

Multiple Myeloma
&
Physical Therapy

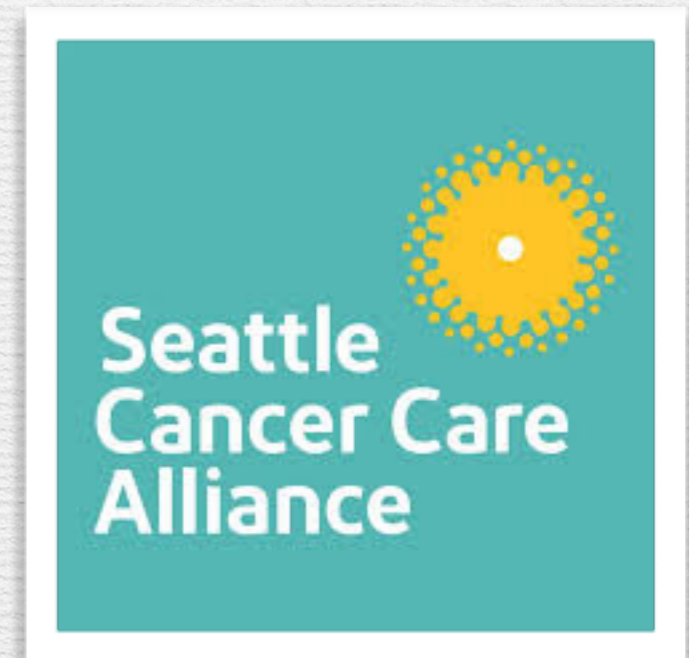
Rachel Douglas, PT, MPT, CLT

2021

My Background and Journey



- Education
- Career pathway
- Instructor and International Volunteer
- Why once



Outline

- Why Physical Therapy?
 - Research
 - Benefits
- Treatment Considerations
- Program Components



When Do I Start?

- Survivorship begins at diagnosis
- Regular exercise reduces the risk of colorectal, bladder, breast, endometrial, lung, prostate, esophageal, liver, stomach, renal, head/neck, multiple myeloma and myeloid leukemia cancers.

JAMA Intern Med. Published online May 16, 2016. Doi:10.1001/jamainternmed.2016.1548



RESEARCH

Cancer-Related Fatigue: Can Exercise Physiology Assist Oncologists?

Lucia A, Earnest C, Perez M.

Lancet Oncology, 2003 Oct;4(10):616-25

- In the past
- Patients were advised to seek periods of rest and to reduce their amount of physical activity
- However, such recommendations can paradoxically compound symptoms of fatigue, since sedentary habits induce muscle catabolism and thus cause a further decrease in functional capacity
- Now
- There is scientific evidence that an exercise program of low to moderate intensity can substantially reduce cancer related fatigue and improve the quality of life of those patients

RESEARCH

Exercise and Survivorship

- Exercise has been shown to improve CV fitness, muscle strength, body composition, fatigue, anxiety, depression, self-esteem, happiness, and several components of quality of life in survivors.
Courney KS. Exercise in Cancer Survivors: An Overview of Research. Med Sci Sports Exerc 2003;35:1846-1852
- Among older, long-term survivors of colorectal, breast and prostate cancer, a diet and exercise intervention reduced the rate of self-reported functional decline compared to no intervention.
Morey et al. Effects of Home-Based diet and Exercise on Functional Outcomes Among Older, Overweight long-term Cancer Survivors: RENEW: A Randomized Controlled Trial. JAMA. 2009; 301(18):1883-1891



RESEARCH

Exercise and Risk Reduction

Promoting Wellness for Prostate Cancer Patients; Mark Moyad, MD, MPH; Tap Pharmaceuticals, 2006

Disease	% Reduction with exercise 30 min/day
---------	--------------------------------------

●	Breast CA	●	20-30
●	Colon CA	●	30-50
●	Depression	●	25-50
●	Heart Disease	●	40-50
●	Osteoporosis	●	40-50
●	Premature death	●	20-50
●	Stroke	●	30-50
●	Diabetes, Type II	●	30-40

RESEARCH

Obesity, Weight Loss, Exercise & Breast Cancer

- Reduced risk for breast cancer risk and improved prognosis associated with:
 - Normal body mass index
 - Lifetime weight maintenance
 - Increased physical activity
- Research
 - McTiernan et al. Cancer Research 2004; 64(8):2923-8
 - Irwin et al. JAMA 2003;289:323-330
 - McTiernan et al. CEBP 2004;13(7):1-7
 - Imayama et al. Cancer Research 2012;72(9); 2314-26
 - Margolis et al. Arch Intern Med 2007 Sep 24;167(17);1837-44

RESEARCH

Institutes of Medicine 2005 Report

Hewitt M, Greenfield S, and Stovall E, eds.

http://www.cancer.net/patient/Survivorship/IOM_Executive_Summary.pdf

- Transition from active treatment to post-treatment care is critical to long-term health
- Follow-up visits are opportunities to promote healthy lifestyle, check for cancer recurrence, manage lasting effects of cancer, promote general health
- Much can be done to avoid, ameliorate, or arrest the late effects of cancer

RESEARCH

Lifestyle Change for Cancer Risk Reduction

- Attitude — Nutrition — Weight Management — Exercise

WCRF/AICR Expert Report, Food, Nutrition, Physical Activity, Prevention of Cancer: Global Perspectives

