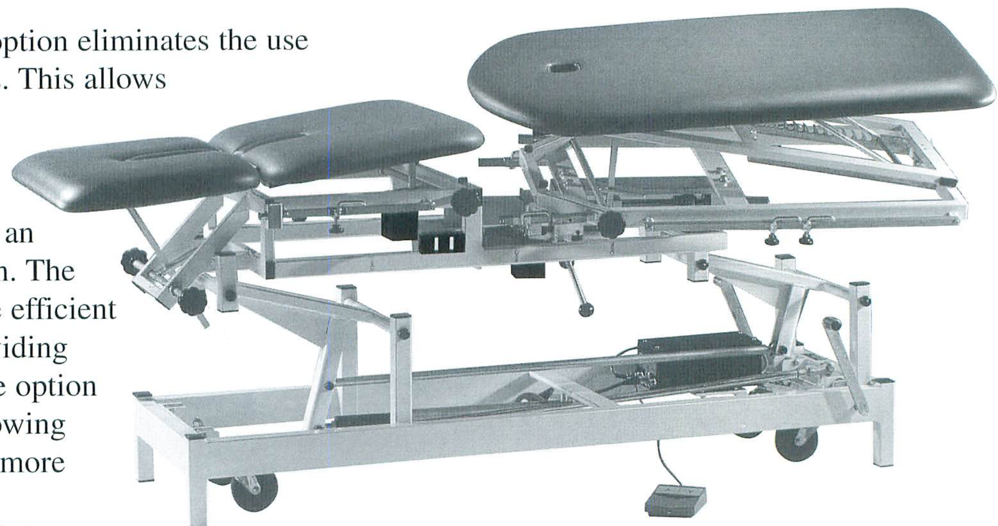

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- Advancement of education and clinical practice,
- Facilitation of quality research, and
- Professional development of members.

PUBLICATION STAFF

MANAGING EDITOR & ADVERTISING
Sharon L. Klinski
Orthopaedic Section, APTA
2920 East Ave. So., Suite 200
La Crosse, Wisconsin 54601
800-444-3982 x 202
608-788-3965 FAX
Email: sklinski@orthopt.org

Orthopaedic Physical Therapy Practice (ISSN 1532-0871) is the official magazine of the Orthopaedic Section, APTA, Inc.

Nonmember subscriptions are available for $30 per year (4 issues). Opinions expressed by the authors are their own and do not necessarily reflect the views of the Orthopaedic Section. The editor reserves the right to edit manuscripts as necessary for publication. All requests for change of address should be directed to the La Crosse Office.

Orthopaedic Practice is indexed by Cumulative Index to Nursing & Allied Health Literature (CINAHL).

Publication Title: *Orthopaedic Physical Therapy Practice* **Statement of Frequency:** Quarterly; April, June, August, and December
Authorized Organization's Name and Address: Orthopaedic Section, APTA, Inc., 2920 East Avenue South, Suite 200, La Crosse, WI 54601-7202

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10 Nollet Dr
Andover, MA 01810-6312
(978) 682-8802
mwilmarth@attbi.com

Managing Editor: Kathy Olson
kmolson@orthopt.org
(See Office Personnel)

ORTHOPAEDIC PRACTICE
Editor:
Susan A. Appling, PT, MS, OCS
University of Tennessee
822 Beale St., Ste. 337
Memphis, TN 38163
(901) 448-5888
(901) 448-7545 (FAX)
sappling@utmem.edu

Managing Editor: Sharon Klinski
sklinski@orthopt.org
(See Office Personnel)

RESEARCH
Chair:
G. Kelley Fitzgerald, PT, PhD, OCS
University of Pittsburgh
Department of Physical Therapy
6035 Forbes Tower
Pittsburgh, PA 16260
(412) 383-6643 (Office)
(412) 383-6629 (FAX)
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Editor-in-Chief:
Guy Simoneau, PT, PhD, ATC
Marquette University
P.O. Box 1881
Milwaukee, WI 53201-1881
(414) 288-3380 (Office)
(414) 288-5987 (FAX)
guy.simoneau@marquette.edu

Executive Director:
Edith Holmes
edithholmes@jospt.org

NOMINATIONS
Chair:
Timothy W. Flynn, PT, PhD
426 Graham Rd
Fort Sam Houston, TX 78234
(210) 221-7582 (Office)
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OFFICE PERSONNEL

Orthopaedic Section, APTA, Inc., 2920 East Avenue South, Ste. 200, La Crosse, WI 54601-7202, (800) 444-3982 (Office), (608) 788-3965 (FAX)

Terri DeFlorian, Executive Director	*x 204*	*tdeflorian@orthopt.org*	*Kathy Olson, Managing Editor HSC*	*x 213*	*kmolson@orthopt.org*
Tara Fredrickson, Executive Associate	*x 203*	*tfred@orthopt.org*	*Jessica Hemenway, Education/Program Coordinator*	*x 216*	*jjhemenway@orthopt.org*
Sharon Klinski, Managing Editor J/N	*x 202*	*sklinski@orthopt.org*	*Linda Calkins, Project Assistant*	*x 215*	*lcalkins@orthopt.org*

Editor's Message

Who Let the Dogs Out?

Have you ever had a pet? I would suppose that a majority of Americans have had some sort of pet in their lifetime, most commonly a cat or a dog. Some of you may have had hamsters or bunnies, or some other type of animal. In my adult life I have had two pets—Tuxey, a black cocker spaniel, and Baby, a tan tabby cat. Generally, adopting a pet means adopting a new member of the family. I treated Tuxey and Baby like my children, making sure they had all the necessities, including lots of hugs and petting, toys, regular walks, and good veterinary care. Like many of you, I even made sure I took pictures of them regularly. I think I would have done just about anything for these two. You may feel the same way about your animals. But, did you ever think about physical rehabilitation for your pets? Caring for your animals no longer means just regular veterinary care, but also physical rehabilitation for musculoskeletal injuries. In this issue of *Orthopaedic Physical Therapy Practice*, you will learn some ways to treat animals from a physical rehabilitation standpoint.

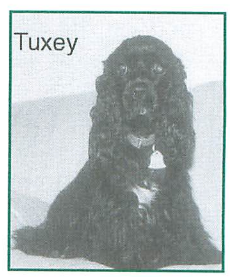
Over the past several years, there has been increased interest in and awareness of the physical rehabilitation needs of animals. From my understanding, much of the impetus initially came from the need to assist animals in returning to 'work' after injury—particularly for racehorses and police dogs. Much training and money had been invested in these animals, so it was particularly important to their owners for the animals to make full recovery and return to 'work.' This idea of physical rehabilitation for animals quickly moved beyond 'work' animals to include family pets and assistance animals as well. Interest continues to grow in this specialized area of practice as evidenced by the growing membership of the Animal SIG.

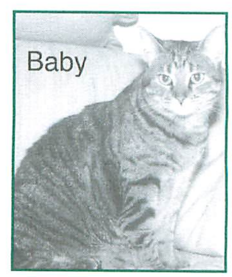
Okay, so the answer to the question in the title of this editorial is the Animal Physical Therapist Special Interest Group. While the Animal SIG has historically focused on canines and horses, the 'animal' part includes all types of animals, including assistance animals. As you will note in this issue, the SIG has presented us with 6 articles and a review pertaining to dogs and 1 other article regarding the rehabilitation of a tortoise. Does that one intrigue you? I never really thought about rehab for a tortoise before, but the article explains how it can be done in a particular case.

This special issue of *Orthopaedic Physical Therapy Practice* is being coordinated by the Animal SIG, with Cheryl Riegger-Krugh, PT, ScD, as the Guest Editor. Cheryl is Immediate Past-president of the SIG and has been a great advocate for the SIG and of animal rehabilitation. I would like to take this opportunity to extend my gratitude to Cheryl and the members of the Animal SIG for working so hard on this issue. They secured authors for the issue and made sure articles were submitted in a timely manner. I would also like to thank the authors of the articles for their hard work as well. Congratulations on a job well done! I can tell you that after reading this issue of *OP*, I have gained new insight into the demands of animal rehabilitation and the importance of a team approach—including the veterinarian, the physical therapist, the PTA, and the veterinary tech, as well as the animal and the owner. I am also reminded about the importance of continuing education, particularly in this specialized area of practice. While PTs and PTAs know much about rehabilitation, they know most about human rehab and have much to learn about animal physiology and such. Cheryl's editorial speaks to this growing area of practice.

I hope you enjoy this special issue of *OP.* It has special meaning to me, in that it comes at a time when I am particularly aware of the importance of having animals in our lives and the pleasure they bring to us. Unfortunately, I lost both of my animal companions in the past few months. Tuxey was 14 years old and died of complications related to Cushing's disease. Baby was 15 years old and died of complications related to diabetes. While each was a great loss, I know they are in a much better place now.

Susan A. Appling, PT, MS, OCS
Editor, OP





Onomatopoeias and Related Thoughts

During the Orthopaedic Section's membership meeting at CSM in Tampa, Florida, a few new motions were adopted. The intent of the two motions are to encourage the Commission of Accreditation for Physical Therapy (CAPTE) and the Federation of State Board of Examiners (FSBPT) to clarify and ensure that mobilization and manipulation are included in the evaluative criteria for professional physical therapy education and on the national physical therapy examination. Although I support both of these motions wholeheartedly, I also believe we must not inadvertently give 'fuel to the fire' to those who oppose physical therapists ability to move synovial joints. We do not want to suggest that we do not already have this specialized knowledge or skill in our education or in our licensing examinations.

The primary reason I see for both of these motions is to make sure that mobilization and manipulation are not left out in our education or on the national physical therapy exam. The ostensible reason is to validate our ability to practice manipulation against those who oppose us. I do not believe that chiropractors care much about physical therapists using mobilization as an intervention. Its manipulation or the more wordy high velocity thrust technique about which they are willing to fight. I think that some chiropractors believe that their profession owns manipulation. Never mind the fact that the chiropractic profession originated after its creator, Dr. Palmer was treated by an osteopathic doctor in Missouri and soon after opened up a chiropractic college in Iowa. Osteopaths learned their techniques from the 'bone setters,' which makes chiropractic clearly not the originators much less the owners of manipulation.

Sometimes I think we are just fighting over a 'pop'—an onomatopoeia! I call onomatopoeia's 'Batman' sounds, or simply defined, a word that describes an action sound—pop, thud, snap, crack. It strikes me a little funny when I think that we appear to be fighting over a sound, just some air. Before knowing where the sound came from both chiropractors and physical therapists have long learned that the appearance of this sound is often associated with pain relief, patient success, and more recently with money (much from the ubiquitous continuing education courses taught). What is also amusing is that historically many chiropractors have been taught that the 'adjustments' that they perform on the spine are directed at the intervertebral disc and not the synovial joints. For example, an illustration from *Gonstead Chiropractic Science & Art* clearly shows where Dr. Gonstead thought an adjustment was directed. Gonstead, on page 53 of his book, clearly points an arrow at the intervertebral disk and then makes a comment that the adjustment is not aimed at the vertebral joints. The Gonstead Technique has long been considered one of the most commonly taught and used methods and is still used and taught at chiropractic colleges today. This illustration convincingly shows that Gonstead believes we are moving the disc not the facet joint! How can that be? The annulus fibrosus is firmly embedded (rooted) into the vertebral body. Does Dr. Gonstead believe that an adjustment is an extirpation of the annulus? Does Dr. Gonstead believe that an adjustment is a movement of the nucleus pulposus? Where would the confined nucleus pulposus go? Pascal's law, which I learned in physics, still applies. Pascal's law states that water, of which the nucleus pulposus is mainly composed, is almost incompressible and when compressed is dispersed in all directions equally. Therefore, chiropractic has long held the belief that adjusting the spine was directed at the intervertebral disc not at the vertebral joints.

I am not trying to pick on Dr. Gonstead. Many physical therapists have had ideas that later were abandoned and proven wrong. That's just how research works! That is how we learn. The point I am trying to make here is that no one owns an idea, no one owns a 'pop,' and no one owns a specific skill that comes from a natural phenomenon. What I think chiropractic should be doing is not fighting over an onomatopoeia but fighting to improve their knowledge base on which their profession is based. All professions must refine and grow through continual research and improve their knowledge base or else they risk becoming extinct. I hope that chiropractors do not believe that the uniqueness of their profession comes from just a 'pop.' I hope as physical therapists we do not rely on such an ephemeral and tenuous view. As physical therapists, we must continue with the job of refining our profession. Continually expanding our knowledge, improving patient care, providing solid evidence, and showing what makes us unique will provide us with a solid foundation from which to move forward. Dr. Gonstead published his book years ago. New research has provided for an elenchus that is more consistent in explaining the reason for the sound made during a manipulation. We now know that the 'pop' comes from the synovial joint not the disc! The 'pop' is explained by Boyles law, which states that pressure and volume in a confined space are inversely related. The 'pop' is all nitrogen gas release, and pressure reduction—just a bunch of air. Therefore, we are fighting over air. However, we know it's not the air but all the hot air created by those whose real interest is not patient care, but money.

Thus, I believe chiropractors will continue to fight these fruitless endeavors and will eventually learn that these efforts are a waste of time and energy. Physical therapists have always moved joints, especially when working with orthopaedic patients. Our primary focus of treatment has always been working with muscles and joints. To attempt to prohibit physical therapists from mobilizing or manipulating a joint (whether a sound is created or not) is similar to prohibiting physical therapists from strengthening a muscle. All synovial joints have nitrogen gas dissolved in their synovial fluid. When the volume of a joint expands, the pressure inside the joint is diminished. The resultant reduction in pressure makes gas come out of solution and if this is done quickly, a 'pop' is heard. Prohibiting, legislating, or the worst scenario policing over this natural phenomena is ludicrous. Every time I turn my neck quickly, I could be charged in some states as practicing outside the scope of my license! What's next, prohibiting natural occurring flatulence by gastroenterologists because it reduces stomach bloating? I hope that soon we will be able to quit devoting money to this "no win" fight and begin spending more money on research that will prove without a doubt that physical therapists can and do improve the quality of lives of our patients by moving joints, and put to rest this wasted energy on who owns the 'pop.'

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President

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40 Hours, 4.0 CEUs (No Prerequisite)
$750

New Orleans, LA	Viti	May 14 - 18
Fresno, CA	Yack	May 15 - 19
Atlanta, GA	Smith	Jun 6 - 10
St. Louis, MO	Lonneman	Jun 25 - 29
Bronx, NY	Yack	Jun 25 - 29
Virginia Beach, VA	Viti	Jun 25 - 29
Knoxville, TN	Lonneman	Jul 16 - 20
Milwaukee, WI	Yack	Jul 16 - 20
Philadelphia, PA	Viti	Aug 6 - 10
Louisville, KY	Lonneman	Aug 13 - 17
St. Augustine, FL	Paris/Viti	Aug 13 - 17
Denver, CO	Yack	Aug 21 - 25
Portland, OR	Yack	Sep 18 - 22
Charleston, WV	Viti	Sep 24 - 28
St.Augustine, FL	Paris/Viti	Oct 9 - 13
*Montgomery, AL	Yack	Nov 2 - 6
Pittsburgh, PA	Viti	Nov 7 - 11
Baltimore, MD	Smith	Nov 7 - 11
Orlando, FL	Yack	Dec 3 - 7
Houston, TX	Viti	Dec 10 - 14

E1 - Extremity Evaluation and Manipulation
36 Hours, 3.6 CEUs (No Prerequisite)
Also available to OTs
$645

Pittsburgh, PA	Busby	May 1 - 4
*Louisville, KY	Turner	May 18 - 21
St. Augustine, FL	Patla	Jun 26 - 29
Denver, CO	Turner	Jul 17 - 20
Ft. Lauderdale, FL	Busby	Jul 24 - 27
Minneapolis, MN	Busby	Aug 21 - 24
Las Vegas, NV	Turner	Aug 21 - 24
Washington, DC	Busby	Sep 25 - 28
Omaha, NE	Turner	Oct 16 - 19
St. Augustine, FL	Patla	Nov 6 - 9
Dallas, TX	Turner	Nov 13 - 16

E2 - Extremity Integration
24 Hours, 2.4 CEUs (Prerequisite E1)
$495

New York, NY	Patla	Jun 6 - 8
Beverly, MA	Varela	Jun 6 - 8
*Pittsburgh, PA	Varela	Jul 20 - 22
Virginia Beach, VA	Patla	Aug 2 - 4
St. Augustine, FL	Patla	Aug 8 - 10
Atlanta, GA	Varela	Aug 15 - 17
Chicago, IL	Varela	Aug 22 - 24
Ft. Lauderdale, FL	Varela	Sep 19 - 21
Denver, CO	Varela	Oct 17 - 19
Las Vegas, NV	Varela	Nov 7 - 9
St.Augustine, FL	Patla	Dec 5 - 7

The Older Adult with a Neurological Impairment
32 Hours, 3.2 CEUs (No Prerequisite)
Also available to OTs
$585

Sarasota, FL.	Clayton/Lowe	May 22 - 25
St. Augustine, FL	Clayton/Lowe	Sep 18 - 21

Motor Control & Motor Learning
23 Hours, 2.3 CEUs (No Prerequisite)
Also available to OTs
$450

St. Augustine, FL	Lowe	May 9 - 11

*Specifically designed to respect the Sabbath.

S2 - Advanced Evaluation & Manipulation of Pelvis, Lumbar & Thoracic Spine
27 Hours, 2.7 CEUs (Prerequisite S1)
$495

Beverly, MA	Yack	May 2 - 4
St. Augustine, FL	Irwin	May 16 - 18
LaJolla, CA	Yack	Jun 6 - 8
Concord, NH	Irwin	Jun 13 - 15
Atlanta, GA	Irwin	Jul 18 - 20
Staten Island, NY	Yack	Aug 1 - 3
Sarasota, FL	Irwin	Aug 15 - 17
Chicago, IL	Yack	Sep 12 - 14
St. Augustine, FL	Irwin	Sep 26 - 28
Las Vegas, NV	Yack	Oct 3 - 5
New Orleans, LA	Yack	Oct 24 - 26
*Orlando, FL	Yack	Nov 16 - 18

MF1 - Myofascial Manipulation
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$495

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St. Augustine, FL	Cantu	Sep 12 - 14
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Las Vegas, NV	Cantu	Nov 7 - 9
Ft. Lauderdale, FL	Grodin	Dec 12 - 14

Medical Diagnostics
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St. Augustine, FL.	Boissonnault/ Koopmeiners	Jul 11 - 13

Managed Care-Success & Survival
8 Hours, .8 CEUs (No Prerequisite)
$225

St. Augustine, FL	Koopmeiners	Jul 10

Basic Cranio-Facial
20 Hours, 2.0 CEUs (No Prerequisite)
$465

New York City, NY	Rocabado	May 23 - 25
Atlanta, GA	Rocabado	May 27 - 29

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St. Augustine, FL	Gorniak	Oct 17 - 19

S3 - Advanced Evaluation & Manipulation of the Cranio Facial, Cervical & Upper Thoracic Spine
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$695

Chicago, IL	Rot	May 15 - 18
Denver, CO	Rot	Jun 5 - 8
Sarasota, FL	Smith	Jun 21 - 24
Las Vegas, NV	Smith	Jul 11 - 14
Birmingham, AL	Rot	Jul 24 - 27
Beverly, MA	Smith	Aug 16 - 19
St. Augustine, FL	Paris/Rot	Sep 4 - 7
Concord, NH	Rot	Sep 18 - 21
Atlanta, GA	Smith	Sep 19 - 22
*Virginia Beach, VA	Smith	Dec 14 - 17

S4 - Functional Analysis & Management of Lumbo-Pelvic-Hip Complex
16 Hours, 1.6 CEUs (Prerequisite S1)
$465

Las Vegas, NV	Varela	May 17 - 18
Denver, CO	Nyberg	Jun 21 - 22
St. Augustine, FL	Varela	Jul 26 - 27
Chicago, IL	Nyberg	Aug 16 - 17
Orlando, FL	Nyberg	Sep 20 - 21
DesMoines, IA	Varela	Sep 27 - 28
Ft. Lauderdale, FL	Varela	Oct 4 - 5
St. Augustine, FL	Varela	Oct 25 - 26
Baltimore, MD	Nyberg	Nov 8 - 9
Atlanta, GA	Nyberg	Dec 6 - 7

Spinal Instability - Whole Spine Stabilization
7 Hours, .7 CEUs (No Prerequisite) Also available to OT's, PTA's & COTA's
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Columbia, SC	Paris	May 15
Charleston, SC	Paris	May 16
Greensboro, NC	Paris	May 20
Raleigh, NC	Paris	May 22
Norfolk, VA	Paris	May 24
Richmond, VA	Paris	May 27
Washington, DC	Paris	May 29
Baltimore, MD	Paris	May 30
Philadelphia, PA	Paris	Jun 3
Harrisburg, PA	Paris	Jun 5
Pittsburgh, PA	Paris	Jun 7

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Ortho 5-03

Guest Editorial

Barking Up the Right Tree

Yes, I realize that this phrase lends attention to dogs more readily than to horses, cats, fish, reptiles, birds, or other animals. Somehow, neighing around the right haystack, meowing at the right window, swimming up the right stream, etc. just does not convey the same understanding within the commonly used language of our society. While I was considering a title with a similar meaning, this phrase appeared in the article by Sandy Brown, so I credit her for the title. You can adapt the generic meaning of "being on the right track" to any animal you wish, however, and with encouragement.

