KERRY: JC, can you still hear me?

JC: Yes, I can hear you.

KERRY: OK, beautiful. With that we are going to get started with the call tonight. Tonight's call is with JC Santana. JC has authored over 60 DVDs and books in the areas of fitness and performance enhancement. He's considered by many to be the leader in functional strength training. JC has worked with the Yankees, the Patriots, Dolphins, Marlins, UFC fighters, to name just a few.

Currently he's responsible for the men's and women's cross country track and field team and the men's and women's swimming team, for the strength and conditioning programs that is, at Florida Atlantic University. His accolades, I could keep going on and on but that's him in a nutshell. So JC Santana, I welcome you to the call this evening.

JC: Thank you very much, Kerry. It's a pleasure to be with you and all of your readers and listeners.

KERRY: Good deal. Let's start off with the first question here. A lot of triathletes go back and forth, one of the main debates out there is whether strength and conditioning programs are something that's needed as triathletes and endurance athletes in general. Tell us what you think about that.

JC: I think any athlete right now that doesn't buy into strength and conditioning being part of their arsenal is dealing in archaic times. I think by now it's well accepted that strength and conditioning should be part of any and every athletes regimen. I think that's not an issue anymore in terms of the need for strength and conditioning. If you think that just doing your sport is the optimal way to train, I would venture to say you're not in the top ten in your sport, unless you've been touched by the hands of God when you were born.

KERRY: All right. So how can a triathlete benefit from strength training?

JC: Well, let's take the simple notion of running. As we know, running speed is stride length times strength frequency. In order to increase stride length I think more power in the hips would be beneficial, giving you great stride length. So just on a very common sense, logical approach, if you had stronger hips and with every stride you can gain say half an inch, what would happen over an entire marathon? So more strength equals more horsepower. More horsepower equals more stride length. Just in running along you can make an argument that strength is essential and strength and

conditioning would be beneficial to running.

Swimming, the same thing. If with every stroke you gain half and inch what happens at the end of 1500 meters? Your seconds ahead of the competition. What happens if you are in the pool and you're coming off the blocks or off of a turn? Power in the lower body not only helps the kick but helps the propulsion off the wall. So in those situations strength and conditioning becomes crucial to getting the edge that so many athletes need.

Of course on the bicycle everybody is familiar with the term wattage. Wattage is a unit of power and power is a function of strength times speed. The fact that you have that strength component in that equation, speaks volumes to the efficacy of strength training for all three sports involved in the triathlon, the three main endurance events.

KERRY: Awesome. All right. In terms of injuries, how can strength training help with that with a triathlete?

JC: Well, the most common injury in triathlon and in endurance sports in general is overuse. Now overuse injuries can be caused by several things. Number one, poor planning and poor periodization, too much volume. I think if you do not pay attention to proper recovery I don't think you get strong enough or have enough of a genetic component to offset bad programming. In other words, we can always pack more volume until you are in an overuse state and are subjected to injuries. However, from a strength and conditioning aspect, the injuries can come from a blind, more load to a structure than that structure can take, whether it's repetitive load or one-time load.

So take shin splints. Strength in the lower body could prevent shin splints because shin splints are a pure indication that you have put enough load on a structure that could not take that load. The easiest way for a structure to be able to take such a load is to get that structure stronger. Any connective tissue will positively respond to progressive overload, which is the essence of strength training.

So from an injury-prevention aspect both periodization and programming is essential but from the strength and conditioning perspective increasing the abilities of soft tissues to take greater loads would certainly reduce the likelihood of injury in soft tissue injuries.

KERRY: OK, great. We're talking about strength and conditioning then. Can you give us good examples of some exercises for a triathlete?

JC: Right. One of the key things with triathletes we have found, and long-

distance runners and endurance athletes in general, they're all afraid to get big. They figure that carrying more weight is detrimental. However, that is not the case if the additional weight comes at additional horsepower. If the additional weight is muscle you're going to have more contractile fibers to provide more force. Since the equation for power is force times speed, greater force capacity would certainly lead to greater speed capacity if trained properly, therefore the wattage would come out. So from that perspective strength and conditioning can come in different colors.