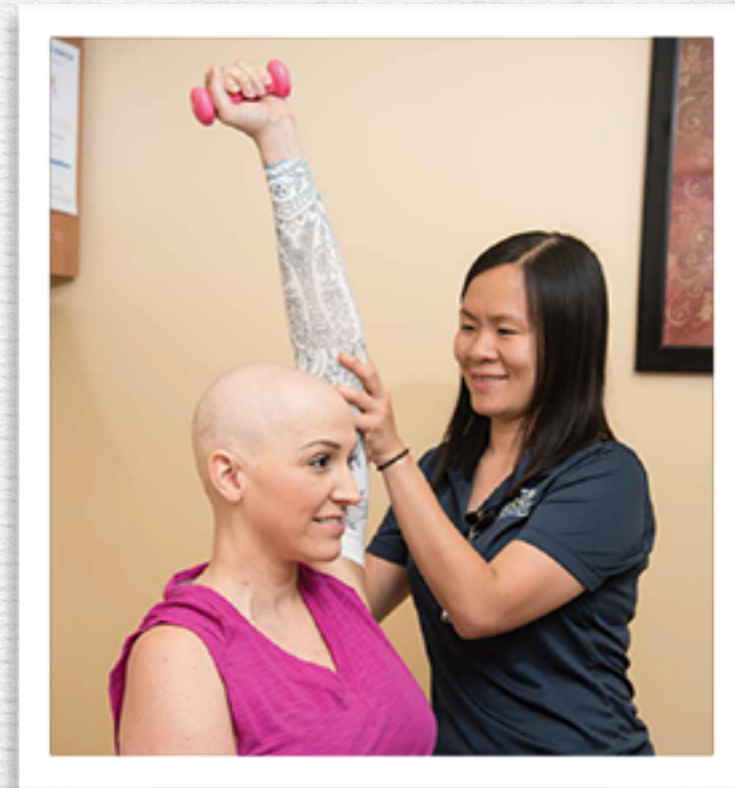
Physical Therapy Is An Integral Part of Care

- Patient and family centered care
- Individualized treatment and management of side effects from cancer modalities
- Reduce symptom burden
- Maintain or restore function
- Enhance quality of life
- Screening for impairments
- Rehabilitation referrals
- Cost containment/hospital admit reduction (Shih, 2009)
- Evidence based



MM Specific Focus

- Cardiopulmonary conditioning
- Muscle mass loss/weakness
- Posture/bracing
- Joint contracture
- Fatigue
- Pain
- Osteopenia/osteoporosis
- Peripheral neuropathy
- Mobility analysis/treatment/education
- Assistive Device consult
- Balance treatment/fall risk assessment
- Peripheral edema/lymphedema management
- Decrease or increase weight gain
- Incontinence treatment
- Mood
- INDEPENDENCE with activities you enjoy



Get Moving!

51% of Americans and 31% of people worldwide do meet recommended exercise levels

JAMA Intern Med. Published online May 16, 2016. doi:10.1001/jamainternmed.2016.1548

Supervision

- **Individualized Care**

- A majority of 307 cancer survivors preferred face to face exercise prescription during cancer treatment to be done by trained staff from a cancer center. *Courneya, et al, Annals of Behavioral Medicine, Volume 24, Issue 4, November 2002, 257- 268*

- **Holistic Training: orthopedic, neurological, vestibular, oncologic**

- **Relationships with Medical Care Team**

- **Attention to disease and treatment specific considerations and/or precautions**

- Bone Health (Bone Mets, Fracture Risk, Osteoporosis)
- Chemo Induced Cardiomyopathy
- Swelling Conditions
- Steroid Myopathy
- Cancer Related Fatigue (CRF)
- “Chemo Brain”
- Effects of Myelosuppression (Neutropenia, Thrombocytopenia, Anemia)
- Peripheral Neuropathy

You are an important part of infection prevention!

Speak up for your care!

Clean your hands and make sure everyone around you does too.

Sneeze and cough into your elbow, not your hand.

Take medications as directed.

Ask about safe injection practices. Remember: *One Needle, One Syringe, only One Time.*

Every day, ask if you still need your catheter.

If your room looks dirty, ask to have it cleaned.

Wash your hands with soap and water or use hand sanitizer often.

Ask healthcare workers and your visitors to do the same.

APIC
Association for Professionals in Infection Control and Epidemiology

Infection Control!



Lab Value Precautions to Exercise

Parameter	Avoid Exercise	Anti-gravity Exercise	Resistive Exercise
Platelets	<10,000	10,000-20,000	>20,000
Hgb	<8.5	>8.5	>8.5
Hct	<25%	>25%	>25%

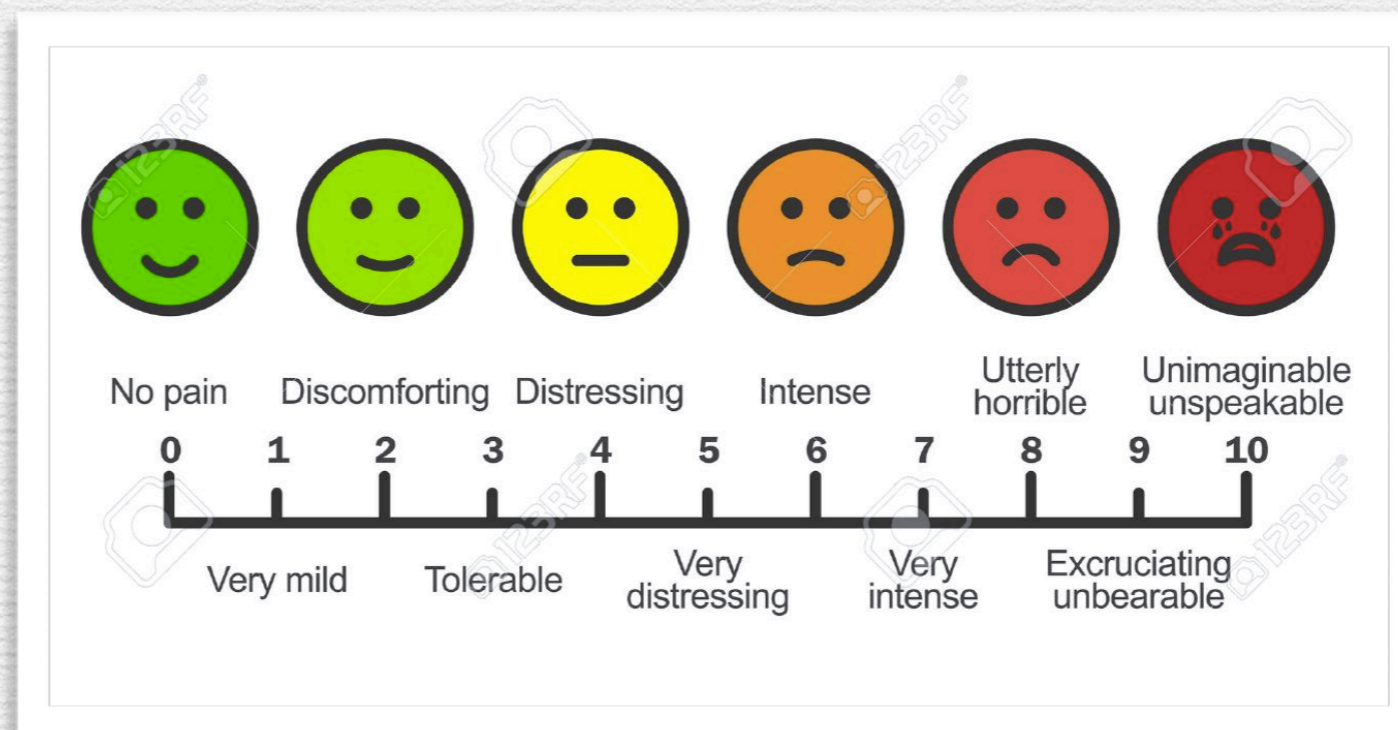
*For massage, platelets need to be >50,000

Treatment Considerations

Pain and Perceived Exertion

- Can you carry on a conversation?
- **BORG Scale** (Is the exercise very light, fairly light, somewhat hard, hard, heavy, etc.)

