



Solid Knees Part 1: By Darryl Leech

The knee joint is an essential part of human movement and plays a huge role in the execution of kicks in Tae Kwon Do but, unfortunately, if it is not taken care of and correctly conditioned the knee can become highly susceptible to injury. Generally people tend not to notice the damage they are doing to their knees until it's too late. In the following article we'll cover ways you can test the strength of your knees and also some great exercises you can use to strengthen your knees to improve your kicks and protect them from potential injuries.

The knee joints need to be rock solid but also have sufficient mobility if they are help balance and move you and also throw kicks. For a Tae Kwon Do practitioner a strengthening program for the knees is quite unique as the knee joints have to strong in both what is known as 'open kinetic chain' (OKC) and 'closed kinetic chain' (CKC) movements. OKC refers to an action that is made while the limb is in free space – a kick - CKC refers to actions made against a solid surface – squats, lunges, and support for the body while the opposite leg is kicking. Before you can increase the power of your kicks you must be solid in the CKC movements, you must have a strong foundation. You shouldn't practice high or jumping kicks if you find something like squats is difficult as your body won't have ideal stability and you'll be inviting all kinds of injuries and postural problems down the track – when building a skyscraper, construction workers don't start with the 10th floor.

Shaky Foundations

People's joints aren't as strong as they used to be. Today, thanks to things like cars, chairs and even machine weights at the gym, the human body is more used to sitting rather than standing and moving. One of the biggest factors influencing the increase in knee, back, neck, and shoulder pain is the fact that we are all sitting down a lot more than we used to. When you sit in a chair for prolonged periods of time the body is held in a flexed position and the body's posture can be pushed out of neutral alignment due the lengthening and shortening of certain muscle groups. Your hips become tight, your back rounds over and your ankles lose conditioning because they aren't used to bearing your weight. Your body always adapts to the load you put it under, remember Bruce Lee's comment about being like water? Well it's pretty much true in regards to how the human body reacts to certain stimuli. If you sit in a chair all the time, your body becomes the chair – if you practice tae kwon do all the time, you become tae kwon do, look at the skill level of the senior belts in the class compared to the new members and you'll understand. If your body is like a chair when you start your Tae Kwon Do class you can bet you'll be damaging your body.

Note: if you do go straight to class after sitting at a desk all day please take time to perform some quick exercises to align and mobilize yourself before beginning.

When considering the strength of your legs, be aware that a chain is only as strong as its weakest link. It is common for a knee injury to stem from a problem occurring elsewhere in the body, someone who has weak ankles or hips may find that they get sore knees – this could be because of a number of reasons but most likely that their knee is overloaded in an attempt to compensate for the other weaknesses. For the knee joint (and whole leg for that matter) to function optimally you must have your foot, knee and hip working together. Isolated strengthening, although can play its part depending on the severity of an injury, will not be an effective long term solution to pain relief for overall strengthening – your goal should be improvement of your functionality. If your foot, hip or lower back is dysfunctional in anyway your knee will not be able to function at an optimal level and you can bet that in time you'll feel soreness or get an injury.

A good way to begin your strength program is from the ground up – with the foot. The foot plays possibly the biggest role in protecting the knee. It is important that there is a balance of mobility and stability in the foot (and every other joint in the body for that matter) to prevent you from developing any dysfunctional movement patterns. You can check the bottom of your shoes to gauge how your foot is tracking, if your shoes are wearing out quicker on one side more than the other or more to the front than the back then consider that the source of your knee pain is coming from the position your foot is being held in all day because if you are loading through one part of your foot more than another then this imbalance will refer up through the leg. You should buy new shoes regularly and try to make sure that they give stability but also promote mobility of your foot – your shoes are pretty much your tyres, would you change them on your car if your car was getting damaged? I think so. Try to avoid shoes with elevated heels, remember as a TKD practitioner you train bare foot, if your foot has been in a plantar flexed position all day then it will be stronger in that position – not in a neutral position where it will now be unstable!

