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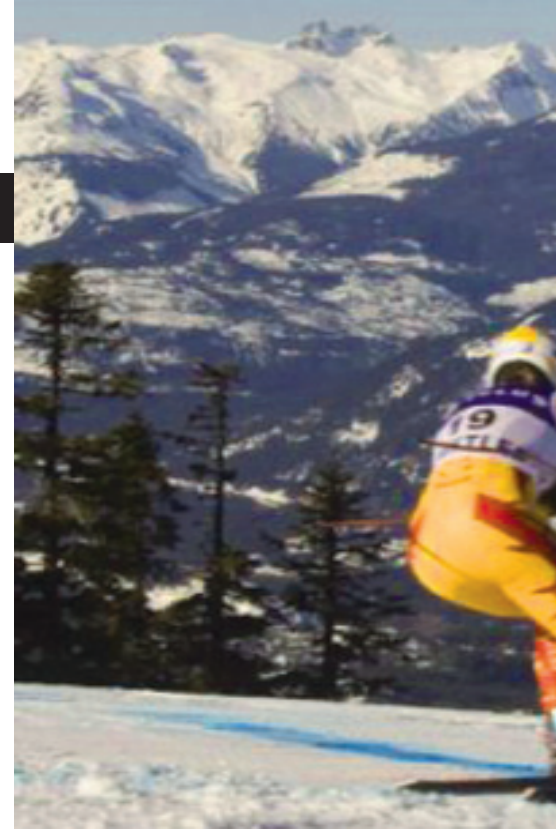
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BANKING ON OUR BIGGEST ASSET

From time to time I hear fellow instructors say something like, 'Don't turn with your butt 'cause it makes you rotate!'



A while ago, I promised myself to one day write an article on the important role our buttocks play while downhill skiing.

From time to time, I hear fellow ski instructors say something like, "Don't turn with your butt 'cause it makes you rotate!" In this article I'd like to counter that. While I acknowledge that hip rotation is not effective, biomechanically we DO need our butt to make good ski turns!

No secret on this one! The Canadian Ski Instructors' Alliance (CSIA) technique suggests that for skis to change direction the turning effort must come from the lower body by turning the legs in the hip sockets. Any effort to turn the skis made from above the hip joints is called rotation.

According to the CSIA, rotation is not considered the most efficient technique for initiating a turn as it leads to a less efficient biomechanical alignment for completing a turn thus resulting in less optimal strength, control and precision.

There are so many actions and



Britt Janyk, Olympian

ROTATION IS LIKELY CAUSED BY SKIERS HAVING DIFFICULTY IN ACTIVATING, CO-ORDINATING, OR ISOLATING THEIR HIP AND KNEE ROTATOR MUSCLES

body movements combined and coordinated to create what we call skiing; and for that reason I am not looking at analyzing all the biomechanics involved but more to attract your attention on to a few key factors.

Keep in mind that to be able to move any limb in any daily activity we need to engage our core muscles in order to stabilize our spine, hip and shoulder girdles. Back to skiing – we need to tightly brace our trunk muscles, shoulders and hips to put our arms and legs efficiently into action against strong forces.

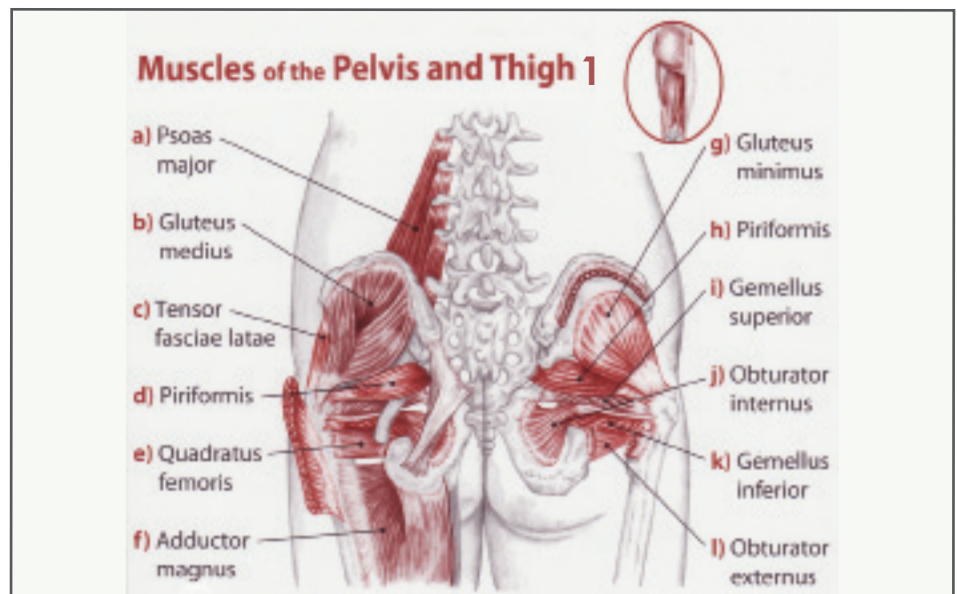
The CSIA divides skiing into 5 skills, so no matter what level we and our clients ski, our performance on snow will reveal these skills in accordance with our ability:

