Lift Correctly – Optimize Gains (Volume II: The Lunge)

In this second segment of the "lift correctly – optimize gains" series we will cover aspects related to proper technique during the forward lunge. Lunging exercises of all types are very popular among fitness enthusiasts and offer variety to training the hip and knee. Since most people are not properly instructed on the movement techniques, the actions are commonly performed with movement errors or in a way that creates an elevated risk for connective tissue irritation or acute overuse injury at the knee joint. This is quite unfortunate as the lunge is a very programmatically-useful, closed-chain exercise; activating a number of muscle groups in the lower body and trunk. An added advantage of the lunge movement is the muscle activation and ROM can vary based on the direction of the action and the position of external load. Adjustments allow for improvements in strength and flexibility at the hip, knee and ankle joints when performed correctly. Another relevant aspect of the movement is related to the split stance position used during forward and backward lunging. The exercise action enhances pelvic stability by preventing undesirable tilts of the pelvis during the movement.

Many people commonly perform the lunge using the forward direction only. However, it is important to note that the reverse and lateral aspects can provide greater activation in the hip musculature when mixed into the program. The joint actions involved during the concentric phase of all lunges employ hip and knee extension which suggest the glutes and quadriceps must be active at some level; that being said, the movement direction changes the prime mover and will increase or decrease the activity of other contributing movers and stabilizers including the iliospoas, sartorius, soleus, gastrocnemius. Likewise, the abductors and adductors play a varied role depending on the direction and may be primary to movement in the frontal plane or function as assistive movers or segment stabilizers in the sagittal plane. The lunge is an exceptionally versatile action as numerous types of external resistance can be used and movements can be added to create a countless number of activities. The lunge is often used as part of exercise combinations due to the very wide variety of actions it can be combined with to increase total kinetic chain connectively or movement complexity (e.g., lunge with plate rotation, reverse lunge to overhead press, lateral lunge with frontal raise).

Comparing Lunge Variations

Forward lunge (single anchor) – prime mover emphasis: Quadriceps

ROM emphasis: Hip Flexors

Reverse lunge (single anchor) – prime mover emphasis: Gluteals

ROM emphasis: Gluteals

Lateral Lunge (single anchor) – prime mover emphasis: Hip Abductors

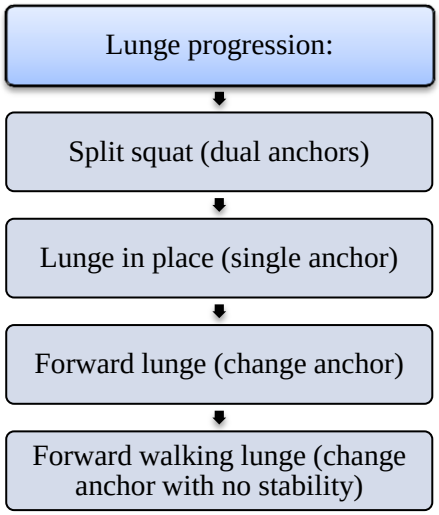
ROM emphasis: Long Hip Adductors

Walking lunge (change anchors) – prime mover emphasis: (Movement Cycle) – Gluteals, Hamstrings and Quadriceps

ROM emphasis: Hip Flexors

Basic Progressions

Many trainers make the mistake of assuming that a novice client should be able to perform a "traditional" lift such as a lunge with little difficulty when it is introduced. Proper exercise movements are certainly not innate in humans, and the body does not naturally gravitate toward perfect biomechanics. Therefore, the first step when introducing any exercise is the skill acquisition phase. This period is related to the development of proprioceptive and kinesthetic awareness, balance and neuromuscular coordination – qualities that must be synergistically integrated during the lunge activity. Additionally, proper progressions must be employed on a client-to-client basis. The diagram to the right could be used as a progression schematic (based on mastery of each component) leading to eventual performance of a walking lunge. The common rule is to master the skill, before loading the skill, before challenging the skill. A skill that has not been mastered will demonstrate movement inefficiency or fault when loaded.



