

Stretch Yourself

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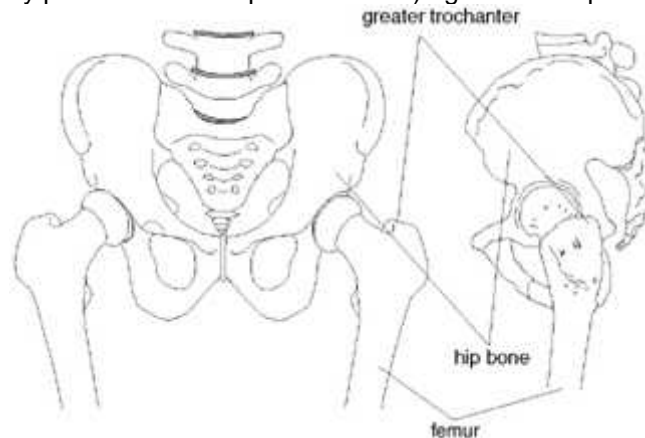
Difficulties with Doing a Side Split

by Thomas Kurz, author of *Stretching Scientifically* and *Secrets of Stretching*

This is the second installment of my column on training that appeared in May 1999 issue of *TaeKwonDo Times*.

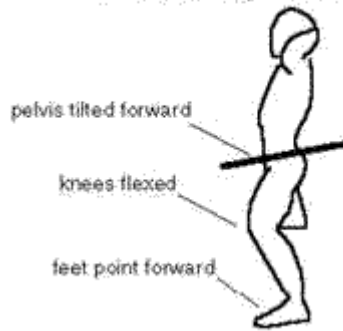
In the first article of this column (in *TaeKwonDo Times* March 1999) you have learned how to determine if you have the potential to do a side split, even before you start your stretching program. You have also learned that for many adults, who can perform the side split test, side or straddle splits are still very difficult. At a certain point, well before sliding into a full split, they feel that there is a "stop," accompanied by pain in the outside hip or upper thigh region that prevents them from sitting in a full side split. In this article you will learn what causes it and what to do about it.

The problem does not seem to be related to the adductors (inner thigh muscles), as they do not feel much tension there. As they continue stretching, their flexibility does improve, but at a very slow rate. This perceived barrier is a very common problem for people who start stretching as adults. The pain and limitation of the movement sideways in the side (straddle) split is caused by spreading (abducting) the thighs without tilting the pelvis forward. This tilt unwinds capsular ligaments of the hip, among them the pubofemoral ligament that in a normal, non-flexed position would resist excessive abduction and would also, during straight abduction, push up the neck of the femur (thigh bone) into the cartilage collar (labrum acetabulare) at the upper edge of the hip socket. For persons in whom the angle between the neck and shaft of the femur is less than 135°, abduction without tilting the pelvis jams the greater trochanter (a bony process on the top of the femur) against the hipbone.

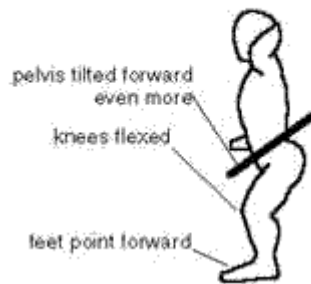


The forward tilt of the pelvis (hip flexion) realigns the hip joint so its ligaments relax, the neck of the femur does not jam the cartilage at the upper edge of the socket, and the greater trochanter fits into a space behind the hip socket. This is the alignment of your hips in the proper horse-riding stance and this is why alignment of your hips, thighs, lower legs, and feet in a side split should be the same.

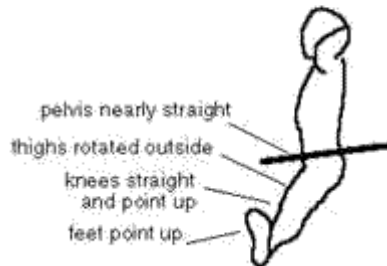
**Starting position for a side split
with feet pointing forward**



**Starting position for a side split.
End position in a side split
with feet pointing forward**



**Getting into a side split:
legs are spread sideways and pelvis is tilted forward.
End position in a side split
with feet pointing up**



**Side split with feet pointing up.
The hips are straight thanks to the rotation of the thighs.**

Note that in doing a side split with toes pointing forward you not only spread the legs sideways, but also tilt the pelvis forward. In a side split with the feet pointing up, you keep your pelvis straight but rotate the thighs outward. The alignment of the hips and thighs in both types of the side splits is the same.

Another way of finding the correct alignment is to use the horse-riding stance as the initial position for your isometric stretches leading to the side split. Just make sure that your stance is perfect, with your thighs parallel to the floor at any width, toes pointing forward, and chest up.



