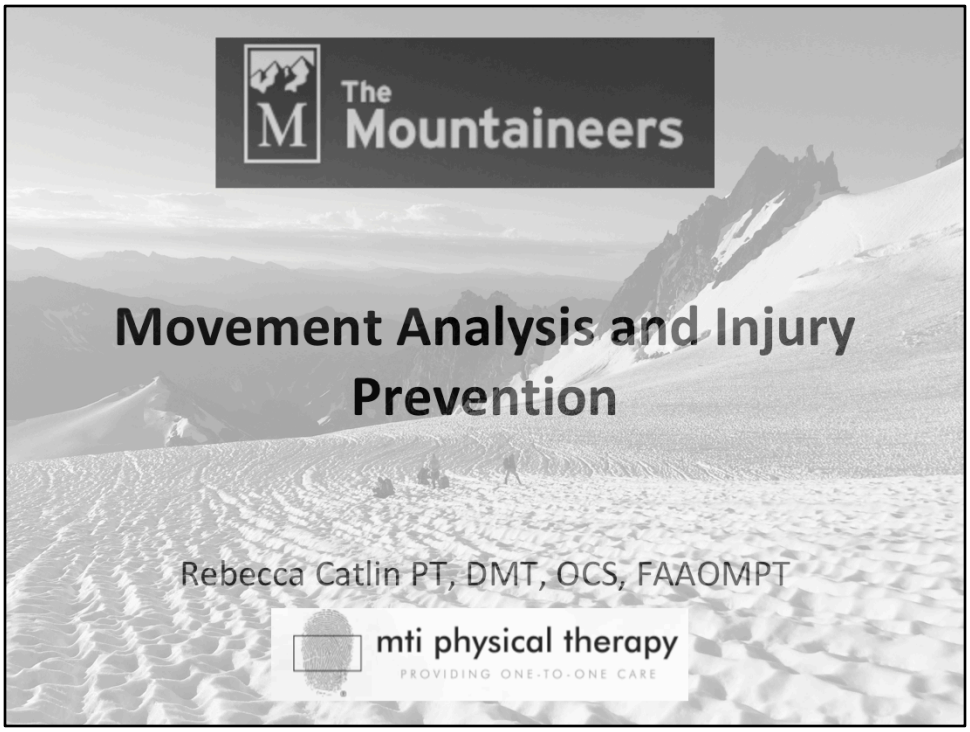
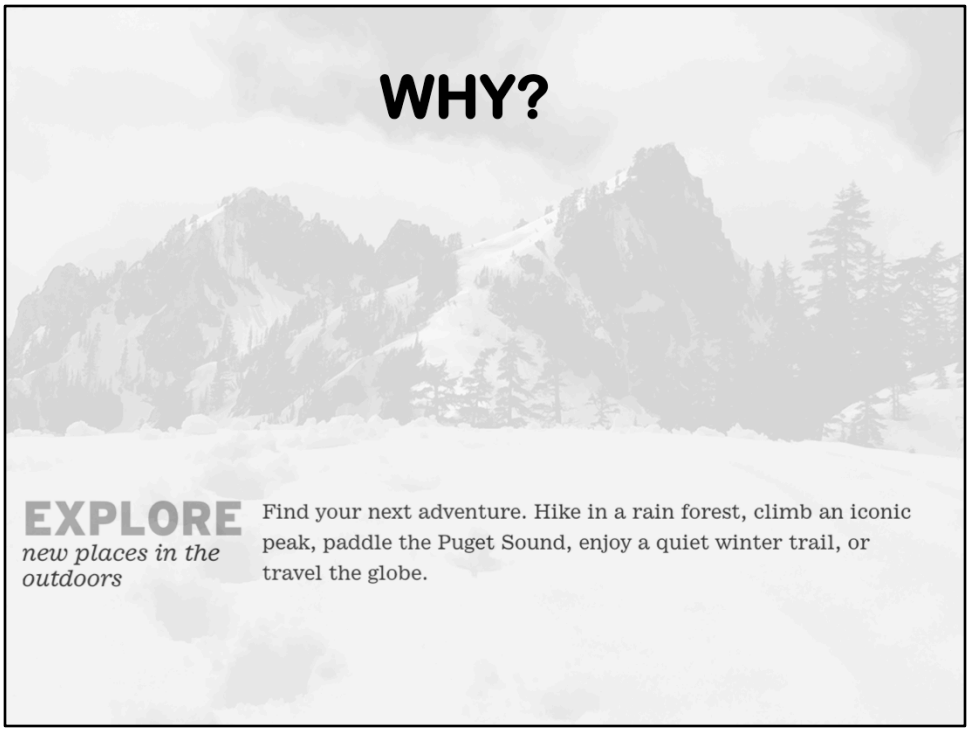
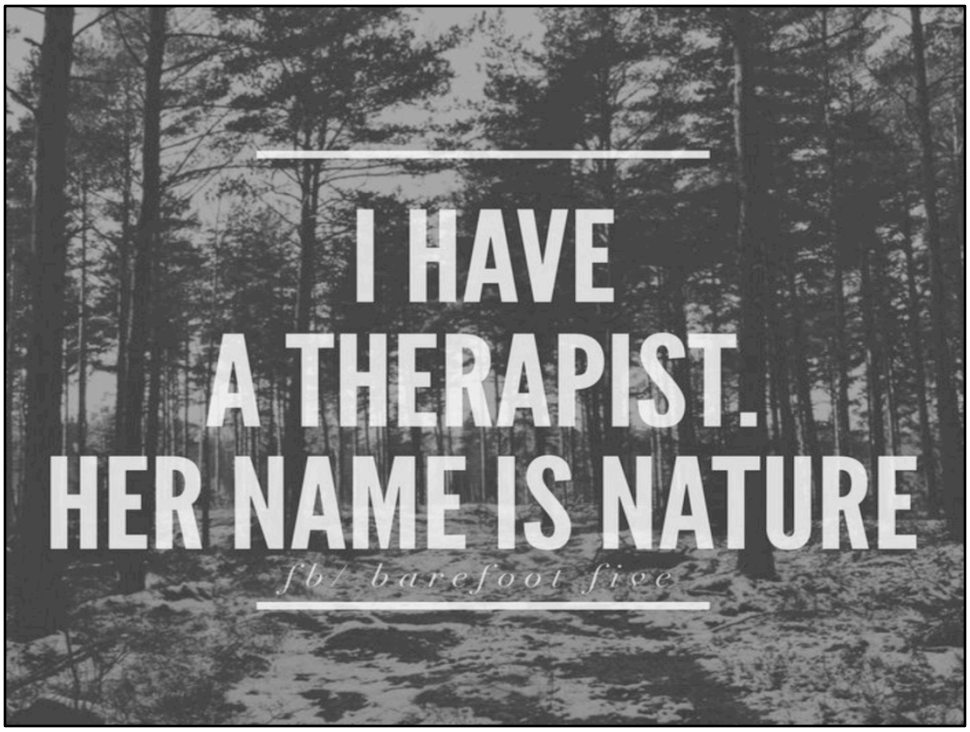