The Animal Physical Therapist Special Interest Group (Animal SIG) is on the right track, as evidenced by the:

1. existence of the Animal SIG within the Orthopaedic Section of the APTA;
2. explosion of interest from physical therapists (PTs) and physical therapist assistants (PTAs) in the area of animal rehabilitation;
3. high quality educational offerings;
4. attendance at educational offerings;
5. requests for credentialing;
6. attempts to determine intervention effectiveness with research;
7. establishment of functional outcome measures;
8. desire of the Animal SIG to function in a professional manner within the current legal environment, and
9. tremendous growth and activity within the Animal SIG. Currently, there are 542 active members and 1,078 interested but nonmembers. Nonmembers include veterinarians and veterinary technicians, as well as non-Section and non-APTA members. The Basic Science for Animal Physical Therapist series was published within the Orthopaedic Section and has sold 601 copies.

There are probably other reasons, but this is an impressive list from which to start. In the arena of animal rehabilitation, advances in human medicine are being used to benefit animals. Physical therapy for humans, inclusive of examination, evaluation, physical therapy diagnosis, prognosis, intervention, and outcome measurement, can be adapted with appropriate knowledge base, scientific rationale, and clinical skill to animals. The articles included in this special issue of the *Orthopaedic Physical Therapy Practice* publication are good examples of evidence listed above. The articles are excellent, and I commend the authors for their clinical and writing achievements.

Rehabilitation protocols developed for human anterior cruciate ligament injury have been adapted to develop a postoperative protocol for surgery for the analogous canine cranial cruciate ligament injury in the article entitled, *A Proposed 12-week Protocol for the Rehabilitation of Cranial Cruciate Ligament Injury Following Tibial Plateau Leveling Osteotomy*. Rationale for weight bearing and exercise in water and/or land for humans has been adapted for similar intervention for dogs in the following articles: *Comparing Options in Canine Therapeutic Exercise: Swimming, Underwater, and Land Treadmills; Rehabilitation Following Thoracic Hemilaminectomy*; and *"Jiminy Cricket: The Magic of Disney."* A unique application exists in the intervention of a tortoise in the article, *Rehabilitation of a Radiated Tortoise with a Dislocated Shoulder*.

Valid and reliable outcome measures in human physical therapy are applied to animal rehabilitation in *A Proposed Canine Movement Performance Test: The Canine Timed Up and Go Test*.

Standardization of gait analysis and gait terminology is an important issue within human rehabilitation. Gait analysis is being developed as a valuable part of evaluation in animal rehabilitation as well. Physical therapists and PTAs are working together to propose standardized gait analysis procedures and gait terminology linked closely to those used with humans. This process would allow PTs and PTAs to apply more easily their knowledge base to animal rehabilitation. These gait concepts are presented in the article, *Method of Analysis of Canine Slow Walk*. An article review, *Reliability of Goniometry in Labrador Retrievers* demonstrates application of the knowledge base of goniometry in humans to joint measurement in dogs.

There comes a time when advances within a profession must involve collaboration between or among professions rather than advancement within a profession alone. In human medicine, this advancement within physical therapy has occurred as physical therapy professionals have collaborated with engineers, business administrators, pastors, lawyers, etc. Another example of advancement within the physical therapy profession has occurred by collaboration with veterinarians and veterinary technicians. Veterinarians are the professionals who know animals and animal behavior best, and they are the ones ultimately responsible for the overall care of the animal. Physical therapists and PTAs know rehabilitation and they bring the ability to apply the knowledge, scientific basis, and clinical skill of rehabilitation to improve health care for animals. Physical therapists and PTAs must have the additional knowledge and skill in areas, such as animal anatomy (specific to the animal treated), common conditions with healing times, animal behavior, contraindications, red flags, etc. This leads to staying on the right track.

As professionals, I encourage PTs and PTAs to use wisdom when contributing to the development of animal rehabilitation. This would involve:

* collaborating under the supervision of a veterinarian;
* continuing the supervisory status of PTs and PTAs as has been established with human patients;
* demonstrating proficiency when working with animals by gaining clinical skills and earning appropriate credentials;
* demonstrating resourcefulness and creativity when adapting human physical therapy concepts to animals;
* presenting information (medical records, oral presentations, publications) in the same professional language used with human patients;
* continuing to respect the legal implications within our profession;
* presenting and sharing information at veterinary and physical therapy meetings and conferences; and
* wisely expanding the focus of care to include more animals. The Animal SIG recently broadened its scope to include prevention as well as intervention for injuries/pathology for animals. The previously stated scope of practice did not include prevention. The Animal SIG scope of practice now includes: (1) assistance animals, ie, animals that assist people with disabilities and animals used for intervention for humans receiving physical therapy (eg, animals used in hippotherapy or dolphin therapy); and (2) the special needs of humans who work with athletic or assistance animals.

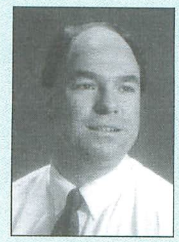
Why have I continued to use the term animal rehabilitation throughout this message? The term physical therapy in almost all states can be used legally by PTs and PTAs when they work with human patients only. As professionals we need to respect practice act language and use of academic credentials, which are within our scope of practice as identified within our practice acts. We can work toward expansion of the word 'human' to the word 'patient' or 'client' but we should respect what presently exists. If the language were changed to a broader term, however, I hope we would always seek the experience we need before working with a patient population that is not our population of training. What is the most important goal? To me, this goal is to provide high quality rehabilitation care for animals and this means the best collaboration of the professions of veterinary medicine and physical therapy. As the Animal Physical Therapist Special Interest Group (SIG), we have the responsibility to stay on the right track.

We encourage PTs and PTAs to join our Animal SIG. Membership is free to Orthopaedic Section members. You can gain access to Animal SIG information at the Section's web-ite: www.orthopt.org.

Cheryl Riegger-Krugh is the Immediate Past-president of the Animal Physical Therapist Special Interest Group with special assistance from Denali and Dakotah Riegger-Krugh, constant companions and always available for consultation.

President's Message *(continued from page 6)*

I hope it is through research, not legislation, that we recognize who is competent and which interventions are effective and which are not. I believe that one day research will provide justification for many of our interventions. Research on mobilization and manipulation should guide our practice. What better way is there for validating our practice rights and existence? This sounds better to me than fighting in legislative arenas where most legislators have little to no knowledge of what we do. Maybe one day soon we will have, as Dr. Steve Rose used to say, the 'goods!' In the mean time I guess I will keep fighting.



Orthopaedically yours,

Michael T. Cibulka, PT, MHS, OCS
President

Method of Analysis of Canine Slow Walk

Charles Evans, MPT, Greg Alnwick, MPT, Stephan Barwise, MPT, Heather Alnwick MPT, Jane Walter Venske PT, EdD, FAPTA

Dover Veterinary Hospital, Dover, NH, USA

INTRODUCTION

Canine gait has historically been analyzed from the perspective of bone and joint movement. The driving force behind this perspective has been the treatment protocols of veterinary medicine. Typically such protocols have emphasized the use of surgical techniques to correct various orthopaedic-based pathologies that affect canine gait. Most of the literature concerning canine gait is pathology-based, and does not address the requirements for normal gait to occur from the perspective of how muscles interact to move bones and joints. Research into the interactions of muscles and how they move bones and joints during *canine gait* would contribute to the emergence of a more interdisciplinary approach to the evaluation of movement disorders in canines.

PURPOSE

The purpose of this study was to determine the interactions between muscles, bones, and joints within the phases of canine gait in slow walk, by performing an exhaustive review of the literature concerning EMG, kinematic, and force plate studies that would provide a basis for the gait analysis.

METHOD

A comprehensive data analysis of EMG, kinematic, and force plate studies provided the necessary framework for the canine gait analysis. The literature review was accomplished by accessing several databases (Pubmed, Medline, Yahoo, Infoseek, and Excite), the Cornell University Veterinary library, and the University of New Hampshire library. The literature search included only peer-reviewed, and refereed journal articles, in an effort to maintain a consistent validity to the data collected.

DATA ANALYSIS

Pattern of Movement

Canine gait as analyzed by Hutton et al[1] and others, is accomplished through the coordinated movement patterns of the forelimbs, hindlimbs and spine, such that 2, 3, and 4 feet are in contact with the ground at any one time. Muybridge[2] and others go on to further define this gait pattern into normal and slow walk, such that normal walk uses the 2 and 3 feet pattern, while slow walk uses the 3 and 4 feet pattern. Muybridge[2] further defines the limb sequence in slow walk as left hind foot, left fore foot, right hind foot, right fore foot. There are 2 stages within the gait sequence, stance and swing phase, each of which are split into 3 further stages of gait—initial contact, midstance, terminal stance, initial swing, midswing, and terminal swing for both the forelimbs and hindlimbs. Initial contact in the dog is the equivalent of initial contact and loading response in humans, terminal stance in the dog is the equivalent of terminal stance and preswing in the human.

Movement Analysis

Canine gait necessitates a sharing of braking and propulsive forces across the 4 limbs. The braking function is primarily carried out by the forelimb to the extent that up to 151% of canine body weight impacts the forelimb on braking function compared to a maximum of 105% in the hindlimb. Propulsive function is primarily performed by the hindlimb with propulsive forces reaching 125% of body weight at the hindlimb as compared to 116% at the forelimb.[3] The roles of braking and propulsion are defined by the position of the forelimbs and hindlimbs in relation to the center of mass (COM). When the forelimb first makes contact with the ground (initial contact), the distal aspect of the forelimb is at the greatest distance from the COM. The resultant force vector causes the forelimb to provide a braking function that will slow the momentum of the dog. The forelimb can therefore only aid in forward propulsion in terminal stance, when the COM has moved ahead or cranial to the contact point of the forelimb on the ground. Nevertheless, force plate analyses show that the forelimbs support an average of 60% of the canine mass during walk, as compared to 40% supported by the hindlimbs.[3,4] These proportions of weight shift illustrate the extent to which inertia carries the body weight forward during slow walk, aiding the functional efficiency of propulsion.

Force plate analyses of peak vertical forces show that generally an inverse correlation is found between peak vertical force and canine size and that stance phase correlates directly with physical size. Thus, at a given velocity a larger dog's paw will remain on the ground longer during stance, increasing the time that the peak vertical forces are exerted and decreasing the loads on the musculoskeletal system.[3]

Canine flexion and extension takes place in the sagittal plane. Flexion represents a decrease in the relative angle between two landmarks, while extension represents an increase in the relative angle between the same landmarks.[5] For dogs, flexion motions of the forelimb occur when the joint angle between the humerus and the scapula decreases from the neutral position. When this principle is applied, it is important to be clear on the definitions of flexion and extension from a directional perspective. The result is that forward movement in the hindlimb is defined as flexion, as in humans, whereas the same forward movement in the forelimb is defined as extension-based on the relative angle between the scapula and the humerus. Conversely backward movement of the hindlimb becomes extension, as in humans, whereas the same backward movement of the forelimb becomes flexion.

Tokuriki[6] developed the following analysis of musculoskeletal interactions necessary for canine gait from EMG studies of locomotion in the Airedale canine breed. The Airedale breed is one of a number of breeds referred to as 'square dogs' because of their relative proportional symmetry. Square dogs are therefore used in veterinary movement analyses because the findings generally can be applied across many other breeds, allowing a broad utilization of the research.

GAIT ANALYSIS

The following analysis of canine slow walk is based upon dynamic EMG studies during gait and biomechanical analysis without direct measurements from the dog. These studies were performed by Tokuriki and reported in the *Japanese Journal of Veterinary Research* in 1973.

FORELIMB GAIT

Metacarpophalangeal Joints

Initial contact

As the digits encounter the ground they are flexing. The extension torque or moment from the ground reaction force on the metacarpophalangeal joints is countered by the deep digital flexors resisting overextension. The result is to maximize the braking effect of the large central pad and to bring the toe pads into contact with the ground as quickly as possible after the large central pad contacts the ground.

Midstance

An extension torque is created on the metacarpophalangeal joints as contact with the ground and forward inertia allows the body to move cranially over the forelimb. The eccentric action of the deep digital flexors maintains ground contact with the toe pads providing stabilization of the forelimb as the braking effect is continued. The digits remain in flexion.

Terminal stance

The COM moves sufficiently over the forelimb to allow for propulsion. The main pad leaves the ground while the toe pads remain in contact. As the limb moves caudally into terminal stance, the deep digital flexors act eccentrically to provide the necessary tension for propulsion and toe off. The common digital extensor co-contracts to stabilize the digits prior to initial swing. At this point the digits are being forced into extension.

Initial swing

A slight residual contraction of the common digital extensor, from toe pad off in terminal stance, continues extension of the digits as the forefoot position is maintained without ground contact.

Midswing

The common digital extensor continues to contract concentrically, bringing the digits into extension in preparation for main pad strike.

Terminal swing

The common digital extensor continues to be active to maintain extension of the digits prior to main pad strike. In response the deep digital flexor co-contracts to stabilize the digits for initial contact.

Carpus (Table 1)

Initial contact

The forelimb is placed in a slightly adducted position at main pad strike. Because of this an adduction force occurs from the ground reaction force vector in the forelimb, in addition to an extension moment, as the main pad makes contact with the ground. This adduction force and moment are stabilized by the synergy of the extensor carpi ulnaris and the flexor carpi ulnaris. Further stabilization takes place between the flexor carpi ulnaris and the flexor carpi radialis, as both act eccentrically to resist the extension moment. At this point, the carpus (wrist area) is in extension.

Midstance

Ground contact produces a compressive force together with an extension torque while the carpal joint is held in neutral. The flexor carpi ulnaris and extensor carpi ulnaris eccentrically stabi-

Table 1. Forelimb: Normal Carpal (Wrist) Joint Motions & Muscle Actions

	Initial Stance	Mid Stance	Terminal Stance	Initial Swing	Mid Swing	Terminal Swing
ROM[8]			Extension			
210°				■		
200°						
190°	■	■	■			
180°						■
170°						
160°						
150°						
140°						
130°						
120°					■	
			Flexion			
Muscle Action[6]	XXXX= very strong	XXX= strong	XX= weak	X= slight	Blank= no action	
Extensor carpi radialis			X	XX	X	XX
Flexor carpi radialis	X		XXX		XX	X
Flexor carpi ulnaris	XXX	XX	X		XX	XXX
Common digital extensor			X	X	XX	X
Extensor carpi ulnaris	XXX	XXX			X	XXX
Dark row indicates anatomical neutral[9,10]						

lize the forelimb, resisting the extension torque, as the body moves cranially. Because the COM is directly over the forelimb at this phase of gait the flexor carpi radialis is not required to contract. This muscle action allows the forelimb to maintain a sound weight bearing position below the COM.

Terminal stance

As the COM moves cranially the resultant extension torque is resisted by eccentric action of the flexor carpi radialis and flexor carpi ulnaris. This synergy maintains toe pad contact and facilitates balance. Further stabilization to the carpus is provided by co-contraction of the extensor carpi radialis and the common digital extensor.

Initial swing

The carpus is flexed by the residual action of the flexor carpi ulnaris and flexor carpi radialis to allow for toe clearance. Stabilization and control of the flexion is provided by co-contraction of the extensor carpi radialis and the common digital extensor.

Midswing

The same movement synergy is continued from initial swing through midswing. However, the flexor carpi radialis and ulnaris flex the wrist to facilitate paw clearance.

Terminal swing

The extensor carpi radialis and ulnaris extend the carpus in preparation for main pad strike, while the flexor carpi radialis and ulnaris stabilize the wrist for main pad strike.

Elbow (Table 2)

Initial contact

The ground reaction force produces a flexion moment at the elbow, which is resisted by the 4 heads of the triceps brachii. This allows the elbow to function as a shock absorber.

Midstance

As the elbow flexes the medial and lateral heads of the triceps brachii act eccentrically to control the flexion torque caused by the forward movement of the COM and its relation to the ground reaction force. Co-contraction by the ulnaris lateralis and the biceps brachii provide stability across the elbow joint.

Terminal stance

As the COM continues to move cranially and the elbow approaches neutral, the flexion torque at the elbow increases. The medial and lateral heads of the triceps brachii contract concentrically to extend the elbow. The biceps brachii contracts to stabilize the elbow prior to toe pad off.

Initial swing

Concentric contraction of the medial head of the triceps brachii extends the elbow following toe pad off. At the same time the biceps brachii and the brachialis begin to flex the elbow.

Midswing

Toe clearance is facilitated at the elbow by concentric contraction of the brachialis, flexing the elbow to the maximum necessary for functional gait.

Terminal swing

The triceps brachii concentrically contract to extend the elbow preparing the elbow for main pad strike.

Shoulder (Table 3)

Initial contact

As the shoulder begins to move from extension to flexion, the infraspinatus, distal and proximal portions of the deltoideus, latissimus dorsi, teres major, and the long head of the triceps brachii resist the extension torque from the ground reaction force on the forelimb. The supraspinatus co-contracts to stabilize the shoulder.

Midstance

As the shoulder continues to move toward flexion the supraspinatus and biceps brachii act eccentrically to resist

Table 2. Forelimb: Normal Elbow Joint Motion & Muscle Action

	Initial Stance	Mid Stance	Terminal Stance	Initial Swing	Mid Swing	Terminal Swing
ROM[8]			Extension			
135°						
130°	■		■	■		■
125°						
120°		■				
115°						
110°						
105°						
100°					■	
			Flexion			
Muscle Action[6]	XXXX= very strong	XXX= strong	XX= weak	X= slight	Blank= no action	
Triceps brachii (long head)	X-				XX	XXX
Triceps brachii (lateral head)	XXX	XX	XX			XXX
Triceps brachii (medial head)	XX	XX	X	X		XXX
Biceps brachii		XX	XXX	XX		
Brachialis				XXX	XX	
Ulnaris lateralis	XXX	XXX			X	XXX
Dark row indicates anatomical neutral[9,10]						

Table 3. Forelimb: Normal Shoulder Joint Motion & Muscle Action

	Initial Stance	Mid Stance	Terminal Stance	Initial Swing	Mid Swing	Terminal Swing
ROM[8]			Extension			
125°						
120°	■					■
115°					■	
110°		■				
105°			■			
100°						
95°				■		
			Flexion			
Muscle Action[6]	XXXX= very strong	XXX= strong	XX= weak	X= slight	Blank= no action	
Brachiocephalicus			XX	XX	X	
Latissimus dorsi	XX	XX	X		XX	
Pectoralis superficialis			XX	XX		
Pectoralis profundus						X
Supraspinatus	XXX	XXX	XXX	XX		X
Infraspinatus	XXX	XXX	X			X
Teres major	X		XX	XX		
Deltoideus (proximal)	X		XXX	XXX	XX	XX
Deltoideus (distal)	XXX	XXX	XXX	XX	XX	XX
Triceps brachii (long head)	X				XX	XXX
Biceps brachii		XX	XXX	XX		

Dark row indicates anatomical neutral[9,10]

the flexion torque and provide stability. A synergy of the infraspinatus and deltoideus co-contract to stabilize and flex the shoulder. As the forelimb begins to move caudally the trapezius cervicalis stabilizes the scapula.

Terminal stance

As the shoulder moves through neutral and into flexion, the flexion torque at the shoulder is resisted by the supraspinatus, biceps brachii, brachiocephalicus cleidobrachialis, and the braciocephalicus cleidocervicalis. The deltoideus, latissimus dorsi, and infraspinatus stabilize the forelimb prior to toe pad off.

Initial swing

The deltoideus and teres major continue to flex the shoulder as toe pad off is completed. At this point the shoulder joint is at its maximum flexion. As toe pad off reaches completion, the brachiocephalicus, pectoralis superficialis, and supraspinatus muscles act eccentrically to slow the flexion of the forelimb prior to extension towards mid swing.

Midswing

The brachiocephalicus cleidobrachialis is aided by gravity in extending the shoulder through mid swing. The latissimus dorsi, deltoideus, and the long head of the triceps brachii co-contract to control this extension.

Terminal swing

Preparation for main pad strike is made by concentric contraction of the pectoralis profundus, infraspinatus, and supraspinatus in continued extension of the shoulder. The deltoideus and triceps brachii muscles co-contract to provide control and stability.