For example, strength and conditioning can come in the use of machines, traditional machines - barbells as well as dumbbells, using free weights. Most of this type of methodology has been applied through the body building principles which is what we can a hypertrophy principle. That is the three sets of eight to fifteen rep range. That rep range has been known to put on muscle. Again, we don't have to fear the accrual of lean muscle tissue because when trained properly that additional muscle tissue can come along with an increase in power. So that's all good.

If you put an extra 5 pounds on a 150 pound frame and this person is now 155 but is able to increase their stride length in running by half an inch, their power stroke by half an inch, and are able to add 10 additional watts of power over 110-mile race, you can see why this person would significantly be ahead, even though they put on 5 pounds. So that is your traditional modality. Those have their place in strength and conditioning.

My area of expertise and the reason that we're so successful with triathletes is that my area of expertise is what has been termed as "functional training" which is using different modalities such as medicine balls, stability balls, cables, dumbbells, kettlebells and body weight to provide more functional strength instead of the traditional hypertrophy strength. The question still remains whether one is better than the other or if both together are really the optimal strategy. I believe that the hybrid approach is the best. I believe there's nothing wrong with doing some squats, some dead lifts, during the basic strength accrual phase but I always like to taper or temper that body building approach and instead of going so heavy on the volume, cut down the volume and substitute or supplement that volume that we're taking out with more functional approaches.

For example, single leg squats would be fundamental for locomotion. Barbell squats and leg presses would load the legs symmetrically in a parallel stance but as you know, triathlon is nothing like that. When we run we take one step at a time. So single-leg stability at the ankle, knee and hip is fundamental. The single-leg squatting progression, whether it's body weight or using dumbbells or kettlebells for additional weight, is instrumental in enhancing the gait cycle, for swimming and cycling. Just

one small example of functional training versus traditional.

KERRY: OK, great. In terms of periodization throughout the year, why don't you describe it. Some people might not be familiar with what periodization is. Why don't you describe how someone would periodize a strength and conditioning program throughout the race season in accordance with what they're doing with other periodization within swimming, biking and running.

JC: Right. First of all let's define periodization. Periodization was an original concept developed by the Russians. It had two purposes. Number one, to avoid overuse inquiries and number two, to peak an athlete for specific times. The way they did that was manipulating the training variables, mainly intensity, volume and rest or frequency. So by having periods of time where you go really heavy with low volume, having other periods of time where you go lighter intensity but more explosive movements, having other periods of time where you back off and having other periods of time where you have additional volume with lower weights, that is basically the same way of putting a house together, where you make sure there's a foundation during the hypertrophy or what they call the anatomical adaptation phase. Then you put up the walls and that's your strength phase. Then you put your roof and that's your power phase. And then in comes the windows and doors, that's your power endurance phase.

So just like you build a house the Russians devised a way to manipulate volume, intensity and frequency so you could build an athlete just as you would build a house, very progressively and with good methodology.

Now, how do you prepare this for a triathlon season or if you're going into individual sports? This is a very difficult thing since most cycles, whether it be the anatomical adaptation, the strength, the power, the power endurance, can be anywhere between two to four weeks. So there's a minimum amount of time that you would need to prepare a body, say eight to twelve weeks ideally. But we all know that sometimes, especially when season starts, you don't have that kind of time. So you have to be a little bit more knowledgeable in your application of periodization. And you have to look at it and say, "Did I start my adaptation, my base training? Once I got the base training, if I'm able to stay active, I don't need to repeat the base training. So then I can oscillate between strength, power and power endurance depending on how much time I have for the events."

So say that you're not in shape, right now you're off-season, because in the winter it's really cold and there's no races going on. Right now would be a great time, you have let's say three months or four months, if you have three months of hard winters and there's not a whole lot of stuff going on, now would be the perfect time to go through all three or four

cycles. Say take three weeks to get your base training. This involves your three sets of eight to fifteen on the strength and conditioning side. It's where your body just gets ready to take more volume in. This is what we in the field call "increases your functional capacity." It creates a nice training base for muscles, tendons, ligaments and bones.

Then you take another three to four weeks of strength. This is where you cut your volume by 30, 40 even 50 percent and increase your load by 25 to 30 percent. There you're going to be working in that four to six rep range developing your strength.

