LUNGE PERFORMANCE AND ITS DETERMINANTS

For activities such as fencing, the ability to quickly complete a lunge and return to the on-guard or move off position for another redoubling attack direction is critical for success. Determining which qualities of strength is important in each situation, are predictors of lunge performance.

Strength and power of lower body extremities are important aspects of lunging. However, as to how these two qualities should be assessed, strength should be defined as the force exerted under a given set of conditions during a maximal voluntary contraction, and power defined as the rate at which mechanical work is performed under a specified set of conditions or the product of force and velocity. Both definitions imply that strength and power are defined by conditions such as velocity, contraction type, posture, and movement pattern specificity.

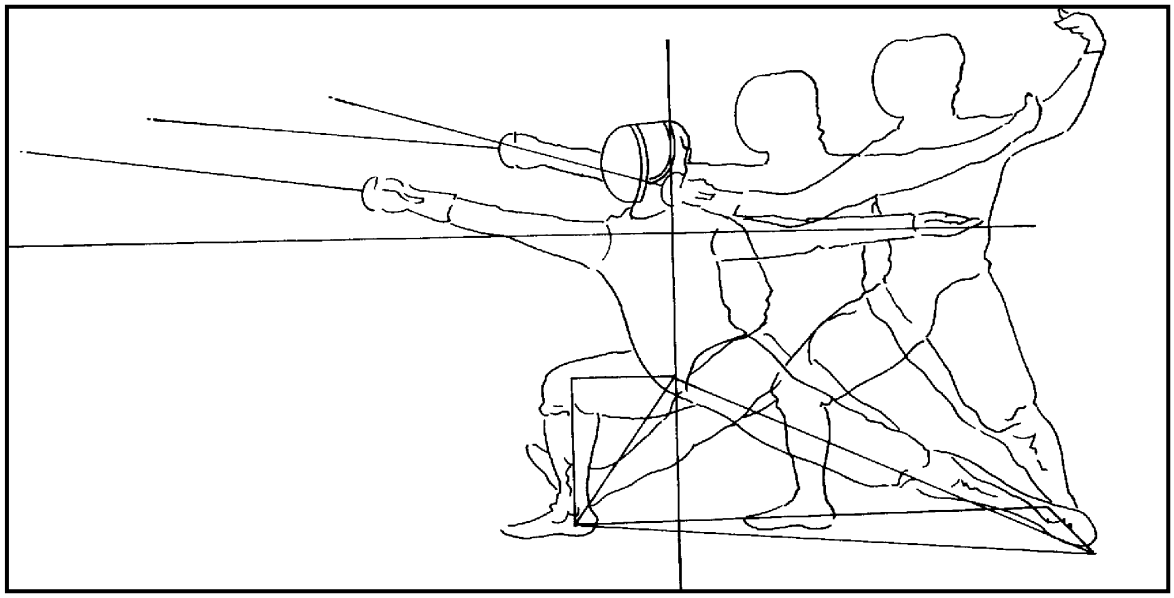
Some activities, such as sprinting, jumping and throwing require force to be produced and have been classified as fast stretch shorten cycle activities. In such events, the rate of force development may be the most important physical capacity.

For an activity such as lunging in fencing, sprint performance is an important aspect of a fencer's overall athletic performance. The ability to quickly complete a lunge and return to on-guard or move off in another direction is critical for success in such sports. Of particular interest to the present study was the relationship between the qualities of strength and lunge ability. However, no research has examined the relationship between the qualities of strength and lunge performance, because the lunge is a relatively slow activity when compared to the foot contraction times of sprinting.

The main aim of this topic was to determine that qualities of strength are important predictors of lunge performance. Such information may provide for talent identification, injury prevention, and rehabilitation or development of this functional task.

The Lunge

The lunge (la fente) represents the most fashionable, the most classic, and the most precise form in attacking with the foil, épèe and sabre. It allows one to make a hit and maintain control of movement by keeping both feet firmly on the floor.



TECHNIQUE: Starting from the on guard position.

Head: Straight and facing forward.
Front Arm: Extends smartly and fully, without tenseness in the shoulders and forearm. The hand (fingers) is in a slight supination position and the weapon point is at shoulder level.
Rear Arm: The rear arm is thrown down in line with the front arm. The hand of the rear arm is open, with the fingers together and the thumb facing up.
Body: The body does not lean forward, but remains in an erect position.
Front Leg: The front leg is thrown forward with the toe pointing smartly upward so that the heel is about 5 cm off the floor. The action of the front leg ends with the thigh and lower leg at right angles to one another, and the knee and heel in line.
Rear Leg: The rear leg straightens and simultaneously springs, pushing the body forward. The sole of the foot stays firmly on the floor during this action.