1. Stance and Balance
2. Pivoting
3. Edging
4. Pressure Control
5. Timing and Coordination

Let's talk more about pivoting! We need to turn our legs and that's

when I insist we need our biggest ASSet. When we see symptoms of the hip and butt coming around and outside of the most efficient line of force applied to our skis for any given type of turn, it is NOT because we have to STOP using our butt muscles!

If we happen to rotate, (Oh no!) it is more likely that we are having difficulty activating, co-ordinating or isolating the hip and knee rotator muscles, so we tend to compensate by creating turning forces with our trunk, shoulder and arm muscles.



Here's a list of the specific muscles in your buttocks, thighs and hips that make your legs turn:

WITHIN the BUTTOCKS

(part of the hip)

- Hip External Rotators: Gluteus Maximus, Gluteus Medius, Piriformis, Quadratus Femoris, Obturator Internus, Obturator Externus, Gemellus Superior, Gemellus Inferior
- Hip Internal Rotators: Gluteus Medius, Gluteus Minimus

WITHIN the THIGHS

(except for Popliteus)

- Hip External Rotators: Bicep Femoris, Sartorius
- Hip Internal Rotators: Adductor Magnus, Adductor Longus, Adductor Brevis, Pectineus, Gracilis, Tensor Fasciae Latae, Semitendinosus, Semimembranosus
- Knee External Rotators (with knees bent): Bicep Femoris
- Knee Internal Rotators (with knees bent): Popliteus, Semitendinosus, Semimembranosus, Sartorius, Gracilis

WITHIN the HIP

(through the groin)

- Hip External Rotators: Psoas Major, Iliacus

NOTE: *In these diagrams, not all muscles identified are involved with leg rotation.*

The medial or internal rotator muscles will assist you turning your uphill ski of the old turn into the new turn while the lateral or external rotator muscles will help you turn your downhill ski in the same direction. Note the bunch of buttock muscles activated to fight centrifugal force; no wonder we skiers tend to have, I'd say, nice round, but firm butt cheeks! After all, the Ski Bum nickname is not so off-track or a bad thing!

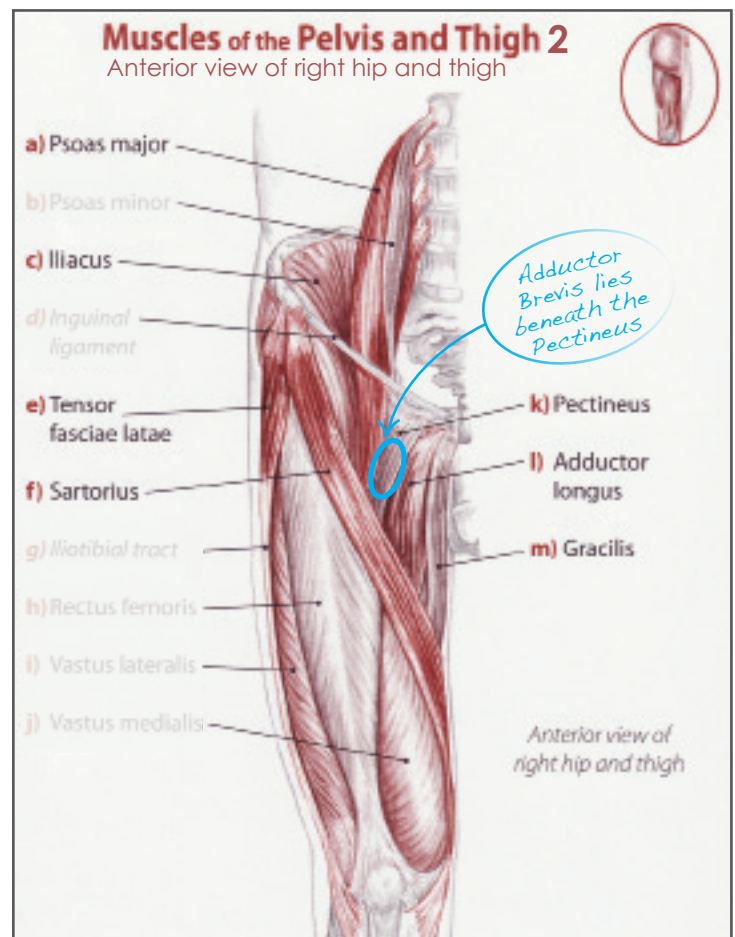
To better understand skiing, an important fact is that anatomical knee rotation is possible, inward and outward, but only when the knees are bent! Yep! This is an important biomechanical feature for more refined skiers wanting for instance, to tighten turns on steep terrain, in a race course, and descending moguls.