Scapula (Table 4)

Initial contact

As gravity and inertia produce an extension moment to the shoulder prior to initial contact and the scapula moves as the shoulder moves from flexion into extension, the rhomboideus thoracis and cervicalis concentrically contract to draw the scapula against the trunk. The two heads of the serratus ventralis (cervicis and thoracis) concentrically contract to depress the scapula affording greater extension at the shoulder during main pad strike. Both parts of the trapezius (cervicalis and thoracicis) are contracting to elevate and abduct the forelimb. All of these actions stabilize the shoulder during initial contact of the main pad.

Midstance

As the scapula moves into extension the compressive force at the forelimb causes the scapula to retract. Stabilization of the scapula against the trunk during full weight bearing is provided by contraction of the rhomboideus cervicalis and thoracis. The serratus thoracis takes on more of the scapula's depression function from the serratus cervicis, while the trapezius cervicalis and thoracicis augment scapular depression to stabilize the shoulder girdle.

Terminal stance

The rhomboids, trapezius, and serratus muscle groups all co-contract to stabilize the scapula as it reaches full extension and augment forelimb flexion with scapulohumeral rhythm, to provide propulsion into initial swing.

Initial swing

Full functional flexion of the forelimb together with trunk support following toe pad off is achieved by serratus ventralis as it depresses the scapula. The rhomboids stabilize scapular depression holding the

Table 4. Forelimb: Normal Scapular Joint Motion & Muscular Action

	Initial Stance	Mid Stance	Terminal Stance	Initial Swing	Mid Swing	Terminal Swing
ROM[8]			Extension			
100°			■	■		
95°						
90°						
85°						
80°					■	
75°						
70°		■				
65°						
60°						
55°						
50°						
45°						■
40°						
35°						
30°	■		Flexion			
Muscle Action[6]	XXXX= very strong	XXX= strong	XX= weak	X= slight	Blank= no action	
Trapezius cervicalis	XXX	XX	XX	X		X
Trapezius thoracicis	XX	XX	XX			XX
Rhomboideus cervicalis	XXX	XXXX	XXXX	X	XX	XX
Rhomboideus thoracicis	XXX	XXX	XXX	X		X
Serratus ventralis	XXX	XX	X	X	XX	XXX
Serratus thoracicis	XX	XXX	X			
Dark row indicates anatomical neutral[9,10]						

scapula against the thorax while the trapezius cervicalis elevates the scapula.

Midswing

Scapular stabilization and trunk support is continued by primarily the rhomboideus cervicalis and serratus ventralis respectively. Rhomboideus cervicalis also raises the forelimb increasing ground clearance through midswing as the scapula begins to move from extension back into flexion.

Terminal swing

Trunk support is maintained by serratus ventralis, while the rhomboids and trapezius cervicalis continue to stabilize the scapula against the thorax. The rhomboids and trapezius also elevate the forelimb to allow for greater extension by braciocephalicus cleidobrachialis, in preparation for initial contact and main pad strike as the scapula reaches the neutral position and moves into flexion.

HINDLIMB GAIT

Hock or Ankle (Table 5)

Because the terms tarsus and hock are used interchangeably in the literature the interactions described in this section pertain to the metatarsus, tarsus, and hock. The veterinary literature refers to the metatarsus (metatarsal area), tarsus (tarsal bones and joints), and hock (tarsus, tarsal bones, talocrural joint, or a combination of the tarsus and talocrural joint).

Initial contact

At initial contact the tarsus and hock are in flexion. Due to a flexion moment exerted on the tarsus and hock by the ground reaction force, the gastrocnemius and deep digital flexor are concentrically contracting to stabilize the tarsus for maximum traction. The deep digital flexor extends the tarsus in co-contraction to provide stability at the tarsus. The cranial tibial muscle is contracting to flex and stabilize the tarsus and externally rotate the paw. The biceps femoris and the gracilis are co-contracting to stabilize the hock.

Midstance

As the hindlimb and inertia propel the body forward, the tarsus is extended and the hock is flexed and impacted by the ground reaction forces. The deep digital flexor eccentrically resists the extension moment at the digits to keep them in contact with the ground and co-contracts to resist the flexion moment at the tarsus. The biceps femoris co-contracts to stabilize the hock and hindlimb for weight bearing and propulsion.

Terminal stance

At terminal stance the tarsus is extended and continues in an extension moment. The hock is moving into extension. The tarsus is affected by an extension moment. The gastrocnemius is concentrically contracting to extend the tarsus to provide the force for effective toe push. The hock is in a flexion moment but the biceps femoris and sartorius are contracting to extend the hock for maximum push off.

Initial swing

The cranial tibial and long digital extensor muscles are flexing the tarsus and externally rotating the paw to prepare the paw for ground clearance at midswing. The biceps femoris and semitendinosis are contracting to provide forward propulsion prior to toe off.

Table 5. Hindlimb: Normal Hock (Ankle) Joint Motion & Muscle Action

	Initial Stance	Mid Stance	Terminal Stance	Initial Swing	Mid Swing	Terminal Swing
ROM[7]			Extension			
155°			■			
150°	■					
145°						
140°				■		
135°						
130°						
125°					■	
120°		■				■
			Flexion			
Muscle Action[6]	XXXX= very strong	XXX= strong	XX= weak	X= slight	Blank= no action	
Biceps femoris	XXXX	XXX	X	X		XXX
Gracilis	X					XX
Rectus Femoris			XXX	XXX	X	X
Semitendinosis				X		
Dark row indicates anatomical neutral[9,10]						

Midswing

As the hindlimb moves forward the cranial tibial muscle is flexing the tarsus and externally rotating the paw while the long digital extensor extends the digits and flexes the tarsus to raise the digits and tarsus for ground clearance. The hock remains in the same position as at initial swing as the hindlimb moves cranially.

Terminal swing

The gastrocnemius and deep digital flexor concentrically contract to extend the tarsus in preparation for initial contact of the main footpad. The cranial tibial and long digital extensor muscles co-contract to flex the tarsus, thus stabilizing the tarsus for initial contact. At the same time the long digital extensor and deep digital flexor co-contract to stabilize the digits for initial contact. The cranial tibial and middle gluteal muscles co-contract to stabilize the hindlimb in internal/external rotation for initial contact, while the superficial gluteal abducts the hind-limb. At the hock the biceps femoris and gracilis contract to extend the hock in preparation for initial contact.

Stifle or Knee (Table 6)
Initial contact

At initial contact a flexion torque and a compression force influence the stifle. The stifle is flexed at initial contact. The biceps femoris, semimembranosus, gastrocnemius, and gracilis are concentrically contracting while the vastus lateralis and vastus medialis are co-contracting to stabilize the stifle for weight bearing and propulsion.

Midstance

The stifle flexion moment continues into midstance. The stifle is flexed but is moving toward extension. The vastus medialis and lateralis oppose the stifle flexion moment caused by the ground reaction force vector to provide for weight bearing and propulsion, while the biceps femoris provides stability at the hip and therefore stabilizes the stifle too.

Terminal stance

The stifle continues in a flexion moment produced by the ground reaction force. The stifle has now moved into extension. The rectus femoris, tensor fascia lata, and vastus lateralis all contract concentrically to extend the stifle thus providing a caudal force for toe off. The biceps femoris and sartorius co-contract to stabilize the hindlimb.

Initial swing

The stifle at this point is at maximum functional extension. The rectus femoris and tensor fascia lata initially extend the stifle and then the biceps femoris, semitendinosis, and sartorius first control the extension and then bring the stifle into flexion.

Midswing

At this point the stifle is moving back into flexion for toe pad clearance. The sartorius contracts concentrically to flex the stifle, while the rectus femoris stabilizes.

Terminal swing

The biceps femoris, tensor fascia lata, semimembranosus, sartorius, semitendinosus, and gracilis contract to prepare the stifle for initial contact.

Hip (Table 7)
Initial contact

The iliopsoas, vastus lateralis and medialis are ending their contractions from terminal swing bringing the hip into position for initial contact. The hip at initial contact is flexed and has a flexion moment imposed by the ground reaction forces. The biceps femoris, superficial gluteal, middle gluteal, and semimembranosus are all resisting the flexion torque at the hip. The superficial gluteal and middle gluteal are also contracting to abduct the hindlimb.

Midstance

During midstance the hip is in a flexion moment due to ground reaction forces. The hip joint is transitioning from flexion to extension. The biceps femoris and superficial and middle gluteals are contracting to extend the hip while the superficial and middle gluteals also resist an abduction force at the hip. The vastus lateralis and medialis are stabilizing the hip for weight bearing and propulsion.

Terminal stance

The hip is now in an extension moment from the ground reaction force, and is extended, due to the cranial movement of the body on the ground. The rectus femoris, iliopsoas, tensor fascia lata, and sartorius are all contracting concentrically to stabilize the hip to provide a stable platform for the more distal joints to propel the dog forward at toe off. The

Table 6. Hindlimb: Normal Stifle (knee) Joint Motion & Muscle Action

	Initial Stance	Mid Stance	Terminal Stance	Initial Swing	Mid Swing	Terminal Swing
ROM[7]			Extension			
150°						
145°	■					
140°		■	■			■
135°						
130°					■	
125°						
120°				■		
			Flexion			
Muscle Action[6]	XXXX= very strong	XXX= strong	XX= weak	X= slight	Blank= no action	
Tensor Fascia Latae			X	X		X
Biceps Femoris	XXXX	XXX	X	X		X
Semitendinosis				X		
Semimembrinosis	X					XX
Sartorius			X	XX	XXX	
Gracilis	X					XX
Rectus Femoris			XXX	XX	X	X
Vastus Medialis	XXX	XX	X			XX
Vastus Lateralis	XXX	XXXX	XXX			XXX
Gastrocnemius	XX		X			XXXX
Dark row indicates anatomical neutral[9,10]						

Table 7. Hindlimb: Normal Hip Joint Motion & Muscle Action

	Initial Stance	Mid Stance	Terminal Stance	Initial Swing	Mid Swing	Terminal Swing
ROM[7]		Extension				
120°			■	■		
115°						
110°		■			■	
105°						
100°						■
95°	■					
			Flexion			
Muscle Action[6]	XXXX= very strong	XXX= strong	XX= weak	X= slight	Blank= no action	
Biceps Femoris	XXXX	XXX	X	XXX		X
Vastus Lateralis	XXX	XXXX	XXX	XXX		
Vastus Medialis	XXX	XXX	X	XX		
Iliopsoas	XX	X	XX	XX	XX	X
Superficial Gluteal	XX	X		X		
Middle Gluteal	XX	X		XX		
Semimembranosis	X		XXX	XX		
Gracilis	X		X	XX		
Rectus Femoris			XXX	X	X	XXX
Tensor Fascia Lata			X	X		X
Sartorius			X	X		X
Semitendinosis						X
Adductor			X			
Dark row indicates anatomical neutral[9,10]						

biceps femoris is stabilizing the hip for toe off.

Initial Swing

Because the hip is now as functionally extended as it gets during slow walk, the rectus femoris, vastus lateralis, vastus medialis, sartorius, iliopsoas, and tensor fascia latae all continue to contract concentrically to begin the process of moving the hindlimb cranially. At the same time the biceps femoris and semitendinosis are residually co-contracting for toe off.

Midswing

The iliopsoas and the rectus femoris contract concentrically to flex the hip to provide clearance for the swing through of the toes.

Terminal swing

The iliopsoas, rectus femoris, sartorius, and tensor fascia lata contract concentrically to flex the hip in preparation for initial contact. The biceps femoris and semitendinosis co-contract to stabilize the hip in preparation for initial contact.

Trunk

Initial contact

At initial contact the rectus abdominis is concentrically contracting to flex the vertebral column while the sacrospinalis muscles at L4 are co-contracting to help stabilize the vertebral column.

Midstance

At midstance the rectus abdominis is flexing the vertebral column to provide a stable platform for the hindlimb to propel the animal cranially.

Terminal stance

At terminal stance the sacrospinalis lumbar (L4) muscles are extending the vertebral column to assist with the final thrust of propulsion at toe off.

Initial swing

The sacrospinalis lumbar (L4) muscles are extending the trunk for the finish of toe off prior to initial swing.

Midswing

The trunk remains in an extended position at this time.

Terminal swing

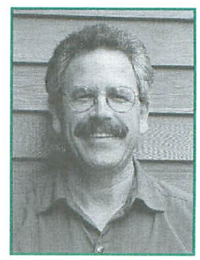
The trunk passively moves into a more flexed position secondary to hip flexion.

CONCLUSION

This study effectively lends itself to the evaluation of canine movement disorders, by drawing attention to soft tissue interactions. Pain at a particular phase of the gait cycle will help identify points of dysfunction. This musculoskeletal analysis will provide insights into therapeutic interventions that could postpone or even negate the need for surgical procedures. The information will provide a resource to aid in the development of postoperative rehabilitation protocols.

REFERENCES

1. Hutten EC, Freeman MA, Swanson SA. The forces exerted by the pads of the walking dog. *J Small Anim Pract.* 1969;10:71-77.
2. Muybridge E. *Animals in Motion.* New York, NY: Dover Publications; 1957.
3. Budsberg SC, Verstraete MC, Soutas-Little RW. Force plate analysis of the walking gait in healthy dogs. *Am J Vet Res.* 1987;48:915-918.
4. McLaughlin R, Roush JK. Effects of increasing velocity on braking and propulsion times during force plate gait analysis in Greyhounds. *Am J Vet Res.* 1995;56:159-161.
5. Evans HE, Lahunta A. *Miller's Guide to the Dissection of the Dog.* 3rd ed. Philadelphia, Pa: WB Saunders; 1988.
6. Tokuriki M. Elecromyographic and joint-mechanical studies in quadrupedal locomotion. 1. Walk. *Jap J Vet Res.* 1973;35:433-446.
7. Adrian M, Roy W, Karpovich P. Normal gait of the dog. An electrogoniometric study. *Am J Vet Res.* 1966; 27:90-95.
8. Sumner-Smith G. *Decision Making in Small Animal Orthopaedic Surgery.* Philadelphia, Pa: B.C. Decker; 1988.
9. Jaegger G, Marcellin-Little D, Levine D. Reliability of goniometry in Labrador retrievers. *Am J Vet Res.* 2002;63: 979-986.
10. Shively M, Beaver B. Dissection of the dog and cat. Ames, Iowa: Iowa State University Press; 1985.



Comparing Options in Canine Therapeutic Exercise: Swimming, Underwater, and Land Treadmills

Sandy Brown, PT, MS

INTRODUCTION

Physical therapists and Doctors of Veterinary Medicine (DVMs), who practice canine rehabilitation, are in a constant quest to discover new and efficient ways to exercise their 4-pawed patients. Commanding a dog to 'sit' or 'speak' is one thing, but asking a dog to perform a biceps curl or quad set is a job better left for Dr. Doolittle. It has, however, been discovered that swimming pools, underwater treadmills, and land treadmills modified to prevent escape are efficient tools to provide rehabilitation for most dogs. The dog is the 'captive audience' and the therapist can do what he/she does best: evaluate and examine the patient, monitor and progress the patient, reassess, and reward with verbal encouragement and a dog cookie.

The purpose of this paper is to compare some of the advantages and disadvantages of exercising and rehabilitating dogs in underwater treadmills, on land treadmills, and in swimming pools. As physical rehabilitation rapidly becomes an integral part of veterinary medicine, clinicians seek effective and efficient ways to get their canine patients barking up the right tree again. The following comparisons hopefully will offer guidance and insight regarding 3 popular modes of therapeutic exercise.

COMPARISONS

Swimming and underwater treadmill walking (UWTW) are entirely different modes of exercise, both of which share the physical properties of water, such as buoyancy, hydrostatic pressure, viscosity and—when the water temperature is appropriate—high specific heat.

Buoyancy is defined as the upward thrust of water acting on a body that creates an apparent decrease in the weight of a body while immersed. Buoyancy diminishes the effects of gravity and axial loading and provides a supportive environment ideal for patients, such as dogs with osteoarthritis, soft-tissue injury, obesity, or other orthopedic disorders. These patients often are unable to exercise with a land-based program either because they can not support their weight or the repetitive strain imposed on the tissues by ground reaction forces leads to injury.

Hydrostatic pressure—the pressure exerted by the water on the immersed body—results in equal and opposite forces surrounding all submerged body parts. As with human patients, the combination of buoyancy and hydrostatic pressure can assist when a canine patient is practicing standing balance. The pressure provides support around the body to an equal degree so if the standing patient should fall slightly off balance when immersed, buoyancy can help him or her regain the vertical position. This is particularly helpful for dogs with neurological deficits. In addition, because hydrostatic pressure increases with the depth of water, distal lower extremity edema may be reduced as the water pressure encourages the return flow of fluids in a proximal direction.

Viscosity is a measure of how much a fluid will resist a body moving within the fluid. The viscosity of water can increase resistance to movement by 40 to 60 times by increasing the speed of movement. As a dog (or human) walks or swims slowly through water, resistance is met. The faster a dog walks or swims through water, the greater the resistance to movement. This is a key element for progression of any patient in an aquatic program.

Lastly, because of the high specific heat of water, patients who are swimming or walking in an underwater treadmill may benefit from the thermal effects of water on the muscles, tendons, and ligaments. Dogs require a cooler temperature than humans and can easily overheat. Typically, 82° to 88° Fahrenheit is an appropriate temperature for exercising dogs in either the underwater treadmill or swimming pool.

Studies at the Universities of Tennessee and Iowa have compared the differences in joint kinematics between swimming, UWTW, and the land treadmill (LT) with the following conclusions:

- Swimming produces greater joint ROM in the hip, stifle (knee in humans), and hock (ankle in humans) than LT, with the increase due to increased flexion at these joints.
- Swimming reduces hind limb extension when compared to LT.
- UWTW increases joint ROM due to increased flexion of the hip, stifle, hock, shoulder, and elbow when compared to LT.
- UWTW produces little change in extension, with the exception of decreased hip and stifle extension during late propulsion with water level at the greater trochanter, as compared to LT.
- With UWTW, joint flexion of the hip, stifle, hock, shoulder, elbow, and carpus is greatest when the water level is at the level of the joint or higher, as compared to LT.
- A canine patient recovering from cranial cruciate surgery may benefit from a combination of swimming to expedite flexion of the stifle and walking to promote extension of the stifle.

Swimming

Veterinarians have used swimming with dogs for decades as a means of rehabilitation for building endurance, strength, and range of motion (Figure 1). Many postoperative spinal surgical or other neurologically impaired dogs respond extremely well to early-onset swimming, which initiates voluntary

Figure 1. Arnie swimming after intervertebral disc surgery.

movement. The patient's natural instinct to kick in water 'kicks-in' even when movement on land is barely detectable. Some dogs—either impaired or normal—will not use their hind limbs to kick; they doggie paddle with their front limbs and simply use their hind limbs as rudders. In such cases, the therapist may provide manual assistance or tactile cues to encourage movement in the hind limbs.

Swimming is an excellent cardiovascular exercise; however, deconditioned dogs may find it too strenuous. Short, succinct sessions should be attempted first. Many dogs are fearful of the water and will thrash when submerged into a pool, potentially causing injury to the dog (eg, by compromising a surgical site, or to the one assisting the dog). An assistant should be present during the entire swimming session and should be able to recognize signs of distress in the dog. Other considerations are flotation vests, which may be donned on the dog for safety, or a submerged pool ramp to allow a resting place between bouts of swimming.

Finally, the cost of a pool will vary enormously, depending on factors such as size, whether it is above or below ground, added ramps, materials, and hoists. Jets also may be added to increase water resistance. By modifying these variables, the cost of a pool can be better controlled compared to an underwater treadmill, which has a much higher base price.

Underwater Treadmill Walking

Underwater treadmill systems have become very popular in canine rehabilitation, in spite of the hefty price tag (~$35,000 and upward). The units are outfitted with controls that alter speed of the treadmill, temperature, and depth of the water. Resistance of the water can be varied by the speed of the treadmill. Control of these variables allows the therapist the ability to progress the patient safely and measurably. A light emitting diode (LED) can be used to measure speed/time/distance. These variables are not as easily controlled during swimming.

Unlike swimming, the UWTW is a functional, closed-chain, weight-bearing (WB) activity (Figures 2 and 3). The amount of WB can be modified at the push of a button, which varies the amount of water in the treadmill side of

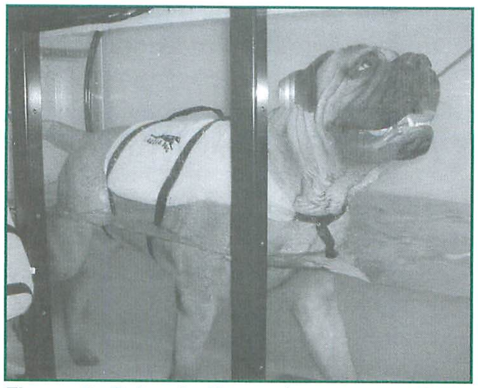


Figure 2. Quinn in the underwater treadmill, building hind limb muscle mass. Diagnosis: Panosteitis.