- **Pain Scale**



Treatment Considerations

Myopathy

- Definition: disease/dysfunction of the muscle fiber
- Symptoms: Muscle cramps, stiffness, spasm, weakness
- Disease Process: Corticosteroids cause muscle atrophy by decreasing the rate of protein synthesis and increasing the rate of protein breakdown (Prednisone, Dexamethaxone, Triamcinolone)
 - Causes weakness to proximal muscles first
 - Proximal LE>proximal UE>distal extremities
 - Occurs with corticosteroid doses >10 mg/day
 - ICU pathologies can act synergistically with steroids to induce myopathy
 - Other symptoms: increased infection risk, change in blood sugar levels, swollen hands/feet, mood changes, difficulty sleeping, indigestion, osteoporosis, eye issues, HTN, increased appetite/weight gain
- Prognosis: Typically resolved after corticosteroid treatment is reduced or discontinued
 - Resistance training may attenuate muscle atrophy but it does not prevent it
 - Patients benefit from gradual, slow progression of exercise to avoid strain or injury
 - Functional recover can take up to 6 months

Morris GS, Brutally KE, Scheetz JS, Venkatachalam S. Outcomes From Functional Performance Measures Do Not Reflect Glucocorticoid Exposure In stem Cell Transplant Recipients. *Medicine & Science in Sports & Exercise*. 2011;29(3):9-13

Treatment Considerations

Bony Mets: Relative Risk of Fracture

- Not well-defined by medical community
- “There is little clinical evidence to guide PTs related to the amount of safe weight-bearing through cancer-lysed metastatic bone during exercise, transfers, ambulation, and other ADL tasks. Some general guidelines have been suggested for patients with bony metastases” *Karavatas SG, Reichert EA, White N, Strong A. Physical Therapy Management of Patients with Multiple Myeloma: Musculoskeletal Considerations. Rehabilitation Oncology: APTA Oncology Section. 2006; 24(3): 11-14.*
- Pathologic fracture risk is related to reduced bone strength or increased fragility
 - Associated factors (Bunting, 2001):
 - Pain with function
 - High levels of pain
 - Lytic lesions
 - Do not respond to radiation therapy
 - >50% cortical involvement
 - Cortical lesions > 2.5 cm diameter

Treatment Considerations

Bony Metastasis

- Determine if weight bearing restriction or lifting restriction
 - (10# weight lifting restriction)
 - Depending on size of the lesion, WB status may not be as relevant as torque
 - Avoid excessive loading/high impact forces
- Spinal precautions: avoid excessive bending and rotation; maintain “neutral” spine
- Proper biomechanics to avoid injury
- Fall prevention precautions to avoid fracture- safety education is key
- Gait and mobility training to avoid stress to weakened area
- Assistive device selection
- Pain control with mobility
- Recommend free weights versus bands
- Avoid passive range of motion exercises
- Supportive orthosis as indicated

Treatment Considerations

Bony Metastasis

- **Therapeutic exercise**

- For bone mets, level of active exercise allowed depends on percentage of cortical bone involvement
- Weight-bearing exercise for 30 minutes, 3-5 times per week has been shown to have a beneficial/protective effect on bone
- In a meta-analysis of 43 RCTs of exercise and bone mineral density in postmenopausal women:
 - A variety of exercise types, including resistance training and weight bearing exercise like walking were beneficial
 - The most effective type of exercise for BMD of the femoral neck was progressive resistance strength training
 - Combined program (mixture of more than one exercise type) was most effective for lumbar spine BMD.

- **Exercise Do's:**

- Complete PT program! Research has shown no significantly increased risk of fracture with PT vs. bed rest.
- Axial loading with body weight is beneficial (mini-squats, walking, etc.)
- Some evidence that extension-based exercises are good with cautious use
 - 3-5 minutes per day to increase QOL (but may be higher risk in fragile patients)

- **Exercise Don'ts:**

- Heavy axial spinal loading—contraindicated for patients with compromised bone (leg press machines, weighted squats, etc. should be avoided)
- Flexion-based exercises (crunches, leg lifts)—these direct more force through weakened anterior/trabecular vertebral bone)

References:

1. Ip EW, Heislein DM. Osteoporosis identification and management for the physical therapist. *Orthopedic Physical Therapy Practice*. 2012; 24(2): 68-76.
2. Howe TE, Shea B, Dawson LJ, Downie F, Murray A, Ross C, Harbour RT, Caldwell LM, Creed G. Exercise for preventing and treating osteoporosis in postmenopausal women. *Cochrane Database Syst Rev*. 2011
3. Braith RW, Mills RM, Welsch MA, Keller JW, Pollock ML. Resistance exercise training restores bone mineral density in heart transplant recipients. *J Am Coll Cardiol*. 1996; 28(6):1471.
4. Karavatas SG, Reicherter EA, White N, Strong A. Physical Therapy Management of Patients with Multiple Myeloma: Musculoskeletal Considerations. *Rehabilitation Oncology: APTA Oncology Section*. 2006; 24(3): 11-14.
5. Rief et al. Isometric muscle training of the spine musculature in patients with spinal bony metastases under radiation therapy. *BMC Cancer* 2011, 11:482
6. Crevenna et al. Aerobic exercise for a patient suffering from metastatic bone disease. *Support Care Cancer* (2003) 11:120–122
7. Kushner A. Evidence table: skeletal metastases. <http://www.oncolgypt.org/pdfs/Bonemetsevidencetable1.pdf>
8. Miceli TS et al. Maintaining bone health in patients with multiple myeloma. *Clinical Journal of Oncology Nursing*. 2011; 15(4).
9. Bibbo C, Patel DV, Benevenia J. Perioperative considerations in patients with metastatic bone disease.
10. Perry SB, Downey PA. Fracture risk and prevention: a multidimensional approach. *Phys Ther*. 2012; 92: 164-178.
12. Egan MP. Surgical and physical therapy considerations for patients with bone metastases. *Rehabilitation Oncology*. 2001; 19(2): 25-26.