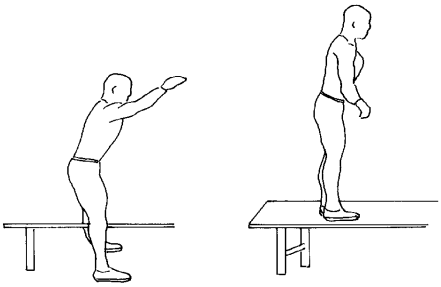
Note: The movements commence with the extension of the arm which, when extended, demands that the body and legs follow in such a manner to give a smooth motion of the weapon point from on guard to final touch. Such motion is difficult and requires much practice.

STRENGTH IN COMPETITIVE FENCING

It is believed that strength is the key to success because it is so intimately associated with muscular endurance, power, and speed (all of which account for total fitness). Working to increase strength simultaneously increases power. Power is usually equated with speed and strength.

Following are some selected callisthenic and isotonic exercises for the lower extremities. The legs play a vital role in all aspect of lunging. The fencer will recognize that development of strength in this area is of paramount importance.

Astride Jumps On and Off a Bench



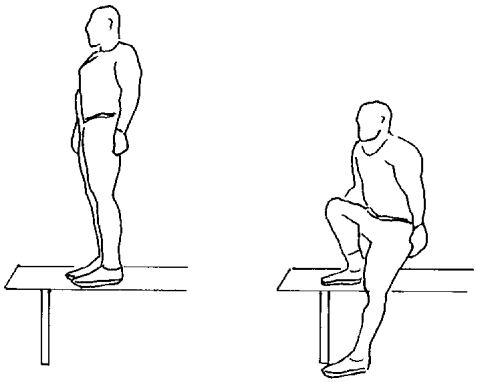
Major Muscles Exercised: Quadriceps, soleus and gastrocnemius.

Starting Position: Stand on the bench perfectly erect, feet together and hands by the side.

Movement: The movement is a simple jump down from the bench with one foot on either side of the bench and a spring back onto the bench again. The movement is then repeated.

Note: The fencer must take care to jump back on to the bench safely and squarely. The movement is a fast and continuous one. The head should be held erect all the time and the fencer should try not to look down at the bench.

Step-Ups onto a Bench



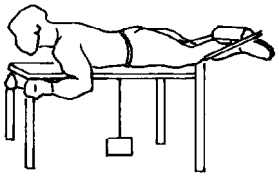
Major Muscles Exercised: Gluteus maximus, soleus, gastrocnemius and quadriceps.

Starting Position: Stand perfectly erect in front of a bench with hands by the side or clasped behind the back.

Movement: The fencer places the right foot on the bench followed by the left foot, so that he/she is standing up on the bench. The right foot is lowered to the ground followed by the left to the starting position and the whole movement is repeated.

***Note*:** In stepping up, the hands must not be placed on the knees. The back must be perfectly straight throughout the movement, with the head up. The exercise should take approximately 4 seconds to the rhythm of 1:2:3:4 and repeated. The exercise is continuous.

Leg Raise - Front Lying



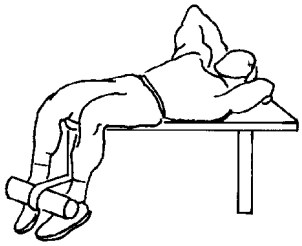
Major Muscles Exercised: Extensors of the lower back, gluteus Maximus, hamstrings, gastrocnemius, soleus and intrinsic muscles of the foot.

Starting Position: Lie in the prone position with the hands holding the bench legs for support. The weight is balanced on the ankles with the legs fully extended.

Movement: Bend the lower legs up until they are perpendicular to the body let them back down slowly and repeats.

***Note*:** Lock the thigh, feet, and ankles and limit the body's movement.

Leg Raise - Back Lying



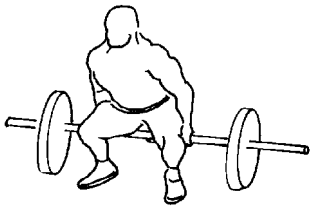
Major Muscles Exercised: Rectus abdominis, iliopsoas, quadriceps and extensors of the foot.

Starting Position: Lie in the supine position with both legs together supporting a bar weight across the front of the feet. The arms reach over and behind the head, gripping the bench board for support.

Movement: Lift the weight with extended legs, lower very slowly. Then repeats.

Note: The lower back should remain in contact with the bench during the exercise. The thighs should remain straight and the head kept back. Beware of stress on the knee ligaments in all knee stress exercises, and either reduce the weight or cease the exercise if any discomfort is sensed in the joint itself.

Hack Squat



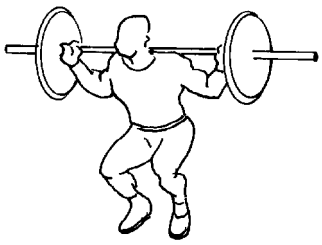
Major Muscles Exercised: Quadriceps, gluteus maximus, hamstrings and erector spinae.