Because your body needs to remain upright for balance etc, the dysfunctional mechanics of the foot refer up into the rest of the body causing knee, hip, back and neck problems. Females are the worst offenders when they wear 2 or 4 inch high heels.

Here are a few exercises to help with the stability of your feet. Make sure you perform these exercises bare foot so that you can feel how your foot reacts against the floor.

Waking up your foot – This is a good little exercise for waking up the stabilizers through the arch of your foot. From a standing position push your big toe into the ground and do not allow the arch of the foot to collapse or let the ankle roll inwards. Perform this for about 20-30 seconds.

Single leg balance – This is another great exercise for waking up the stabilizers of the foot and ankle. Simply stand on one leg and make sure you keep most of your weight sitting in your heel and press onto the floor with your big toe, make sure your knee is in line with your second toe – it should not be twisting inwards or outwards. Again don't let your ankle roll inwards. Once you can hold this position, close your eyes and maintain your balance. Perform this for about 30-45secs on each leg.

Lateral hip dips – This exercise will help with mobility, stability and coordination of the hip. Begin by standing on an elevated platform with one foot floating over the edge (**figure 1a**). From this position

laterally tilt your hips so that your free leg lowers to the floor (**figure 1b**) do not rest your weight into the free leg though and do not bend the supporting knee. Now lift your free foot by tucking your hip up towards your rib cage (**figure 1c**). When performing this exercise be sure to keep the knee of your supporting leg in line with the second toe as this is the anatomical neutral position of the knee. Perform this movement at a slow and controlled pace. Perform 8-10 reps on each side.



Figure 1a



Figure 1b



Figure 1c

7 – point single leg squat – Balance on one leg and perform a single legged squat pushing your butt out behind you, reach your free foot out in front of you (**figure 2a**) – don't try to stay upright (**figure 2b**). Return to the start position and squat down again but this time reach diagonally in front of you (**figure 2c**) again remember to bend at the waist then return to the start. Squat again and reach directly to the side of you (**figure 2d**), then diagonally behind you (**figure 2e**), then straight behind you (**figure 2f**), then diagonally behind on the opposite side (**figure 2g**), then finally to the opposite side behind your supporting leg (**figure 2h**). Whilst performing the exercise pay close attention to how your foot is working against the floor, if you find that it is rocking all over the place you can bet that it's quite unstable and thus not providing sufficient support for the knee. For this exercise it's beneficial to have someone watch your technique or to watch yourself in front of a mirror so that you can monitor the tracking of your knee, which should be in line with your second toe. Complete 3 rotations on each leg (complete all rotations on one leg before moving to the other). Perform your reps in a controlled manner and use a 3/2/3 tempo.

Note: If your calves are burning then this tells you that they aren't that strong. This exercise shouldn't be tough for an intermediate TKD practitioner.



Figure 2a



Figure 2b



Figure 2c



Figure 2d



Figure 2e



Figure 2f



Figure 2g



Figure 2h

Squats - I say this in all of these articles, here we go again – the squat is one of the human body's most basic and fundamental movement patterns. You should aim to be able to perform full range squats comfortably and without any restriction of movement. A lot of people have some trouble performing full range squats so here's a good way to start them, begin in a squatted position on your toes and then shuffle your feet apart so that you can sit flat footed (**figure 3a**) – remember to watch how your knees sit and where the weight is on your feet. Your ankles and feet should not roll inwards. Sit in this position for a while and let your hips relax into the position. Now lift from your chest and bring your whole body up in one controlled motion. Do not push your hips up first. Perform a set of about 15 squats at a 4/4/4 tempo.



Figure 3a

If you find you have a lot of trouble maintaining the neutral position of your knee and can't control the tracking of your foot then I recommend that you spend time working on the above exercises with a strong focus on the positioning of your joints. Because when your knee functions out of neutral alignment it will not be able to perform at an optimal level, and if you can't stabilize in the above exercises just imagine the damage you could be doing to your body when you jump around in your Tae Kwon Do class.

In the next article we'll cover some OKC exercises and some other things to look for when performing the above exercises.