Fracture Prevention

Back Health: Getting Back to Basics

Protecting your back is all about posture. Proper posture can help prevent injury to your back and even reduce pain.

WHAT IS POSTURE?

Posture is the way we position our bodies during work, rest and play.



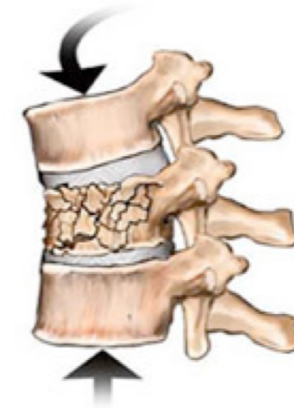
WHY IS POSTURE IMPORTANT?

Posture is important in order to maintain even pressure throughout the spinal vertebrae (a normal, healthy vertebral column is pictured to the left³). In a healthy spine, there are 3 curves that keep your body balanced and support your body when you move. Think of your vertebrae like building blocks; if they are all lined up on top of each, then they stack up nice and neat, but if one gets out of line, then the whole stack can sway and even crumble.

BUT WHY DOES THIS MATTER TO ME?

Everyone should be cautious of their posture everyday, however, if you have any of the following conditions, which are common in individuals with cancer, posture is especially important:

- *Osteopenia* – Weak bones
- *Osteoporosis* – Very weak bones. This may place you at an increased risk for bone fractures.
- *Compression fracture* (pictured to the right⁴)– When vertebrae are squashed and made smaller under pressure, you may notice a loss in your height. In severe cases, this may cause pain felt in the neck, back, arms, or legs and/or numbness or tingling in the hands or feet.
- *Cancer diagnoses or metastases* – Some types of cancer will travel to other body parts, which may include the bones in the back. One type of cancer that affects bones, especially in the spine, is Multiple Myeloma.



SO WHEN DO I NEED TO WORK ON MY POSTURE?

During work, rest, and play; basically, all the time. Your posture is in effect when you sit, stand, walk, move, and even just breathe. Using the best possible posture will reduce the stress through the bones of your spine and this can prevent and reduce back pain.

SOME POSTURE TIPS:

For all positions: Try to keep your head directly above your shoulders and your shoulders above your hips. Think about a string coming from the top of your head and pulling you straight up, ever so lightly.

In Sitting: Try to keep your feet on the floor, with your hips and knees in line with each other and both bent no less than 90°. Think of this position like 3 straight lines: one running up and down through your back, one running alongside your thigh, and the last running up and down through your lower leg.

At the computer⁵: Try to keep the top of the monitor at eye level. Keep your shoulders relaxed and elbows bent at 90°.

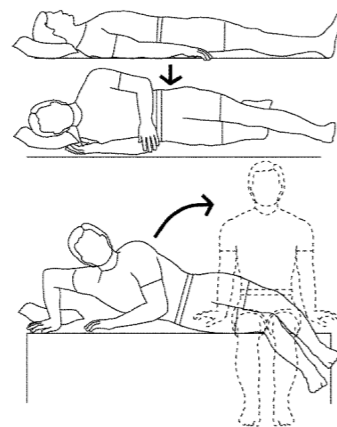


Driving: Sit close enough to the steering wheel so that your arms are comfortably bent. Sit upright with both hands on the wheel (think about the driver's education "10 and 2 o'clock" position).

Turning, Reaching, Bending⁶: It is important to have safe body mechanics to keep your spine healthy: a) avoid heavy lifting and bending, b) carry objects close to your body, c) lead with your feet when turning to keep your hips and shoulders in line, and d) avoid twisting through the spine.

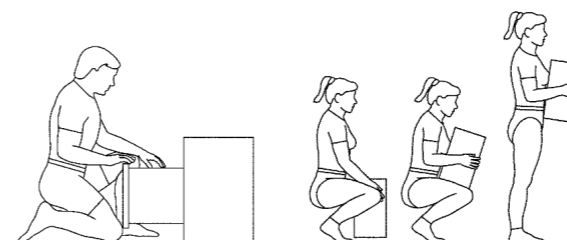


Sleeping: Choose a pillow and mattress that are firm enough to support the natural curves of your back and neck. When sleeping on your side, a pillow placed between the knees is important to prevent additional back strain.



Getting in/out of bed⁷: The safest way to get out of bed is in three parts by "log-rolling": 1) roll from your back onto your side, 2) sit up on the edge of the bed by dropping your legs off the bed at the same time as you push up through your arms, and 3) stand up with good posture.

Kneeling/Squatting⁷: Instead of bending over through your back, use a kneeling or squatting position when picking up objects. Most importantly, keep your back straight by bending through your hips and knees, and always try to carry objects close to your body.



DO'S:

- Stand up tall and sit up straight.
- Bend with your knees and hips.
- Keep your hips and shoulders in line.
- Turn leading with your feet
- Carry objects close to your body.
- Sleep on your side or back.
- Sleep with a pillow between your knees, if comfortable.
- Stay active, and add walking into your daily routine.
- Wear appropriate shoes; what you wear on your feet has a big impact on your posture.
- Take a break about every hour to stand up, walk around, and stretch your back, if possible.
- Exercise for strength and cardio endurance

DON'T:

- Slouch when you sit.
- Bend with or twist through your back.
- Lean forward with your back when sitting or standing like when washing, brushing your teeth, or dressing.
- Stay in one position for a prolonged period.