Starting Position: This technique is similar to a regular squat except the bar is held behind the legs.

Movement: Lower the body into the half squat position and repeat the movement.

Note: This exercise may also be performed on a hack machine.

Half Squat



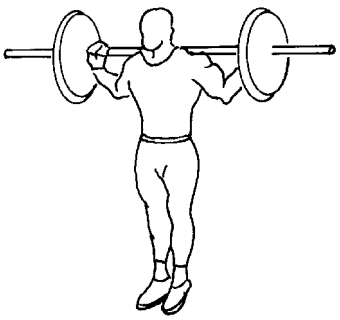
Major Muscles Exercised: Gluteus maximus, hamstrings and quadriceps.

Starting Position: The weights are evenly balanced across the shoulders while standing perfectly upright. The feet are apart and the body balanced. Hold the bar with a pronated grip outside the shoulder line.

Movement: Lower the body into the half squat position (as if on a chair). Return to the erect position and repeat the movement.

Note: The back must be perfectly straight with the chest out and the head steady. The eyes should be kept fixed upon a point directly ahead. Flexing the knees closed more than 100 degrees increases the pressure on the joint without increasing the effectiveness of the squat.

Heel Raise



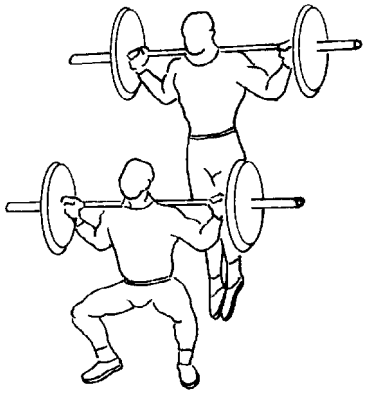
Major Muscles Exercised: Soleus, gastrocnemius and planter flexors of the foot.

Starting Position: Stand perfectly erect with the barbell resting across the shoulders. The feet are a few inches apart turned slightly in or out or just pointing straight ahead.

Movement: Lift the weight simply by raising the heels off the ground as high as possible, balancing carefully on the toes. The heels are then lowered slowly to the floor.

Note: The erect position throughout the movement is very important. Beware of leaning forward or backward.

Squat Jump



Major Muscles Exercised: Gluteus maximus, quadriceps, gastrocnemius and soleus.

Starting Position: Place the bar across the shoulders, hands in a supinated grip and the weight evenly balanced. The feet should be placed firmly apart on the floor (it may be important to have a towel resting under the bar on the neck and shoulders).

Movement: Descend slowly into a crouch position. Spring upward trying to get the feet off the floor before returning to the starting position. Repeat.

Note: This exercise should not be done half-heartedly. The attempt should be made to achieve as much height as possible. Keep the body steady and the feet perfectly balanced on the return.

INJURY PREVENTION

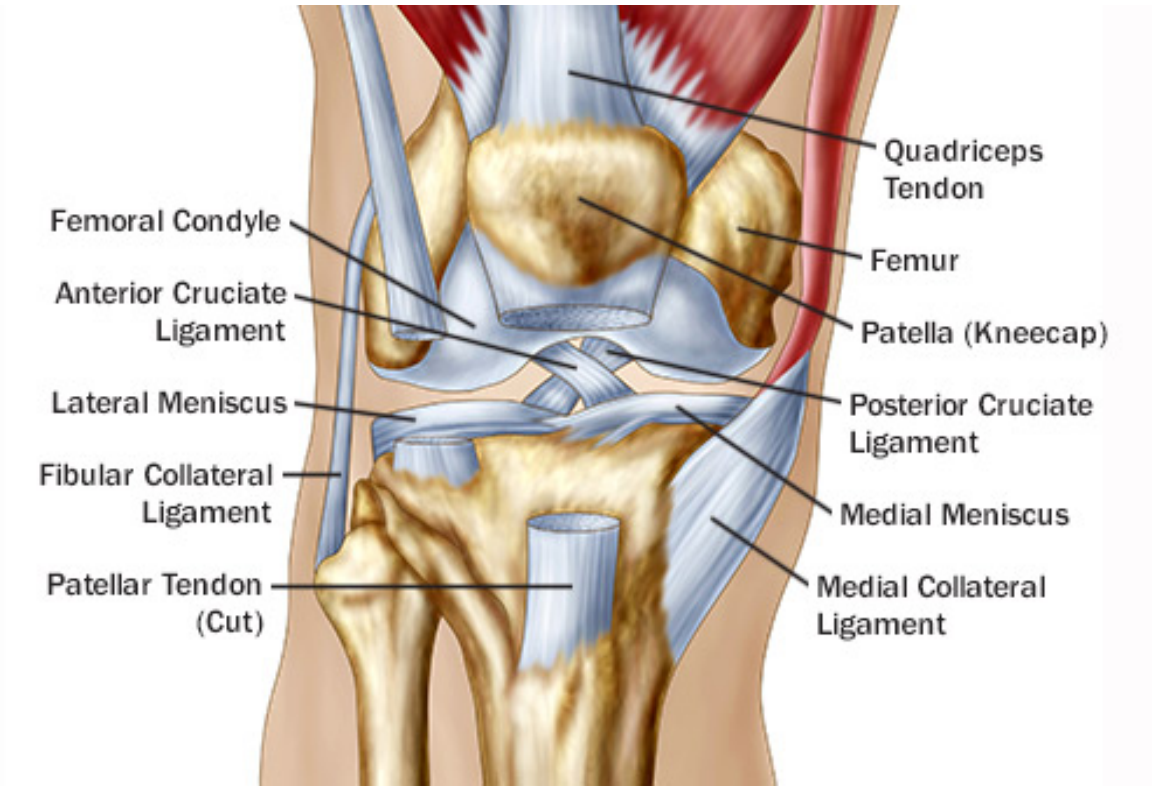
The risk of injury varies immensely from sport to sport and is dependent on several factors. In fencing, these include physical fitness of the fencer experience, technique and style.