Front view of a "five-step" horse stance



Side view of a "five-step" horse stance



Front view of a "seven-step" horse stance

To sum it all up, you cannot do the side split without either rotating your thighs outward or tilting the pelvis forward. The outward rotation or the forward tilt (hip flexion) unwinds capsular ligaments of the hip, among them the pubofemoral ligament, which resists excessive abduction. Spreading the legs without these additional movements twists and tightens the ligaments of the hip and pushes up the neck of the femur into the cartilage collar at the upper edge of the hip socket. For persons who have coxa vara (less than 135° angle between the neck and shaft of the femur), abducting the thigh without tilting the pelvis jams the greater trochanter against the hipbone above the acetabulum (hip joint cavity).

This jamming of either the neck of the femur into the cartilage or of greater trochanters against hip bones is the cause of pain and of a limit to the sideways movement in both the side split and the raising side kick.

If the outside of your hips hurts when you do high side kicks you need to learn how to tilt your pelvis while you kick. The same forward tilt of the pelvis that helps to do a side split will let you raise your leg higher to the side because the reason for the pain and limitation in the sideways movement in both side kicks and in the side split is the same. In the next issue you will learn how to test if your joints and muscles of your thighs and hips will permit you to do a front split.

My area of expertise is conditioning for sports and martial arts, but I am most known by martial artists as the author of the book ***Stretching Scientifically: A Guide to Flexibility Training*** and of video ***Secrets of Stretching***.

Even though this column is titled "Stretch Yourself" it will deal with nearly all aspects of physical training as all of them are interrelated and should not be considered separately.

I will provide readers with information they can put immediately to use and experience its benefits, often right away too. In the course of providing this information I will dispel some harmful yet persistent misconceptions on exercise and training methods. Here are some of these misconceptions.

- That most people can't do splits because of structure of their joints and length of their ligaments
- That it takes long time to achieve great flexibility
- That strength training limits flexibility and speed
- That static stretches, such as attempts at doing splits, are to be done during a warm-up to improve range of motion and prevent injuries
- That stretching prevents injuries

There are other misconceptions and I will address them as they come up in discussing specific issues and answering readers questions.

In this issue I will address the first misconception: That most people are kept from doing splits by structure of their hip joints and length of the hip joint ligaments.

There are simple tests that show you that for the great majority of people the structure of joints and the length of ligaments are not the obstacle for doing splits. You can use these test to determine if you have the potential to do front and side splits before you start your stretching program. (Yes, there are people who cannot do side splits because of hip joint deformity called coxa vara.)

Here is the side split test: Stand beside a chair or table and put your leg on it as shown below. Make sure that both your hips and your raised leg are all in one line. Repeat this test with your other leg.



If you think that the length of your muscles and structure of your hips will not let you do side splits, try this test... The leg resting on the chair is in the position it would have in a split.

Now, what have you done? You have done "half side splits" with both your legs!

You have proved to yourself that both your hip joints have all the mobility (range of motion) needed for a full side split!

You have also proved that the muscles of each of your legs are already long enough for a side split. You know that no muscle or ligament runs from one inner thigh to the other (or, if you don't know it, you can ask your doctor). So, what keeps you from doing the whole side split with both legs spread sideways at the same time? Your nervous system, that's what!

I will not bore you here with explaining how that happens. The important thing is that with the right stretching method you will teach your nervous system to let you do side splits any time, without any warm-up.

The right method works with your nervous system and lets you do splits within months, sometimes even weeks. Other ways of stretching take more time and bring worse results because they work against your nervous system.

I stress a *method* as opposed to mere stretches. You may know many stretches but it is not stretches alone that make the difference in flexibility. What does make a difference is *when* and *which stretch* or exercise you do during your workout.

Many adults, who can perform the side split test with ease, have a great deal of difficulty with side or straddle splits (but not necessarily with front splits) due to a problem in the outer part of their hips. When the limit is reached, they feel that there is a “stop,” accompanied by pain in the outside hip or upper thigh region that prevents them from opening their legs very wide. In the next issue I will tell you what to do about it.

In the first article of this column (in *TaeKwonDo Times* March 1999) you learned how to determine if you have the potential to do a side split, even before you start your stretching program. In this article you will learn if the joints and muscles of your thighs and hips will permit you to do a front split. Here is the front split test: Stand in a deep lunge. If your thighs are nearly in one line, as they would be in a front split, it means that your hip joints and their ligaments do not prevent you from doing the front split. Only tightness of your hamstring and calf muscles, and in some cases of the iliopsoas muscles, may keep you from sitting in a flat front split with both legs straight. With the right stretching method you will relax, or even elongate, these muscles and be able to do the front split with no warm-up.



Deep lunge. The knee of the front leg is flexed and the thighs are nearly in one line.

In both the front split test and side split test, relieving the tension of the muscles around the joint increases the joint's range of motion, proving that only muscular tension prevents you from doing splits. Muscular tension has two components: the tension generated by the contractile elements (muscle fibers) and the tension present even in an inactive, denervated muscle, exerted by the connective tissues associated with the muscle.