The Mountaineers
Movement Analysis and Injury Prevention
Rebecca Catlin PT, DMT, OCS, FAAOMPT
mti physical therapy
PROVIDING ONE-TO-ONE CARE



Why do you explore and get out?

Consider that the emotional connection to your outdoor endeavors.
Off season training, the injury prevention tuning, and general strength and conditioning is so much less glamorous than our actual sport. Yet it may be what keeps you going season after season.

One of the challenges of my job is educating people and getting them to “buy in” to the importance of a home exercise program.
I might assume most avid Mountaineers have some kind of fitness routine. If not, you may find a 20 minute warm-up and strength training program is advantageous.
Ideally, the goal is to prevent rather then cleanup the damage after you are injured.
Pay attention to those annoying aches and soreness and manage them before they get worse.


I HAVE
A THERAPIST.
HER NAME IS NATURE
fb/ barefoot free

Functional Assessment

- How do you move? (squat, lunge, sit up, posture, balance, FMS)
- What are your strategies? (Gluts, quads, abs, hip flexors)
- Where are your weaknesses? (balance, trunk, gluts, posture, flexibility)
- Common injuries and quick guide to prevention (lateral epicondylitis, knee pain, 1st toe pain, LBP, ankle sprains)

Becca Catlin
Seattle, WA

2003 Basic Climbing
2007 Intermediate Climbing
2015 Advancing Alpinism/ Advanced Rock

Education/Certification

PhD Program Orthopedic Manual Physical Therapy – The Ola Grimsby Institute (2012)
Fellow of the American Academy of Orthopedic Manual Physical Therapists (2010)
Fellowship Program Orthopedic Manual Physical Therapy – The Ola Grimsby Institute (2010)
Residency Program Orthopedic Manual Physical Therapy – The Ola Grimsby Institute (2009)
Orthopedic Clinical Specialist Certification (2004)
Master of Science Degree in Physical Therapy – University of Indianapolis (2000)
Bachelor Human Biology – University of Indianapolis (1998)
Clinic Information

MTI Physical Therapy- Issaquah (manager), 22500 SE 64th Pl Building G, Suite 115, Issaquah, WA 98027 (425)-442-6075
and
MTI Physical Therapy – First Hill, 506 12th Ave, Seattle, WA 98122

Credentials

PT – Physical Therapist
MSPT – Master of Science in Physical Therapy
DMT- Doctorate in Manual Therapy
OCS – Orthopedic Clinical Specialist
FAAOMPT – Fellow of the American Academy of Orthopedic Manual Physical Therapists