Then you take another three weeks where you start converting this huge strength you have, remember power is force times speed and the power phase is where you start bringing in the speed. This is where you start bringing in your plyometrics or your jump-training or other explosive methodologies like medicine ball throws, etc.

And then you have your power endurance phase where you're trying to push that lactic threshold to the right as much as possible. That's where you're really working on your buffering mechanisms to be able to develop that bicarbonate system that attaches itself to the hydrogen caused by lactic acid production. So there would be a way where your off-season, where your athlete can really get together for the beginning of season.

Then when your season starts you have to figure out which are your key battles that you want to win. Every single race can't be a winner, especially if you're pacing them every month. You're not going to have time. You're just going to oscillate. Some of them are what we call "work through races." We treat them as training. But if you have a qualifier, where you have to do well, then that's a peak race. So you play around with that power and power endurance cycles in between races to keep you in shape throughout the season.

KERRY: All right, that was awesome. One of the things you hear a lot of people talking about is the core. I get a lot of questions on that. A lot of people aren't really familiar with what the core is. Can you explain to us what the core is?

JC: Sure. We can complicate this to high heaven but I'm a very simple guy. I'm old-fashioned. I'm 50 years old. I come from the 70s and 80s where hard work was the mode of the day. So I like making things simple. Your core is between your sternum and your knees. It's that general area. More specifically it's that area around the belly button and it goes all the way around to where the lumbar meets the pelvis. That's where the foot hits the road. You know what I'm saying? That's the big area, where that lumbar spine touches the pelvis. That's where everything is going.

So why is the core important? Well, let's look at it from a very logical standpoint of survival and then we'll apply it to all three events in the triathlon. Number one, if you notice your spine it's got 24 different areas between your pelvis and your skull to where it can get in trouble. It's one of the most moveable systems in the body but yet houses one of the most important communication systems of the body which is the spinal cord. So the body is designed to give you incredible mobility, which comes with instability, and it's supposed to house and protect something very important. So the body is very cognizant of that and it will not allow you to yank on it, pull on it, compress it or sheer it if it's not stable. So there is the importance of the core. We must stabilize it because everything attaches to it and it houses a very important item which is the spinal column. So there's your logic in terms of evolution.

Now let's talk about sports. Why is it important? Every time your foot hit's the ground you have ground-reaction forces that occur at the foot and those ground-reaction forces help to propel your hips forward. What happens when your foot hits the ground at anywhere between five to seven times body weight? Well the forces have to come up through the ankle, knee and hip. Now when it hits the hip it's very, very important what goes on here. If you can imagine horizontally the pelvic girdle and vertically the femur, when this whole system comes down the pelvis has the tendency to want to collapse around the joint where the femur meets the pelvis. If that area there collapses because you don't have hip stability, by the way, the hips are part of the core, if you don't have hip stability, then the pelvic crest will collapse inward and that will de-stabilize the SI joint on the lumbar spine. Now remember, we've got to protect that spine because it is something that houses a very important unit, the spinal cord.

If the body gages that the pelvis is not sturdy and that the core is not sturdy, it will reduce your stride length neurologically. In other words, it will inhibit the muscles associated with those unstabilized joints, being the pelvis and the SI joint, which means no matter how much you leg press, no matter how much you squat, when you come down on one foot if that pelvis and SI joint are not stable, the brain will pick that up and it inhibit the glutes, the hamstring and the quads, lessening the impact on the ground, lessening your stride length, lessening the next impact and surviving that event and coming tomorrow to do it again.

The stability of the core is essential in gait in terms of stabilizing the pelvis and the SI joint at food contact. This is something that is done neurologically. It's not like you can go to a class and hypnotize your way through it. This happens at the neurological level. Any time a body notices an unstable joint it will shut down every muscle or most of the major muscles above and below the joint to protect that joint. That's something

you can't work against. The best thing to do is do those single leg squats, those single leg curls on a stability ball, all those things that allow you to stabilize that impact.