Some authors (M. J. Alter, B. Anderson, H. A. deVries, S. A. Sölveborn) claim the connective tissue tension to be the main factor restricting flexibility. They advocate slow static stretching, even in a warm-up, as if muscles were pieces of fabric to be elongated to a desired size. Ramsey and Street (1940), however, prove and state clearly that if the range of extension does not exceed 130% of resting length (30% more than resting length), the resting tension in a noncontracting muscle is very small. (The resting length of a muscle is the length of an uncontracted and unstretched muscle in the body.)

Also, Shottelius and Senay (1956) show that, in a muscle stretched to well over 100% of its resting length, the passive tension generated by its connective tissue is a small fraction of the tension due to active contraction. They show that eventually, at approximately 120% of a muscle's resting length, the two components of muscle tension contribute equally to total tension. At greater lengths, the passive tension increases while the active tension, generated by contracting muscle fibers, decreases.

For practical purposes, as long as you feel your muscles contract in response to a stretch, it means that relaxing them can improve your stretch and that you should concern yourself more with nervous regulation of the muscles' tension and less with the muscles' connective tissue. This concept is most strikingly demonstrated in the side split test shown in the March 1999 issue of *TaeKwonDo Times*.

In the next column you will learn about kinds of flexibility and about the role of splits in taekwondo, karate, and kickboxing. (If you think splits are necessary for kicking high, you are wrong.)

In previous articles in this column (in *TaeKwonDo Times* March 1999, May 1999, and July 1999) you learned how to determine if you have the potential to do [a side split](#) and [a front split](#), even before you start your stretching program. In this article you will learn about kinds of flexibility and the right role for splits in kicker's training.

There are three kinds of flexibility:

Dynamic—The ability to perform dynamic movements within a full range of motion in the joints. High kicks are a display of dynamic flexibility.

Static passive—The ability to assume and maintain extended positions using your weight (splits), or using strength not coming from the stretched limbs, such as lifting and holding a leg with your arm or by other external means.

Static active—The ability to assume and maintain extended positions using only the tension of the agonists and synergists while the antagonists are being stretched. One example is lifting the leg and keeping it high without any support.

The principles of flexibility training are the same in all sports. Only the required level of a given kind of flexibility varies from sport to sport.

Flexibility training is speed-specific because in the muscle there are two kinds of stretch receptors, one detecting the magnitude and speed of stretching, the other detecting magnitude only. Dynamic stretches improve dynamic flexibility and static stretches improve mostly static flexibility, which is why it does not make sense to use static stretches as a warm-up for dynamic action.

Flexibility training is also joint-specific. One person may have great flexibility in some joints but not in others, some joints may have great range of motion in one plane of motion but not in all planes. Finally, flexibility training is position-specific. If you stretch lying down but display your flexibility standing up, your range of motion is going to be worse than if you stretched standing up (Breit 1977). Dynamic stretching by using movements similar to the task—for example, leg raises before kicking, lunges before fencing, arm and racquet swings before playing tennis, done with gradually increasing range and speed of motion—facilitates neural pathways that will be used in the task. (Facilitates means “increases the excitability or receptivity of the neurons involved in the movements because of repetitive use or because of the accumulation of impulses arriving from other neurons.”) These movements of gradually increasing similarity in range and speed of motion require muscular contractions increasingly similar to those of the task (e.g., kick, fencing attack, serve). These contractions cause arterioles and capillaries in the working muscles to dilate in proportion to the force of contraction.

Static stretches do not facilitate these neural pathways, do not prepare the nervous system and blood vessels in the muscles for the dynamic task. You even sweat differently when warming up with dynamic actions than when doing static stretches. During dynamic exercises you sweat all over and your sweat is hot. During static stretching you sweat little, mainly on the face. This tells you that static stretching, such as attempting splits, is a poor warm-up. That takes care of the common misconception that sitting or standing in stretched positions, and attempting to do splits during a warm-up, improves one's range of motion for kicking. (In a future column I might address the misconception that static stretching before a workout prevents injuries.) Static stretches are most effective at the end of your workout, during cool-down (*Stretching Scientifically*, p. 13).

As a kicker, then, why should you be interested in doing a front split—a static stretch nonspecific for kicking that requires static flexibility while kicks require dynamic flexibility? Because being able to do the front split facilitates (though it is not necessary for) learning high side and roundhouse kicks—the position of legs in a front split is the same as in high side and roundhouse kicks (the rear leg in this split corresponds to the kicking leg and the front leg to the supporting leg). If you can do the front split, you can practice the high side and high roundhouse kicks slowly enough to control and correct your body alignment, especially of the supporting leg in relation to the kicking leg and of the trunk in relation to the legs.