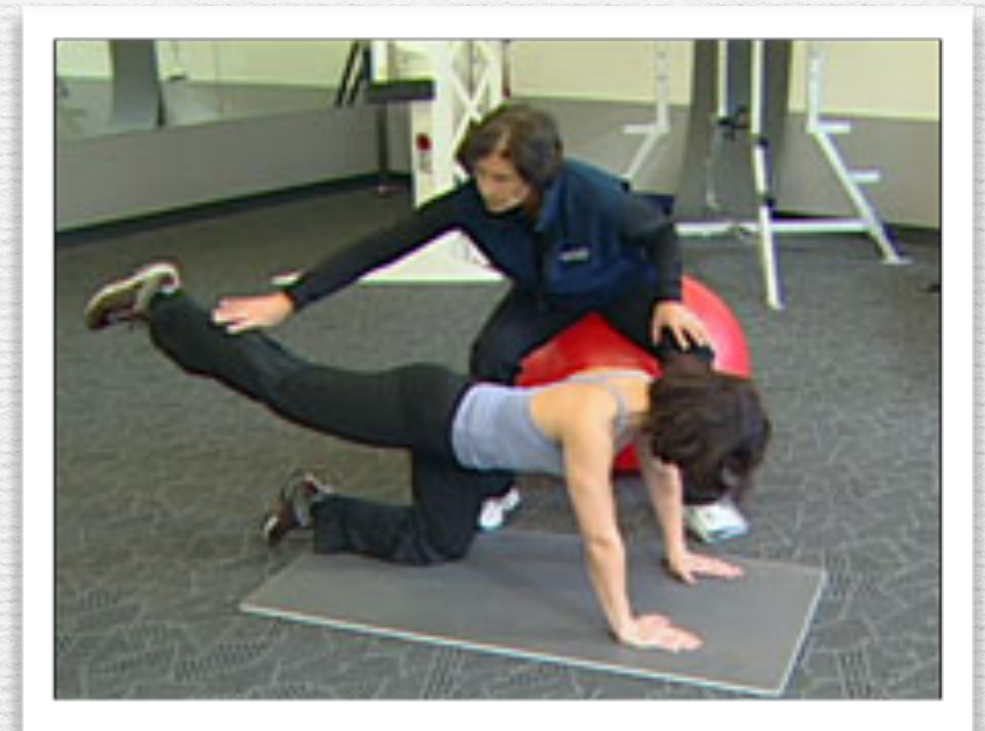
A regular exercise program can be designed specifically for you to maintain or develop good strength and appropriate movement in your back. Please see your physical therapist to develop and begin an individualized exercise program that is safe and appropriate for you.

REFERENCES:

1. Wilke, HJ, et al. New In Vivo Measurements of Pressures in the Intervertebral Disc in Daily Life. *Spine (Phila Pa 1976)*. 1999 Apr 15;24(8):755-62.
2. Søndergaard KH, Olesen CG, Søndergaard EK, de Zee M, Madeleine P. The variability and complexity of sitting postural control are associated with discomfort. *Biomech*. 2010 Jul 20;43(10):1997-2001.
3. Accessed: 3/6/2011. http://www.umm.edu/spinecenter/education/low_back_pain_overview.htm
4. Accessed: 3/6/2011. <http://neurosurgicalassociates.stvin.org/Education/Diagnosis/SpinalFractures.aspx>
5. Accessed: 3/6/2011. <http://mediconweb.com/health-and-computer/>
6. *Back Basics: Managing Spine and Disk Problems with Self-Care*. CA: Stay Well Company, 2001.
7. Exercise Pro V5, Version 5.054. Bio Ex Systems, Inc.: 1996-2010.

Other Considerations

- Always consult with physician or other practitioner to clear you for exercise
- Check blood counts (Platelets, Hct, Hgb)
- Side effects resulting from cancer burden, surgery, radiation, chemo, medication
- Gradually increase time and intensity of exercise
- PROMOTE EXERCISE “SNACKS” initially
- Keep exercise simple
 - Avoid overuse/fatigue
 - Avoid pain
- Set functional goals and involve family and friends for improved compliance
- Proper hydration and rest
- Use of appropriate equipment
- Dress properly
- Careful of IV lines, chest tubes, drainage tubes
- Do what you enjoy! So many options!
- Nutrition Consult



