Biomechanics Seminar

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Biomechanics is what we're going to discuss right now. I just want to give you a few tips on proper form that you can start right from the beginning of your program. And, as you move along in each phase, you will find how your form will change and the economy of your stride. Based on the different phases that you will adapt to will definitely change how your run. However, these little drills are things that you can start working with.

The main thing in running form is that we want to have proper arm action. At no time ever should the hands come across the chest. If you envision a line going down your chest, those arms should just be coming back and forth, but never crossing over. Generally what happens with fatigue is that we start seeing a rotation in the upper torso. And, therefore there is a lot of energy wasted, laterally, when we're talking about moving forward. So, keeping the shoulders just in forward motion of you with the arms coming right in front of you and coming back.

From a side angle, we are looking at the elbow being in line with your wrist. And you are just moving in this direction, keeping the shoulders nice and relaxed. Those arms are just going along for the ride. Unless we are planning on doing a sprinting, and again when we move along to the pace work, then of course we are moving our arms. However, when we're out there doing an endurance run or a nice easy run, those arms are just going along for the ride and keeping our posture up straight.

The alignment that we're looking at with our gait, and again energy can be lost here too, is that with fatigue most will start leaning over. And once we start leaning forward, we are cutting off from the hips. And, therefore we can't have our knee coming up to give us that nice stride.

The one thing we are looking for is that our shoulders are neither behind our hip nor too far in front of our hip. So, we just want it slightly in front of our hip to have our shoulders. And that will be our driving force when we're going forward. So just keep that in mind when you find yourself leaning back or leaning too far forward.

On the stride itself, well it's broken down into three phases. We have the heal strike, and we have the mid-stance and we have when we're actually in flight, when both feet are off the ground. But what we're looking for it's not a heavy heal strike. It's just a slight heal strike with a heal strike and pushing off on the ball of your foot. We want to make sure the alignment of the feet.

And that's where everyone changes. That's where everyone changes. There's what is called pronation and suppination. And, 95% of the population are pronators. And the other 5% are suppinators. What I mean by that is that a pronator will heal strike and then

as they're coming off they go forward inward. And that's where a lot of knee problems occur, because of that over exaggerated [position] on push off in pronation form. The thing that's great now a day's is the technology of shoes that prevent us from ever going over there. And that's basically down to reinforcement in the heal cup.

The suppinator will be the athlete that's heal striking then coming off the outside of the foot. Typically, for the suppinator, there's very little heal strike. It's more on the fore foot strike. And again, it has to do with the speed. So, 5% of the population are suppinators the other 95% are pronators. But as I said, being in the proper pair of shoes can eliminate how much you pronate and suppinate that will prevent you from any serious injuries.

We're going to talk right now about the proper stride length. This is crucial, especially when we're going into an endurance event. Because again, the longer our stride and the more power pushing off <that we want to> [allows us to] cover as much distance as quickly as possible <<<?????>>>. You can check your stride by counting how many times your foot hits the ground, in a given minute. So let's just say you look at your watch and count every time that right foot hits the ground. So, proper running form or proper running gait will occur when you put that right foot down 90 times per minute. That's 180 strides per minute when you're counting right and left foot.

What we want to be looking for is whether we're over-striding or under-striding. So if your number is very much over 90, say 95, or if you're 85, that's the difference between over-striding and under-striding. And you can get into a gait that gets you very close to 89, 90, 91, which becomes a more efficient stride and means then that you can concentrate on maximizing the distance you can cover.

I want to show you a couple of drills that will help on your knee lift and also on your back kick. They are just simple drills you can start with. You can start with them walking, then moving into a skip and then moving into a run. I'm now going to demonstrate those drills.

Proper Running Form

Support Phase – Heal Strike

Support Phase – Mid-Stance

Support Phase – Mid-Stance

Support Phase – Take Off

Flight Phase

But first let me show you some characteristics of good running form. From the side profile, we're going to look at the two phases of your running gait: the support phase and the flight phase. The support phase is the heal strike, the mid stance and take off. And the flight phase is when both feet are off the ground.

We want to look here that the hands are not crossing over the midsection of your torso.

From a treadmill profile, we're looking here how the shoulder is positioned just slightly in front of the hips. The support phase is a heal strike, just a slight heal strike that more a mid-foot strike, the mid-stance your foot is directly below your hip, your hips are in that forward drive motion, and take off, is your foot coming off with your knees coming and driving forward.

Upper body here: keep the shoulders relaxed, arms going back and forth, with no energy being lost vertically. And you are driving forward.

Drills

Walking High Knees

Starting Position

Mid Position

Ending Position

Side View – Mid Position

Now I'll show you some drills to help improve your running form. The first one is walking high knees. The emphasis here is bringing the knees up as high as possible and pushing off the ball of your foot. You can see this from a side profile. The back remains straight. Again the emphasis is pushing off and bringing the knee up.

Skipping High Knees

Same drill here with a quicker tempo. Your doing it with a skipping. High knees coming up. You can see this again in your side profile. Emphasis again is the knees coming up as high as possible.

Double Tempo High Knees

Here we have a double tempo with the same drill. And again, high knees. You can see this again from the side profile. You are working on those hip flexors emphasizing knee lift.

Butt Kicks

Position 1

Position 2

Position 3

Position 4

This drill is called butt kicks. You are working on that back kick. You can see from this drill, we want to emphasize bringing the heals up to meet the butt and do this drill as quickly as possible in contracting the muscle. You can start with single butt kicks to allow the muscles to adapt to the drill, then move into double tempo in which you will be working at the speed of the contraction. And we'll see this coming through right now. Again you want to keep the back straight, arms are going back and forth. And we are working on how quickly we can contract the hamstrings in bringing the heal up to the butt.

Straight Leg Running Forward

Position 1

Position 2

Position 3

Position 4

This drill is called straight leg running forward. The emphasis is on keeping the legs as straight as possible. Envision a pole down your legs. We're working on the mid-stance of your running gait. You can see this from the side profile, however doing it outdoors you can emphasize pushing back and working on the mid-stance, again an important element of your running form.

Running Backwards

Position 1

Position 2

Position 3

Position 4

Position 5

Position 6

This drill is running backwards. The emphasis is on bringing your heals up to the butt then pushing <them> [your feet] out. Again, you want to keep the back straight. Take your time working on this drill.

Standing High Knees

Position 1

Position 2

Position 3

Position 4

This drill here helps with the contraction in working with knee lefts and the hip flexors. You can start with whatever tempo feels comfortable and then moving to a faster tempo. The emphasis again is on the height of the knee.

Improved Economy

Those drills I just demonstrated are done only for a short distance, 20-50 meters. Just take your time learning them and they will definitely help in your biomechanics and the economy of your stride when you're out there training. You'll think about all those little things. One of the key things is that you would <start> work<ing> on these on a day that you have a very easy day. You certainly would not do these on a day when you are doing any one of the key days for pace run, long run or interval workout.

So, have fun, take your time and enjoy them.