The lunge attacking in fencing, in which the leading foot is thrust forward close to the floor with the knee bend while the back leg remain straightened, torn muscles, sprained joint, these types of injuries are particularly frequent, while lunge technique is inadequate.

One should do their upmost to prevent the injuries while lunging, and understanding of the mechanisms of injury-productions and the methods by which injury can be reduced.

It's Complicated

Your knees have lots of moving parts, and you use them a lot, so lots of things can go wrong. Too much of one kind of motion, especially if you don't work up to it, can lead to "overuse" injuries. Simple wear and tear is a problem. Accidents can crack bones and tear tissue. With some conditions, your body attacks its own joints. Your doctor can help you sort out what's going on with your knee when it doesn't feel right.



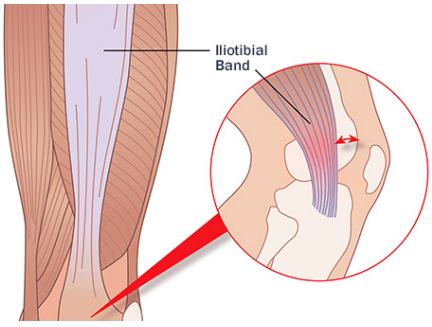
Following they are the most frequently encountered injuries in lunging:

Torn Anterior Cruciate Ligament

You hear a *pop* and can't move after you suddenly change direction -- often while over stretch or lose one footing and slide in lunging. You may have torn your ACL, which connects the femur and the tibia and prevents the tibia from moving too far forward. Your knee will hurt and swell and feel unstable.

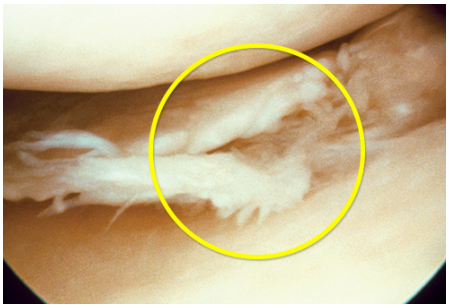
You can tear or strain any of the tissues that hold your knee together: Ligaments connect bones to each other; tendons connect muscle to bone. Irritated tendons? That's tendinitis.

Iliotibial Band Syndrome



The "IT band," a ligament that runs along the outside of your thigh, can rub against the bone and get irritated and swollen. You're more likely to get this when you twist or slide and fall while over lunging the front leg.

Torn Meniscus



A sudden twist or pivot -- especially with your full weight on your knee -- can tear a meniscus, the rubbery cartilage that acts as a cushion between the bones of your thigh and shin. You have one on each side of your ACL. They may be more susceptible to tears. The pain can be hard to pinpoint and describe. Your knee may get stiff, swollen, and hard to move and extend.

Fencer's Knee

You'll feel this in the front of your knee, around the kneecap. Your knee may hurt after you sit with it bent for a while or when you try to kneel. It may pop or crack when you climb stairs. Typically, patellofemoral pain syndrome comes from overuse, misalignment between your hip and ankle, a weak thigh muscle, or the breakdown of cartilage behind your kneecap -- or a combination of these. It's common in fencing.

What You Can Do

RICE -- rest, ice, compression, and elevation -- can often help, too: Get off your feet. Raise your leg so it's higher than your heart. Put a cold pack in a thin cloth or towel on your knee for 10-20 minutes at a time, several times a day. Wrap an elastic bandage around your knee when you're up and about, snug but not tight.

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