

# *TerranearPMC Safety Share*

## **Week of April 15, 2013 – The Thrill of Victory and the Agony of De Feet!**

Last week, I found myself at the Palms Hotel/Casino in Las Vegas, attending a national body building competition. I saw a woman 65 years old that looked like she could pick me up and throw me across the room ó with one arm. Throughout the evening I saw all sorts of people: short and tall, young and old, that had a complete dedication towards keeping their physical appearance in top shape. The main event featured Jay Cutler (not the NFL quarterback) óthe four-time Mr. Olympiad. While only about 5 foot-seven-inches tall, he was massive! Each bicep was the size of Kansas (well maybe an exaggeration, but you get the idea). As I left the event I couldn't help but wonder about how much we humans can achieve and push ourselves beyond our pre-conceived limits. Is there no end?

Watching a basketball game highlight the other night, I might have got an answer to that question. Danilo Gallinari, of the Denver Nuggets, while driving to the basket, landed on his feet in an awkward position. This resulted in twisting his knee and possibly tearing his anterior cruciate ligament (ACL). Less than one week earlier, a sophomore from the Louisville basketball team, broke his leg after he jumped to block a shot during the NCAA Tournament. As the story was reported, while jumping, he came down and the lower part of his leg got caught under his body causing his leg to break in two places while and the bone popped out of his skin.

These are not isolated incidents. Last year, New York Yankees relief pitcher Mariano Rivera tore his anterior cruciate ligament during batting practice. And on the first day of the 2012 NBA playoffs, both Derrick Rose of the Chicago Bulls and Iman Shumpert of the New York Knicks tore their ACLs.

It seems that we humans find ourselves doing things that push us beyond our physical limits. Things that our anthropomorphic features, as much as we work to develop our muscles and agility, limit us. In the case of ACL injuries, we weren't built to leap and cut. The cruciate ligaments are located inside the knee joint, connecting the underside of the femur (thigh bone) to the top of the tibia (one of the shin bones). The anterior cruciate ligament's main duty is to prevent the tibia from sliding in front of the femur and out of joint. The dynamic forces created by leaping and cutting side-to-side tend to stress the ACL by pushing the tibia out of position. When the ACL tears, it's usually because the hips were rotated at the wrong moment, multiplying the forces on the ACL. This can happen when someone makes a slightly awkward movement while planting his foot.

And awkward movements just don't happen to athletes. Second only to motor vehicle accidents; slips, trips and falls are the most frequent accidents leading to personal injury, resulting in head injuries, back injuries, broken bones, cuts and lacerations, or sprained muscles. If we do not notice uneven terrain as we walk, we are setting ourselves up for what could be a serious injury.

Here's a simple test you can do to show the intricacies of your body mechanics. Wrap your thumbs and index fingers (both hands now!) around a piece of a metal/wood bar (each hand at opposite ends of the bar) with the bar about six inches in front of you and parallel to your body. Now have someone try to move the bar clockwise (or counter clock wise). For the most part, you will be able to keep the bar steady and not have the bar rotate. Now try this with your thumbs and middle fingers wrapped around the bar. Your resistance powers will be substantially diminished. This is a simple demonstration to show that even the slightest changes in how we do things, such as how we may pick up a tool from the ground can influence our physical ability. If we are not aware of what we are doing, or not giving our full attention to a task, we could be setting ourselves up for a very uncomfortable experience.

As it turns out, there are about 200,000 ACL injuries per year in the United States; and the vast majority is not due to sports, but rather they all are the result of a lack of muscle support for twisting or rotational movements around the joint.

Weak knees may be an evolutionary consequence of our rapid shift to bipedalism around 6 million years ago. As quadrupeds stride, they are able to spread the force of the impact across four sets of muscles. Our two legs have to absorb all of our body weight on their own. To compensate, we developed a straight-knee gait, allowing our bones and joints to absorb the shock that the muscles can't handle. (Contrast the walking style of a chimpanzee, which keeps its knees slightly flexed throughout its stride, with that of a human, who locks out his knees when the heel touches down.) The system works well enough during a leisurely stroll, but our knee joints aren't well-adapted for leaping, twisting, and changing direction.

Over the years, humans have gotten bigger and faster. And that means that our ligaments have to absorb greater forces. At the same time, no one has figured out a way to strengthen the ACL. That's not to say ligaments can't be toughened up with training. For instance, the ligaments in a pitcher's throwing arm tend to be a lot stronger than the ones in his other arm. But it's very difficult to isolate the ACL in an exercise. Biomechanics experts have proposed repetitive movements that force the tibia forward, like walking backward downhill, but there's little research on whether this actually prevents ACL injuries. Despite the many ACL-injury prevention programs that are out there already, which focus on strengthening the muscles around the knee, the rate of ACL injuries hasn't budged.

Many companies require morning exercises as a way to have their work force loosen up so that strains and sprains can be avoided. The intent may be good, but if stretching exercises are not performed immediately *before* a work activity, not only will the stretching be ineffective (as our bodies will lose that limberness), but it may also contribute to a strain or sprain, as the exercise may give one a sense of false security due to the agility that the exercise was supposed to provide, becomes ineffective during a time lapse. Observations of athletes strongly suggest that the best time to perform any type of stretching would be immediately before an activity is conducted.

**Laughing at our own mistakes can lengthen our own life. Laughing at someone else's can shorten it.** – Cullen Hightower