THE PERFECT STRIDE – Part 1

The stride is everything. That's all there is to it; stride after stride. In light of this fact, it's truly amazing how little attention has traditionally been given to stride development in the training of distance runners. Most coaches have few ideas about the characteristics that define good running form and do nothing to actively improve the stride of their runners other than prescribe a few technique drills that are justified by tradition more than by any sound biomechanical rationale.

Ole' Joe listens to coaches and runners discussing their theories on why Kenyans run distance faster than anyone else. Things like: "since they were very young, they run long distances to and from school every day," and "they play a form of soccer where they kick and run after a soccer ball for hours on end every day since they were small children."

News Flash: In the '60s when the Europeans and Scandinavians were dominating the distance running scene Young Joe listened to coaches and runners discussing the same theories on why Europeans and Scandinavians run distance faster than anyone else. Things like: "since they were very young they played soccer and built up a huge advantage over American runners," and "they run 100s of miles every day in training through the forest, on beaches and in the mountains."

Well, I decided to look at what this American did as a youngster and realized I walked or, if the weather was bad, ran to school every day. After school and on weekends I played sandlot baseball, tackle football, basketball, cowboys and Indians, various chase games in the park woods (just to mention a few) from sun up to sun down. In addition, I played Little League baseball, then Babe Ruth baseball, and then in High School trained and competed in every sport our school offered. Simply put, from the time I could walk there was not a day went by that Joe was not in motion.

Right then and there I decided "I had the advantage." LOL…..I digress.

Getting back on track (no pun intended) Ole' Joe's training system takes a different approach to stride development. In fact, in the TRC training system, stride development is actively pursued in every single step of every run, as well as in cross-training workouts and, yes, technique drills. The reason stride development saturates the TRC training system is that the performance levels of athletes that has emerged over the last decade more or less demands it. There is simply no way to improve as a runner that is independent of direct or indirect changes to the running stride, which of course, is completely governed by the brain.

Direct changes to the stride include improvements in the power-to-weight ratio, which enable the runner to take longer strides, reductions in co-activation (or tension in the muscles opposing the working muscles), which enhances stride efficiency by decreasing the amount of internal resistance in the stride; increases in pre-activation, or stiffening of the leg prior to foot-strike, which reduces ground contact time and increases elastic energy conservation; and enhancement of motor unit cycling, or the sequential resting of select motor units within the working muscles during prolonged running, which increases endurance.

Indirect changes to the stride are those that impact on fatigue. "Running is an effort to delay and resist

fatigue." And how does fatigue affect performance? By changing the stride! Fatigue-related deceleration is almost always caused by a reduction in motor unit recruitment and loss of neuromuscular coordination that results in declining stride length and/or stride frequency and increased ground contact time. (The only other cause of fatigue-related slowing is voluntary speed reduction resulting from suffering and loss of motivation.) Simply put: to fatigue is to have your stride fall apart.

Studies have shown that individual muscles approach homeostatic limits, such as glycogen depletion, acidosis, and muscle cell depolarization, at different rates during running. To protect these muscles from catastrophic damage, the brain reduces motor output to them. If running were controlled by the muscles instead of the brain, the exhaustion of any single running muscle would result in a spastic and even grotesque distortion of the running stride as the first muscle to fatigue became totally unstable. But since the brain is in control, it responds to fatigue in one muscle by changing the entire stride pattern so that some semblance of a normal running stride can be maintained despite local muscle fatigue.

Nevertheless, there is a subtle loss of muscle coordination and timing that follows local muscle fatigue and has a major spoiling effect on stride efficiency and power. Efficient running requires very precise timing of muscle contractions and relaxations. As fatigue sets in, the muscle actions become less synchronized. As a result, the entire stride pattern changes. The stride loses stiffness, ground contact time increases, and the stride rate decreases. This loss of coordination is believed to be the reason middle distance runners sometimes hit the wall and slow down precipitously, instead of gradually losing momentum, in the final lap of a track race. This phenomenon is similar to the way a juggler's loss of timing causes him to drop all five balls instead of just one or two.