The same goes for swimming. When you're in the water everything that propels you forward is attached to the lumbar spine and the pelvis, being the hips and the arms. When you do that big lat pulling, what is the lat attached to? The lat is attached to T11, T12, all the way down to the pelvis. How do you think the body is going to allow this big lat to pull on it so the humors can come in and you can get that good stroke and pull on an unstable spine? It's not going to happen. What happens is if your spine can't take the big torque of that lat the brain says, "I've got a destabilized spine and pelvis, let me inhibit the lat by 20 percent and lessen that stroke." Now you're slowing down.

The same thing can be said for the kick. If the legs are moving but they're moving against an unstable pelvis, the brain will pick that up and will inhibit everything that moves your legs. So neurologically it pays off to be stronger and get that strong core, that stiff core, that allows all those muscles to pull on it so we can move the limbs that propel us.

Same thing for the bike although the bike does not involve the core as much as running and swimming. But I still think that a tight core will allow more, or reduce the inhibition that occurs at the various major muscles that propel the body on the bike.

KERRY: Yeah, absolutely. I agree. JC, you've got a product for triathletes out there. What's that called?

JC: It's called "To The Max." I wrote it with one of my former partners. He was one of my interns from Florida Atlantic University, Gary Lavins. He was a big fan of triathlons. I trained him and trained several of the athletes that he brought over. We had great success. He took a ventilatory test in exercise phys., they told him he had compromised lung function. So when he came to me as an intern he said, "I can't do this and I can't do that." I said, "Why?" He said, "Because I took a respiratory test and ventilatory threshold test and it told me I had compromised lung function." I said, "Come on over here. I'll give you compromised lung function." Of course, eight years later he was running marathons and doing triathlons and I believe he still competes.

So we joined forces and all the information from this is an accumulation from five other books that I have involving functional training and the training modalities and all we did was just apply it specifically to triathlons. So I think that "To the Max: Functional training for the endurance athlete," is a precedent book on functional training. I don't

think there's any one book that has had that system completed the way we completed it.

KERRY: Yeah, definitely. It's definitely a great product. If you guys want to check it out you can go to triathlonsummit.com/jc and you can check that out. There's some good stuff in there.

Let's talk about plyometrics. What are they and do triathletes need them?

JC: Plyometrics are a series of jump or explosive exercises, traditionally jump exercises but you can do plyometrics with the upper body that doesn't involve jumping. It is a movement that involves a counter-movement that's a very explosive counter-movement. This counter-movement would invoke what we call the myotatic reflex which is that reflex that you have in your knee when the doctor taps it and your knee jerks out like that. That is done when the doctor hits the tendon. The tendon suddenly stretches. When the tendon suddenly stretches really fast it creates a reflex where it contracts the major muscles attached to those tendons. So traditionally plyometrics involved jumping - jumping onto boxes, off of boxes, on one foot. So you have three basic plyometric jumps. You have the jump, the hop and the bounce. Traditionally coming from track, all this jump training does is promote more power because of the stretch reflex invoke-ment.

Now, the question is do endurance athletes need this? I think they could benefit from some plyometrics but we have to taper that with the possible injury related to plyometrics. In order to partake in high-level plyometrics there has to be an enormous amount of strength-base already developed. The National Strength and Conditioning Association even goes along with saying your body is not ready for plyometrics unless you can squat one and a half times your body weight. Now I don't know about your athletes, but I weight 237. One and a half times of 237 would be in the neighborhood of 340, 350. I can no longer squat that because of my knees and hip surgery that I had. But at my best I think I could squat that maybe three or four times. I would venture to say that I would rank in the top ten percent of the population, of strength athletes, not triathletes. So to find a triathlete that can squat one and a half times their body weight, so they can start doing plyometrics of a higher level, I think is going to be hard to find.

The question becomes, can the endurance athlete and triathlete benefit from light plyometrics such as skipping? I think skipping and some speed agility equipment drills, such as hurdles, such as fast legs, A skips, B skips, carry overs, all of those, just from a hip-mobility perspective, they can. I think some miles should be taken off and addressed to SAQ drills as a method of cross training and faster feet. Stiffer ankles, which you're going to need in forward propulsion in running. So I think you could

benefit from light to moderate plyometrics. How much? I would say use with caution and don't spend a whole lot of time on them.