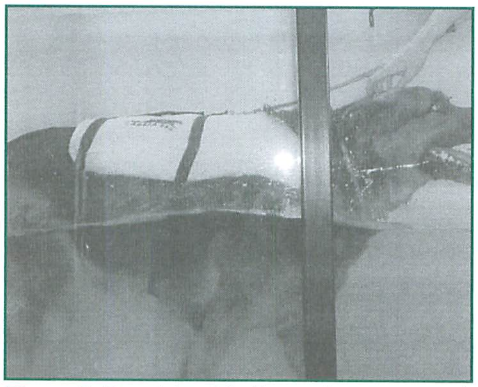


Figure 3. Roustabout in the underwater treadmill.

the treadmill/water system. At the University of Tennessee, studies demonstrated that when a dog is immersed in water, WB is significantly reduced. This reduction is directly related to the depth of the water. Weight bearing is 38% of land weight when water is at the level of the greater trochanter, 85% when the water is at the level of the lateral condyle of the femur, and 91% when the water is at the level of the lateral malleolus. These data allow a therapist to place patients in deeper water for minimal WB, and gradually increase WB by decreasing depth of water.

The benefits of early, controlled WB and mobilization are well known to all therapists. Wolff's Law states that bone remodels in response to stress with optimal stress resulting in bone deposition and too little or too much stress resulting in overall bone resorption. Soft-tissue also will remodel according to the stress and mechanical loads placed upon collagen. Similarly, cartilage also responds to WB. The optimal stimulus for cartilage regeneration is intermittent and optimal intensity of joint compression and decompression with gliding, ie, walking.

As stated earlier, joint flexion of the canine hip, stifle, hock, shoulder, elbow, and carpus is greatest when the water level is equal to or higher than the level of the concerned joint. Use of the underwater treadmill therefore allows the therapist to focus on a particular joint by varying the depth of the water.

Most dogs are not overly fearful in the underwater treadmill, because the water rises slowly and their paws are always in contact with the surface. There is a short learning curve, but generally dogs learn quickly during the first session. Some therapists may join canine patients in the tank not only to provide them with comfort, but also to guide them through immersed aquatic exercises such as 'dancing' or step-overs. The water level can be raised so that the dog begins to swim, although this is difficult with larger breed dogs due to the smaller size of the tank compared with a pool. As with the swimming patient, a flotation vest may be used for safety. A patient in the tank should never be left unattended.

Land Treadmill

Land-based units have an important place in rehabilitation. Dogs who are able to 'graduate' from aquatic exercise are ideal candidates for the land treadmill, as are dogs who are high functioning and have gait abnormalities for which full WB is not prohibited.

There are several key advantages to using a land-based treadmill that should be noted: (1) Treadmill 'hills' are excellent for progressive training. The incline and length of the hill can be measured and documented. Running up real hills accomplishes the same goal; however, treadmills allow precision in the workouts and freedom from poor weather. (2) A precise pace can be set enhancing the ability to achieve specific goals. (3) A precise duration of workout can be measured and documented.

Critics of treadmills argue that a 6-minute mile on the treadmill does not equal a 6-minute mile on terra firma. The 6-minute mile pace on a land treadmill usually produces lower heart and oxygen consumption rates than running the same pace over land, partially due to lack of wind resistance. This finding reflects the clear biomechanical differences between treadmill and overground running. Penn State University evaluated the differences between treadmill versus 'overground' running in humans and found that at faster speeds both stride length and 'support time'—the length in milliseconds of the stance phase of the gait cycle—are longer on the treadmill. Studies comparing differences between overground and treadmill walking in dogs have yet to be completed.

On land, there is forward progress as a dog runs with the center of mass accelerating and decelerating with alternate braking and propulsion. During ambulation on a treadmill, there is no 'net-propulsion' because the treadmill belt disappears behind the dog. The leg muscles therefore, are not used for propulsion, but rather to reposition the legs to keep the center of mass stable. Although this not considered 'real running' because of the altered kinematics, it is not without its merits.

Land treadmills are convenient to buy and inexpensive compared to pools and underwater treadmills. They only need some side-guards to prevent a 'quick getaway' from the canine patient. A harness attached to a center-pole may be used to keep the dog centered on the treadmill. Again, a person should always be present while the dog is ambulating on a land treadmill.

CONCLUSION

Author's Personal Note

In the perfect clinic, a pool, underwater treadmill, and land-treadmill would cover all rehabilitation bases. Space limitations and prices guide clinicians into making big decisions about equipment to purchase. I have chosen the underwater treadmill as the first of the 3 modes of exercise to offer my patients, because of the versatility and therapeutic advantages presented above. I am convinced I have made the correct choice for my 650 sq. ft leased area and for my numerous patients with osteoarthritis. A land-based treadmill will soon be an addition. And the pool? Maybe next year.

REFERENCES

1. Jackson AM, Millis DL, Stevens M, Barnett S. Joint kinematics during underwater treadmill activity. In: Proceedings of the 2nd International Symposium on Physical Therapy in Veterinary Medicine; 2002. Knoxville, Tenn.
2. Tragauer V, Levine D, Millis DL. Percentage of normal weight bearing during partial immersion at various depths in dogs. In: Proceedings of the 2nd International Symposium on Physical Therapy in Veterinary Medicine; 2002. Knoxville, Tenn.
3. Hecox B, Mehreteab TA, Weisberg J. *Physical Agents.* East Norwalk, Conn: Appleton and Lange; 1994.
4. Marsolais GS, McLean S, Derrick T, Napier A, Conzemius MG. Kinematic comparisons of swimming and terrestrial motion in normal dogs and dogs after surgery for cranial cruciate ligament rupture. In: Proceedings of the 12th Annual Veterinary Symposium; 2002. San Diego, Calif.
5. Nelson RC, Dillman CJ, Lagasse P, Bickett P. Biomechanics of overground versus treadmill running. *Med Sci Sports.* 1972;(4):233-240.
6. Norkin CC, Levange PK. *Joint Structure and Function.* Philadelphia, Pa: F.A. Davis Co.; 1992.

Sandy Brown is a physical therapist who owns TheraPeT, a private practice specializing in the rehabilitation of companion animals in Overland Park, Kansas.

Sandy (human) and Kali (dog). Diagnosis: Fibrocartilaginous Emboli (for Kali)

Case Study
"Jiminy Cricket: The Magic of Disney"

Caroline Adamson, MSPT

Jiminy Cricket Mosakowski (Figure 1) is a 12-year-old, neutered male Clumber spaniel. His owners complained of Jiminy's 'back problems' since March 2002. At that time, he presented to the referring veterinarian at Purdue University holding his head down low and with signs of neck pain upon manipulation. He was sent home and improved with a course of steroids and house rest. He was doing well until mid-October when he began knuckling on the left forelimb and was not able to use his right forelimb. This time the condition did not improve with steroids and rest. By late October, his condition worsened and the owners' noticed that he became reluctant and wobbly (ataxic) when ascending/descending stairs.

Figure 1. Jiminy Cricket Mosakowski in rehabilitation at the Colorado Canine Sports Medicine/Rehabilitation Clinic in Denver, CO.

Dr. Lisa Klopp, a neurologist at Colorado State University's College of Veterinary Medicine, performed a neurological exam and radiographs were taken. Upon initial presentation, Jiminy was tetraparetic (nonweightbearing on all 4 limbs). A computed tomography (CT) scan confirmed her diagnosis of intervertebral disc disease (IVDD) in the cervical spine at the C3-C4 level. Dr. Klopp performed a hemilaminectomy surgery on 10/31/02 to relieve the pressure of the disc material on the spinal cord. She reported severe compression down to 10% of the diameter of the spinal cord. In addition to the IVDD, Jiminy suffers from arthritis in both of his elbows.

Dr. Klopp referred Elaine and Chris Mosakowski to the Colorado Canine Sports Medicine/Rehabilitation Clinic (CCSMRC) at Alameda East Veterinary Hospital (AEVH) in Denver, Colorado. The CCSMRC is housed within AEVH and has a full-time physical therapist on staff 5 days per week.

Jiminy presented to the CCSMRC one week after his surgery on 11/7/02. He was carried in and out on a stretcher and was only able to lift his head. He was unable to sit from left sternal recumbency by himself or even stand and support himself independently and had minimal motion on his left side, with the most motion at his shoulder. His right side was completely paralyzed and he had moderate bilateral forelimb and hindlimb muscle atrophy (R > L). He required maximal assistance of 2 people to support him while standing, but was knuckling (indicating loss of conscious proprioception) on his right side. He was dependent with all transfers and was unable to flip himself from side to side. He held his head low and was reluctant to actively extend his neck. He was only able to support himself in right sternal sitting for no more than 4 seconds, indicating weak trunk musculature.

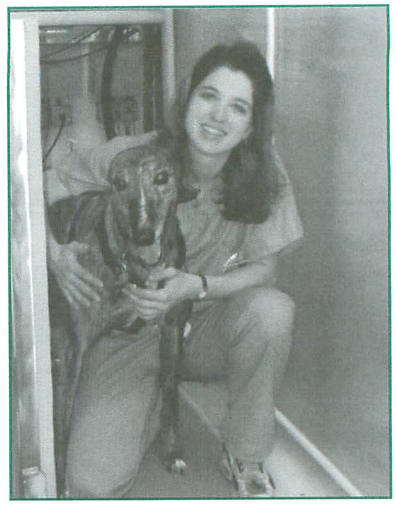
Jiminy boarded at the CCSMRC for a week at a time in order to pursue intense rehabilitation. His rehabilitation plan of care included daily hydrotherapy to strengthen his cervical extensor and trunk muscles and to maintain and re-educate what motor function had remained on his left side. Initially, water levels were raised and lowered repeatedly to encourage 5 to 10 repetitions of side-sitting from a lateral recumbent position. Water levels also were filled to just under chin level, then slowly raised to strengthen cervical extensors. Water temperature was maintained between 85° and 90°F and a 'Fido Float' was worn by Jiminy to provide support in the water. Electrical stimulation was performed daily on his right forelimb and hindlimb. Therapeutic exercise began with proprioceptive training to include weight shifts and repeated sink-to-stand exercises. This required Jiminy to support his weight on all 4 limbs, with maximal assistance at first. As he gradually *sunk* down into a sitting position, his legs were raised back to a standing position. This exercise was repeated numerous times over the course of a day. A Theraball also was used to improve trunk stability and neck range of motion into extension. Jiminy was asked to reach for treats while positioned over a ball. In addition, he was rotated in all planes and encouraged to move himself back to midline to increase trunk strength and stability. Jiminy's owners were given a home exercise program, to include transferring from sidelying to sternal, standing and supporting his weight with feet flat, and encouraging him to lift his head. As he progressed, transferring from sternal to sitting was added to his home program. This allowed for continuity of care and provided his owner's with activities to do at home.

Rehabilitation was progressed and continued through mid-December. Over a period of 4 weeks, we saw Jiminy improve by leaps and bounds. After 1 week, he was turning himself from side to side independently. By the end of week 2, he was able to sit from sidelying to sternal by himself and minimal voluntary motor function was visible. He was starting to push himself up using his forelimbs from a sternal position into sitting. At the end of November and early December, he was able to support himself in standing and began taking a few steps. In mid-December, he was independent with all transfers and walking by himself. At this time, Jiminy's primary limitations included inability to ambulate on hardwood and slippery floors and difficulty supporting his body weight when defecating. Despite these limitations, Jiminy continued to improve.

As of January, 2003, Jiminy's condition has returned to near normal. He is able to ascend/descend stairs and can posture and support himself to eliminate independently.

Caroline Adamson is a Staff Physical Rehabilitation Therapist* at Colorado Canine Sports Medicine/Rehabilitation Clinic, Alameda East Veterinary Hospital in Denver, Colorado.

*Though a graduate of an accredited Master of Science in Physical Therapy degree program and the holder of a physical therapy license in the state of Colorado, Carrie is unable to call herself a 'physical therapist' when working with animals. Colorado's legal definition of a physical therapist is a person who is licensed to practice physical therapy. In turn, physical therapy is defined as the examination, treatment, or instruction of *human beings* to detect, assess, prevent, correct, alleviate, or limit physical disability, movement dysfunction, bodily malfunction, or pain from injury, disease, and other bodily conditions. Thus, due to the specific use of the terms applied to humans, the State of Colorado Physical Therapy Licensure Board has requested that Carrie not use the terms 'physical therapist' or 'physical therapy' when working with animals.



A Proposed 12-week Protocol for the Rehabilitation of Cranial Cruciate Ligament Injury Following Tibial Plateau Leveling Osteotomy in Dogs

Caroline P. Adamson, MSPT, Cheryl Riegger-Krugh, PT, ScD

INTRODUCTION

The cranial cruciate ligament (CCL) in a dog is analogous to a human's anterior cruciate ligament (ACL). This ligament's function is three-fold: to resist cranial (anterior direction in humans) drawer of the tibia on the femur, to limit internal rotation of the tibia, and to prevent hyperextension of the stifle (knee in humans).

A partial or complete tear of the cranial cruciate ligament is a common orthopaedic injury in the dog. Due to the dog's normal stance of approximately 120° of stifle flexion, conservative approaches to stabilize the stifle have presently proven unsuccessful. Osteoarthritis begins to develop in the stifle after just 3 to 4 weeks following complete tears of the CCL.[1-3] Interestingly, it has been shown that unilateral severance of the CCL does not cause a compensatory increase in loading on the contralateral limb.[4] However, the frequency of contralateral rupture is well reported. Singleton reported that 18% of dogs (18 of 98 dogs) developed contralateral rupture on an average of 11.3 months after the initial CCL rupture, ranging from 3 weeks to 3 years.[5] Out of 107 dogs with CCL rupture, Pond and Campbell reported 8 (8%) dogs with bilateral rupture at the time of presentation and an additional 14 (13%) dogs with contralateral rupture occurring within 12 months of the treatment for the initial rupture.[6] Perhaps the contralateral rupture is due to the alignment of the contralateral limb with the dog's attempt to limit weight bearing on the involved side.

Over the years, a variety of extracapsular and intracapsular techniques have been developed to repair this injury in dogs.[7] The most common extracapsular stabilization procedures include lateral imbrication and extracapsular stabilization with polypropylene suture or fibular head transposition. With a lateral imbrication repair, two polypropylene sutures are passed around the lateral fabellae. The distal suture is passed through a hole in the tibial crest and secured while the proximal suture is passed through and secured in the parapatellar tissue. A fibular head transposition involves a lateral arthrotomy followed by elevation and cranial transposition of the fibular head and lateral collateral ligament. The fibular head is then secured with a pin and wire.[7,8]

Intracapsular repairs, though rarely done today, include patellar over-the-top or fascial strip over-the-top repairs. These techniques incorporate autogenous (originating within the body) tissue placed through the joint along the same anatomical pathway as the original CCL, mimicking normal joint function and biomechanics. The patellar tendon repair uses an autogenous graft created from fascia lata, medial patellar bone wedge and the medial one-third of the patellar ligament. The graft is passed through the stifle joint and 'over-the-top' of the lateral femoral condyle and secured to the tissues of the lateral femoral condyle.[7,8] The fascial strip repair employs a fascia lata autogenous graft that is passed from its origin at the craniolateral aspect of the tibial plateau, through the stifle joint and 'over-the-top' of the lateral femoral condyle where it is secured to the tissues of the lateral femoral condyle. Most of these extra- and intracapsular techniques have produced variable and inconsistent results in regards to joint stability and the animal's full return to preinjury function.[7]

More recently, the tibial plateau leveling osteotomy (TPLO) technique has been employed. However, very little has been discussed on the postoperative management following TPLO surgery.

THE TIBIAL PLATEAU LEVELING OSTEOTOMY

In a cruciate-deficient stifle of a dog, each weight-bearing step causes cranial translation of the tibia on the femur (Figure 1). The ground reaction force vector at hindlimb contact produces a stifle flexion moment or torque. With stifle flexion motion, normally a caudal glide would occur. The propulsive effort with stifle extension and the normally occurring cranial glide produces a caudally directed force on the ground and a cranially directed shear force as a response from the ground. This shear force is an example of Newton's Third Law – for every action there is an equal and opposite reaction. Without the restraint from the CCL at weight bearing, the result is excessive cranial translation of the tibia on the femur. In addition, with weight bearing with the CCL deficiency, each step tends to produce a cranioventral tipping of the cranial portion of the proximal tibia. The intact CCL prevents the tipping motion, while CCL deficiency allows the tipping to occur. Therefore, in the CCL deficient stifle joint, there is excessive cranial glide of the tibia and excessive cranioventral tipping. This situation leads to an unstable stifle joint and the tendency to avoid weight bearing.

Figure 1. Normal canine stifle (assuming no propulsion) causing cranial tibial thrust at the proximal tibia with each weight-bearing step.

The TPLO procedure is a surgical technique designed to change the tibial slope of the dog, so that the ground reaction force produces a smaller caudal/cranial component. It does not attempt to repair the CCL itself. By performing an osteotomy at the proximal end of the tibia and rotating it a calculated number of degrees, the slope of the tibial plateau flattens out and limits cranial movement (Figure 2).[9]

As a secondary consequence to rupture of the CCL, the caudal horn of the medial meniscus becomes trapped and can be crushed between the tibial

Figure 2. Postoperative TPLO model illustrating the osteotomy, with plate stabilization, and leveling of the tibial plateau.

plateau and femoral condyle. This is due to the unrestrained internal rotation of the tibia along with the cranial shear and tipping of the tibia. Thus, a release of the caudal horn of the medial meniscus is performed as a standard part of the surgical procedure. The purpose of this release is to give the caudal horn of the medical meniscus a chance to move away from the medial femoral condyle during cranial translation of the tibia.[7]

With the advances in surgical procedures, arthroscopy may be used to visualize and remove the CCL, based on surgeon's preference, in a TPLO procedure as well as to perform the medial meniscal release. The TPLO procedure may involve an open arthrotomy depending on the surgeon's skill and availability of expensive athroscopic equipment. In the cases using arthrotomy, the joint capsules are disrupted and surgically incised to varying degrees.

POSTOPERATIVE CARE FOLLOWING CCL REPAIR WITH THE TPLO

Traditionally, postoperative rehabilitation care following major orthopaedic surgery in dogs included crate rest and leash walks. With the recent increase in interest in canine rehabilitation, the addition of a licensed physical therapist on staff at a veterinary hospital can offer the development of rehabilitation protocols based on scientific principles and appropriate adaptations from protocols developed for and used extensively for humans. Barclay Slocum, the inventor to the TPLO technique, devised a regime for rehabilitation of his patients with TPLO.[10] However, it is the feeling of the authors that this plan of care is too conservative. Based on time frames for healing and at the request of staff surgeons at Alameda East Veterinary Hospital, the following protocol was developed in February 2000 by Caroline Adamson. Since that time, over 250 canine patients post-TPLO surgery have been rehabilitated with favorable results using the care map outlined below.

TPLO HOME CARE MAP

On the next page is a 12-week home care map designed specifically for those dogs that have undergone a TPLO. This is a working protocol that continues to be modified as clinical necessity, efficacy, and each animal's progression within the rehabilitation phase requires. This protocol is not used as a 'cookbook' for treatment, but serves as a guide to allow more effectiveness in the animal's rehabilitation plan of care as well as to help prove efficacy of the TPLO intervention overall for dogs.

REFERENCES

1. McDevitt CA, Muir H. Biochemical changes in the cartilage of the knee in experimental and natural osteoarthritis in the dog. *J Bone Joint Surg*. 1976;58B:94-101.
2. McDevitt CA, Gilbertson EMM, Muir H. An experimental model of osteoarthritis. Early morphological and biochemical changes. *J Bone Joint Surg*. 1977;59B:24-35.
3. Pond MJ, Nuki G. Experimentally-induced osteoarthritis in the dog. *Ann Rheum Dis*. 1973;32:387-8.
4. O'Connor BL, Visco DM, Hech DA, Myers SL, Brandt KD. Gait alteration in dogs after transection of the anterior cruciate ligament. *Arthritis Rheum*. 1989;32:1142-7.
5. Singleton WB. Observations based upon the surgical repair of 106 cases of anterior cruciate ligament rupture. *J Small Animal Pract*. 1969; 10:269-278.
6. Pond MJ, Campbell JR. The canine stifle joint. I. Rupture of the anterior cruciate ligament. An assessment of conservative and surgical treatment. *J Small Animal Pract*. 1972;13:1-10.
7. Bojrab MJ. *Current techniques in small animal surgery*. 4th ed. Baltimore, MD: Williams & Wilkins; 1998.
8. Patterson RH, Smith GK, Gregor TP, Newton CD. Biomechanical stability of four cranial cruciate ligament repair techniques in the dog. *Vet Surg*. 1991;20(2):85-90.
9. Slocum B, Slocum TD. Tibial plateau leveling osteotomy for repair of cranial cruciate ligament rupture in the canine. *Vet Clin N Am: Sm Animal Practice* 1993;23(4):777-795.
10. Slocum Enterprises. Available at: http://www.slocumenterprises.com/rehab.htm. Accessed April 14, 2003.