Front split



and a high roundhouse kick

The side split, if done according to my method of developing flexibility and strength both at the same time, strengthens muscles of the inner thigh. These are the muscles of the supporting leg that are stressed when you do high kicks. During a kick the kicking leg displays only dynamic flexibility but the stretch on the supporting leg is more like a static stretch, albeit short. The inner thigh of the supporting leg tenses while being stretched by the momentum of your whole body moving toward a target. To strengthen the muscles of the inner thigh you can either tense them in a wide straddle stance and eventually in a side split or you can do resistance exercises such as adductor flies and adductor pulldowns (shown on the video ***Secrets of Stretching***).

In this article you will learn about the method of developing dynamic flexibility so you can kick high anytime without any warm-up.



**Tom Kurz, author of *Stretching Scientifically*,
kicks cold at age 40**

What difference does it make how well you kick if you can kick well only after warming up? Your kicks, like your punches, are supposed to be your weapons—always accessible and ready. You would not carry a gun disassembled, would you? You would not count on having the time to put it together while facing an attacker.

And yet . . . how many people practice kicks, especially high kicks, and can't use them right away without first warming up and stretching?

If you want to increase the height of your kicks and to be able to reach that height with no warm-up, you need to develop the right kind of flexibility—dynamic flexibility. Dynamic flexibility is the ability to perform dynamic movements within a full range of motion in the joints. Kicks are dynamic movements. Dynamic stretches for kickers are simple leg raises in all directions. First develop the ability to move your limbs with moderate speed within a full range of motion in the joints. You should start at a lower extension (height) to avoid injury from any sudden contraction of rapidly stretched muscles. Do not “throw” your limbs; rather, “lead” or “lift” them, controlling the movement along the entire range. Then, after you have reached nearly your full range of motion, you can increase the velocity of the limb so the last few inches of its trajectory will be less controlled but the stretch will not be sudden. Do leg raises to the front, back, and sides. Make 12 repetitions in every set and do as many sets as you need to feel you have reached your current limit of flexibility.



**a) Leg raise to the front; b) Leg raise to the back;
c) Leg raise to the side**

If you rely on high kicks as your combat techniques and want to do them anytime without warm-up, you should do dynamic stretches twice a day. Research has shown the effectiveness of dynamic stretching twice every day (Matveev 1977). First spend a few minutes in the morning (before having your breakfast) on the dynamic stretching of your legs and then later during the day do dynamic stretches again. On days you have your workout, do these dynamic stretches in the warm-up before kicking. Starting slowly, you should gradually raise the legs higher, and then you should increase the

speed of your movements. Doing the actual combat kicks in this morning stretch is not necessary to be able to do them later in the day without a warm-up.

According to Matveev (1977), eight to ten weeks is sufficient time to develop maximal dynamic flexibility.

Yes, you can have great dynamic flexibility in a matter of a few weeks and then display it even without a warm-up. All it takes is the right stretching method. Spending several months on developing your flexibility and not being able to use it without a warm-up indicates either that the stretching method you use is incorrect, you are chronically fatigued, or both.

There are several explanations for failing to make progress and being fatigued:

1) Incorrect methods of teaching skills, which may result in too many repetitions of a given exercise and chronic local fatigue.

2) Training loads that are too great and not enough rest. If you begin your workout still fatigued or even sore after the previous one, you are asking for an injury, or at least you hamper your further progress.

3) The wrong sequence of efforts. If you use the wrong sequence of efforts (exercises) in a workout or in a set of consecutive workouts, it may double or triple your recovery time (Kurz 1994, p. 64).

Now, how about all those static stretches—splits, for example—so many people try to do before kicking?

Don't! Never do static stretches before dynamic stretches, kicking, or any other dynamic movements. For several seconds or even minutes following any type of static stretch, you cannot display your top agility or maximal speed because your muscles are less responsive to stimulation—your coordination is off. Static stretches reduce the force production of the stretched muscles. This was shown by subjecting calf muscles to several 30-second stretches and measuring their force afterward (Rosenbaum and Hennig 1995). Maximal force production is impaired for several minutes after strenuous static stretching (Kokkonen, Nelson, and Cornwell 1998). If you try to make a fast, dynamic movement immediately after a static stretch, you may injure the stretched muscle. I explain these and other reasons in ***Stretching Scientifically*** (Kurz 1994).

In choosing stretches, you should examine your needs and the requirements of your activity. For example, if you are a kicker, you need mostly a dynamic flexibility of hips. To increase your range of motion, you need to do dynamic leg raises in all directions.

The principle of specificity states: Flexibility is specific to the speed of movement. Flexibility is also position specific, so static exercises or stretches like splits are not very useful if you want to kick higher (a display of dynamic flexibility). According to Logan and McKinney (1970) the principle of specific adaptation to imposed demands in the case of flexibility means that eventually, either at the end of the first set of dynamic stretches or in other sets, you should stretch at a velocity not less than 75% of the maximal velocity used in your actual skill, a kick, for example.

