



Dynamic Flexibility and Strength Training for Tennis

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A lot has been written over the last decade about both flexibility and strength training as each relates to the sport of tennis. The purpose of this article is to focus on the practical aspects of both and provide exercise recommendations that can be implemented with a minimum of equipment. The reason flexibility and strength exercises are combined in this article, is that both types of exercise go very much hand-in-hand. Our goal is to present an overview of some of the goals of a strength and conditioning program, outlining some of the necessary components to get your players performing their best on court.

Before going further into the importance of strength and flexibility training it is important to define some common terms:

Static Stretching – Stretching a muscle or muscle group until the player feels a slight tension and then holding that position for 15-30 seconds.

Dynamic Warm-up / Dynamic Flexibility Training – A series of activities or exercises designed to increase body temperature and heart rate while stretching muscles through normal movement patterns.

Strength Training – A type of progressive overload in which the player exercises against increased resistance. The goal can be to develop increased strength and/ or power.

Conditioning – Training the energy systems of the body to be able to produce and utilize energy more efficiently.

Movement Training – Specific drills and exercises designed to improve footwork, speed and the ability to change direction (agility) in ways that are important for tennis.

Functional Training – Strength exercises that are specifically designed to mimic tennis movements/ skills and train the muscles in patterns that are used in tennis play.

DYNAMIC FLEXIBILITY

Recent research has shown us that a warm up containing dynamic flexibility exercises and drills may be more productive than performing static stretching prior to a practice or competition (Faigenbaum et. al. 2005, Young and Behm, 2003).

Dynamic flexibility involves performing controlled movement about a joint or joints through a full range of motion. In tennis this would preferably be similar to the movement patterns used in the sport. Clearly, the purpose of a warm-up is to prepare a player for the movements and intensity they are about to perform. The benefits of dynamic flexibility are as follows. It allows for:

1. The gradual and progressive warming of the body's temperature and increase in heart rate.

2. A gradual increase in the elasticity of muscles and tendons by actively stretching the muscle, using movement.
3. The incorporation of balance, coordination and strength components.
4. The incorporation of movement techniques that might otherwise require a specialized practice session.
5. Developing coordination and readying the player mentally by focusing on specific movement patterns and body control.
6. Using muscles in “patterns” that players might find themselves in during a match.

A dynamic warm-up is an important component of any pre-practice or pre-competition routine and should involve a gradual progression of basic skill movements to more complex movements. A specific order of exercises will also assist in making sure all major body parts are included. Typically, players should start with the larger muscle groups and end with the smaller ones.

Any number of exercises can be incorporated into a dynamic warm-up, but several routines using exercises presented in the USTA's Dynamic Warm-Ups for Tennis DVD (Human Kinetics, www.humankinetics.com) are outlined below.

Sample Routine I	Sample Routine II	Sample Routine III
Glute Bridges	Monster Walks	Quadruped Exercise
Scorpions	Leg Cross Overs	Crossover Skipping
Backward Lunge & Twist	Arm Hugs	Lateral Leg Swings
Arm Swings	Pillar Skipping	Low to High Chops
Knee Hug Lunges	Sidelying Hip Abduction	Caterpillar
Handwalks	Lateral Skipping	Alley Hops
Straight Leg March	Lateral Lunge	Trunk Rotations
Skipping	Hip Crossover	Lateral Reach
Shoulder External Rotation	Rapid Rotations	Lateral Bridge
Butt Kicks	Marching	Forward Lunge

Table 1. Samples of a dynamic warm-up

It is recommended that players take approximately 10 minutes before practice or competition to perform these dynamic warm-up exercises. The exercises only need to be performed for 30 seconds but players should only take short rests between them.

But what about static stretching? Do tennis players still need to include this as part of their training? The answer is YES! Static stretching is necessary to maintain normal range of motion around joints. In fact, because tennis player characteristically become tight in specific muscle groups due to the repetition of certain movement patterns, static stretching can help reduce the effects of this adaptive tightness, thus helping to prevent injury. There is a proper time to stretch, however, and it is not right before a competition. Recent research studies have even indicated temporary decreases in muscle strength (Behm et. al., 2001, Fowles et. al., 2000, Guissard and Duchanteau, 2004, Nelson et. al, 2004) and power (Young and Behm, 2003) immediately after static

stretching. These effects can last for as long as 60-120 minutes after the stretching has occurred. Therefore, if players still feel they should stretch before a match, they should complete their stretching routines at least 60 minutes before the start of their match.

Many tennis players could benefit from increased flexibility in the following areas:

- Calf muscles
- Hip flexors
- Shoulder External Rotators (improving internal rotation)
- Lower back muscles

However, when possible a full body flexibility plan is recommended to maintain range of motion about all joints in the body and optimise on-court performance.

STRENGTH TRAINING

Similar to the field of flexibility, strength training has seen some considerable changes over the past decade. Look at today's player as well as the demands of the game and you will quickly realize a player needs both power and endurance to succeed at the highest levels. In addition, players need to avoid injuries that would keep them from being able to practice or compete. As a result, strength training has become more functionally based and sport-specific; there has been a movement away from a "body-builder strength-training" mentality and the focus is now more on incorporating tennis-specific exercises integrated with an injury prevention program.