Caroline Adamson is a Staff Physical Rehabilitation Therapist at Colorado Canine Sports Medicine/Rehabilitation Clinic, Alameda East Veterinary Hospital in Denver, Colorado.

Cheryl Riegger-Krugh is an Associate Professor in Physical Ther-apy, Physical Therapy Program at the Uni-versity of Colorado Health Sciences Cen-ter in Denver, Colorado.

Tibial Plateau Leveling Osteotomy
TPLO Care Map

Same Day as Surgery

1. Begin initial evaluation
   a. Limb circumference (edema, muscle mass): affected/unaffected limb
   b. Range of motion (goniometry): affected/unaffected limb
   c. Gait analysis (weight bearing, degree of lameness)
   d. Palpation (sensitivity, skin temperature, muscle atrophy, edema)
2. Modalities for local inflammation (electrical stimulation, ice packs, phonophoresis)
3. Therapeutic activities
   a. Passive Range of Motion (PROM) to hip, stifle, hock (10 repetitions; 2-3 x/day)
   b. Leash walks: toe-touch/partial weight bearing via towel walking (2-3x/day)
   c. Massage: quadriceps, sartorius, semitendinosus, gracilis, biceps femoris
4. Instruction
   a. Towel walking (on slippery surfaces to prevent slipping and injury)
   b. Bandage care (first 24 hours post-op)

Post-Op Day 1-2 (When no problems are noted and dog returns home in PM)

1. Monitor and record circumference, ROM, gait
2. Modalities as appropriate BID (either returning to the clinic or with home use)
3. Therapeutic activities (same as above)
4. Client (owner)* Education
   a. Time frame for bone healing
   b. Towel Walk (on slippery surfaces)
   c. PROM
   d. Modalities (ice-TID)
   e. Suture removal in 10-14 days (appointment needed)
   f. Schedule follow-up appointment (3wks)
   g. Leash walk-short distances, with a short lead—monitor dog's response (comfort, stiffness)
   h. Avoidance of explosive activities (running, jumping, playing)
   i. Problems to note: persistent edema; acute pain identified by sharp yelps/cries; change in the usage of the affected limb; licking incision site

Post-Op Week 1 (For the Client)

1. Multiple short walks (5-10 min) on a short lead, 3x/day
2. Passive ROM (10-15 repetitions or reps) 3x/day-slowly
3. Modalities as appropriate
   a. Massage before and after PROM and walks
   b. Ice (15 min.) 3x/day-after PROM and walks
4. Problems to note

Post-OP Weeks 2-3

1. Reassess circumference, ROM, gait, palpation (3 weeks post-op @ follow-up appointment)
2. Gradually progress therapeutic activities
   a. Stop PROM/Massage
   b. Multiple short walks (10-20 min) 3x/day
   c. Double the distance of the walks on a short lead
   d. Limited by dog's response/tolerance
3. Problems to note (see above)

NOTE: If increased fatigue, soreness, or discomfort were noticed with increased distance walked, revert to previous level of activity, and begin again from there.

Post-Op Weeks 4-5

1. Continue to progress therapeutic activity
   a. Slow leash walks (20-30 min) 3x/day to tolerance
2. Begin functional strengthening
   a. Sit to stand (corner stands-with operated leg against the wall) - 10 reps, 3x/day
   b. Figure 8 circles to the left and right at a walk
3. Begin neuromuscular re-education (balance board, figure of 8s, trampoline, couch cushion, blow-up mattress)

Post-Op Weeks 6-8

1. Radiographs to confirm bone healing/reassessment
   a. If not yet fully healed, return to post-op weeks 4-5
2. Increase intensity/duration of therapeutic activities
   a. Leash walks on a longer lead (30-40 min.) 3x/day to tolerance
   b. Cones at a walk
   c. Figure 8 trotting (no sharp turns)
   d. Ramps (inclines and declines)
   e. Ascend/descend stairs: 5-10 flights slowly (2-3x/day)
   f. Swimming - no explosive water entry
   g. Tug-O-War
   h. Dancing
   i. Trotting on a longer lead in a straight line (no sharp turns or cuts)
3. Continue neuromuscular re-education (balance activities)

Post-Op Weeks 9-12

1. Final check-up/healing complete (radiographs)
2. Reassess at weeks 9 and 12
3. Therapeutic activities
   a. Zigzag trotting
   b. Running in a STRAIGHT line
   c. Use of leg weights (1/2# - 1# to start)
4. Return to prior level of activity at the END of 12 weeks

OUTCOMES at the end of rehabilitation:

1. Stifle is free of inflammation
2. Full range of motion at the stifle
3. Equal muscular development between affected and unaffected limb
4. Osteotomy healing is complete
5. Progression of osteoarthritis is halted
6. Return to prior level of activity by post-op week 12

* Client = owner   Patient = animal

A Proposed Canine Movement Performance Test: The Canine Timed Up and Go Test (CTUG)

Amie Lamoreaux Hesbach, MS, PT

Objective outcome measurements must be established in canine rehabilitation in order for clinicians to demonstrate the efficacy of applying physical therapy interventions and techniques, which have been developed for use in humans, to dogs. The inter-rater and intra-rater reliability of any measurement or intervention must be tested. Objective measurements currently used in canine rehabilitation include lameness scores for gait, girth measurements, pain scores, and range of motion measurements, none of which measure or describe the level of functional movement recovery of the canine patient with movement dysfunction.

This author proposes the Canine Timed Up and Go (CTUG) test, similar to the Timed Up and Go test used by physical therapists in human geriatric rehabilitation. The Up and Go test is a measure of fall risk in the elderly population and has been correlated with the Berg Balance Scale and Barthel Index of ADL. The Timed Up and Go test has established good inter-tester and intra-tester reliability for human patients.[1]

The procedure involved in the Up and Go test for human patients first positions the patient in a straight-backed chair. At 'go,' the patient stands up from the chair, walks 3 meters, turns around, walks back to the chair, turns around, and sits in the same position as when initiating the task. Though there are no established norms, a 5-point rating scale is used to score the patient's performance. The scale, as developed for humans, is as follows:

1. Normal, no instability.
2. Very slightly abnormal (ie, slow execution).
3. Fairly abnormal (ie, hesitation, compensatory movement of the upper limbs and/or the trunk).
4. Abnormal (ie, the patient stumbles).
5. Severely abnormal.

Timing the Up and Go test, however, allows for serial comparisons. For example, self-selected gait speed is a predictor of self-perceived function and overall physical performance in a wide range of abilities.[2] For humans, a score of 20 seconds or more to perform this task indicates the possible need for supervised care; as the person may no longer be able to reach the bathroom in time, escape a house fire, etc.

The purpose of the CTUG test is to quantify functional movement recovery from neurological injury or insult, including fibrocartilagenous embolism (FCE), paraplegia due to intervertebral disc disease (IVDD), tetraplegia due to Wobbler's syndrome, and subsequent surgical procedures. As the animal recovers and regains sensation, proprioception, and motor control, ataxia and loss of balance are expected observations. Outcome measures are necessary to record objective progress or regression in rehabilitation.

The CTUG test requires that the canine patient be lying in a recumbent position in a marked, designated area (X) on a nonskid surface. This surface should be at least 15 feet in length and consist of a nonskid surface, such as low-pile carpeting or rubber matting. An indicator (line) should be designated for the endpoint of the test and is located 10 feet away from the X. On command, the patient is required to move from recumbent to standing and walk or trot to the 'line' 10 feet away. The 'motivator' should be at the 'line' to encourage the patient to perform the test. This 'motivator' must be identical in type and quality during each subsequent trial and may be a favorite toy, a treat, and/or the owner/handler. The verbal cues used during one trial should be identical in type and quality as well. The verbal cues used might vary per patient, as dogs are trained at various levels and are motivated by different things. For example, 'Taffy, come' or 'Here Kate!' The score is the time, which is recorded from the initiation of movement by the patient to the point at which its paw first crosses the 'line.'

The traditional 5-point scoring scheme used by the Up and Go test might be applicable to the Canine Up and Go test. However, as the Timed Up and Go has good intra-tester and inter-tester reliability, there is hope that the canine counterpart might be meaningful and reliable as well. Initially, each patient will serve as its own control and serial measurements should be compared, however, norms per breed or patient size will be important to establish.

REFERENCES

1. Podsiadlo D, Richardson S. The timed up and go: A test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc.* 1991;39(2):142-148.
2. The Mayo Foundation for Medical Education and Research. The get up and go test. 2002.

Rehabilitation Following Thoracic Hemilaminectomy: A Case Study

Elizabeth Wagner, MSPT, PCS

INTRODUCTION

Intervertebral disc disease (IVDD) is a common cause of paraparesis in dogs. Degenerative changes of the disc allow the nucleus pulposus to protrude or herniate into the vertebral canal.[1] Hansen Type I disc disease affects chondrodystrophic breeds such as Beagles, Daschunds, and Pekingese, generally between 2 to 5 years of age. Degenerative changes of the nucleus pulposus lead to acute rupture of the disc, with resultant spinal cord compression. Type II disease affects 5- to 12-year-old large breed non-chondrodystrophoid dogs, including German Shepherds and Labrador Retrievers. Nucleus pulposus degeneration causes slowly evolving disc protrusion with gradual onset of symptoms.[1,2]

More than 65% of canine disc protrusions occur at T11-T12, T12-T13, T13-L1, L1-L2.[1] Treatments are medical and/or surgical, based upon neurological symptoms.[1-3] Surgery is implemented immediately in cases of moderate to severe neurological deficit.[2,3] Laminectomy, hemilaminectomy, minilaminectomy, or pediculectomy are among the procedures that are performed.[3]

Traditional postoperative care of dogs undergoing spinal decompressive surgeries has consisted primarily of 6 to 8 weeks of cage rest. Recent interest in small animal rehabilitation, however, is growing, and physical therapy interventions are being shown to be effective in treating these dogs.[4,5]

This case study reviews the rehabilitative plan of care implemented for a young Pekingese dog following thoracic hemilaminectomy. Physical therapy interventions, passive range of motion (PROM), circumferential measurements, motor, sensory and proprioceptive capacities are documented as he regains function.

CASE HISTORY

Pippin is a 14-month-old neutered male Pekingese. His owners bought him from a pet store as a puppy, and is one of 3 well-loved family dogs. He has received consistent routine veterinary care, is up-to-date on vaccines, and has no significant previous medical history. He is a happy and active dog and enjoys rough-housing with the other dogs in his home.

On the evening of 10/31/02 Pippin's owners noted him to be unsteady on his pelvic limbs, and that his back was spasming and painful. They kept him quiet overnight, but by the morning of 11/1/02 he was unable to bear weight on, or move his hind limbs. They rushed him to the local emergency veterinary hospital, where, following neurological examination, veterinarians suspected traumatic IVDD or spinal fracture. Pippin was started on methylprednisilone sodium succinate* and was anesthetized for x-rays and a myelogram. Radiographs confirmed the diagnosis of T12-T13 right-sided dorsal disc herniation with spinal cord compression and Pippin underwent hemilaminectomy immediately.

Pippin remained hospitalized for 4 days for pain management and supportive care. He received morphine, a fentanyl transdermal patch,† methylprednisilone sodium succinate,* and was put on a regular turning schedule. He was continent of bowel and bladder and non-ambulatory.

Pippin was discharged home on 11/5/02, on methocarbamol‡ to reduce muscle spasms, phenoxybenzamine to relax internal urethral sphincter tone, and Pepcid to protect his stomach from developing stress ulcers. Pippin's owners were instructed to confine him to a crate for 8 weeks, to carry him outside regularly to urinate and defecate, to perform massage and PROM to his hind limbs, and to swim him in a bathtub following staple removal. They were told to use a towel sling to help him walk if necessary, and to consider ordering a mobility cart if he did not regain the ability to walk. They were referred to physical therapy.

INITIAL EVALUATION

Pippin's family was seen in physical therapy for review of his home program on 11/9/02, and they initiated formal sessions on 11/11/02. They carried him into his first appointment. They were crating him at home as instructed and reported that when Pippin tried to walk, he 'dragged' himself by his front legs. He cried when he had to urinate or defecate, and they were successfully taking him outdoors to do so on a regular schedule. They reported some active movements of his hind limbs.

Initial assessment revealed a quiet little dog, tail drooping, unable to achieve sit from sternal recumbency without assistance (Figure 1) or to support weight on his hind limbs in stand. Staples were in place and his surgical scar was well-healed. Skin, fur, and nails were intact with no signs of wearing or breakdown noted. No thoracolumbar paraspinal tenderness or guarding was palpated. Hind limb proprioceptive positioning responses were absent, flexor withdrawal reflexes were present, slightly delayed on the right hind limb. Deep pain responses were present in both hind limbs. Patellar tendon reflexes were present bilaterally, slightly hyper-reflexive on the right hind limb. No volitional movement was observed in either hind limb in sidelying or ventral recumbency. Passive range of motion of the hind limbs was measured as follows: left hip flexion 55°, extension 140°, left stifle flexion 45°, extension 145°, left tarsal flexion 60°, extension 160°. Right hip flexion was measured at 50°, extension 145°, stifle flexion 45°, extension 150°, tarsal flexion 70°, extension 160°. Passive range of motion measurements were taken as described by Jaegger et al.[7] Thigh girth measurements at 3 cm above the stifle joint line were 20 cm bilaterally.

Goals of rehabilitation included: protection of skin and nail integrity,

Figure 1. Pippin in the early stages of rehabilitation.

increased hind limb PROM of hip and stifle extension, where limitations were measured and reduced PROM of stifle and tarsal flexion, where excesses were noted as compared to normal[6-9] (Note: research is still needed to determine objective goniometric breed specific values for canine joint angle measurements. Jaegger et al measured PROM in Labrador Retrievers.[7]), improvement in, or at least maintenance of muscle girth, improvements in hind limb sensation, proprioception, strength and motor control, and home program instruction. Physical therapy was recommended 3 times a week, but due to the significant distance that Pippin's family had to travel for appointments and their work and school schedules, twice weekly appointments were agreed upon.

TREATMENT

Initial treatments included massage of the thoracolumbar paraspinals and hind limbs; PROM and gentle stretching of the hind limbs; Proprioceptive Neuromuscular Facilitation (PNF); weight bearing over a bolster (Figure 2); swimming with manual assist and a life vest; ice to the thoracolumbar back. Treatments progressed to standing in water with a life vest on and manual support (Figure 3); standing on a carpet with lumbar support; weight shifts and proprioceptive challenges on a therapy ball (Figure 4); weight shifts and co-contractions on a balance board; assisted walking on the underwater treadmill; assisted walking on carpet; assisted walking up/down small inclines/declines and uneven surfaces; independent swimming, walking on the underwater treadmill, walking on carpeted and on noncarpeted floors. Pippin's home program was modified with each visit to reflect his progress, and to appropriately challenge his abilities. Pippin's owners were diligent in their compliance with his home care. A mobility cart was not necessary due to Pippin's quick return of hind limb motor control.

Figure 2. Weight bearing over a bolster.

Figure 3. Standing in water with assistance.

Figure 4. Proprioceptive exercises on the therapy ball.

OUTCOMES

Pippin was seen for a total of 12 visits over a 12-week period. Eleven of these visits were within 8 weeks. The final visit was a month later due to weather-related cancellations. At his first visit, Pippin was able to initiate hip flexion with his right more so than his left hip during assisted swimming. By his second visit, he was able to transition from sternal recumbency to sit, and was able to stand with lumbar stabilization when placed. At this point, he began to have difficulty with constipation, and Metamucil was added to his diet per our veterinarian's recommendation. At his third visit, on 11/23/02, Pippin was happy, wagging his tail, and able to walk a few steps, though tending into hind limb adduction on the left more so than right, with hind limb knuckling bilaterally, left more than right. By Pippin's sixth visit, on 12/7/02, he was walking 15 to 20 steps and using strong reciprocal hind limb movements while swimming. He was able to start walking on the underwater treadmill at .2 mph with assist to propel his left hind limb with the water depth level at his greater trochanters. At his eleventh visit, on12/31/02, Pippin walked on uneven surfaces, walked independently on the underwater treadmill for 6 minutes at .2 to .4 mph, and although exhibiting mild hind limb ataxia, walked 50 feet on a linoleum floor.

Pippin walked into his final physical therapy appointment on 2/1/03 (Figure 5). His fur had grown back over his thoracolumbar back, and his paraspinal muscles were nontender to palpation. His left hind limb proprioceptive responses were delayed (3 seconds) and normal on the right. His flexor withdrawal and deep pain responses were present and appropriate bilaterally. Patellar reflexes were normal bilaterally. Passive range of motion was measured at: left hip flexion 60°, extension 158°, left stifle flexion 55°, extension 162°, left tarsal flexion 50°, extension 180°; right hip flexion 60°, extension 150°; right stifle flexion 60°, extension 160°; right tarsal flexion 48°, extension 180°. The PROM measurements were taken as noted previously. Hip and stifle extension improved to close to normal. Hip and stifle flexion PROM were increased due to Pippin's active resistance to measurements. Tarsal flexion decreased to close to normal. Thigh girths measured 20.7 cm on the left, 21 cm on the right, with increases of .7 and 1.0 cm respectively.

Figure 5. Pippin walking on his final day of physical therapy.

Pippin was continent of bowel and bladder immediately after surgery, though he was initially unable to physically position himself correctly to eliminate. He now walks outside and squats to urinate and defecate. He walks and runs in his yard, and takes up to 45 minute walks with his family. He has a tendency to lose hind limb balance or 'wipe out' and fall if he runs corners quickly. If he over-exercises and fatigues, his gait pattern worsens temporarily. He is still crated when left alone, and is not allowed on stairs or to roughhouse with the other dogs. His family is continuing to follow a home program for him, with emphasis on standing proprioceptive challenges, walking on uneven surfaces, sit to stand exercises, and exercises to improve overall strength and endurance, avoiding excess fatigue.

CONCLUSION

After 12 physical therapy visits, Pippin's sensory, motor, and proprioceptive capacities improved. Passive range of motion improved in some of his hind limb measurements, and thigh girths increased. Function improved, including the ability to transition between positions, and the restoration of ambulatory skills, with mild deficits remaining. Pippin's family is very happy with his progress and feels that he can now live a happy, active, and comfortable life.

KEY FOR MEDICATIONS

*Solu-Medrol (Upjohn)
†Duragesic (Janssen)
‡Robaxin (Fort Dodge)

ACKNOWLEDGEMENTS

I thank Dr. Marjorie McMillan for her thoughtful wisdom and Cathy Symons, CVT who also treated Pippin. Both are from the Windhover Veterinary Center, Walpole, MA where Pippin received rehabilitation care. Emergency care and surgery for Pippin were provided at Ocean State Veterinary Specialists, East Greenwich, RI.

REFERENCES

1. Oliver JE, Lorenz MD Kornegay JN. *Handbook of Veterinary Neurology*. 3rd ed. Philadelphia, Pa: WB Saunders Co.; 1997.
2. Millis DL. Northeast Seminars: Canine II PT; 2002. Concord, NH.
3. Fossum TW. *Small Animal Surgery*. St. Louis, Mo: Mosby; 1997.
4. McCauley L. Disc disease and paralysis. In: Proceedings of the 2nd International Symposium on Rehabilitation and Physical Therapy in Veterinary Medicine; 2002:217-219. Knoxville, Tenn.
5. Bockstahler B, Lorinson D, Groblinger K, Lendl S. Benefits of physical therapy for dogs undergoing decompressive Spinal Cord Surgery. In: Proceedings of the 2nd International Symposium on Rehabilitation and Physical Therapy in Veterinary Medicine; 2002:193-194. Knoxville, Tenn.
6. Riegger-Krugh C, Weigel J. Canine Anatomy and Biomechanics II: Hindlimb. In: Wadsworth C, ed. *Basic Science for Animal Physical Therapist*. La Crosse, Wis: Orthopaedic Section Home Study Course Series, American Physical Therapy Association; 2000:2-28.
7. Jaegger G, Marcellin-Little DJ, Levine D. Reliability of goniometry in labrador retrievers. *AJVR*. 2002;63:979-986.
8. Mann FA, Wagner-Mann C, Tangner CH. Manual goniometric measurement of the canine pelvic limb. *J Am Animal Hosp Assoc*. Mar/Apr 1988; 24:189-194.
9. Newton CD. Normal Joint Range of Motion in the Dog and Cat. Appendix B: *Textbook of Small Animal Orthopedics*. Philadelphia, Pa: JB Lippincott; 1985.

