

Muscles Involved in Alpine Skiing

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Types of muscles involved:



The major muscles involved in a movement are called the 'prime movers'. The 'prime movers' for alpine skiing are primarily those of the hips, thighs, legs and feet. Programs to train elite skiers are no longer generalized. The latest training programs designed by sport scientists now target key muscles involved in the action of skiing.

While skiing generally involves the whole body, the lower body muscles are targeted as the primary muscles involved in the action of skiing. These are the hip muscles, hamstrings, quadriceps, calves and muscles in the feet (as pictured left).

More specifically, scientists at the US Ski and Snowboard Association (USSA) have conducted detailed kinesiological evaluations and movement EMG experiments to narrow down the key muscles involved in skiing in order to tailor specific training programs for USSA athletes.

Specific muscles in the lower body include: (i) Gluteus medius, (ii) peroneus longus, (iii) adductor longus, (iv) gluteus maximus, (v) rectus femoris, (vi) vastus intermedius, (vii) biceps femoris and (viii) semimembranosus.

- i. **Gluteus medius** - the anterior fibers abduct and internally rotate the thigh, the posterior fibers may externally rotate the thigh
- ii. **Peroneus Longus** - everts and plantar flexes the foot
- iii. **Adductor Longus** - adducts, flexes and medially rotates the thigh
- iv. **Gluteus maximus** - extends the hip, externally rotates the thigh, abducts the thigh & assists to stabilize a fully extended knee.
- v. **Rectus femoris** - extends the knee and flexes the hip
- vi. **Vastus intermedius** - extends the knee
- vii. **Biceps femoris** - flexes the knee and extends the hip. Reverse muscle action: Posterior pelvic tilt and assists to draw the trunk upright when in a flexed position.
- viii. **Semimembranosus** - extends the hip, flexes the knee and pulls the medial meniscus posteriorly during knee flexion. Reverse muscle action: posterior pelvic tilt and draws the trunk upright from a flexed position.

Types of Contractions:

The majority of the prime mover muscles used in skiing actions contract eccentrically. This means that the muscle lengthens as it contracts. For example, the thigh muscles work in the same way or lengthen as you walk down stairs in an eccentric fashion. The same happens during the squatting nature of skiing.

The rate or speed of contraction during skiing is relatively slow compared to running and other activities. This is because the hip angle, for example, does not change significantly during a turn in skiing, so the speed of contraction is relatively slow.

Based on the above information, the type of training that you should do to get ready for skiing should involve predominately lower body exercises with a large eccentric bias and a relatively slow rate of contraction. This means that you should do the exercises slowly in a controlled fashion concentrating on technique to maximize the benefits of the exercise and transfer to skiing performance.

Exercises to train these prime movers:

The following are some key exercises to train these 'prime movers':

Gluteus medius: The band hip abduction exercise



Peroneus Longus: The band side step exercise



Adductor Longus: Hip adduction exercise



Gluteus Maximus: Prone hip extension exercise



Rectus Femoris: Cable kick exercise



Vastus intermedius: Stability ball deep squat exercise



Biceps Femoris: Cable leg curl exercise



Semimembranosis: Cable hip extension exercise



Remember that performing exercises incorrectly can be detrimental to your health. Consult your medical doctor before beginning any new exercise program.

For more information, CD Roms and DVDs on how to prepare for the upcoming ski season, visit the USSA website: <http://education.ussa.org> ■