General Exercise Recommendations

- **3 Areas of Focus**



Cardiovascular

Strength Training/Balance Training

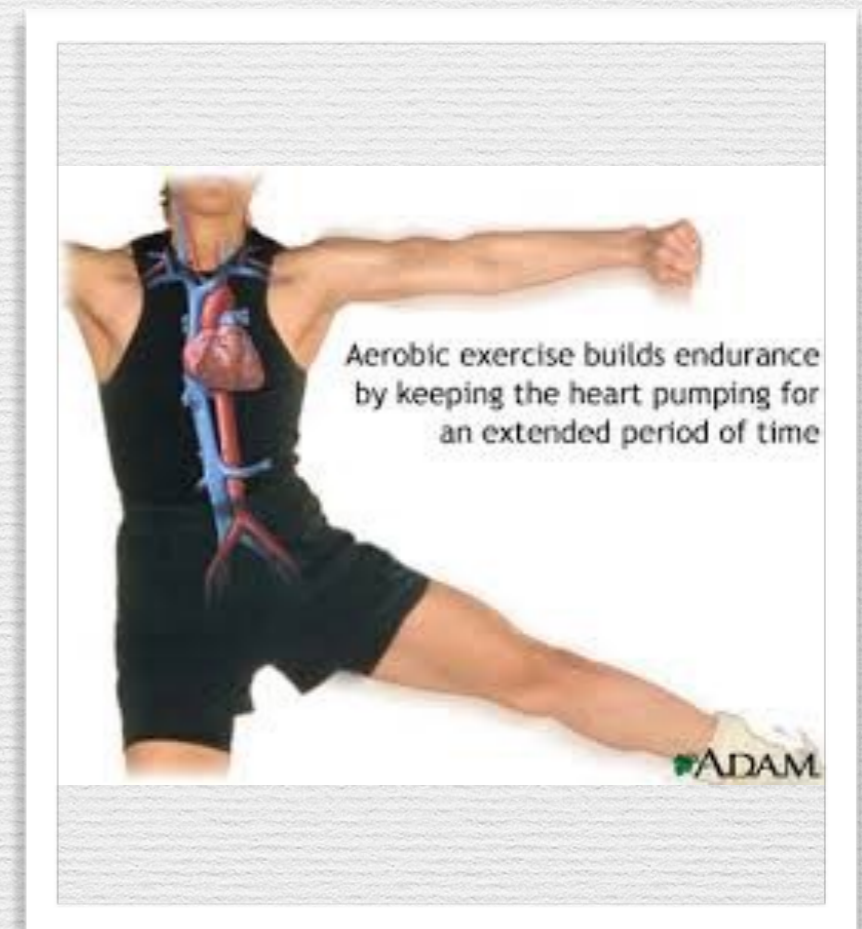
Stretching/Posture

Cardiovascular

- ACS Recommendation

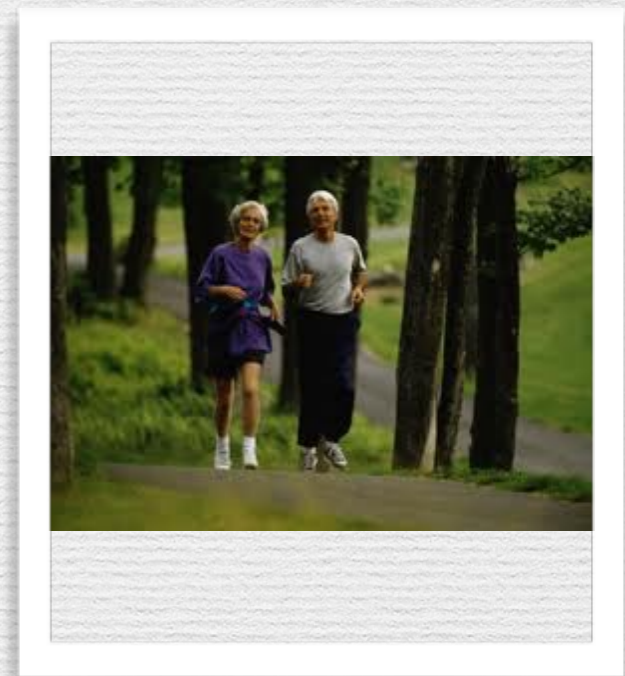
Adults: 30+ minutes of moderate-vigorous physical activity, **45-60 preferable, >5 days/week**. Includes cardiovascular and strength training exercises. *That's a minimum of 2 1/2 hrs of moderate or 1 hr and 15 min of vigorous exercise/week.*

- Warm up: 5-10 minutes (low intensity, THR <55%)
 - Prevents injury
 - Stretches postural muscles
 - Augments blood flow
 - Increases metabolic rate
- Conditioning/Endurance Zone: 20-60 minutes
 - Target Heart Rate
- Cool down: 5-10 minutes (low intensity)
 - Reduces HR back to resting level, injury risk
 - Muscle help return of venous blood to heart, preventing pooling in legs



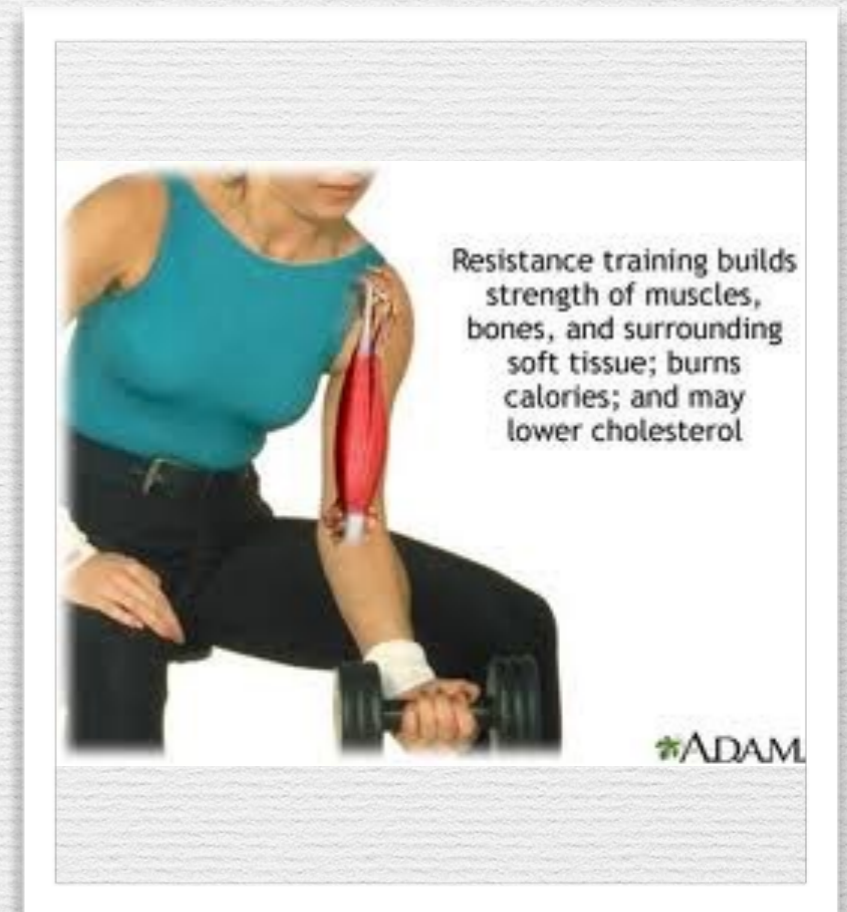
Target Heart Rate (THR)

- Definition: Correct training heart rate range or zone based on age
- Achieving good cardiovascular benefits with minimal strain
- Moderate intensity
- Normal heart rate at rest: 70-100 bpm for adults
- Calculation of THR: 60-80% of maximum heart rate based on age
 - $220 - \text{age} \times .60 = A$
 - $220 - \text{age} \times .80 = B$



Strength Training/Balance Training

- 2-3 x/week
- For arms, abdominals, legs
- Slow, steady progression
- Start without weights and work on endurance
 - Recommend free weights versus bands
- Bone mets: often 10# limitation
 - *Check with Medical Team for specifics*



Balance Training

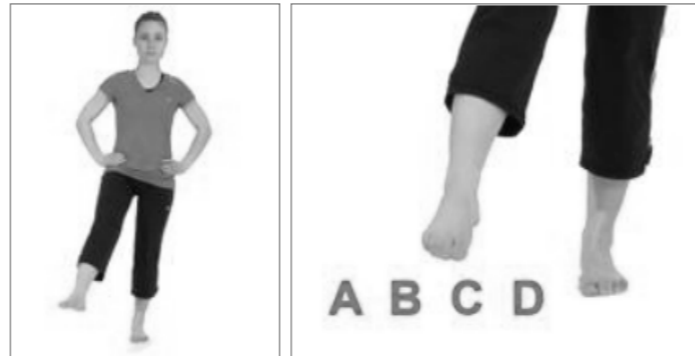
- One side effect of chemo is peripheral neuropathy which can decrease balance and lead to falls
- Exercise has not proven to decrease the symptoms of PN, but strengthening postural and weight bearing muscle groups assists with fall prevention