Call for *Orthopaedic Physical Therapy Practice* (*OP*) Editor

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Article Review

Amie Lamoreaux Hesbach, PT, MS

For Paws Rehabilitation, LLC

Mid-Atlantic Animal Specialty Hospital, Huntingtown, MD

Jaegger G, Marcellin-Little DJ, Levine D. Reliability of goniometry in Labrador retrievers. *Am J Vet Res*. 2002;63:979-986.

Canine rehabilitation is a relatively new niche practice, allowing for the collaboration of physical therapists and veterinarians. Case studies and investigative reports of the efficacy of the application of traditional human physical therapy interventions, techniques, and modalities on the canine patient population are emerging. In order to advance this area of clinical practice, there is a necessity for a common language for communication among physical therapists and veterinarians as well as other members of the rehabilitation team. Objective outcome measurements and standards in canine rehabilitation must be established and the reliability of these measurements tested. These measurements include lameness scores for gait, pain scores, and measurements of range of motion, strength, posture, movement control, girth, etc.

In a study published in the *American Journal of Veterinary Research* in 2002, Gayle Jaegger, DVM, Denis J. Marcellin-Little, DEDV, and David Levine, PT, PhD established a standardized method of goniometry applicable to all canine breeds. At the same time, reference ranges of motion were established for adult Labrador retrievers "free of orthopaedic disease." The investigators' goals were to evaluate the reliability of measurements by goniometry compared to measurements by radiography, to assess inter-tester and intra-tester reliability, and to evaluate the effects of sedation on range of motion.

Sixteen American Kennel Club-registered adult (range 2-7 years, median 3 years) Labrador retriever dogs (6 males, 10 females) were included in the study. All subjects were free of orthopaedic disease as determined by past medical history, orthopaedic examination, and radiography. Each of the 3 investigators measured flexion and extension range of motion of the carpus (wrist in humans), elbow, shoulder, tarsus (ankle in humans), stifle (knee in humans), and hip, as well as varus and valgus range of motion of the carpus of each dog. Three measurements were recorded for each joint position while the dog was awake. The dog was sedated and positioned into maximal flexion and extension for each individual joint, which was measured in triplicate by each investigator. A radiograph was made following these measurements.

The results reported by the investigators included the following. There was no statistically significant difference between goniometric range of motion measurements of awake and sedated dogs. However, this study did not include goniometric measurement of dogs with painful joints. There was no statistically significant difference between testers (inter-tester reliability). The intra-tester mean variability was reported to be 3° (range of 1°-6°). Additionally, there was more variability with range of motion measurements of proximal joints when compared to distal joints. The investigators attributed this to an increased amount of soft tissue proximally and, as a result, more difficulty with location of bony landmarks. The resulting mean range of motion measurements are outlined in Table 1.

This study is clinically relevant for physical therapists and veterinarians who practice canine rehabilitation. The detailed diagrams and descriptions of precise landmarks outlined in the article allow for a standardized protocol for goniometric range of motion measurement of canine patients.

Table 1. Canine Range of Motion Means

Joint	Motion	Degrees
Carpus	Flexion	32
	Extension	196
	Valgus	12
	Varus	7
Elbow	Flexion	36
	Extension	165
Shoulder	Flexion	57
	Extension	165
Tarsus	Flexion	39
	Extension	164
Stifle	Flexion	42
	Extension	162
Hip	Flexion	50
	Extension	162

Rehabilitation of a Radiated Tortoise with a Dislocated Shoulder

Lynn McGonagle, MSPT, LVT, Noha Abou-Madi, DVM, K Wysner, J Brown, J Hewitt

BACKGROUND

Rosamond Gifford Zoo, Syracuse NY. A tortoise was on exhibit in an open aviary with uneven terrain and access to water. When lameness was detected, the tortoise was removed from the exhibit and was maintained in a small cage for observation.

PURPOSE

This paper addresses the physical rehabilitation of a tortoise with an orthopaedic injury.

SUBJECT DESCRIPTION

Male radiated tortoise, approximately 11 years old with right caudally displaced shoulder. The etiology of injury is unknown.

VETERINARY EXAMINATION

The tortoise presented with an inability to bear weight on the right forelimb, difficulty maneuvering around obstacles, and loss of shoulder motion. Right shoulder displacement caudally was detected on radiographs and CAT scan. No fractures or bony lesions were observed. Initial treatment consisted of a gauze bandage with adhesive tape wrap to immobilize the limb within the confines of the shell. Furniture coasters were applied to the plastron to allow for mobility using 3 limbs. This conservative treatment was followed for approximately 2 months. Shoulder alignment was not reassessed prior to the request for physical therapy evaluation.

PHYSICAL THERAPY EVALUATION

Following removal of the wrap, no swelling or localized pain response was noted. No evidence of muscle spasm or soft tissue injury was palpated. Range of motion was moderately limited for right shoulder extension and flexion (with shoulder flexion involving motion of the humerus in the anterior direction) as compared to the left. The tortoise was able to bear only partial weight on the right forelimb. He was unable to raise himself enough to clear his shell for forward movement. Endurance for movement was poor—less than 12 inches of forward movement. The tortoise appeared to be relaxed with handling and did not withdraw his limbs with efforts to encourage active movement.

INTERVENTION

A *Team Approach* to rehabilitation promoted collaboration and communication among the veterinarian, physical therapist, veterinary technician, and zoo staff. The rehabilitation program included massage, stretching exercises, strengthening activities using isometrics and resistive movements, assisted walking with a towel sling, joint mobilization, and myofascial release. In addition, a period of time ranging from 30 minutes to an hour each day was allowed for free movement on smooth, even concrete flooring. During the 3-month period of PT intervention, the coasters remained glued to the shell to encourage mobility. Treatment frequency was 2 to 3 times weekly. Activities were modified according to this animals' willingness to allow guided movements to occur. Goals of the rehabilitation program were for the tortoise to return to previous level of health and to move independently within the natural environment of the exhibit.

OUTCOME MEASURES

Goniometry, distance traveled during free movement, and functional mobility checklist were used as outcome measures.

OUTCOMES

After a 3-month period, the tortoise gained the ability to bear full weight on the right forelimb without using the furniture coasters for support. He was able to move freely around obstacles, up and down inclines, and on uneven surfaces.

Right shoulder range of motion, as measured by goniometry, improved to normal values as compared to the left shoulder. No observable difference between right and left shoulder active movement was detected at the end of the treatment program.

Endurance for walking increased to over 50 feet. It was determined by the veterinary and zoo staff that it would be safe for the tortoise to return to the exhibit.

DISCUSSION

Successful rehabilitation of this tortoise with caudal displacement of the right shoulder resulted from the cooperation of a team of professionals; in this case a veterinarian, physical therapist, veterinary technician, and zoo staff.

THE SPECIALTY SECTIONS of the AMERICAN PHYSICAL THERAPY ASSOCIATION
Hereby Offer This

CALL FOR PARTICIPANTS

MULTI-SECTION PLATFORM AND POSTER PRESENTATIONS
APTA COMBINED SECTIONS MEETING
Nashville, Tennessee * FEBRUARY 4 - 8, 2004

Persons wishing to make poster or platform presentations of RESEARCH, SPECIAL INTEREST, CASE STUDIES, OR THEORY are invited to submit abstracts for consideration.

This year we are using a new on-line submission format that is available on APTA's web page: www.apta.org. The online submission process will improve the efficiency of abstract reviews, notification of acceptance, and scheduling presentations for conference. Details regarding submission format and forms are provided on the website.

CONTENT:

- **RESEARCH** reports must include in order 1) purpose or hypothesis of the study, 2) number and kind of subjects, 3) materials and methods, 4) type(s) of data analysis used, 5) summary data, 6) numerical results of statistical test(s) where appropriate, 7) conclusion, 8) clinical relevance. This category would also include single-subject research designs.
- **SPECIAL INTEREST** reports must present a unique program, idea, or device and must include 1) purpose of the presentation, 2) description, 3) summary of experience or use, and 4) the importance to Section members.
- **CASE STUDIES** must 1) present the treatment of a patient or a series of patients, 2) provide unique insight into the treatment or natural history of conditions seen by PTs, and 3) include accurate descriptions of the patients, treatments, and outcomes.
- **THEORY** presentations must 1) state the phenomenon that the theory proposes to explain or predict, 2) explicitly state the theoretical proposition or model, 3) give the evidence on which the theory is based, 4) suggest ways that the theory could be tested, and 5) describe the importance and utility of the theory to members of the Section to which the abstract is submitted.

DATE OF AVAILABILITY ON APTA'S WEBSITE WAS THURSDAY, MAY 15, 2003
DEADLINE FOR RECEIPT OF ABSTRACTS IS TUESDAY, JULY 15, 2003

Occupational Health Physical Therapists Special Interest Group

Orthopaedic Section, APTA, Inc.

Summer 2003

Volume 15, Number 2

OCCUPATIONAL HEALTH SPINE CARE: OUTCOMES & EVIDENCE-BASED OUTPATIENT PHYSICAL THERAPY

James Gose, PT, OCS, CertMDT

When you walk through the door of SpineKnoxville, you immediately recognize there is something different about this physical therapy clinic. You are in a huge room of resistive and cardiovascular exercise machines and the message becomes very clear: wow, these people are serious about exercise!

SpineKnoxville is an outpatient physical therapy and physician's practice in Knoxville, Tennessee that, as the name implies, focuses only on the evaluation and treatment of orthopaedic disorders of the spine. In fact, we refuse to even see peripheral orthopaedic problems, save for the occasional differentially diagnosed shoulder or hip condition, so as not to water down our specialized approach to treating spines. Also, because we specialize in spinal disorders, many of our patient's conditions are very complex, often times having failed previous therapies. The clinic is set up where there are physician's offices on one side and the physical therapy clinic is on the other side with the exercise and waiting areas in between. There are 2 orthopaedic surgeons who specialize in spinal surgery and 2 physiatrists who are injection-trained. There are 2 full-time physical therapists and 1 part-time physical therapist, all of which are certified in the McKenzie method of diagnosis and treatment of spinal disorders. In addition to their McKenzie training, they have extensive training in other forms of manual therapy such as Maitland and Mulligan approaches. There is also a physical therapist assistant who has been through 3 McKenzie courses, 4 Maitland courses, and 1 Mulligan course.

The primary philosophy of the clinic is one of 'progressive invasiveness' when it comes to treating spinal disorders. We try, as much as possible, to base our practice on what the scientific evidence has to say about the etiology and treatment of neck and back pain. Since low back pain is one of the most studied human maladies of all time, there is plenty of evidence over the past 50 years on which to base our approach. One statistical fact that has become very clear is that somewhere around 80% of low back pain resolves within 2 weeks and around 90% resolves within 1 month, no matter what the treatment approach. Based on this statement alone, we feel a conservative approach is best when it comes to treating spines. Therefore, physical therapy is the primary focus for this practice.

The physical therapy approach at SpineKnoxville is somewhat different from what might be considered traditional to many. For starters, the traditional treatment modalities of moist heat, ultrasound, electric stimulation, and massage are not used in this clinic. We consider this a passive approach to treating spinal disorders. Besides that, the scientific evidence does not support that these interventions have any impact on improving outcomes when it comes to treating low back pain. A large study performed by the Swedish Counsel on Technology Assessment in Health Care in 1991 analyzed over 25,000 studies on neck and back pain and concluded that there was little to no evidence that these treatments improved outcomes. They also concluded that there is strong evidence for the effect of dosed exercise and manipulation for improving outcomes when treating low back pain. This is just one example of the type of evidence we use to guide our practice. Therefore, our primary focus of treatment is what we consider to be an active approach. We assume that somewhere around 80% of spine pain is mechanical in nature, being caused and affected by mechanical loading. A corrective approach to treatment can be taken by using mechanical force in the form of directionally specific exercise and manual techniques to influence the structure that is originating the patient's symptoms. We use a McKenzie framework for the initial evaluation and treatment, applying other philosophies and techniques of manual therapy as indicated. Hands-on techniques are applied only when it becomes evident that progress on the patient's symptoms from patient generated force, ie, directional preference exercises, has slowed and a progression of manual force is needed to influence the mechanics of what is producing the patient's symptoms. This is to discourage the patient from becoming dependent on the practitioner to resolve their condition. We want to teach the patient how to self-manage their condition, not only for their current episode of symptoms, but also to prevent future episodes. We educate the patient on the cause and effect of their pain, teaching basic principles of biomechanics and pathology, as well as pain avoidance behaviors such as posture and body mechanics. We believe it is a disservice to the patient to do otherwise.

Typically, we will see the patient in a private treatment room to assess the response to treatment each visit and modify and progress as needed. Usually by the third or fourth treatment, we try to begin an active exercise program in the gym, frequently with a directionally specific bias based on the direction of exercise their condition is responding to. For example, if a patient's low back and leg pain are centralizing, decreasing, and resolving with lumbar extension exercises, they will begin a program initially of walking on the treadmill, lumbar extension resistive machine, and multi-hip extension, all of which encourage lumbar extension-type movement. We would, in this case, avoid exercise that involves flexion positions and movements such as recumbent bicycle, seated hip machines, and lumbar flexion machines. Eventually, as the patient's symptoms resolve, they may be on all of these machines. This type of reactivation program tests the stability of the patient's improvement by determining the effect of physical activity on the patient's symptoms, as well as strengthens and conditions the patient to better tolerate return-to-work and recreational activities.

The literature suggests that large muscle group exercise is effective in reducing chronic pain. Another benefit of a conditioning program is the confidence it instills in the patient that they can exercise without increasing their pain. In many cases, the patient has become extremely apprehensive about physical activity, exercise or otherwise, because they have always related it to an increase in their pain. If physical conditioning is directionally specific at first, gradually initiated, and progressed slowly, many times the patient is pleasantly surprised at how much better they feel from their exercise routine. This motivates them to continue their program after discharge.

The model of treatment at SpineKnoxville is set up as an algorithmic flow chart. The way the patient presents upon initial evaluation by the physician determines the clinical decision-making. For example, in the case where a patient who presents with a 2-week onset of low back pain with no radicular symptoms, no history of trauma (two-thirds of low back pain cases present with the patient being unable to recall any inciting event), no cauda equina symptoms (saddle anesthesia, bowel/bladder dysfunction), no progressive weakness of a limb, and no history of metastatic disease, an x-ray or other diagnostic tests may not be indicated or performed. Still following our example, this patient may be prescribed pain and anti-inflammatory medication (excessive use of narcotics is discouraged) and referred to physical therapy. Prescribed physical therapy visits usually do not exceed 6 to 9 visits initially. If the patient's condition only partially responds or does not respond to conservative mechanically corrective treatment, then upon recheck with the physician, several courses of treatment will be considered. For instance physical therapy may be continued or discontinued, diagnostic testing performed, consideration of epidural or facet injections, or possibly a surgical consult. Our belief is that many times treatment for spinal disorders has become too 'medicalized' often driving up the cost of treatment and sending the message to the patient that their problem is more serious that what it actually is.

The fact is, not too many people drop over dead because of neck or back pain. While these conditions can be extremely painful and disabling at times, they are usually self-limiting. Many times today, treatment is over utilized or overly invasive, with many procedures such as surgery being performed unnecessarily. We believe surgery should only be performed as a last resort, barring immediate surgical criteria indications such as progressive weakness of a limb, cauda equina symptoms, and severe unrelenting pain that is not responding to conservative management. In these cases, the patient's clinical presentation should correlate with pathology detected from imaging studies.

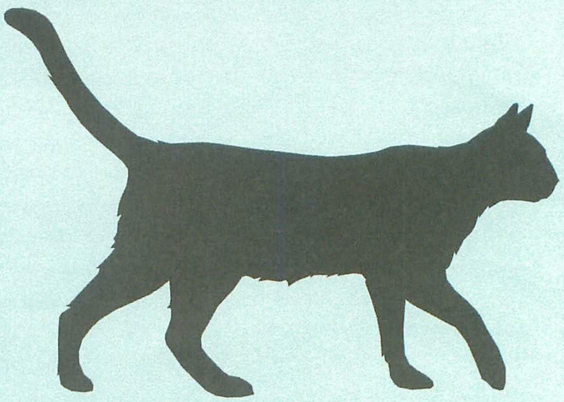
When all treatment options have been explored and delivered on a patient's case, they may reach a point where the physician considers them at maximal medical improvement or MMI. At this point, the patient may undergo a functional capacity evaluation in physical therapy to determine their physical capabilities and to assist in return-to-work decisions, case closure, and impairment ratings.

We at SpineKnoxville are 'hooked on evidence' as coined by the American Physical Therapy Association. We realize we could blow our horn all day about how different and special our clinic is, but if we do not have the evidence and numbers to back it up, then we have no proof to say our approach is any more effective than any one elses. Therefore, we tabulate clinical outcome data yearly and print what we call our 'Clinical Outcome Report Card.' Here are a few examples of outcome results from 2002:

- 94% of our patients are VERY or SOMEWHAT satisfied with their overall care provided
- Average number of physical therapy visits is 9.5 visits
- Using Roland-Morris questionnaire data for patients treated in physical therapy:
  - 80% improve in terms of symptom reduction and function
  - 10% regressed in terms of symptom exacerbation and function
  - 10% were unchanged in terms of symptoms and function

It is my hope that this description of our practice offers a different perspective to consider for those practitioners managing patients with spine pain, as well as anyone who is involved with occupational health issues.

For anyone who may be interested in more information or has questions regarding our approach at SpineKnoxville, I can be reached at (865) 694-8353 or GoseJR@ortholink.net.



OHSIG Officer Listing

PRESIDENT

Deborah Lechner, PT, MS
ErgoScience, Inc
15 Office Park Circle, Ste 214
Birmingham, AL 35223
Ph: 205 879-6447, ext. 204
Fax: 205 879-6397
Email: deborahlechner@ergoscience.com
Term expires: 2006

VICE PRESIDENT

Bonnie Sussman, PT, MEd
Cioffredi & Associates Physical Therapy
PO Box 727
Lebanon, NH 03766
Ph: 603 643-7788
Fax: 603 643-0022
Email: bsussman@tpk.net
Term expires: 2004

TREASURER

Margot Miller, PT
General Manager
Isernhagen Work Systems
11E Superior St, Ste 370
Duluth, MN 55802
Ph: 218 728-6455
Fax: 218 728-6454
Email: mmiller@workwell.com
Term expires: 2006

SECRETARY

Karen Elton Walz, PT, MA, OCS, CMPT
Therapeutic Associates of Central Oregon
2600 NE Neff Road, Ste B
Bend, OR 97701
Ph: 541-388-7738
Fax: 541-388-7785
Email: kelton@taiweb.com
Term expires: 2004

PRACTICE & REIMBURSEMENT

Brad Wolter, PT
Peoples Energy Corporation
Employee Health Safety & Security Svs.
130 East Randolf Drive, 19th Floor
Chicago, IL 60601
Ph: 312 240-4965
Fax: 312 240-4609
Email: bwolten@pecorp.com

RESEARCH

Frank Fearon, PT, DHSc, OCS, FAAOMPT
North Georgia College & State University
Barnes Hall-Department of Physical Therapy
Dahlonega, GA 30597
Ph: 706 864-1899
Fax: 706 864-1493
Email: ffearon@ngcsu.edu

EDUCATION

Deirdre Daley, PT, MSHOE
Premier Physical Therapy
4140 Fern Creek Dr
Fayetteville, NC 28314
Ph: 910 484-9663
Fax: 910 484-6668
Email: kanandarqu@aol.com

NOMINATING

Kevin Weaver, PT, MA, OCS, CEA, CIE
New York University
380 Second Ave, 4th floor
New York, NY 10010-5615
Ph: 212 998-9411
Fax: 212 995-4190
Email: kcweava@aol.com or Kqw9532@nyu.edu

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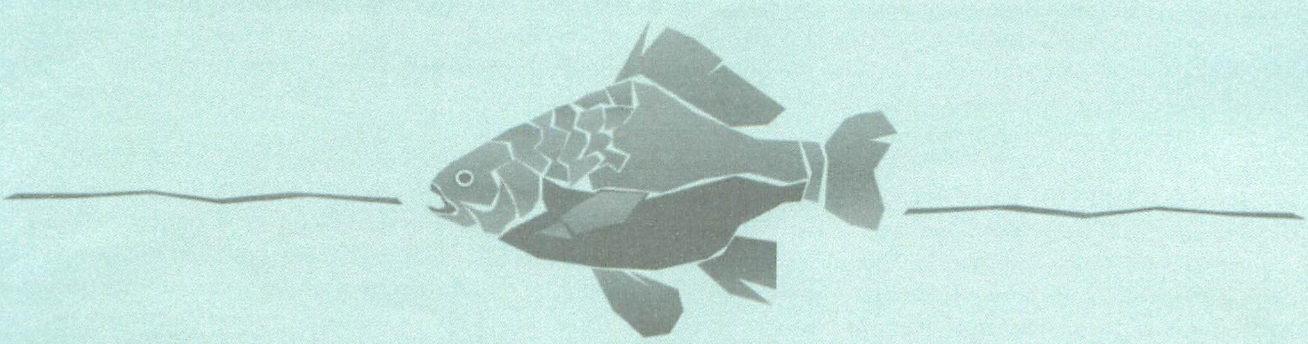

FOOT & ANKLE

SPECIAL INTEREST GROUP

ORTHOPAEDIC SECTION, APTA, INC.