Highly fit runners are able to delay stride deterioration because of superior local muscular endurance in the active muscles. They are also able to maintain a more consistent stride even at the point of exhaustion, most likely because of neuromuscular adaptations that have more to do with running experience than with running fitness per se. For example the American runner Dathan "Ritz" Ritzenhein in the last mile of the New York City Marathon, which he ran a full minute slower than his average pace for the race, despite feeling horribly fatigued and slowing down inexorably, Ritz maintained a stride pattern that looks relaxed, fluid, and powerful.

Fatigue-related stride changes not only ruin performance but also contribute to overuse injuries. The joints slip away from preferred movement patterns into abnormal patterns that cause tissue damage and ultimately dysfunction. Stride form in general is closely connected to injury risk. Nearly every running injury that occurs has a stride flaw or abnormality as it root cause. For example, a tendency for the thigh to rotate internally during the stance phase is a common cause of patellofemoral pain syndrome (runners' knee) and iliotibial band friction syndrome. Any stride flaw that increases injury risk is likely to limit running performance even in the absence of injury. This is almost certainly why elite runners, who have the most efficient strides, are also typically able to handle much higher training volumes than average runners (well in excess of one hundred miles a week for many) without injury.

Recent years have brought numerous discoveries concerning the stride related causes of particular running injuries. These discoveries have led to the development of a new physical therapy sub

discipline called gait retraining, which entails systematic efforts to reprogram the motor patterns governing the injured runner's stride in a way that eliminates the stride flaw suspected of causing the injury. Among the experts who practice gait retraining, there is something of a consensus that runners should not try to change their stride until and unless they are injured, because ill-advised changes can cause injuries that might not happen otherwise. In other words, if it ain't broke, don't fix it. Nearly every runner experiences at least one running-related injury sooner or later, however, so practicing this advice usually amounts to simply waiting for an injury to suggest the right stride correction to make.

Those who come at the issue of stride development from a physical therapy perspective also tend to believe that runners should not try to modify their gait on their own. They should leave it to the expert to determine what is wrong with their stride and oversee the process of correcting the flaws.

Insured runners certainly should seek the help of medical professionals with knowledge of running injuries and gait retraining techniques, if possible. But I believe the risks associated with meddling with one's own stride are greatly overstated. There is evidence that regularly fiddling and playing around with one's stride technique in sensible ways actually reduces injury risk by distributing the trauma of running more evenly across the bones, muscles, and joint tissues, so that no particular area suffers too much damage. (It's sort of like rotating your car's tires periodically for more even tread wear.) There are some simple means of improving stride form that any runner can implement without supervision and that are far more likely to prevent injuries than cause them, while also enhancing stride efficiency and power.

TRC APPROACH TO STRIDE DEVELOPMENT

The TRC approach to stride development has three components: emulation, proprioceptive cues and technique drills. The techniques of emulation and proprioceptive cues, while common in some sports, are, for the most part, unique to the sport of running. Additionally, most of the specific, technique drills used is rare. Cross-training is also used for stride development in the TRC system; however it has other benefits as well.

Emulation

Athletes in many sports work to improve their technique by emulating that of the very best athletes in that particular sport, (copy them). There is no reason runners can't do the same thing. While differences in body structure limit the degree to which any runner can copy the form of another, there are certain universal characteristics of good running form that all runners can enhance in their own stride.

The first step is to develop a vision of the perfect stride using resources that include studies by leading researches in the field of gait retraining, such as Irene Davis, Ph.D., of the University of Delaware, a wonderful book called *Running: Biomechanics and Exercise Physiology Applied in Practice,* by Frans Bosch and Ronald Klomp, who place a heavy emphasis on stride development in the training of elite European runners.

Proprioceptive Cues

Proprioceptive cues are used to improve technique in a number of sports, including swimming. They

are particular thoughts and sensations that athletes focus on while performing a sports movement to help them control that movement in a desired way. There about a dozen cues that are effective in improving stride and if they are used constantly throughout every run, they become an awesome training tool.

Technique Drills

The use of technique drills in run training is not nearly as radical as the constant use of proprioceptive cues, but even so, technique drills are under-utilized by most runners. There are basically six drills that specifically enhance each of the five characteristics of good running form.