A common sight in training halls, gyms, dojang, or dojo, is someone standing and holding up the leg. Such standing, while requiring and developing static balance and static strength, is not developing dynamic flexibility nor dynamic strength. It is developing a static active flexibility required from gymnasts but not something that kickers need. Such leg holding requires a strong tension of the muscles on one side of the trunk when the lower back is twisted to this side and pulled forward by the psoas muscle on the same side. This, if done by someone with insufficient lower back strength or any back problem, can lead to lower back strain or intervertebral disc inflammation.

As far as strength is concerned, the specific strength for a kicker is the strength that lets one pack a wallop in a kick, not to hold up a leg! Specific strength for kicking is developed by kicking a heavy bag, kicking into layers of sponge, kicking with bungee cords attached to legs and doing other dynamic exercises similar to kicking. Strength, just like flexibility, is specific to the speed of movement, its angle, and range of motion. This is explained by McArde, Katch, and Katch (1991). You cannot learn dynamic skills well by using static exercises, and vice versa.

There is more to throwing high kicks without any warm-up than the right type of stretching. In the next column you will learn the “little” details of kicking techniques that let you kick high and with power without a warm-up.

Apart from the right way of developing your flexibility — meaning doing the right stretches at the right time, to throw high kicks without any warm-up—you need to know and practice the right technique of kicking, including the right body alignment. In this article you will learn the correct body alignment for the high side kick. The high roundhouse kick I will discuss in the next article.

When I took up karate in Poland, at the age of 20, it was obvious to me that if some people had to prepare, stretch, and loosen up before kicking, then there was something wrong with them or with their kicks.

I knew how to stretch because I was already at the AWF (University School of Physical Education). But some karate instructors were showing me high kicks that would stress my joints even though my flexibility was good. The problem was that the body alignment that worked for a given kick when it was aimed low (as in original Okinawan karate) did not work when the kick was aimed high—did not work, that is, unless one had an extraordinary range of motion in the hips and lower back joints. (The high kicks that appeal so much to young people were introduced into karate by Yoshitaka Funakoshi, son of Gichin Funakoshi, without any attention to whether they made sense in combat [Draeger 1974, p.134].)

Luckily I met Mac Mierzejewski, the author of *Power High Kicks with No Warm-Up!*, a knock-down karate fighter and instructor who also studied at AWF. He was less flexible than me, but he could throw any kick higher than I could, with knockout power, and without any prestretching.

During our individual workouts he taught me how to align the body for great height and power in the kicks without having to reach the limits of one's range of motion in the hip joints. He had to show me the "little" details of kicking techniques that let you kick high and with power without warm-up! As a bonus, these same little details reduce your chance of injury.

Yes, you can learn how to throw high kicks "cold" without injuring yourself, pulling muscles, or even getting sore. All you need to do is to learn (and practice!) the right body alignment to make sure your hips and knees don't hurt when you throw high side and roundhouse kicks.

I will use the example of a raising side kick (*yoko keage* in karate), a kick that should be learned before learning the high thrust side kick (*yoko geri kekomi*, in karate, *yop-chagi* in taekwondo), to show how small adjustments of your position can increase its height.

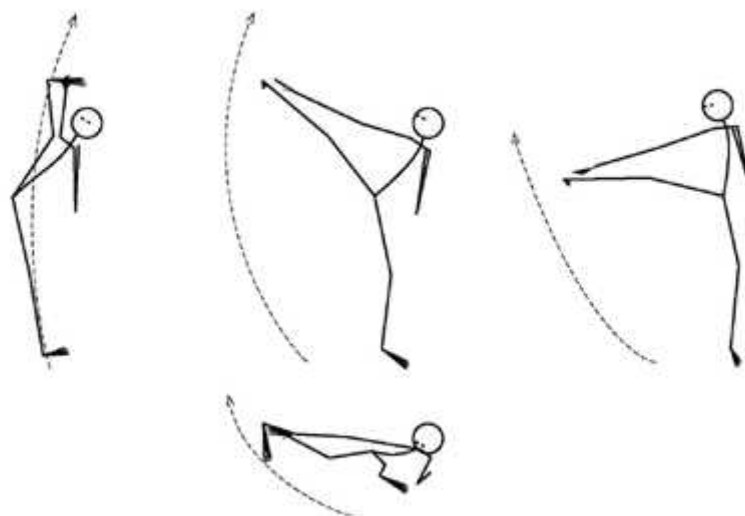
When learning the raising side kick, you should start with the leg raise to the side shown in the previous (fifth) article of this column in *TaeKwonDo Times* November 1999. This exercise (leg raise to the side) will eventually allow you to reach a higher side kick. Many people experience quite a bit of discomfort, even pain, in attempting this dynamic stretch. They can only raise each leg to about 45 degrees (and it hurts doing that).

Their problem? They try to keep their leg straight, and to raise it straight sideways while attempting to keep their whole body straight too. This is typically the cause of difficulties and hip pain among beginners attempting this kick. Those who are not shown this leg raise or raising side kick in its combat application tend to do it this way.