Teaching Cues

There are many effective teaching cues that can be used to ensure a client performs the lunge correctly. The static lunge or split squat should be mastered first to ensure competent and efficient movement without undue lateral sway at the knees or hips or tibial translation at the patella. When the exercise becomes more dynamic instructors must be cognizant of limb length and movement mechanics. During the forward and reverse lunges, the movement distance of the hips must be greater than the femoral length or the knee will cross the toe. Essentially, the participant should take a large step using the back knee to guide the hips. Regardless of the direction in the sagittal plane, the back leg is always the controlling mechanism of the pelvis. Ideally and under control, the movement will accommodate 90° hip and knee flexion (forward thigh parallel, rear thigh perpendicular with the floor) in both of the lower extremities. Greater range may be attained dynamically if used for ROM purposes, but excessive knee flexion under load is undesirable due to hyaline cartilage friction.

During the forward lunge the participant will push back using a flat foot (balls of the feet to the heels) to the starting position. Lateral sway is usually due to kinetic chain instability whereas tibial translation is usually the result of taking too short of a forward step or not lowering the pelvis in conjunction with anterior movement of the center of mass. When the pelvis remains elevated it prompts excessive dorsi flexion at the forward ankle. Translatory forces placed upon the connective tissues of the knee joint from a sagittal-plane deviation of the tibia can cause microtrauma in the knee. The weight and forward accelerative force of the thick, heavy tibia bone pulls on the connective tissues that

help maintain patellar position and knee stability. To ensure this does not occur, the forward foot must be flat on the floor and the rear ankle should be dorsi flexed with the weight balanced on the ball of the foot. A quick test of load location is to ask the client to "tap their toes" of the front foot to ensure they have the weight toward the heel instead of the distal aspects of the foot (toes), which increases knee stress. During the forward extension phase the client must maintain balance with an upright torso while producing the majority of the force (~70%) with the knee and hip extensors.

The reverse lunge is more difficult from a proprioceptive standpoint, making it relatively difficult for those who lack adequate kinesthetic awareness. From a biomechanical standpoint, the risk for tibial translation will be lower due to the backward movement. This rearward transition of the hips and pelvis forces a greater relative activation of the posterior chain musculature, including the hamstrings and gluteals. However, lateral sway and loss of balance is more prominent during the reverse lunge when compared to a forward lunge. It takes a greater degree of neuromuscular coordination to move backward for most people as it is an unfamiliar movement action and lacks the afferent data of sight. During the reverse lunge, the participant engages in the same lunging action as the forward direction, attaining the 90/90 position at the bottom of the eccentric phase, but must then push the body back to the starting position primarily via activation of the posterior-chain musculature in the anchoring leg.

The lateral lunge is likewise challenging for novice clients due to coordination and ROM requirements. As mentioned earlier, the hip adductors will be stretched to a significant degree, especially the long adductors such as the gracilis during single knee flexion. The lateral lunge variation is valuable to many programs as most clients spend a great deal of their lower-body training time in the sagittal plane, but little in the frontal plane. Lack of frontal plane lower body movement can lead to strength imbalance within the gluteals and hip abductors/adductors; especially the gluteus medius, gluteus minimus and tensor fascia latae. During performance of the lateral lunge the participant takes a broad step in the frontal plane abducting both hips to about 45° relative to the midline. As the step foot makes contact with the ground the participant should drop the hip back and downward so that the ipsilateral (opposite) knee

flexes to 90 degrees. The knee should not cross the toes nor continue to progress in a lateral fashion in the direction of the lunge. The anchoring foot should remain flat on the ground with the knee fully extended to maximize adductor ROM and allow for an efficient hip movement back to the starting position.

Corrective Strategies

Spotting during lunges should be primarily managed with tactile and verbal cues. The following diagram summarizes major movement errors seen during the forward lunge with verbal and physical methods for addressing the issues.