Foot and Ankle Research Retreat II
Measuring Foot Mechanics: Inverse and Forward Dynamic Models
Sponsored by the Foot and Ankle Special Interest Group of the Orthopaedic Section of the APTA

We are now in the process of planning the second Foot and Ankle Research Retreat. Our first retreat was held in Annapolis, MD in April 2000. The focus of the retreat was: Static and Dynamic Classification of the Foot. Dr. Jim Gordon, PT, PhD has agreed to host the second retreat at the University of Southern California in late April/early May, 2004. The 1.5 day format will be similar to the first retreat, with keynote addresses presented by expert scientists in the field, as well as podium presentations given by researchers doing work in the area of dynamic foot measurements. Based on the reviews from the previous retreat, the strength of the format of this meeting is the large amount of time allotted for discussion.

A formal announcement will be made in June regarding the meeting specifics. A call for abstracts will be made in July with an abstract deadline of October 15, 2004. All abstracts will undergo a peer review process and those deemed acceptable in terms of scientific merit and relevance to the meeting will be invited for presentation. Participants will be notified by December 2, 2004. The Editor of the *Journal of Orthopaedic and Sports Physical Therapy*, Guy Simoneau has agreed to publish the meeting abstracts. It is hoped that this retreat will provide an enriching and rewarding forum for researchers and clinicians interested in the area of foot mechanics.

Irene McClay Davis, PT, PhD (mcclay@udel.edu)
Debbie Nawoczenski, PT, PhD (dnawoczenski@ithaca.edu)
Blaise Williams, PT, PhD (bjwrpt@aol.com)

Business Meeting Minutes
Combined Sections Meeting 2003 • Tampa, Florida

The Foot & Ankle SIG Business Meeting was called to order by Stephen Reischl, President of the FASIG, on 2/14/03. A motion came from the floor to pass the minutes from the Boston, 2002 CSM meeting and this was passed unanimously. Byron Russell seconded the motion.

OFFICER / COMMITTEE REPORTS

Chair: Stephen Reischl discussed his interaction with the Orthopaedic Section and stated that the SIG officer training was making the SIG's run more efficiently. He also stated that the Wednesday preconference course was a success once again thanks to the effort of Mark Cornwall who coordinated the programming.

Vice Chair: Mike Cornwall was absent and there was no report.

Secretary/Treasurer: Stephen Paulseth stated that the budget was not going to change this year ($4,825). The FASIG reserve with the Orthopaedic Section had also grown this year and this is primarily due to the successful preconference course at the Tampa CSM which had 52 entrants.

Research Committee: Irene McClay was absent.

Practice Committee: Joe Tamaro was absent.

OLD BUSINESS

Elections: Stephen Paulseth was elected Vice President of the FASIG. Mark Cornwall will be stepping down from the job of the past 4 years and will assume the last year remaining on the term for Secretary /Treasurer. Cheryl Maurer has agreed to become a member of the Nominating Committee, which includes Tom McPoil as Chair. For the year 2004, the President and Treasurer positions are open for nominations and an election will follow. The Orthopaedic Section requires nominations and the actual election occur prior to the next CSM. Balloting will be sent to the general Orthopaedic Section membership in December 2003.

"Find a Foot & Ankle Physical Therapist" Web Listing: Any member of the Orthopaedic Section is welcome to fill out their demographics on the "Find a Foot & Ankle Physical Therapist" web listing on the FASIG site. This can be used to geographically locate physical therapists that can participate in the treatment of these conditions. Unfortunately there have been very few respondents from the members of the Section to date. There is now a plan to send out a mass email to the Orthopaedic Section members to remind them of this opportunity.

AOFAS: This society has acknowledged that the FASIG will become linked to their organization. In order to link to the foot/ankle surgeon listings, certain criteria still need to be established. This criteria distinguishes which specific attributes a "Foot & Ankle" Physical Therapist possesses and why the AOFAS surgeons should refer to us versus any physical therapist.

NEW BUSINESS

A discussion ensued pertaining to the criteria that establish a foot/ankle physical therapist as a 'specialist' for treating these conditions. Criteria for treatment of these conditions could be established by a survey sent out to the orthopaedic PT membership. A specialty test was also suggested and it was noted that we are already a part of the "advanced specialty practice" criteria. Nancy Henderson suggested that a specific category within the recertification for the OCS exam include foot/ankle as base criteria. Michael Wooden felt that there should be a minimum set of criteria established at first, and then self-evaluation to follow, and he questioned whether the OCS was necessary at all. This is due to the fact that the OCS exam currently includes less than 10% of its content on the foot/ankle.

Also from the floor, it was suggested that perhaps the CPed certification would make a good adjunct criteria for treatment of these conditions. The possibility of establishing a fellowship similar to the model used by the AOFAS could be incorporated with various biomechanical research labs and specific PT clinics around the country. Another suggestion included that the transitional DPT program may be necessary and that the portfolio of the OCS may encompass the expertise required.

The AOFAS has already been made aware of our website which includes our mission statement and related information, the tremendous amount of collaborative research and our extremely didactic means of evaluating and treating the foot/ankle patient is within our scope of practice and would be an asset to the Foot & Ankle surgeon's patients. Nancy Henderson also requested a subcommittee be formed to come up with a criteria list and Stephen Paulseth agreed to work with her on this.

Research Retreat: It is proposed to take place in May 2004 at the Physical Therapy and Biokinesiology Department at USC in Los Angeles. Irene McClay, in addition to Deb Nawoczeneski, is offering to spearhead the retreat. Three years ago in Annapolis, there were approximately 25 participants from all over the world and from varying backgrounds who participated. Evaluation of the patient's static and dynamic foot typing was discussed and several important papers were presented pertaining to this subject.

Several ideas for topics at the 2004 retreat were suggested from the floor in order to get different people of different backgrounds together to discuss the foot. Holding it at a university may prove to be advantageous due to the facilities, research lab, and the proximity for many physical therapists and other health care professionals. Another theme of the research retreat included a potential 3-hour segment, which includes keynote presentations and discussions followed by breakout sessions, which includes certain clinical applications such as foot orthoses applications. One theme included how to clinically evaluate the foot. Further ideas included looking at clinical outcomes for the treatment of foot/ankle patients, foot modeling [clinical vs. biomechanical (3-D)], and a possible forum of open topics.

Entry Level PT Foot & Ankle Information: It was proposed in last year's meeting to form a group that would establish the basic level of foot/ankle information currently being taught to the entry-level physical therapist around the country. Lisa Selby Silverstein had noted that the Pediatric and Neurological Sections had already established models as well as task forces in order to evaluate the pediatric and neurological content being taught in physical therapy programs. The neurological model included obtaining different syllabi from the neurological content of different programs whereas the pediatric program included a specific set of guidelines suggested by a task force. It has been suggested that we establish certain guidelines for foot/ankle content in the entry-level program and perhaps establish a survey which can be sent out to the different PT programs nationally. A task force could create a form letter from the FASIG, which is seeking to obtain the content being taught in this area and send it to all PT programs initially. We would request syllabi, compile it in a compendium, and then share the results or guidelines with the different programs around the country. The introduction letter to the schools will be sent to alert them of our very difficult task of obtaining this information.

Next year, a topic was proposed to include each school in a round table forum in order to discuss the content being taught. This should include the basic PT guidelines.

Further discussion of new business was halted at 6:04 pm and there was a movement to adjourn by Stephen Paulseth, which was seconded by Ward Glasoe.

These minutes are respectfully submitted by:
Stephen Paulseth, PT, MS, SCS • Secretary/Treasurer FASIG

Reports from the FASIG

Spring is definitely in the air in Southern California. Daylight savings has allowed more sunlight in for the afternoons, which allows more time for fun after work. Those involved in the SIG have been busy and this will get you up-to-date.

The new format for the Orthopaedic Section website is up and looks great. Please take time to get on the FASIG webpage and see what is new on the site. For those Orthopaedic Section members who are not members of the FASIG, there is a sign up page in the FASIG website.

PRESIDENT'S REPORT

The focus of this year's activity is the education program at CSM in Nashville. Steve Paulseth the Vice President is currently in the process of setting up the education sessions for the 4 hours of programming at CSM.

As you will read in this section of *OP*, the Foot and Ankle Special Interest Group is planning a Research Retreat in April/May of 2004.

VICE PRESIDENT REPORT

Steve Paulseth is currently getting the programming ready for Nashville in 2004. Look for further information in the upcoming *OP* newsletters.

SECRETARY/TREASURER

Mark Cornwall has agreed to complete the year remaining in the term of Secretary/Treasurer vacated by Steve Paulseth taking the Vice President position. Mark has been instrumental in the FASIG having served as Secretary/ Treasurer and Vice President offices.

NOMINATING COMMITTEE

The Nominating Committee is made up of Tom McPoil, Bill Meredith, and the newest member, Cheryl Maurer. This year the positions of President, Secretary/Treasurer, and one nominating position will be open for election.

In this edition there is a summary of a presentation given during the preconference course in Tampa, sponsored by the FASIG. Steve Paulseth presents the pathomechanics and etiology of metatarsalgia, a common foot condition which can have origins from many different sources. The next issue of *OP* will include a presentation is by Cheryl Maurer who will discuss the treatment of metatarsalgia. Cheryl's practice is nearly all foot and ankle and has a vast experience with foot orthoses.

As always, if there are questions, I can be reached through email at sfreischl@charter.net with questions or concerns.

The Pathomechanics and Etiology of Metatarsalgia

Stephen Paulseth, PT, MS, SCS

This presentation is from CSM's preconference course.

Metatarsalgia is a generic term for pain in the plantar forefoot at the metatarsal head area. The pathological sequellae of this problem is often due to foot dysfunction in areas other than the forefoot. This may be dictated by foot type and other etiologies that will be discussed. First it is necessary to describe the basic related biomechanics of this problem.

Our forefoot, which contains the metatarsophalangeal mechanism, is a nonconstrained system. The mid-foot or tarsometatarsal mechanism is also nonconstrained as opposed to the hind-foot, which is a constrained structure. This has been eloquently described by Huson[1] as the vital inter-relationship between the osseous structures within the subtalar and midtarsal joints. As one joint moves into supination or pronation so does the other, like the gears in a car transmission. The forefoot and distal to the mid-foot however are functionally free of this constrained cog-in-cog motion. This has vital functional implications. The distal foot must be able to adapt to changes in the total body's center of pressure and simultaneously create motion, often in a different direction within a triaxial joint system. The goal of forefoot function is often to attempt to form a stable base in concert with the rear-foot which can adapt to different surfaces or functional demands. This adaptation is heavily influenced by the proximal foot mechanisms, which can dictate metatarsal/metatarsophangeal joint function.

The ability of the foot to function normally is dependent upon a variety of factors which include congenital foot type, acquired foot mechanics, and tissue stress buffering capacity. The forefoot primarily contributes to foot function once our center of gravity passes anterior to the ankle axis such as during propulsion in gait and equilibrium of stance. Hence, *pressure* under the forefoot due to excessive ground reaction forces may progressively lead to the genesis of metatarsalgia.

PATHOMECHANICS

The first ray alone must withstand 350 N of force repetitively during walking and 1000 N during running.[2] The ground reaction force (GRF) is a combination of vertical and shear forces, with the latter often leading to superficial callus formation. This involves hyperplasia and the diminution of exfoliated skin along with mucoid degeneration of the distal plantar tissue and skin. Plantar keratomas/hyperkeratosis become deeply enucleated and often fibrotic. Often the web space and inter-metatarsal tissues, especially the neurovascular structures, become compromised as adherent tissue forms. It is often progressive due to the hypovascular nature of this tissue proliferation. The tissue over the metatarsal (MT) heads becomes less able to attenuate the everyday forces of weight bearing and thus, metatarsalgia becomes a reality.

The multiple layers of tissue over the MT heads is well documented and beyond the scope of this paper. Suffice it to say, the increase in pressure to this area leads to attrition and pathology of the following structures:

1. Skin callus/distal plantar fascia
2. Fat pad (atrophy and distal migration)
3. Flexor sheaths (tenosynovitis)
4. Flexor brevis/ longus (tendonitis)
5. Plantar plate (fibro cartilage/deep transverse inter-metatarsal ligament)
6. MTP joint capsule (capsulitis/instability)

Once the latter structure is involved, the stability of the unicondylar metatarsophalangeal joint (MTP) is reduced and toe/forefoot deformity may ensue.[3] The fat pads under the MT heads endure greater forces than that of the heel. They are thickest under the first MT (due to the sesamoids) and are progressively less thick towards the most lateral MT. The first MT fat pad has the greatest compressibility index and modulus of elasticity.[4]

Metatarsalgia primarily involves the second and third metatarsal. The 4th and 5th rays are typically highly mobile. The 1st ray can be also, depending on the foot type. Morton's neuroma or interdigital neuroma is a diagnosis that is often confused with metatarsalgia and can occur simultaneously. The 2nd/3rd and 3rd/4th interdigital areas are most often affected. Tissue changes in these areas can place increased pressure on the interdigital nerve and a neuroma may develop.

FOOT TYPE

As was mentioned initially, the pathomechanics of metatarsalgia are related to the forefoot nonconstrained mechanism and the proximal constrained mechanism. The function of these mechanisms is dependent upon static and dynamic foot type.

1. Pes Planus/Flatfoot: This foot type is synonymous with abnormal foot pronation and forefoot varus conditions. In order for the 1st ray to contact the ground, the hind foot must pronate excessively. If pronation is prolonged in gait the forefoot tends to abduct, the 1st ray dorsiflexes, and an abductory twist/shear occurs under the MT heads. The 2nd and 3rd MTs are excessively loaded since they are the most stable rays or 'I' beams of the longitudinal axis of the foot. This problem is more common in females and with advancing age.[5]
2. Hallux Abducto-Valgus Deformity: This foot type is closely related to pes planus except that there is usually a hallux bunion deformity. The hallux migrates laterally due to instability of the 1st ray, which dorsiflexes and inverts excessively. As the deformity progresses the 1st and 2nd toes may crossover. This leads to laxity of the collateral ligaments in the MTP joint, altered toe flexor angle of pull, and midfoot muscular action. Intrinsic foot muscle weakness also coincides. The MT head instability causes lateral condyle prominence and callus formation. During gait

propulsion the metatarsals shift and rotate over fixed plantar tissues. The lesser MTs sustain increased pressure which usually lends to central MTP joint capsulitis.

3. Splay Foot: This foot type is also related to the prior types described. The difference is the progressive widening of the forefoot. It is seen most often in middle-aged females and involves an insufficient transverse arch and increased intermetatarsal angle. Plantar plate instability and MT fat pad atrophy often result.
4. Forefoot Valgus: In order for the 1st ray to contact the ground the constrained mechanism of the hind foot must supinate to compensate. This is due to a relatively plantar flexed position of the 1st ray and elevated 4th and 5th rays (forefoot pronated). The 1st ray typically is stiff which leads to increased forefoot GRF of the medial rays at heel rise in gait.
5. Pes Cavus: This is a rigid foot condition and is related to forefoot valgus. The 1st and 2nd rays are often stiff and plantar flexed.[6] Toe deformity is common with this foot type. This includes hammer or claw toe and developmental or neurological muscular imbalance and contracture. Hammer or claw toe deformity can be caused by deficient lumbricals/intrinsics, which permits hyperextension of the MTP joint and dorsal subluxation of the proximal phalanx. The fat pads subsequently migrate distally, exposing the MT heads to increased pressure and metatarsalgia may prevail. Toe deformity can occur along with any of the foot types described and several others not detailed here.

ETIOLOGY

The etiology of metatarsalgia is ill-defined in the literature and is due to many causes.[7] This includes structural or functional abnormality, which was previously discussed, or traumatic injury to the MT heads.[5] In fact, several intrinsic/extrinsic factors can lead to abnormal stress to the MTs. Here are the primary causes of metatarsalgia:

1. Microtrauma/Mechanical – The most common cause of this problem and typically involves excessive pronation in propulsion. Mechanical causes are prevalent in propulsion or stance. Stance is related to the 1st ray position and mobility as well as callus formation. Propulsion problems are related to MT length and declinated MT positions. This can increase pressure under the MT head and lead to capsulitis. Normal MT length is rated as: $1<2>3>4>5$. Other mechanical causes include the chronic use of high heels or narrow shoes, limited MTP joint motion (<65°), intrinsic/extrinsic foot musculature weakness, limited ankle dorsiflexion motion and ankle equinus.
2. Osteoarthrosis – Can lead to limited selective foot joint motion and weakness. It can also be unilateral or bilateral.
3. Occlusive / Spastic Vascular Conditions
4. Neuropathies – Any type of neuropathy can contribute to a neuritis or neuroma condition in the foot. Certain spastic neurological conditions can also lead to metatarsalgia.
5. Trauma may include MTP joint osteochondral lesions and/or MTP joint capsular instability.
6. Proximal Dysfunction – This may include postural problems, knee or hip disorders which can alter normal foot pressures.

There are a myriad of other factors which may underlie the etiology of metatarsalgia. Identification of this problem through detailed assessment is paramount. This includes the understanding of the numerous differential diagnoses and evaluative techniques currently being utilized. This information is vital in establishing a treatment plan that can yield a favorable outcome for this problem. A discussion of the assessment of metarsalgia will follow in a later *OP* edition.

REFERENCES

1. Huson A. *Functional Anatomy of the Foot, Biomechanics of the Foot & Ankle*. Part II. WB Saunders; 1992;15:409-431.
2. Glasoe WM, Allen MK, Ludewig PM. Comparison of first ray dorsal mobility among different forefoot alignments. *J Orthop Sports Phys Ther.* 2000;30(10):612-623.
3. Powless SH, Elze ME. MTP joint capsule tears. *J Foot Ankle Surg*. 2001;40(6):374-89.
4. Wang CL, Hsu TC, Shau YW, Shieh JY, Hsu KH. Ultrasonographic measurement of the mechanical properties of the sole under the MT heads. *J Orthop Res*. 1999;17(5):709-713.
5. Root ML, et al. *Normal and Abnormal Function of the Foot Clinical Biomechanics: Volume II*. 1977.
6. Hockenberry RT. Forefoot Problems in Athletes. *Med Sci Sports Exerc.* 1999;31(7)suppl:5448-5458.

FOOT & ANKLE OFFICER LISTING

CHAIR:

Stephen F. Reischl, PT, DPT, OCS	(562) 427-2225
2650 Elm Ave, Ste 207	(562) 427-5656 FAX
Long Beach, CA 90806-1600	sfreischl@charter.net

VICE CHAIR:

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1950 Century Pk E	(310) 286-1224
Los Angeles, CA 90067-4708	stephen@paulsethpt.com

SECRETARY/TREASURER:

Cheryl Maurer, PT	(617) 489-3993
41 Westford St	(617) 489-5004
Saugus, MA 01906	cheryl@functionalmechanics.com

NOMINATING CHAIR:

Byron Russell, PT	(509) 368-6608
EWU Dept PT]	(509) 386-6623 FAX
310 North Riverpoint Blvd	bryon.russell@mail.ewu.edu
Spokane, WA 99202	

PRACTICE CHAIR:

Joe Tomaro, PT, MS, ATC	(412) 321-2151
490 East North Ave, Suite 501	(412) 434-4909 FAX
Pittsburgh, PA 15212	jtomaro@teamhmi.com

PASIG

Performing Arts Special Interest Group • Orthopaedic Section, APTA

Message from the President

Hello everyone!

About this time of year, the weather becomes more amenable and thoughts turn to activities that get everyone out-of-doors. Venues for concerts or plays that rely on fair weather are seen more readily. We certainly hope that each of you thinks about getting involved in your local performing arts communities. There are opportunities out there for you to offer screenings, talk about prevention, introduce what you as a physical therapist can offer a performing artist, etc. As a recent Motion Pictures Academy attendee stated, "I'm an entertainer and my job is to entertain." We are the movement specialists who can help the performer do just that. And in these rather uncertain times, it appears that we can all do it with a bit of entertainment to keep our spirits up.