Exercise Program for Chemotherapy-Induced Peripheral Neuropathy (CIPN)

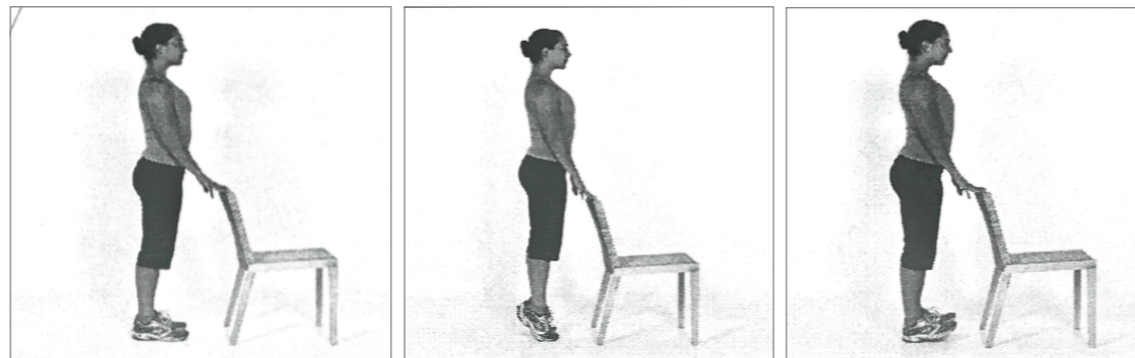
A 2016 study¹ concluded that the following set of exercises were effective in reducing neuropathy symptoms and improving balance in a set of patients with CIPN. These exercises were performed **5 times per week for 3 weeks**, for a total of 15 exercise sessions.

1) Ankle alphabet



For warm-up, raise one foot at a time and draw the alphabet in the air by moving your ankle. Complete one alphabet on each foot. Use support (a sturdy chair or table) if necessary.

2) Toe and heel raises



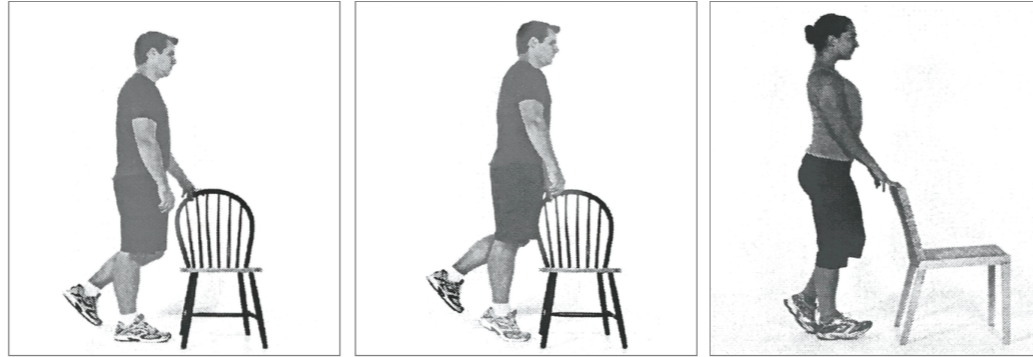
While standing, alternate between raising your toes and heels as high as you can, as quickly as you can. Use support only if necessary. Start with 1 set of 10 repetitions, then increase by 1 additional set each week (every 5 exercise sessions) to a maximum of 3 sets in a single exercise session. Rest 1 minute between sets.

3) Side-to-side ankle rolls ("inversion/eversion")



While standing, roll your weight to the outside edges of your feet, lifting your big toes off the ground, then roll to the inside edges of your feet, lifting your little toes off the ground. Start with 1 set of 10 repetitions in each direction, then increase to 2 sets of 10 after the first week (after 5 exercise sessions). Rest 1 minute between sets. Use support only if necessary.

4) **Toe and heel raises on one leg**



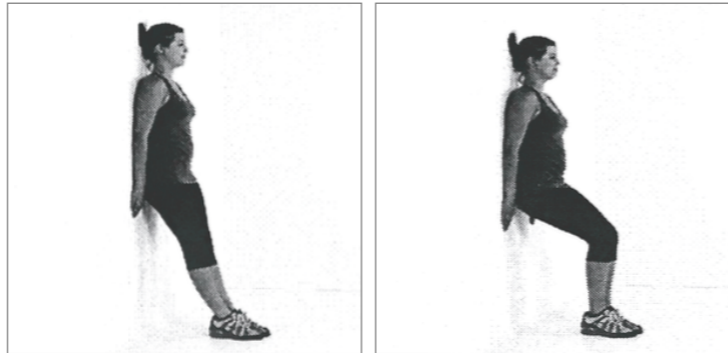
Perform exercise #2 while standing on one leg, holding the other limb in the air for the duration of the exercise. Start with 1 set of 5 repetitions on each leg, then increase to 1 set of 10 repetitions on each leg after the first week (after 5 exercise sessions), then increase to 2 sets of 10 exercises on each leg after the second week (after 10 exercise sessions). Rest 1 minute between sets.

5) **Side-to-side ankle rolls on one leg**



Perform exercise #3 while standing on one leg, holding the other limb in the air for the duration of the exercise. This exercise may challenge your balance, so you may use support (rest your hands on a counter) if necessary. Start with 1 set of 5 repetitions in each direction, and increase to 1 set of 10 repetitions after the first week (after 5 exercise sessions). Rest 1 minute between sets.

6) **Wall slides**



Lean against a wall with your feet approximately 12 inches from the wall, shoulder distance apart. Slide down the wall, bending knees to about 45°, then slide back up the wall to return to starting position. Start with 3 sets of 10 repetitions; after the first week (after 5 exercise sessions) perform the first set one-legged (complete 10 repetitions on each leg), followed by the second and third sets using both legs. Rest 1 minute between sets.

7) One-legged balance



Stand on one leg, with your arms at your side and your eyes open, for as long as you can up to 60 seconds. You have 3 attempts allowed on each foot.

