Kathy's ladies healthclub

By Robin Weiss

Open and Closed Chain Exercises

You may not have heard of open and closed chain exercises. But chances are, you do them all the time without even knowing it. It's important to understand the difference between the two because one type is safe for most of us while the other can increase our risk of pain and injury.

All of our bones and muscles are connected in a "chain" that is referred to as the kinetic chain of the body. All the movements we make are part of that kinetic chain.

During **Open Chain Exercises** our hands or feet are **free to move.** These types of exercises usually isolate a **single muscle group** and a **single joint**. For example, the one joint involved during a leg extension is the knee and the muscle group it isolates is the quadriceps. Open chain exercises can be done with or without added weight. But, when weight is added, it's usually placed at the distal (far away) portion of the limb, such as the ankle. Examples of open chain exercises include chest presses, biceps curls, leg curls, and leg extensions.

During **Closed Chain Exercises** our hands or feet are in a **constant, fixed position**, which is usually on the ground. These types of exercises work **multiple muscle groups** and **multiple joints** at once. For example, the multiple joints involved in a squat are the knee, hip and ankle; and the multiple muscles groups are the quads, hamstrings, hip flexors, calves and gluteals. Closed chain exercises can be done with body weight alone or with added weight. When external weight is added, it is usually rested across the back of the shoulders or the front of the chest. This is safer than the distal placement of weight during open chain exercises. Examples of closed chain exercises include pushups, pull-ups, squats, and lunges.

Which is better for us and why?
In general, exercise physiologists, physical therapists, and athletic trainers agree that **closed chain exercises are better for us.** Here's why:

1. Closed chain exercises improve our "functional" fitness because they better mimic activities in our daily lives. They're also great for athletes because sports require multiple joint and muscle movements to happen at once. Very few movements in real life or in athletics isolate joints and muscles like open chain exercises do.

2. Closed chain exercises work many muscle groups at once. So, in addition to the reasons in #1, they allow us to get more benefit in less time.
3. Closed chain exercises are safer for our joints. This is especially true for joints that are very vulnerable to stress and injury, such as the knee joint. The force involved in closed chain exercises, like lunges and squats, is *compressive*. This type of force *stabilizes* our joints and helps strengthen them. In contrast, open chain exercises, like knee extensions and hamstring curls, produce *shear force.* This type of force *stresses* our joints and is more likely to cause injury. In the case of extensions and curls, the highest injury risk is to the ACL.

How does this affect your workouts?
If you already suffer from joint pain or a previous joint injury, you should try to avoid open chain exercises at that particular joint. For example, if you have bad knees, do squats and lunges (closed chain exercises) instead of leg extensions and leg curls (open chain exercises); if you have elbow pain or an injury, do pushups (closed chain) instead of chest presses (open chain); if you have shoulder issues, try pull-ups in lieu of overhead presses; and so on.

Armed with this information, we might be able to prevent problems from occurring in the first place. It gives us yet another reason why we should vary our exercise programs. We can do both open and closed chain exercises, but now that we know the difference between the two, we can choose what's best for us. For example, since our knee joint is the most vulnerable joint in our body, it would be best to limit the amount of open chain exercises we do for our lower body, especially when using heavy weight that is added to the distal part of our leg. Since the joints of our upper body aren't as prone to injury as the knee, they can handle equal amounts of open and closed chain exercises. But, we should vary between the two on a regular basis.

Reference: SparkPeople.com 2008