Another point to remember is that ankle rotation is not

possible. Nope! To help hold and complete turns there is a very refined combination of isometric, concentric and eccentric muscle activation to control foot inversion (or supination – when the sole of your foot points toward your mid line) and eversion (or pronation – when the sole of your foot points away from you).

Isometric, concentric and eccentric refer to 3 types of muscle contraction: Either the tensed muscle fibres are static, shortening or lengthening.

Now we find ourselves talking a bit about edging! To picture this more clearly, I suggest you try this exercise: lay on your back as you would be doing an abdominal crunch and

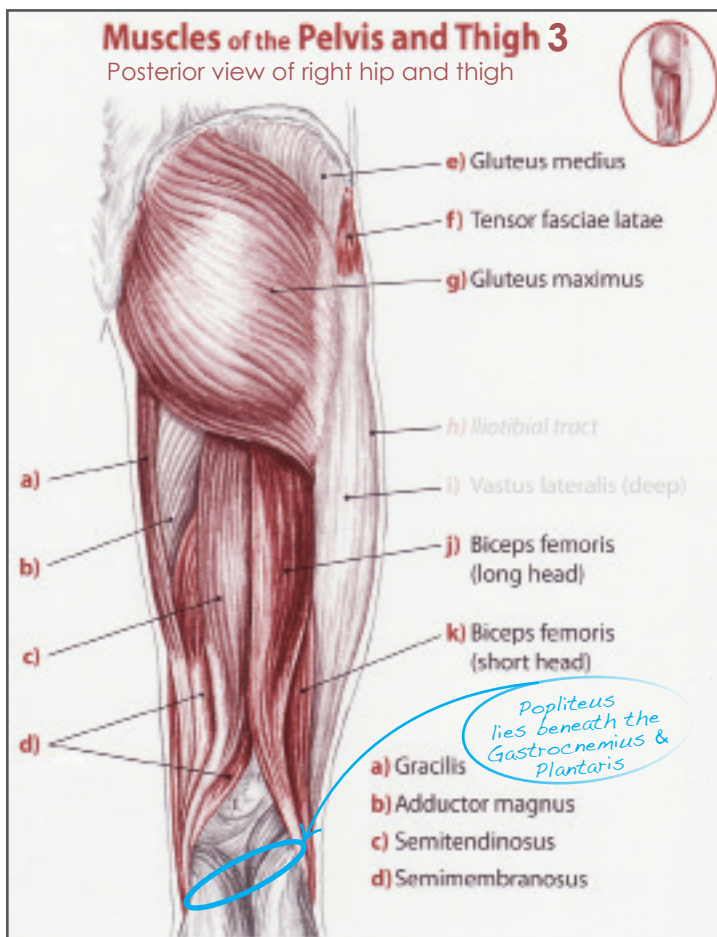


mimic the completion of a turn with your feet. Imagine then execute what you would do with your feet in your ski boots while doing short turns on a steep slope.

Watch and analyze. In skiing, our feet hold and adjust the inversion and eversion depending on the speed, steepness, snow type, direction we want to go, or how sharp of a turn

we wish to make! Finally observe your toe movements, as you invert they will adduct (get closer together) and as you evert they will abduct (spread apart).

My goal of this article is mainly to highlight the muscles and their functionality relative to pivoting. This may also give you an approximate idea of how complex the implication of the whole body is in the mechanics of skiing, throughout the 5 skills we use in the CSIA. All the muscles together, accordingly and in a well-timed manner, stabilize or move our joints, absorb or deploy energy, control our actions, and balance and mobilise our bodies in motion down the hill; however always respecting at their best, our intentions and desires.



You may be thinking at this point, to get yourself into better shape for the upcoming ski season. If so, I would urge you to include in your routine, strengthening exercises for your trunk, shoulders, arms, hips and legs. Practice variations of planks, plus incorporate functional exercises that involve synchronization of your arms and legs, therefore challenging the core muscles and stabilizing or mobilizing

all appropriate joints in a proper sequence.

Work on your balance doing such exercises as a single leg squat. Improve your speed with running drills but focusing on keeping your hips stable and levelled. Plan to progressively increase your leg strength and power but making sure to balance the work of your quadriceps versus your hamstrings.

Always promote form before challenging intensity and quantity! Allow time for some regular aerobic exercise and stretching – refer to last year's article featured in ProView Fall/Winter 2012-2013:

www.kinesiomajo.com/blog/stretch-out-for-ski-season/

Enjoy your ski season!



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For more about Majo and KinesioMajo visit:
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Diagram Reference:
Andrew Biel, Trail Guide to the Body: Muscles of the Body, Book of Discovery, 2010