Board of Instructors Ola Grimsby Institute
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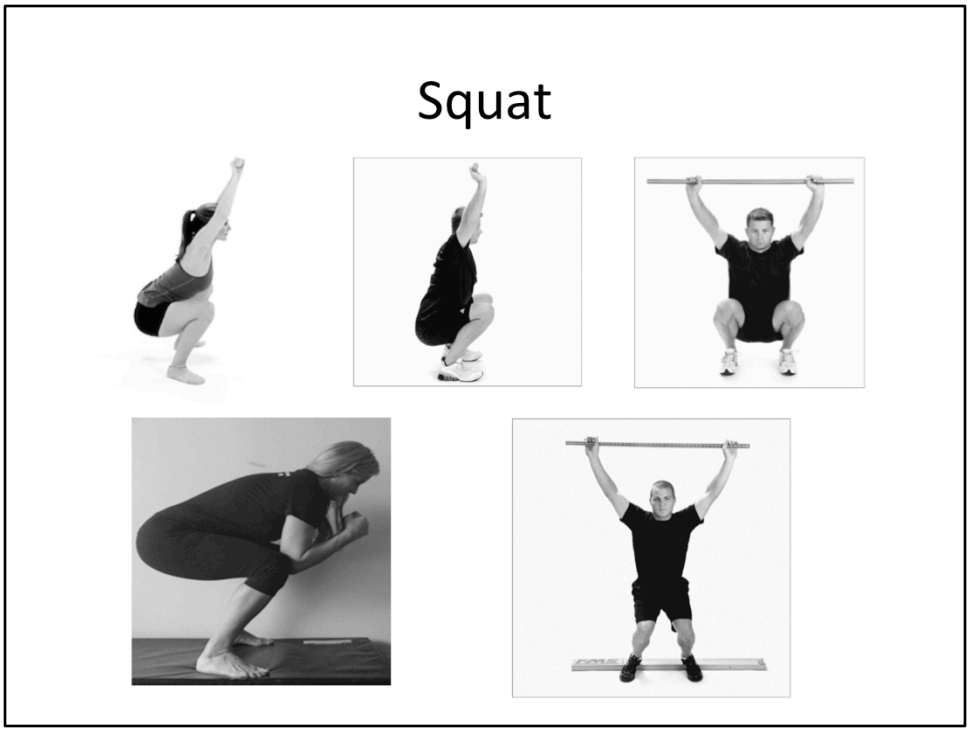
Why do I get to talk to you today?
I am passionate about about what I do as a PT and I love to climb.
I have 15 years experience as a PT and 14 years as a Mountaineer.
My professional career led me down a path of clinical mastery. I became increasingly captivated by the desire to help more people get more out of their bodies. I love anatomy, biomechanics, and challenges. I train, study, and have treated many hundreds of people in the clinic over 15 years. I hold the highest designation a PT can obtain nationally and internationally as a Fellow in the AAOMPT and now teach within a Fellowship training program and mentor PTs from across the US and from overseas. I see my job as a calling. I love to share what I know in order to help others maximize their function and get back to doing what they love to do.

I did an internship in WA while in PT school and fell in love with mountains (we do not have those in IL where I grew up). I knew I had to come back and satisfy my curiosity to see the view from the top of a summit. After I graduated from PT school I did come back to WA and have been climbing ever since. I am grateful for the Mountaineers where I learned skills to climb and found a climbing community. I have had many adventures through the club, gained friends, and continue to have that insatiable curiosity to see what lies over that next ridge, and immerse myself in the great beauty of our world.

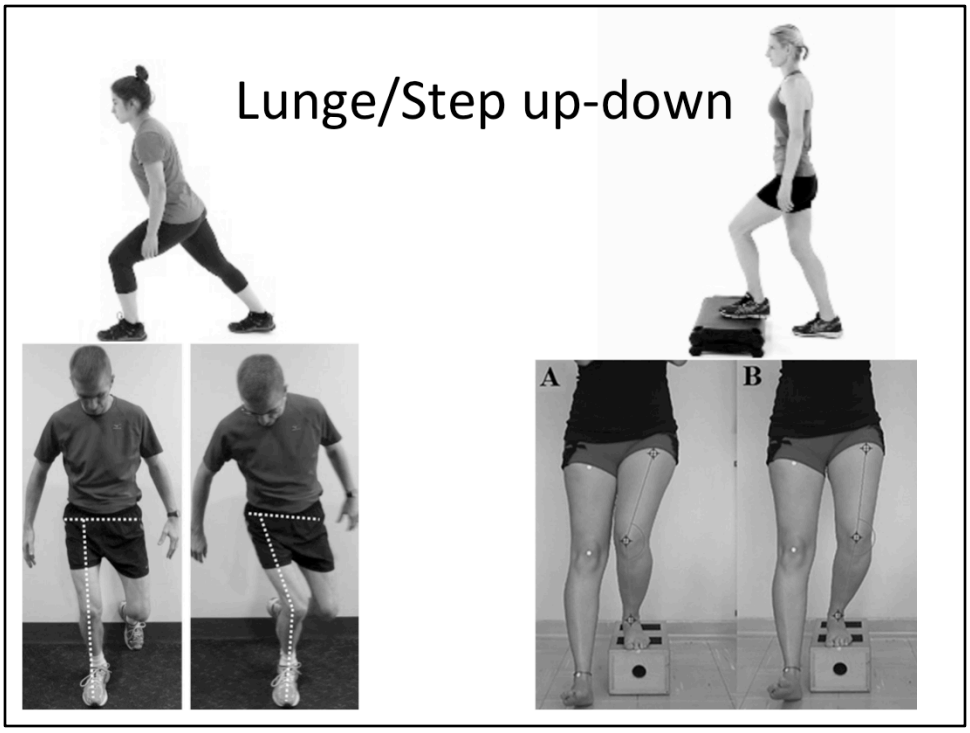


The top row are pictures of what we consider “good” form in a squat.
The top row models have enough flexibility through their upper back, hips, and ankles as well as the strength in their gluts and quads to get their butt down below their knees while keeping their trunk upright. From the front view hips and knees are in line with his feet.