To dramatically increase the height of the raising side kick, you need to tilt your pelvis forward as you raise your leg sideways. To learn its proper form do this: Stand with your feet together, extend your right arm to the side, hand at your hip level, palm down. Slightly bend your right leg in the hip and knee joints. Form your foot correctly (knife foot, *sokuto* in karate, *balnal* in taekwondo) for the side kick. Raise the right leg such that you kick your palm with the side of your foot. Start from hip level, and gradually increase the height of your kicks. Make sure that you lean forward and your knee is slightly bent, and that it raises ahead of your foot. Kicking your palm forces you to align your trunk, pelvis, and thigh just right for the greatest range of motion in your hip joints. Note especially the amount and direction of the forward lean in the drawings below.

*Leg raise to the side,
side view*

*Leg raise to the side,
front view*



*Leg raise to the side,
top view*

Another purpose of kicking your palm is to keep this dynamic stretch from turning into a ballistic, uncontrolled stretch and to prevent overstretching.

By the way, the cause of the pain and the limitation of the movement sideways in both the raising side kick and the side split is the same. It is caused by spreading (abducting) the thighs without tilting the pelvis forward. The “cure” for the pain on the outside of the hip is to tilt the pelvis forward (which is the same as flexing the hips) while attempting the side kick or side split. The alignment of hip, thigh, lower leg, and foot in a raising side kick should be the same as shown in a side view of the horse-riding stance (see the second article of this column in *TaeKwonDo Times* May 1999).

Children below age 11 do not experience this limitation of movement because the angle that the necks of their thigh bones make with their hip bones is different than in adults. In children, the neck of the thigh bone goes more sharply down and slightly forward. This makes the neck of the thigh contact the upper edge of the hip socket at a greater range of abduction than in adults and keeps the trochanter away from the hipbone so it does not restrict motion as much as for adults. As the children grow, that angle gradually changes. The neck of the thigh becomes closer to a horizontal plane and rotates more forward. These changes reduce the abduction of the thigh, as well as the outside rotation of the thigh (also known as “turn-out” or “first position” in ballet). Around age 11, that angle gets set. I explain how the outside rotation relates to a side split on page 17 of ***Stretching Scientifically***.

To throw powerful high roundhouse kicks you need to align your body as follows:

1. The thigh of your kicking leg and your spine viewed from above lie along one line (are in one plane).
2. Toes of your supporting foot point away from your target—they are at about 135° or more from the line formed by your kicking leg.
3. The line of sight from your eye to your target goes just in front of the shoulder (right shoulder for the right kick, left shoulder for the left kick), over your hip and extended kicking leg.
4. The arm on the same side as the kicking leg drops behind your back. The arm on the side of the supporting leg protects your face.
5. The higher you kick, the higher you should chamber your kicking leg (in other words, raise your flexed leg so its knee points at or above your target) and the lower you should drop your trunk. Your kicking leg and your trunk are the two pans of a scale, balancing on your supporting leg. The lower you lean your trunk, the higher you can raise your chambered kicking leg. When beginning to learn the high roundhouse kick, you may need to lean your trunk so low that your head is below your hips. With practice you will reduce the amount of this lean.



Body alignment in the high roundhouse kick demonstrated by Thomas Kurz (on the left) and Mac Mierzejewski, author of *Power High Kick with No Warm-up!* (on the right)

Now the details of movement:

While planting the supporting foot, move your whole body forward. When you start the pivot on your supporting foot, throw your flexed leg and its hip at the target—straight at the target, not to the side. Chambering by lifting the thigh to the side causes hip pain and possible inflammation. The reasons are explained in the previous article on the side kick in *TaeKwonDo Times* January 2000.

Chamber as if aiming higher than you need to for a given target. Either an insufficiently high chamber or lowering the knee while the lower leg is thrown at the target can cause pain at side of the knee. At the highest point of your chamber start an inward rotation of the thigh of your kicking leg. The inward rotation of the kicking leg in the roundhouse kick is essential for transferring most of your force to the target—without it your kick would be a mere glancing blow—and to spare your kneecap from getting sore. This inward rotation depends on the outward rotation of the thigh of your supporting leg—the more outward you rotate your supporting leg (so your toes point at a wider angle away from the target) the greater is the inward rotation of the thigh of your kicking leg.

Is it safe for someone who has only read this description and watched people kick, to go and practice the high roundhouse kick? No.