The PASIG has turned around quickly after Tampa's CSM to plan our programming for next Combined Sections Meeting. CSM 2004 is planned for Opryland and we will be offering our preconference course, "Introduction to Dance Medicine," which was unavoidably cancelled this past meeting due to low registration. I would encourage all of you to consider this very exciting and informative preconference course. Whether you are thinking about getting more involved with dancers or already have an established relationship with a dance facility in your area, this *beginner to intermediate* level programming will meet your expectations. We are hoping that this course will be the beginning of other course offerings by the PASIG, but we need to see that interest exists through course participation. Perhaps you, or someone you know, have been considering working with dancers and just don't feel comfortable enough yet. Or consider the physical therapist that has been working with dancers irregularly and would like to solidify their skills enough to provide backstage coverage or work with a local company. We will be posting more about this course offering on our website at www.orthopt.org.

Speaking about websites...ours is getting a makeover via the Orthopaedic Section and we'd like your input! Take a look at our website and give us feedback regarding what you'd like to see offered. We are limited somewhat in items that the Orthopaedic Section will permit us to post, but we want to have a user friendly site that encourages all of you to visit. Take a moment out of your busy day and give OUR newly updated site a look!

Our Practice Analysis is in its final few months and we expect to have a Description of Advanced Clinical Practice (DACP) by Annual Conference in June. Many thanks to those of you who completed and returned your surveys. We realize it was a very long survey, but your input was extremely valuable and our efforts should yield results that help to define future course offerings/course curricula within the performing arts and PT. We have also been working on developing a working relationship with Actor's Equity Association. They have requested our professional opinion with regards to several work surfaces affecting their membership. This appears to be a good chance to apply some of our human movement expertise to real life concerns and hopefully prevent future injuries. A task force, established in Tampa, FL at CSM will be helping to define work risk and injury factors, once we further establish how involved Actor's Equity would like us to be. If this consultation develops, it could mean the beginning of a positive ongoing relationship. I will write more about this as I find out more myself.

For now, remember that your Board is ready to serve your needs, and we welcome the chance to hear your ideas or concerns. Many members are available to offer mentoring at some level or to simply answer patient questions. Feel free to contact us.

All my best,
Jeffrey T. Stenback, PT, OCS
President, Performing Arts Special Interest Group

ANNOUNCEMENTS

PAMA

PASIG member, Shaw Bronner is a featured speaker at the upcoming PAMA (Performing Arts Medicine Association) Conference: 21st Annual Symposium of Medical Problems of Musicians and Dancers. Her talk is entitled, Biomechanical Analyses in Dance: Insight into Injury, Control, and Optimization. PASIG member, Chad Fortun, will be presenting a paper entitled: Computerized Dance Wellness Data, in the Open Communications Forum. The conference will be held in Aspen, from June 19 to 22nd. Website: www.artsmed.org.

Combined Sections Meeting in Nashville, TN
PASIG Preconference Course
PERFORMING ARTS SPECIAL INTEREST GROUP
INTRODUCTION to DANCE MEDICINE

INSTRUCTORS: Brent Anderson PT, OCS
Shaw Bronner PT, MHS, EdM, OCS
Jennifer Gamboa MPT, OCS
Marshall Hagins PT, PhD

I. Introduction to Dance:
Lecture/Interactive Demonstration

II. Preseason Screening for Dancers:
Lecture/Demonstration

III. Dance-specific Functional Examination and Evaluation:
Lecture/Demonstration

IV. Treatment Essentials for Dancers:
Lecture/Lab

V. Getting Started in Dance Medicine:
Panel Presentation/Discussion

PASIG CSM ANNUAL SURVEY

There were 14 surveys completed at this year's CSM and the results are as follows:

Did you receive a survey on Performing Arts PT this past year?
Yes 64% No 35%

If yes, did you complete and return it?
Yes 57% No 0%

Do you feel that your educational needs and concerns regarding issues related to treatment of performing artists are being met?
Yes 50% No 35%

For those that answered no, specific comments asked for education to address more advanced aspects of dance medicine, marketing, billing issues, networking between members, and education on PASIG's relationship with IADMS or PAMA.

Do you receive the *OPTP*?
Yes 78% No 14%

Do you currently receive other performing arts journals?
Yes 57% No 35%

Which ones?
Performing Arts Medicine 14%
Journal of Dance Medicine and Science 50%

Have you attended a performing arts-related course?
Yes 85% No 9%

How likely would you attend a preconference course?
Very likely 64% Not sure 9% No 21%

How likely would you attend an off-site course?
Very likely 50% Not sure 29%
No 14% (depends on course location)

How likely would you buy a home study course?
Very likely 29% Not sure 29% No 35%

Future topics for education were listed as: Dance, screenings, post hip arthroscopy in dancers, marketing, costume and footwear considerations for multiple types of performers, lumbosacral diagnosis with performers, and courses with more lab work and discussion.

Compiled by Susan C. Clinton, PT, MHS
PASIG Secretary

NOMINATING COMMITTEE:

CALL FOR NOMINATIONS:

The PASIG invites you to submit your name or that of a willing candidate to run for office. Help to contribute and learn about the performing arts by serving. The following positions are open for nomination: Vice President and Secretary. Each position is for a 3-year term. This is a great way to get involved and meet wonderful people from across the country.

Guidelines: Nominees must be PASIG and Orthopaedic Section members. Nominees must give their consent to be nominated before their names are put forward. Nominees may be self-nominated. Upon agreeing to be nominated, nominees will be asked to write a short biography and a position statement (250 words) regarding their ideas and role as an officer in the PASIG.

PASIG Vice President Job Description
1) Assumes all duties of the President if she/he is unable to serve and/or attend scheduled meetings.
2) Serves as a voting member of the Executive Board.
3) Coordinates PASIG programming (for CSM) with the Program Chair of the Orthopaedic Section based on suggestions by the PASIG membership.
4) Is liaison for all PASIG program speakers to the Orthopedic Section and is responsible for meeting all speaker information deadlines for CSM.
5) Coordinates the annual PASIG membership survey at CSM.
6) Attends all PASIG Executive Board Meetings, conference calls, and the Annual Business Meeting at CSM.
7) Other duties as assigned by the President.

PASIG Secretary Job Description
1) Serves as a voting member of the Executive Board.
2) Serves as Editor for the newsletter and chair of the Membership Committee.
3) Is responsible for recording, or providing for recording of the PASIG Annual Business Meeting and all Executive Board minutes. Minutes are typed and distributed to the PASIG Executive Committee and Orthopaedic Section Executive Committee.

4) Maintains all written records of PASIG with copies sent to the Orthopaedic Section Office.
5) Maintains PASIG membership records with copies sent to the Orthopaedic Section Office.
6) Submits, in coordination with the Executive Board, information relative to PASIG functions to the Managing Editor of Journals/Newsletters for publication in *Orthopaedic Physical Therapy Practice*.
7) Serves as liaison to the Editors of Orthopaedic Section and APTA publications (eg, *OPTP*).
8) Other duties as assigned by the President.

Please contact:

Shaw Bronner PT, MHS, EdM, OCS
Nominating Committee Chair
Work: 718-246-6377
Fax: 718-246-6383
Email: sbronner@liu.edu

PUBLIC RELATIONS/MEDIA COMMITTEE:

The Orthopaedic Section has allowed us to shift some of our budgeted money from telephone to marketing. We now have $575 to use for advertising the preconference course in non-APTA journals. In addition to recruiting attendees we hope to increase awareness of the PASIG.

Please visit our new (and still improving) website at www.orthopt.org and click on "SIGS". If you would like to be listed under "Find a PT," please send your name and contact information to tfred@orthopt.org with PASIG typed in the subject line.

Adrienne McAuley, PT
Treasurer

MEMBERSHIP COMMITTEE:

This year the committee is working with the Orthopaedic Section to update the membership directory for our special interest group. Please take the time to return the emails (mass mailing) with any updated information for future contact. If you did not receive an email to update, please contact me as soon as possible so all of your information can be entered into the directory.

Please contact:

Susan C. Clinton, PT, MHS
Membership Chair
Work: 504-568-3434
Fax: 504-568-4538
Email: sclint@lushsc.edu

GET INVOLVED IN THE PASIG AND THE FUTURE IS YOURS !

Join your fellow PASIG members in becoming an ambassador for the Performing Arts! The PASIG wants to encourage all our members to become actively involved by serving as committee members, regional directors, officers, and by offering your input at business meetings and through communication with other PASIG members. Remember, when you give of your time and energy to the PASIG, it's like giving a gift to yourself! The PASIG is only as strong as its members. If you have an interest in committee involvement, please contact the Committee Chairperson, listed below.

PASIG EXECUTIVE COMMITTEE

President: Jeff Stenback, PT, OCS
Orthopedic Rehabilitation Specialists
8720 North Kendall Dr, Ste 206
Miami, FL 33176
Ph: 305.595.9425 / FAX: 305.595.8492
Email: jsptocs@hotmail.com

Vice President: Lynn E. Medoff, MPT, MA
1428 Mariposa Rd.
Flagstaff, AZ 86001
Ph: 520.527.8601 / FAX: 928.527.8601
Email: lemedoff@hotmail.com

Treasurer: Jennifer (Adrienne) McAuley, PT, OCS
7830 Old Georgetown Rd., Ste C-15
Bethesda, MD 20814-2432
Ph: 301.656.0220 / FAX: 301.654.0333
Email: mcauley@painpoints.com

Secretary: Susan C. Clinton, PT, MHS
Department of Physical Therapy
LSU – Health Sciences Center
1900 Gravier Street, 7th Fl.
New Orleans, LA 70112-2262
Ph: 504.568.3434 / FAX: 504.568.5438
Email: sclint@lsuhsc.edu

COMMITTEE

Education Committee Chair:
Lynn Medoff, MPT, MA (contact information at left)

Practice Committee Chair:
Marshall Hagins, PT, PhD
Division of Physical Therapy
Long Island University
Brooklyn, NY 11201
Ph (W): 718.488.1489 / FAX: 718.780.4524
Ph (H): 718.398.1897
E-mail: mhagins@titan.liu.edu
Members: Joel Dixon, PT; Brent Anderson, PT; Lisa Shoaf, PhD, PT

Nominating Committee Chair:
Shaw Bronner, PT, MHS, OCS
ADAM Soar Research at Long Island University
122 Ashland Pl. #1A
Brooklyn, NY 11201
Ph (W): 718.246.6377
FAX: 718.246.6383
E-mail: sbronner@liu.edu
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(contact information at left)
Members: Alice Burton, PT; Terry Sneed, PT

Research Committee Chair:
Lisa Sattler, PT
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New York, NY 10021-7961
Ph: 212.838.6847
Members: Scott Stackhouse, PT; Brent Anderson, PT

Pain MANAGEMENT

SPECIAL INTEREST GROUP • ORTHOPAEDIC SECTION, APTA, INC.

Letter from the President

Joseph A. Kleinkort, PT, MA, PhD, CIE

This is a very rare and exciting time in the field of pain management. At the same time there are 3 new and dramatically different and somehow very similar techniques emerging in the physical therapy realm. The first two are mainly a series of techniques applied manually and the third is a new modality.

I just returned from a course that I must recommend to anyone who is interested in changing patterns of chronicity in a rather immediate fashion. The work is called PRRT and is a remarkable new way to release neuromuscular patterns that have been engrained in the system for a long time. The work is very easy to learn and extremely refreshing in its results without having to go through years of complex training. John Iams' paper in the last edition of *OP* can enlighten you further as to the method of this approach. I highly recommend this work. The results are nothing short of immediate and amazing.

Another equally dramatic technique emerging is that of Alan Weismantal's 'Functional Mobilization.' The article to follow will give you some of the background to this technique. These manual techniques can dramatically alter pathology whether acute or chronic. He incorporates various manual methods to include aspects of myofascial, neural, visceral, and articular mobilization.

Finally, I must touch on the final breakthrough in new technology coming out in the area of light therapy. While some of the light products are arrays of light, one of them (Erchonia) is a true laser with the ability to modulate up to 4 frequencies. This ability to alter frequencies has a dramatic effect on the ability to reset the muscle. The use of frequencies actually goes back to the 1920s and has been used recently very successfully in small groups with microcurrent, but not on a wide scale. Now that more has come out in the area of biological coherence from Herbert Frohlich's work, we can see how important the resonance of the living matrix truly is. Its function in the area of neuromuscular re-education will be a tremendous tool for the clinician in the future.

These are very exciting times in the area of rehabilitation. It is more important now than ever that we continue our education and constantly keep our minds open to new thoughts, ideas, and concepts. These are truly changing times and those with set paradigms who are unable to shift their thinking will be left in the dust of new and dramatically more effective techniques and technology. What is most interesting is that much of this draws on knowledge that we have already known but had not synthesized in a coherent and user friendly pattern. Again I urge you to send short articles you would like printed in the newsletter that have to do with pain management. I look forward to seeing each of you at our Annual Conference in Washington, D.C.

Functional Mobilization

Alan Weismantel, PT, OMT, FAAOMPT

This is a brief overview of a new series of manual techniques that I have used and have come to call Functional Mobilization. The treatment technique is a combination of a variety of myofascial, neural, visceral, and articular mobilization techniques. The clinician uses these various tests and techniques to assess the patient's movement dysfunction. The difference with this and many other forms of manual work is that the clinician places their hands on the restricted tissues while the patient moves through a variety of functional movements. The patient is more actively involved in the accomplishment of the these techniques. Recoil methods also are used to further enhance the effectiveness of the treatment.

This work has evolved over 30 years of manual therapy training. In 1969 while performing nerve conduction velocity exams with EMG, I noticed that people with intense pain exhibited a minimum increase in distal latency while showing a proximal slowing of nerve conduction with decreased amplitude. In theory, this should have been the opposite. This sparked my interest in what Michael Rogers coined "the central peripheral connection." This made the idea that distal pain being caused by proximal structures was both intriguing and plausible.

Most of the techniques acquired in the 1970s to mid 1980s were active participation by the therapist and passive patient participation. Mobilization, myofascial release, and counterstrain were some of the techniques of concentration.

In 1989, I began extensive work with John Upledger and was exposed to visceral manipulation. A realization of the connection of the abdomen affecting the back became obvious. There seemed to be a high amount of irritation to the femoral nerve, especially the lateral femoral cutaneous nerve. Fascial release techniques followed by stretching were then used to add prolonged relief of pain symptoms. Then we looked at the upper quadrant and found that as much as 80% of patients with shoulder problems also had thoracic problems. Following this finding, there seemed to be a general weakness of the shoulder musculature that was enhanced by treating thoracic spine and ribs. Patterns of dysfunction became apparent.

With trial and error a muscle weakness lead to a dysfunction at a specific level in the thoracic spine and the rib. Treatment of the spine and ribs resulted in return of strength, improved function, and relief of pain.

By 1994 a specific system of evaluation and treatment was developed using 3 muscle tests and 3 active tests. A positive test (weakness and/or limitation) leads to a level of dysfunction. Successful treatment at that level returned strength and movement. Addition of soft tissue release after the osseous release further improved the function in the cervical spine and the upper extremity.

In 1996 I was introduced to a concept, 'Recoil,' which I incorporated into my treatment. Along with the release of the soft tissue by active participation of the patient, Recoil, and other therapies, I was able to get great results with 60% treatment time and fewer treatments. I found that there is a direct connection of the thoracic viscera to the upper quarter pain patterns. By 2000, this was included in the treatment protocol. There are now 6 muscle tests and 3 active tests, and new treatments are developing monthly.

By 1996 I thought that if these tests were reliable in the upper quarter, the same must be true in the lower quarter. Incorporating the knowledge from mechanical link and visceral mobilizations, I began muscle testing and active movement testing. Within 1 year there were 3 resistive tests and 3 active movements that directed me toward treatment of specific areas of the abdomen and low back. Successful treatment again improved strength and movement. There are now 6 resistive tests and 3 active tests with new treatments developing weekly. Patients walk in the clinic with pain and within 10 minutes of functional therapy report 60% relief from pain.

The treatments consist of a 3-dimensional 'lock' on the tissue or osseous area involved. The patient then moves in small functional oscillations to relieve pain and improve movement. The patient is in full control of movement and pain 70% of the time.

To date I have presented 20 courses throughout the United States, "Functional Manual Therapy for the Upper and Lower Quarters." New techniques are being developed by students, patients, and me on a regular basis. I look forward to sharing this with my colleagues and helping with another step in our development.

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PRESIDENT
Joseph A. Kleinkort, PT, MA, PhD, CIE
303 Inverness
Trophy Club, Texas 76262-8724
PH: 817-491-2339
FX: 972-887-0294
indusrehab@aol.com

VICE PRESIDENT
John E. Garzione, PT, AAPM
PO Box 451
Sherburne, NY 13460-0451
PH: 607-334-6273
FX: 607-334-8770
jgarzione@juno.com

TREASURER
Scott Van Epps, PT, PCS
45 Wapping Ave
South Windsor, CT 06074-1345
PH: 860-545-8600
FX: 860-545-8605
svanepps@cox.net

SECRETARY
Elaine Pomerantz, PT
20 Brookwood Road
PH: 973-575-1112
FX: 973-575-1369
South Orange, NJ 07079
smokeyman@aol.com

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Orthopaedic Physical Therapy Practice Instructions to Authors

Susan A. Appling, MS, PT, OCS, Editor
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1. *Orthopaedic Physical Therapy Practice (OPTP)* will publish articles pertaining to clinical practice. Articles describing treatment techniques as well as case studies and reviews of literature are acceptable. Language and format of articles should be consistent with the *Guide to Physical Therapist Practice*.
2. Manuscripts should be reports of personal experiences and written as such. Though suggested reading lists are welcomed, references should otherwise be kept to a minimum with the exception of reviews of literature.
3. Manuscript Preparation Guidelines *(details can be found at www.orthopt.org)*
4. Manuscripts are accepted by mail or electronically. Save your monograph to a 3 1/2" IBM-compatible computer disk in Microsoft Word or plain text format. Provide 2 hard copies of the monograph. Protect any original photographs and artwork for shipment. The manuscript should be sent to:

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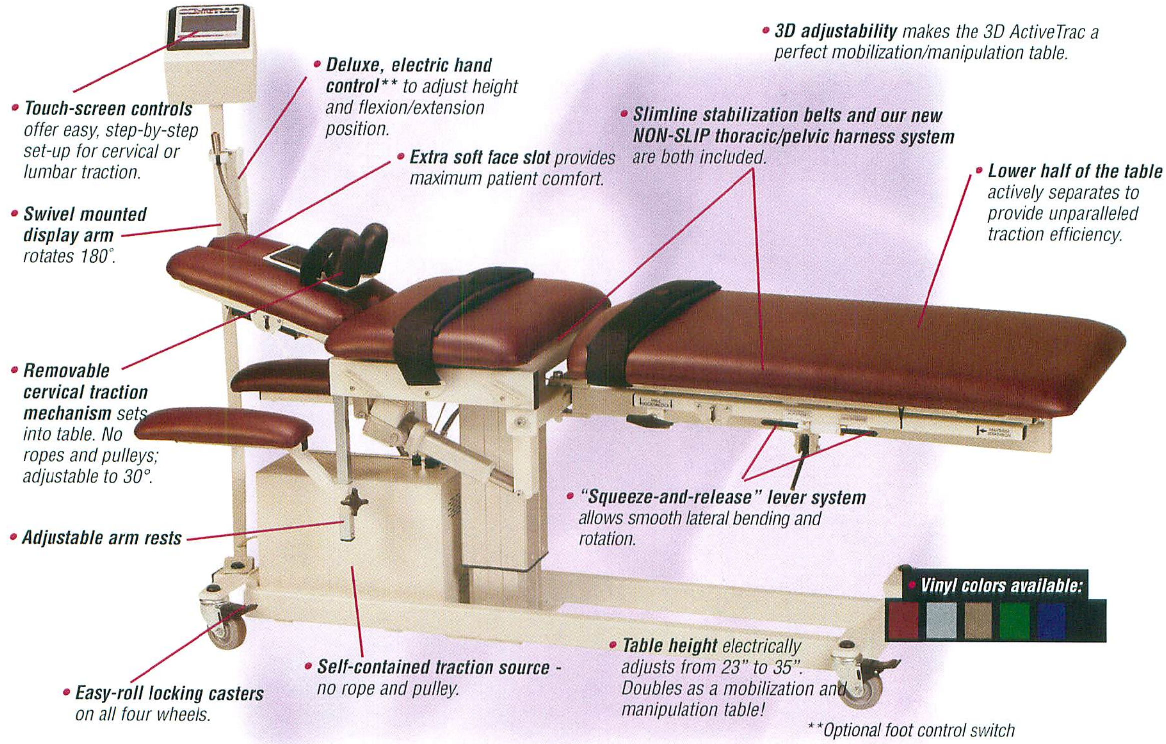

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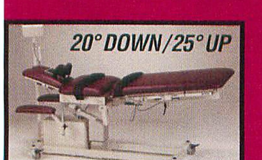

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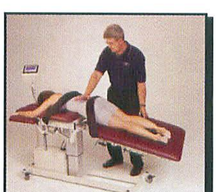

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