In the bottom picture the lady is unable to get her butt below her knees, so she has compensated by leaning her trunk forward.
Remember that drill we tried where you squatted in front of the wall? This lady would find that to be super challenging. The wall is a quick way to tease out the “too far forward trunk”.

The last picture on the bottom right, the man’s knees are buckling. Notice how his knees do not line up with his feet. This is often due to hip weakness.

Remember: due to human biological variation we will not all perform a perfect textbook squat. This is not always bad, it may simply be different. If you are continually finding a pattern of weakness, lack of flexibility, asymmetries left vs right, you may consider working on your form.

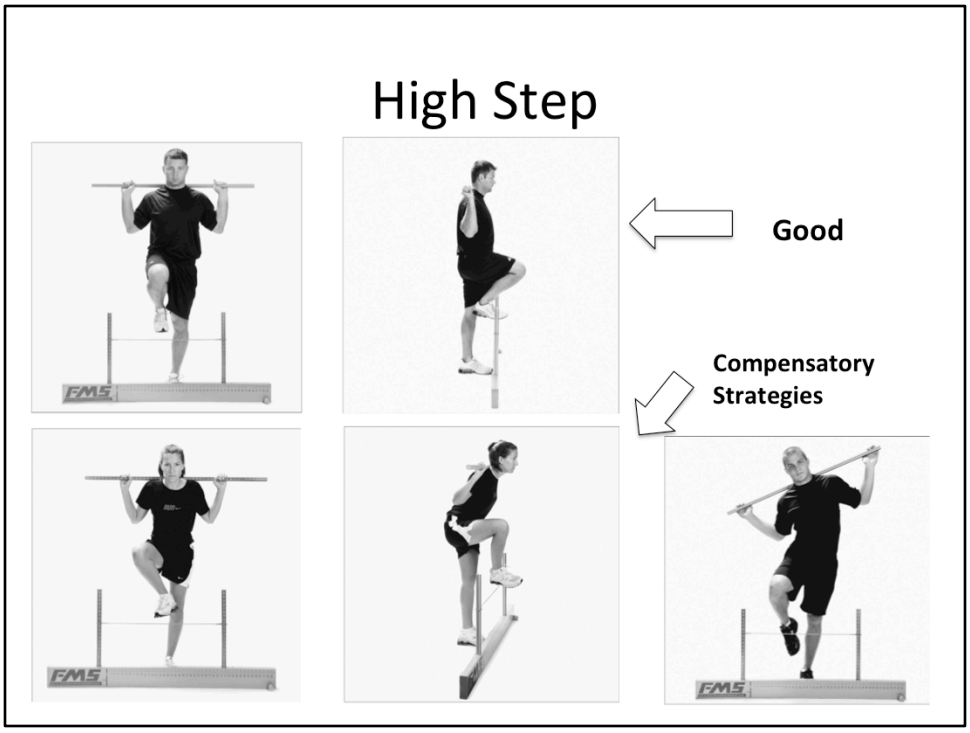


Alignment helps prevent ligamentous injuries as well as other pain associated with knee pathology.

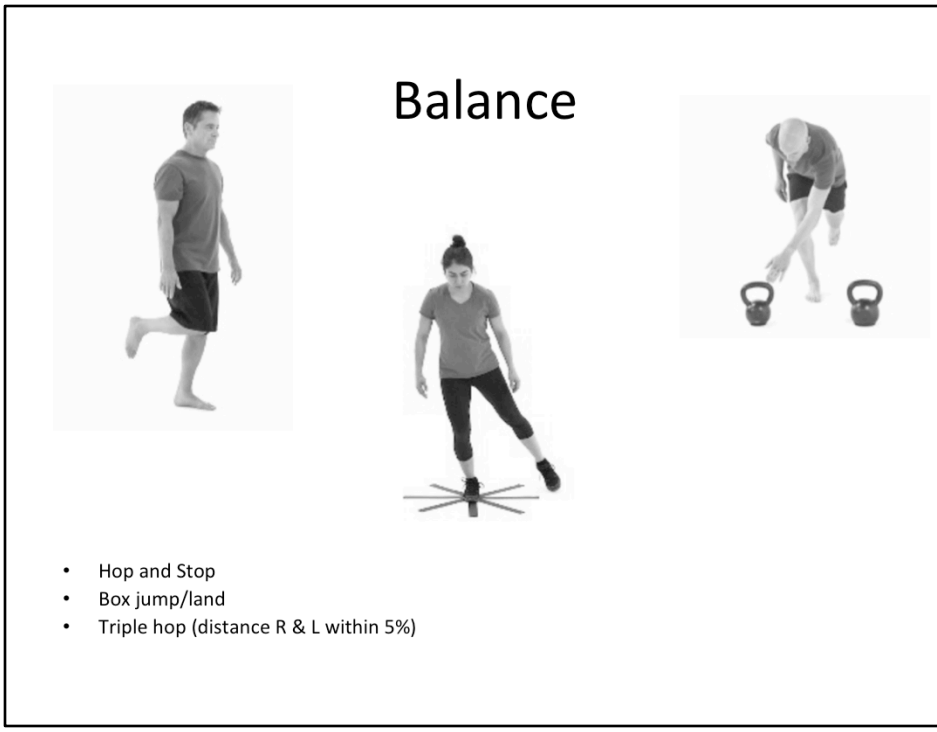
Lunges, step ups, and lowering from a step are all functional movements that can be used to screen your form and strength and as the training exercise.