Any strength training programme should have two distinct, but equally important, components: training for injury prevention and training for performance enhancement. Because of the unbalanced nature of the sport, tennis produces players with noticeable strength imbalances throughout the body. It is paramount that players address these imbalances to ensure proper joint function and minimise the risk of injury. In particular, tennis players need to focus on developing strength in the following areas:

- External rotators of the shoulder.
- Hip extensors and hip abductors.
- Upper back muscles that stabilise the shoulder blades.
- Core musculature, particularly the lower back muscles.

The player's goal in strengthening these areas should be to build a base level of muscular endurance by performing several sets of 15-25 repetitions using moderate levels of resistance. This foundation of strength should be developed first, addressing strength imbalances before engaging in exercises and drills that will build maximum strength or power.

Many of the strength training methods used effectively in tennis involve multi-joint exercises that complement the needs of the player. When designing a strength training program, we focus on areas of the body that are most commonly injured in the competitive player as well as those body parts that require explosive strength or muscular endurance. Key areas in high performance players include the shoulder, low



back, wrist, elbow and hamstrings and some sample exercises that can be used to train these areas are listed at the end of this article.

TRAINING PROGRESSION

It is unsafe and unreasonable to expect a player who has never engaged in strength training before to immediately be able to perform high intensity exercises. There is a progression every player should follow, regardless of how talented they are on the tennis court. The first step should be to build a baseline level of muscle strength and endurance. This is accomplished by lifting moderate weights for a large number of repetitions. For some players, those who are young and/or are recovering from an injury, the training progression may end right here – at least until the player has hit puberty or gotten over the injury. For others, after a base of strength is developed, the player can then move more toward building maximal strength and power, using higher intensity plyometric exercises and possibly Olympic lifts to boost performance. As a final step, the player engages in more tennis specific activities that model the movement patterns and coordination a player needs on court. While each of these phases are appropriate at specific times in a player's physical development, they should also be included at various times throughout a training year – a process known as periodisation. Keep in mind that strength training is a long term commitment. What a player does today will help today, but the true rewards will come from making this an integrated part of an overall training plan.

WORKING WITH YOUNGER PLAYERS

Strength training can be safely used with adolescent and preadolescent tennis players provided that proper exercise technique is taught to the players and EVERY exercise session is supervised by a qualified strength and conditioning coach (Faigenbaum et. al, 1996, American Academy of Paediatrics, 2001). However, certain guidelines should be followed. The focus of a strength training programme should be on developing muscle endurance and a base of strength. This can include some low level plyometric exercises, but high intensity power training should not be used until after the player has gone through puberty. Until this time, power training provides minimal benefit since players do not produce the anabolic steroids (like testosterone) that will lead to significant increases in muscle mass and power. Other safety precautions that should be followed with younger players include:

- Make sure players have the emotional maturity to be able to follow instructions and understand the goals of strength training.
- Do not encourage competition between players.
- Similarly, do not have athletes attempt to lift maximal loads. Player should perform multiple sets of 15-25 repetitions per set.
- Do not have players perform overhead lifts.
- Use body weight (or less) in many of the exercises you use.
- Always emphasise proper technique on every repetition of every set.

TRAINING WITHOUT “EQUIPMENT”

One of the problems players face when trying to maintain a strength and conditioning programme is having only limited access to equipment. While well-equipped training facilities offer some advantages to a player, there are plenty of ways to perform strength training and conditioning exercises using “other means”. Think of the training tools that can easily fit into a travel bag. Elastic bands can be used to help develop strength in the legs, particularly the hip abductors. Stretch cords can be used for training the rotator cuff and upper back muscles. Small medicine balls can be used to train the core and/or explosive power in different body parts. Cones can be used to set up movement and agility drills on court. Use a player’s body weight, or resistance applied by another player, to provide the stimulus for strength development. The possibilities are endless – be creative and don’t get into the habit of thinking that every exercise has to be performed on a weight “machine” or use a piece of equipment.

PUTTING IT TOGETHER ON-COURT

Below are some exercises you can use to develop strength in the players you work with, and none of them require the use of special equipment. The exercises listed are organised from the larger body parts to the smaller body parts and also start with lower intensity dynamic flexibility exercises and increase in intensity with a larger strength component.

EXERCISES FOR TENNIS

General/Overall Body

Jogging
Side Shuffle
Carioca
High Knees Marching (arms and no arms)
High Knees
Heel Kicks

Back/Trunk

Standing Trunk Rotations
Standing Trunk Rotations with Pivot
Standing Trunk Rotations into Lunge
High Knee Trunk Rotations
Supine Bent Knee Crossover
Supine Straight Leg Crossover
Prone Leg Over
Prone Press-Up

Hips/Quadriceps

Leg Cradle
Walking Knee to Chest
Forward Hurdle
Backward Hurdle
Over and Under
Forward Lunge
Forward Lunge with Forearm to Instep
Backward Lunge
Ready position Side Steps
Speed Skating

Hamstrings

Inverted Toe Touch (Hole in One)
Caterpillar/Hand Walk

Ankle

Toe Walk
Heel Walk
Ankle Circles

Neck/Shoulders

Lateral Flexion – Ear to Shoulder
Neck Rotation – Chin to Shoulder
Neck Flexion – Chin to Chest
Shoulder Shrugs
Arm Hugs
Mini Arm Circles
Full Range Arm Circles
90-90 Internal/External Rotation

Medicine Ball Combination Exercises

Service and Overheads
Groundstrokes
Volleys

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