Schedule of Exercises

You may wish to use the following table as a quick-reference for the number of sets and repetitions to do each week. This information is also listed alongside each individual exercise (above).

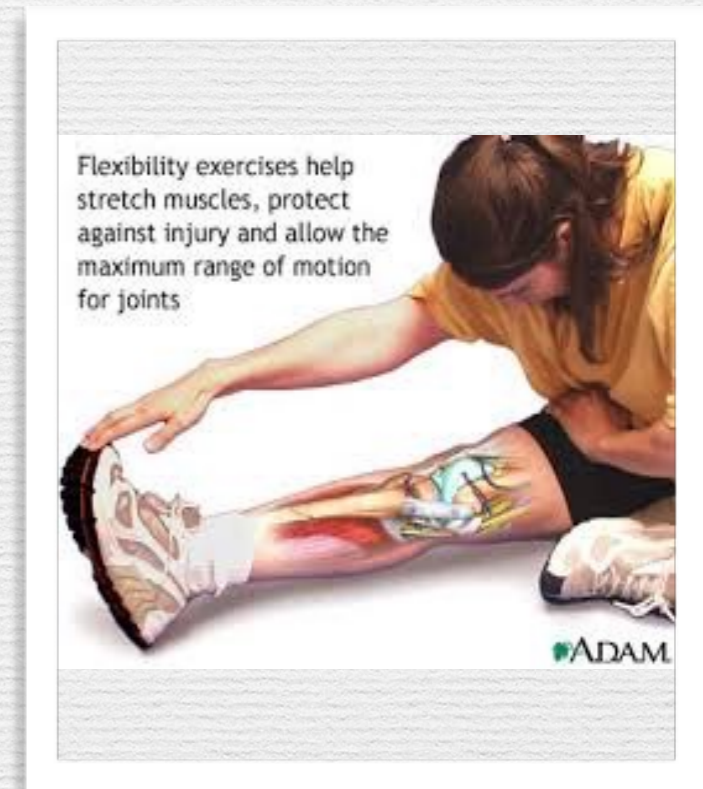
	Week 1 (sessions 1-5)	Week 2 (sessions 6-10)	Week 3 (sessions 11-15)
Ankle alphabet	One alphabet per foot		
Toe and heel raises	1 set of 10 reps	2 sets of 10 reps	3 sets of 10 reps
Side-to-side ankle rolls	1 set of 10 reps	2 sets of 10 reps	
Toe/heel raises on one leg	1 set of 5 reps (each side)	1 set of 10 reps (each side)	2 set of 10 reps (each side)
Side-to-side rolls on one leg	1 set of 5 reps (each side)	1 set of 10 reps (each side)	
Wall slides	3 sets of 10 reps	1 set of 10 reps (one-legged), then 2 sets of 10 reps	
One-legged balance	60 seconds of balance		

References

1. Fernandes J & Kumar S. Effect of lower limb closed kinematic chain exercises on balance in patients with chemotherapy-induced peripheral neuropathy: a pilot study. *International Journal of Rehabilitation Research*. 2016, 39:368–371.

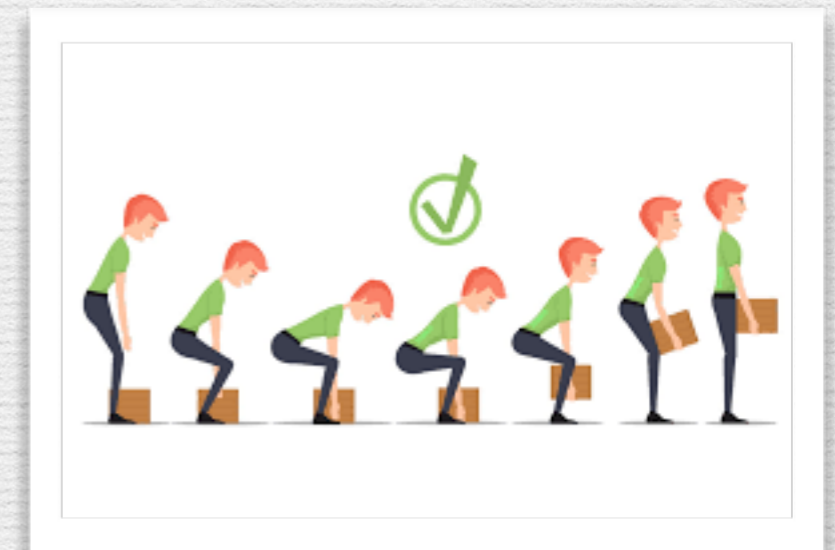
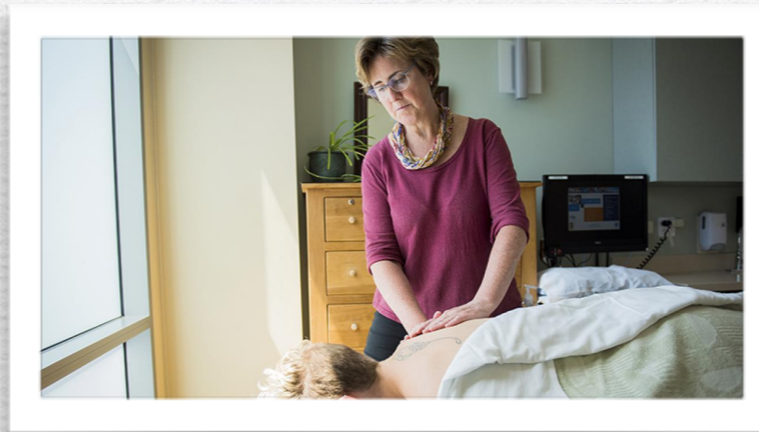
Flexibility/Stretching/Posture

- 2-3x/week
- Importance of technique to avoid injury
- Radiation (XRT) precautions
 - Avoid stretching fragile tissues during treatment
- Surgery precautions
 - Avoid stretching until drain removed or cleared by surgeon for healing



Other Interventions

- *Manual Therapy*
- *Assistive Device Recommendations*
- *Orthotics*
- *“Back Basics”/Fracture Education*
- *Edema Management*



Summery



- Research supports the benefits of exercise and PT interventions
- By following precautions and treatment guidelines you can successfully treat without injury





Thank You!

Contact Information:
rdouglas@seattlecca.org