The two side views on the top are good form. During training, keep tibia nearly vertical and the knee not going past the end of the toes. This reduces compression on the knee joint. When doing reps for training follow these guidelines. Do not worry about “rules” when you go hiking, just have fun! Your training ideally set you up for success on the trail.

The bottom pics are an example of poor control. Try single leg movements in front of a mirror and see how you look, compare left vs right.

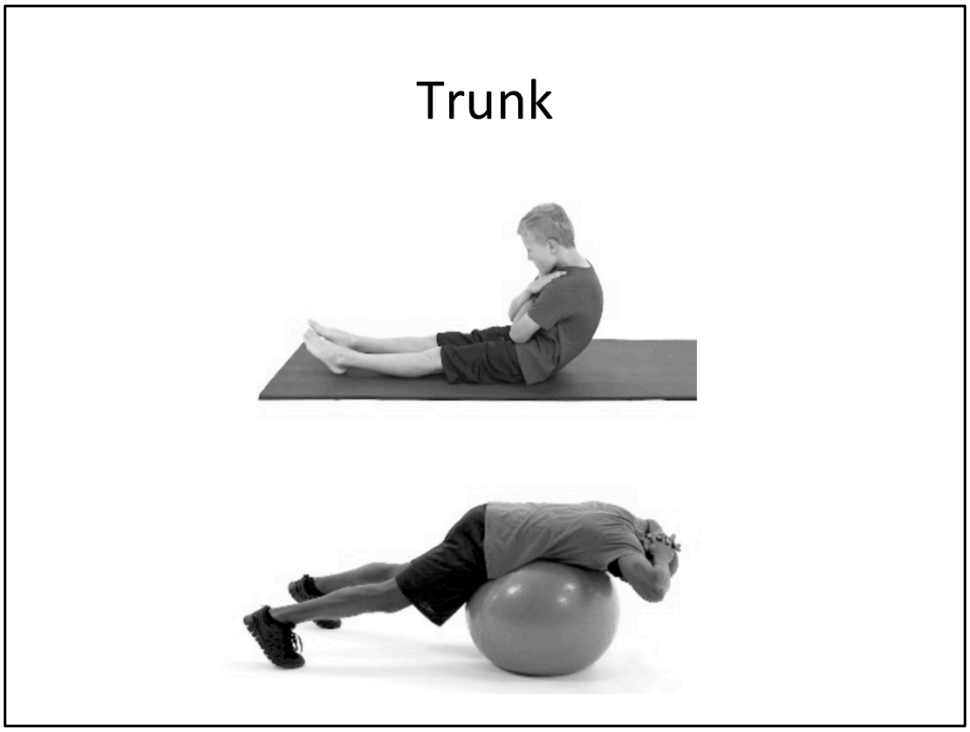


The top two pics are good form. The bottom 3 have compensations.
This is a screening movement that may capture compensations. It does not tell you if it is due to strength, flexibility, or where the disconnect resides. Try this out and see you find it is stiffness, balance, or simply weakness lifting the leg. Try it with a backpack on and see how that compares.



Balance progressions:
Single leg balance,- progression is to try it when turning head side to side
Balance and reach with lower extremity
Balance and reach with upper extremity

Then try these wearing a backpack and see how that changes your center of gravity and your movement control.



Curl up with Plantar flexion (toes pointing down) vs dorsiflexion (toe/ankles pulling up)

A) Do a sit up with your feet tucked under something or someone holding your feet so you can pull feet up as you curl up.
B) Then do the sit up pressing your feet down or pointing the toes down as you curl up.

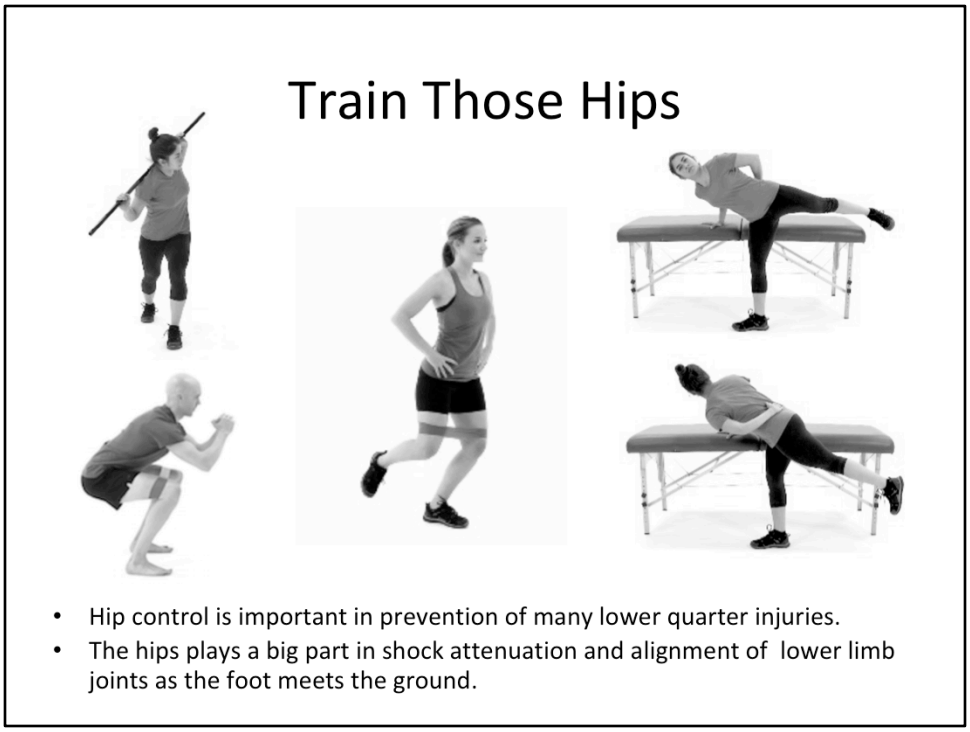
The second version reduces the recruitment of your hip flexor muscle and many folks find it much harder to curl up to a full sit.