Before learning this kick you must master several other techniques that are lead-up skills for the high roundhouse kick. The movement habits as well as strength and muscular endurance acquired while drilling these lead-up skills will make learning the roundhouse kick easy and protect you from injuries. Here is the sequence of these skills:

1. Straight punch—to acquire the habit of rotating and counterrotating hips and shoulders. Also, people who have not mastered straight punches put their arms in weird positions during the roundhouse kick.
2. High front knee kick—to develop the habit of high chamber and putting the hip into the kick.
3. Groin kick (*kin geri* in karate)—teaches flicking the lower leg without overextending its knee and returning the foot back so the heel contacts the buttock. All this happens without lowering the knee below its chambered position.
4. Front thrust kick—to acquire the habit of throwing the hip toward the target and rotating and counterrotating hips and shoulders with arms.
5. Side thrust kick—to acquire the habit of turning the supporting foot away from the target, committing the hip into the kick in a greater measure than in the front kick, plus leaning the trunk away from the target while the whole body moves toward it. It also reinforces the habit of high chamber.

These skills should be taught in the sequence given above. Each skill should be mastered to the point of being stable and reliable in contact sparring (except the groin kick, of course, which is forbidden in any kind of sparring), even under great fatigue, before the next skill is taught.

Leg raises to the front and back may be practiced right from the beginning of one's training to increase range of motion in the movements making up the high roundhouse kick. The leg raise to the side, which was described in a previous article of this column in *TaeKwonDo Times* January 2000, helps in finding the position of the hip joint that permits greater side mobility while keeping the trunk high enough for instantaneously regaining the upright position you need for punching.

Now you know how to align your body for great height and power in the roundhouse kick without having to reach the limits of the range of motion in your hip joints. To throw high roundhouse kicks without any warm-up, you have to develop your dynamic flexibility and master the lead-up skills prior to practicing the roundhouse kick.

The Post Exercise Stretch As An Important Tool In Preventing Martial Arts Trauma

By Bruce Everett Miller, PA-C

Editor's Note: *This is a second in a series on stretching. See the first article by Miller entitled, **Stretching As An Important Tool In Preventing Martial Arts Trauma.***

One aspect of stretching which seems to be almost universally ignored is the stretch which should be done during the cooling off period. When the body exercises for any significant amount of time there are waste products which build up in the muscles. There are also small amounts of muscle damage which occurs to small muscle fibers. The third thing which happens is a re-contraction of the body's muscular system.

When we are done stretching (correctly) most of our muscles are loose and flexible. As we work, however, we exert force on the joints of our body. As we have said earlier each one of these joints are surrounded by small muscle fibers to prevent joint movement in unwanted directions. In order to do this, these muscles tense up (contract), and soon non-moving joint muscles can be even tighter than before we began our initial stretch. Note, however, that it does take a small period of time for this to happen and those muscles which are in motion may tighten up but will not be as tight as they were before you stretched out.

This tightening of small motion joints is particularly important in our back. Whenever we do any significant exercise like running or weight lifting or even kicking and hitting a bag in martial arts our body's joints adjust to compensate for the force load. Vertebrae shift to take up the shock of our feet striking the floor as we run or the impact of striking a bag or lifting weights. While this may be desirable while we are under these stress loads, the vertebrae are also supposed to resume their normal alignment once the force load has been removed. However, because the muscles surrounding the vertebrae (vertebrae are joints) have contracted, it may be hard for the body to regain its correct alignment.

Since the real reason we stretch should not only be to prevent injury but to enable us to move smoother and easier throughout our entire active life styles, we need to restore the looseness of the muscles we have caused to tighten. The post exercise stretch can do this.

The proper method is gradually to decrease the amount of work you are doing. You should continue to do enough work to generate small amounts of heat in the main muscles you had been using, as you stretch back out again. This gives you the advantage of allowing those muscles that are already loose to contract slowly while you loosen up the contracted muscles.

THE AM/PM STRETCH

The fact is that most people who are on their feet a lot have pain in their back, usually their lower back. In many cases, the cause of the pain has nothing to do with any muscle, bone, tendon or ligament damage. The real cause of the damage is improper alignment of the spine.

The spines of the vertebrae stick out from each side of the vertebrae and from the back. When these spines are in proper alignment, they fit into the parts of the body which are designed, space wise, for their presence. When they move out of this natural position, they press on the tissue in the area which occupies this new space.

The body's vertebrae are supposed to be able to twist and turn. If this was not true there would be no reason for these joints. The body would be comprised of solid bone in the back which would be stronger and less susceptible to being damaged. By being able to twist, the vertebrae can accommodate the way we turn our bodies and also help take up some of the shock when we walk or do some other shock generating actions. What keeps these vertebrae from moving too far is the ligaments and muscles which surround each vertebral joint. These tendons, ligaments and muscles are supposed to let the vertebral joints rotate in the correct angles but also keep them from moving out of position with each other.

Unfortunately, our body works on a use or lose principle. When we do not stretch out these muscles and ligaments, they naturally tend to shorten with time and age. Soon we are left with ligaments and muscles which give us the range of motion we need for most of our daily activities, but just barely.