We should also distinguish between plyometric training and power training. I'll give you the difference. Plyometric training involves a reflex. So for example, a counter-movement, jumping off a box, jumping onto a box, multiple jumps, those types of things are plyometric events. A power event would be a box jump where I can get the power out of it on the jump but save the landing. I think that is my favorite way of developing power. Where plyometrics I think puts a lot more wear and tear on the body. One of things we have to watch for in endurance athletes is that volume of training and wear and tear injuries are the number one injury. So for that reason I don't prefer plyometrics for endurance athletes. I think they could benefit from some light plyometrics, used sparingly and as a method of cross training, not in addition to all the volume. The volume would have to come down if you're going to include some of this stuff. I would prefer power training. Yes, power is essential. Power is what gets you that stride length. Power is what gets you that stroke. Yes, endurance athletes need power and then develop power endurance.

KERRY: Awesome. One of the things that's obviously important with sports is flexibility. There's a lot of different ways and theories out there that people have about developing flexibility. You have people who talk about the standard static stretching where you're holding a stretch. Then you can talk about functional stretching and all that type of stuff. What's your opinion on how to develop good flexibility?

JC: I'll tell you what, there's only one flexibility that I care about and that's functional flexibility. That's the flexibility that I can use. I don't care if I can do a split when nobody's around if I can't do a split when I'm kicking somebody in the head, in terms of the martial arts. I don't care if I can put my hand in my back pocket if I don't have a good swim stroke. The flexibility that I care about is functional flexibility. How do you develop functional flexibility? You use functional training to get you into functional ranges of motion that you need to be strong in, period. That is why functional training works because it works the ranges of motion that you need, whether they're extreme or moderate. Here's what we have to watch.

We don't even know what flexibility is right now. All we know from the research is that if you stretch a muscle two things happen. Number one, it acutely stretches. Number two, when it acutely stretches it acutely gets weaker. So we know that stretching is not related whatsoever to performance and to injury prevention. That is unequivocal from the last literature reviews on stretching, from Facker [?] just recently and from Shearer about five years ago. The literature reviews definitely say one

thing, that stretching is not associated with injury prevention or performance. That's number one.

Number two, we don't even know what type of stretching or when is most appropriate because the types of stretching that are typically done in the sports world have never been tested. If you're going to stretch something for 30 seconds, rest assured of this, it will be longer and it will be weaker acutely and depending on how many sets you do it will stay weaker for minutes and sometimes hours. So certainly static stretching is something you definitely don't do before a run, before a swim or anything else. Dynamic is more preferred.

My whole thing is, look, why don't you just train functionally and the ranges of motion are taking care of themselves? We create incredible athletes and we do not statically stretch at any time, before, during or after. And we have very little injuries because I believe most of the injuries - check this out, Kerry, which is crazy - most of the injuries occur in the middle of the range of motion. We used to think that injuries occurred at the end of the range. Take hamstring pulls for example. Eighty percent of hamstring pulls occur at foot plant, where the foot is one or two inches in front of the hip. How can that possibly be a flexibility issue when it's in the middle of the range of motion? When it's clearly is a strength issue.

Now, is it a strength issue that we can correct with strength training? Or is it a strength issue that we can't correct with strength training and we need a neural-type of training because it's a coordination issue? Let me explain what that is. Let's say that you have three muscles coming online at a specific time and one of them comes online 30 milliseconds after it should have come online. The other two now take the full force of all three. Chances are that one, maybe both, might be injured. That issue cannot be taken care of from strength training alone because strength training was not the problem. Strength was not a problem. If all three muscles were to fire in synchronicity and hit at the right time, nothing would have happened. They are indeed strong enough. But because of things that we are yet to be able to identify, whether it's fatigue, neural fatigue, inhibition or any other mechanism that's yet to be identified, three muscles did not fire in synchronicity. One came in latent, the other two took the brunt of all three, therefore they ended up injured. That type of situation is better fixed with functional training because of the coordinated value that functional training has.

KERRY: Awesome. One of the things you were talking about in there and it's something that I strive to educate people I train a lot on is with warming up. A lot of people the first thing they like to do when they warm up is do a static stretch. Why don't you just describe to people why that's not a great idea and also what is a good call in terms of warming up?