If you want to increase the work load on the abs, do crunches with the feet pointing down and the calf muscle lightly activated.

Functional Training

- Hop and Stop
- Box jump/land

Functional training is doing movements that are similar to motions that our body does during normal activity.
For example, the pictures on the right could be someone unloading the dishwasher. They lift the dish up into the upper cupboard and then bend back down to the dishwasher.
I love to train people using functional movements because it gets them stronger in patterns they will use all the time.
There is nothing wrong with lying on a mat and doing crunches or doing a leg press on a cybex machine. Consider adding in some functional movements to your workout.
They can be an efficient way to train using upper extremity, lower extremity and the trunk all in one exercise.



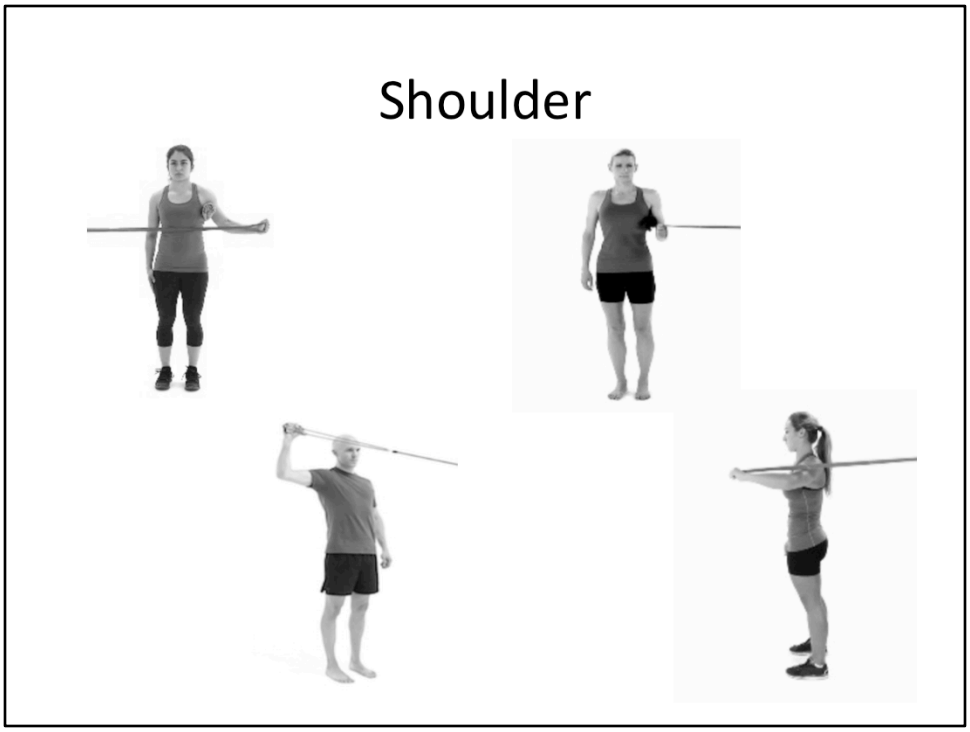
The hips are often found to be weak on many people.
Hip weakness can also be a culprit in many lower extremity musculoskeletal issues.

Big toe joint pain, posterior tibialis tendonopathy, knee pain, knee ligament tears can result from hip weakness and poor loading patterns.

Adding the band at the knee and pressing the knee gently into the band as you squat up and down increases your hip recruitment. It is nice way to train hips for endurance and promotes this motor pattern so your hips/gluts work when doing thousands feel of elevation gain and loss on Mountaineer outings.

The single leg picture in the middle is a progression for people that are not challenged with a double leg squat.

The hip roll on the right is a good butt work out without using the knees.