When we make that sudden movement, we can force the spines of our vertebrae over the top of muscles, tendons and ligaments which were supposed to stretch out of the way when the vertebrae rotated, but couldn't because they weren't long enough any more. Compound that fact with the changes in posture and stress loads caused by wearing shoes with heels and you quickly begin to understand why our backs can hurt, even when we have never had a noticeable back injury.

Many people mistakenly believe that their problem is only related to lack of exercise and start a workout program. Luckily in most cases, their exercise program generates some added stretching and thus does in fact help decrease their pain. Assuming they don't produce an injury by not stretching those overly tight muscles before they exercise them. The advantage built into martial arts is that it causes you, at least in most styles, to have that regular stretching program.

What the back really needs is to be stretched out several times each day. It also doesn't hurt to involve yourself in a general toning program designed to improve muscle tone and maintain proper body posture.

What I recommend to friends and patients is that they stretch out a minimum of twice a day. I usually recommend that they stretch the first thing in the morning and the last thing just before they go to bed at night. These are excellent times because it is easy to get into a routine. The important thing to remember is that you should never bounce. Try to put the palms of your hands on the floor as you keep your knees locked. Initially most people find that they can't stretch this far. They find that the backs of their knees and thighs are too tight. After several weeks they find that their range of motion has significantly improved, and even if they can't reach the floor yet, their pain has significantly decreased.

****** WARNING *****

**DO NOT DO THESE PROCEDURES IF YOU HAVE HAD BACK SURGERY OR A BACK INJURY,
UNTIL CLEARED BY YOUR PHYSICIAN!**

****** WARNING *****

The proper position for this stretch is to stand with your feet at shoulder width. Lock your knees and slowly bend over as far as you can. Hold this position for at least 20 seconds. The second part of the stretch is to cross your legs by putting one foot just in front of the other. Again bend over as far as you can. Do not bounce! Hold it for 20 seconds. Lastly reverse your feet and bend over again.

The whole procedure takes only slightly more than 1 minute, but within a month you will notice an improvement in how far you can stretch and how you feel.

Stretching As An Important Tool In Preventing Martial Arts Trauma

By Bruce Everett Miller, PA-C

The issue of health to the martial artist is one that carries a lot of emotional impact. Whether it is because of illness or because of injuries, when we are not in full health we cannot, in most cases, enjoy the martial arts we love best.

With as much at stake as all that, there obviously arise a great number of different opinions on both how to both care for our health and restore it once we are sick or disabled. This series of articles will deal with the subject of injuries. Mostly the understanding of injuries and how they relate to the martial artist. Along the way you will find that the more you know about the way your body works, the better you can take care of it and also how you can use someone else's body against him.

There are many different approaches to preventing injuries. Besides the issue of safety, the most commonly agreed upon way to prevent injuries is to stretch before working out. Almost everyone agrees on this point of fact but unfortunately most people have never really been taught how to stretch. For those of you who scoff at the idea of having to be taught how to stretch, then I ask you a simple question. How many times have you pulled a muscle during a work out when you thought you were already stretched out? If the answer is never you are either a master at stretching or lying. Either way you don't need this article.

For the rest of us, I want to state that the most common fault in stretching is not that we don't stretch, or even stretch the major muscles adequately. What we fail to do is stretch the minor muscles.

The most common non-impact injuries that I see (and/or treat) in martial arts are bone bruises after sparring and those relatively small but very painful muscle pulls or tears. (We will talk about bone bruises in the next article). The main reason for the muscle pulls is that we tend to stretch out joints in the directions which we are used to moving them in. Makes sense so far. What we don't realize is that almost every joint in the body is built to withstand and compensate for some rolling motion as the joint goes through its full range of motion. The major muscles which we are used to stretching are those which are responsible for the major movement of the joint, but the minor muscles are responsible in a large part for keeping the joint aligned. When we don't stretch these minor muscles, we run the risk of pulling or tearing them if we move the joint suddenly in any angle oblique from the normal direction that it was primarily designed to go. This is also what we do to our opponents when we force their joints in ways that they were not designed to go.

Therefore, we need to loosen up these small muscles surrounding each and every joint. The method I recommend is as follows: First, develop a set pattern in your stretching. For example, start with the feet and work upward or vice versa. Secondly, not only stretch each and every joint in its major directions of travel, but also roll each joint in as much of a circular motion as possible. This loosens up the minor muscles we talked about above. Thirdly, make sure that any tension you place on muscles and ligaments during your stretching is done with slowly increasing pressure. Jerky movements should be avoided, because even small jerks can tear the small muscle fibrils which make up each muscle. While this won't cause dramatic pain or limitation of motion, such injuries can add up.

If you work as hard at developing good stretching habits as you do learning a new form, then soon you will have developed a way to dramatically decrease injuries. Even more importantly, correct stretching in itself can make you feel better even after the effects of the rest of the work out have worn off.

The next article on preventing martial arts trauma will continue on the subject of stretching and address the post exercise stretch.