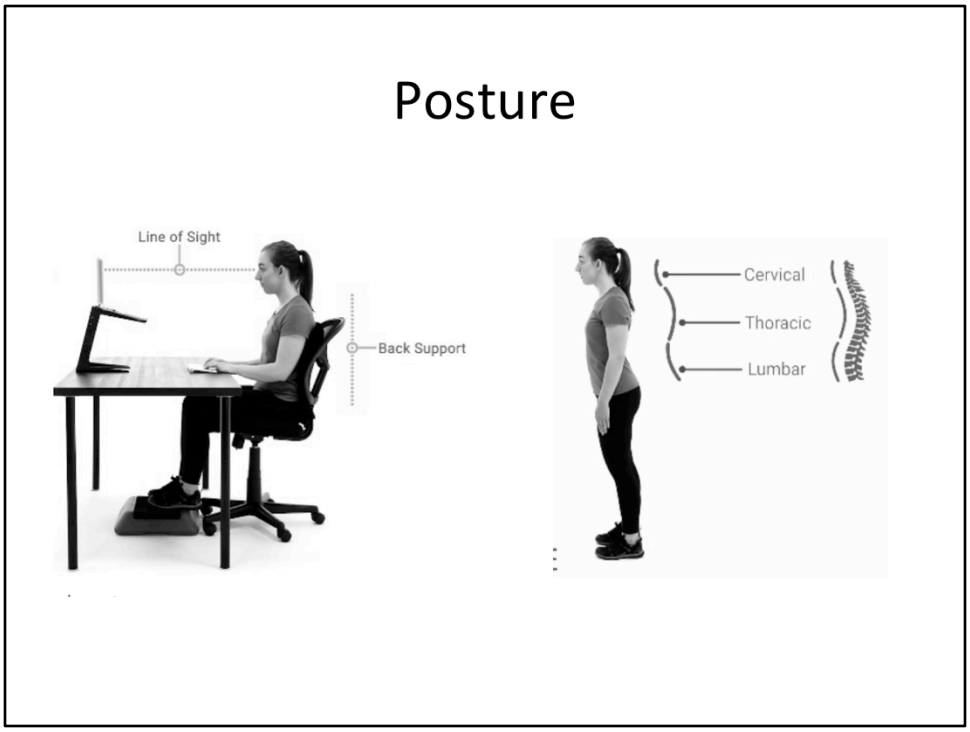
In general, training the rotator cuff is a way to help keep those shoulders feeling good.

Biceps, triceps, deltoid, pecs, lats are all large muscles that do the heavy lifting. They allow you to do that pull-up or lift that heavy pack up onto your shoulder.

The rotator cuff are the smaller muscles that keep the head tracking in the socket. If your cuff is weak or otherwise inhibited, it is like having a screw loose and the ball will shimmy around in the socket and starts rubbing tendons. This change the mechanical leverage and the muscle/tendons have to work harder to do the same job.
The rotator cuff keeps the train on the tracks.
It is often a break down in the cuff or the scapular muscles that is a precursor to shoulder pain.
Add some rotation training to your training 1-2 times a week.
These muscles are designed for endurance so training them in the fatigue at 20-30 rep range is appropriate

Scapula

These scapular (shoulder blade) training exercises go along with keeping your shoulders happy



A work station set up is about 90 degree angles: Hips, knees, elbows at 90
Monitor up at eye level.
Lap tops and phones really should not be used for prolonged work. If you are going to sit and work on a project have a lap top stand and and external keyboard. I see folks in coffee shops all the time with these step ups. They are cheap, compact, and into fit in your computer case.
Most companies with buy you the tools you need to set up your work station to accommodate posture and ergonomics.
Sit stand desks are affordable and worth considering if you are a 8+ hour a day computer worker.
Versa desk is one brand
Get one that goes up and down easily. If it is heavy to lift it is just as bad as sitting ;-)
The ones that are hydraulic are nice.

Combat Computer Posture



- Collagen will creep under low load prolonged tension
- This will cause micro trauma to the tissue, reduce hydration, reduce elasticity, reduce passive support
- Get up and move!
- The pictures show passive mobility work on the foam roll and active isometric endurance work for postural muscles

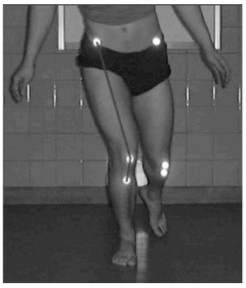
We need extension in our Thoracic spine (area of the spine where your ribs attach) to get up tall pull our head in line with our shoulders and waist.
We need our ear to bisect our shoulder, which bisects our waist and our hip and lastly our ankle bone.
Upper back strength helps us to sustain prolonged sitting postures (but do sit all the way back in your desk chair and use it to support you rather then sitting perched on the edge of your chair.

The middle pic is a lady holding 3# weights out at a 90 angle as long as she can hold them for isometric training. Try it, you will feel your back get tired. Find a weight that causes fatigue at around 20 seconds.

Knee pain/Patella Femoral Syndrome

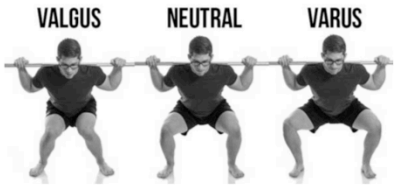
Problem List

- Often find a valgus pattern of loading (lower limb collapses inward)
- Weak hips



Training Plan

- Train those hips (Slide 12)
- Use trekking poles
- Mindful of loading alignment when training



I think it is silly to tell people to tighten this, and don't let the knee do that put the knee here when you are doing and all of a list of "rules" your body has to follow when out hiking. Beware of being too internally focused.

Once you get out on your trip just move and enjoy. That is the goal.

We (PTs) get anal and "form" happy during training when the intention is to prepare your body for the fun.
When at the gym use a mirror, consider your form, alignment, symmetry. See if you can pick up on lazy movement habits. Do reps to solidify motor patterns that are advantageous.

When you climb, just climb and have fun!

1st toe Pain Prevention

Problem List

- Reduced motion in 1st toe
- Weak foot muscles
- Weak hips

Training Plan

- Increase toe mobility

- Increase foot strength

- Increase toe flexion strength

Raise up high on big toe (do not roll out To the outside toes)

This is a bunion or hallux valgus
Flexible slipper shoes, climbing shoes,and walking bare foot can often be a problem for the big toe

Keep your feet strong and they will support themselves.
Stretching with heel dropped off the edge of step (calf stretch) after your workout is a great idea.

Rigid shoes like Mountaineering boots, ski boots are a toss up. Some people do well because there is much less motion required of the toes.
Some folks find them to painful often because of fit issues and needing a larger toe box.

Ankle Sprain Prevention

Problem List

- Ligamentous laxity
- Reduced Proprioception/ balance
- History of ankle sprain correlates with hip weakness

Training Plan

- Balance
- Ankle strength
- Train those hips (slide 12)

Studies have repeatedly shown a correlation of reduced hip strength in people with ankle injuries

Elbow Pain Prevention

Problem List

- 70% 0f lateral epicondylitis has its origin in the Neck dysfunction
- Poor posture
- Repeated micro trauma

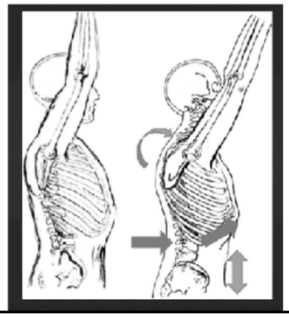
Training Plan

- Address Posture
- Take many breaks from the computer
- Neck, upper back, scapular endurance
- Eccentric training to wrist extensor tendons

Shoulder Pain Prevention

Problem List
- Poor posture
- Weak rotator cuff
- Scapular weakness

Training Plan
- Manage posture
- Strengthen rotator cuff and scapular muscles (slide 13,14)



Good posture is also necessary for healthy shoulders.
Sit slumped and raise your arms up as far as you can.
Then sit up tall and raise both arms up as far as you can.
Can you tell how much farther you raise your arms with good posture?
The shoulder hits its end range much sooner in a slumped rounded shoulder flexed spine posture. This reduced the amount of room inside the joint for the head to glide around and can cause impingement of the ball against the tendons.
To have full shoulder elevation to 180 degrees we need flexibility in our thoracic spine (upper back/ribs).
Improve your set up and posture and help save those shoulders.

General Dosage Concepts

- Good form with exercise is paramount
- Endurance training increases the network of capillaries for efficient O2 distribution and allows a muscle to perform at low levels for long periods of time. To train for endurance is 60% of your 1 rep max or gentle fatigue at about 25-30 reps.
- Strength and hypertrophy is trained at 80+ % of 1 rep max or Fatigue at <10 reps
- A hybrid of the two mixing strength and endurance is shooting for muscle fatigue at around 15 reps.
- Plyometric training utilizes Power which is speed + strength (jumping, dynos, throwing)

mti physical therapy

PROVIDING ONE-TO-ONE CARE

- One to One Care always with a PT (no aids or assistants)
- All PTs have1-3 year of Post Doctoral training in Orthopedic Manual Physical Therapy with an emphasis in movement analysis and exercise design
- 7 Clinic locations in the Seattle area

Our practice style continues to be informed by the latest research, course work, and our involvement in clinical mentoring and teaching both nationally and internationally. As you work with your therapist, you will recognize the difference in MTI's approach and your practitioner's clinical skill. We know that your experience at MTI will be unique for you, educational, and allow you to meet your individual goals.

mti physical therapy

PROVIDING ONE-TO-ONE CARE

Issaquah

22500 SE 64th Place Building G,
Suite 115 Issaquah, WA 98027

Phone: 425.441.6075
Email: issaquah@mtipt.com
Fax: 425.746.2471

First Hill

506 12th Ave
Seattle, WA 98122 • USA

Phone: 206.430.6262
Email: firsthill@mtipt.com
Fax: 425.746.2471

DOWNTOWN SEATTLE - WASHINGTON ATHLETIC CLUB

1325 Sixth Avenue
PO Box 1709
Seattle, WA 98101 • USA

Phone: 206.839.4780
Fax: 425.746.2471

Bellevue

1560 140th Ave NE, Ste. 1(
Bellevue, WA 98005 • USA

Phone: 425.746.2475
Email: Bellevue@mtipt.cor
Fax: 425.746.2471

Magnolia

3200 West McGraw Street
Seattle, WA 98199 • USA

Phone: 206.281.7970
Email: magnolia@mtipt.com
Fax: 425.746.2471

Kirkland

11800 NE 128th Street, Ste. 510
Kirkland , WA 98034 • USA

Phone: 425.820.2590
Email: kirkland@mtipt.com
Fax: 425.746.2471

Fremont

3601 Fremont Avenue N, Suite 414
Seattle, WA 98103 • USA

Phone: 206.548.1522
Email: fremont@mtipt.com
Fax: 425.746.2471