JC: As I alluded to and explained before, the reason that static stretching is not a viable form of warm-up, and you may be able to get away with it in an endurance athlete because the paces when they start running are not that fast, is because if you take connective tissue and you stretch it, you have deadened its ability or killed its ability to be elastic in nature. That's where the running, especially running, most of running occurs because of an elastic component not a muscular contraction component. So the elasticity of the muscle deadens when you statically stretch it, especially for long periods of time like 30 seconds.

So you're putting the muscles to sleep and you're actually, this has been shown, you're actually making it more susceptible to injury by various mechanism, anywhere from deadening to pain to actually causing micro-fractures in the contractile fibers, which could lessen the muscle's ability to produce force by as much as 20 percent. So for various reasons the signs clearly show that static stretching is not something you want to do before you're involved in a dynamic activity like swimming, running or cycling. So that's number one.

A more viable way, and more popular in the literature, is dynamic stretches. So you can a lot of the things that are seen in track and field, just moving your muscles around, mimicking the movements you're going to do and increasing your blood temperature, increasing the circulation and increasing the elastic component of your muscles, getting into stretch and contract. That's why you see a lot of sprinters actually do light plyometrics right before they get on the blocks, to excite the muscles into firing fast. So those are the things that you want to consider. Although you're not firing fast or sprinting when you're doing triathlons, you do want to move dynamically to get the body ready for the fact that it's going to be involved in an elastic, dynamic activity and static stretching does the opposite.

KERRY: Awesome. We have a few questions here that people are actually typing in. I'll let you have a crack at a few of them here. What is the strength training frequency that is best for older triathletes?

JC: That depends on your running volume. We like two to three times a week, depending on how hard you go. You can split your body, in other words do legs, chest and back, which is a traditional body building split, if you're going to increase a little bit more volume. With the older folks, and I'm 50, the way I like to train now is I don't like to split my body for one reason. When you split your body up you're doing it because you want to assault that body with a lot more intensity and a lot more volume and because you're splitting that body you're giving it greater recovery. However, when you get into your late 40s and 50s I noticed that I wasn't

recovering from the big bangs but I could recover from the short, intense hits. So it's more apt for senior athletes to work the entire body two to three times a week, depending on how much they're running and what they're work schedule is and what their family schedule is, and reduce the sets and reduce the reps. That way we can give it more frequent hits but they're shorter. Two to three days recovery is certainly enough to recover from say three or four sets for the legs.

That's a very complex question because it depends on if you're a fulltime athlete. I don't care if you're a senior or not, are you a fulltime athlete? Do you have time to take naps? Do you have time to recover? Or are you a CEO training at five o'clock in the morning, going doing nine hours and training another hour and then spending time with your family and not able to recover? Those individuals, I would cut down the running volume, I would cut down also the training volume to twice a week.

KERRY: OK, great. We've got another question here. How do I gain muscle without eating meat?

JC: Gaining muscle is not a function of what you eat but a function of how much you eat. It's unfortunate to say. Basically gaining muscle is a function of being calorie-positive. Now, with that being said, you can't just eat mayonnaise and lift and think you're going to gain good quality muscle. You may gain some muscle but that type of catastrophic diet would lead to more adipose tissue than muscular tissue.

So you don't have to eat meat. As long as you do enough protein, and I think this is another thing that you have to consider for endurance athletes. Endurance athletes are under-proteinized through and through. We have found out through Peter Lemon's work and many more pieces of research following Peter Lemon's nitrogen-positive research from the 90s that endurance athletes can use almost as much as weight-lifters in terms of protein and that anything from three quarters of a gram to one gram of pound of body weight is recommended for endurance athletes. So if you want to just do the math easy, if you weight 150 pounds, you're looking at 130 to 150 grams of protein. So in order to put on muscle you have to make sure that you get enough protein. You have to make sure that you're consuming more calories than you're putting out and you have to make sure that you have a muscle-building stimulus such as resistance overload. That's the way you put on muscle.

KERRY: Awesome. We've got Ed in Paradise Valley here and he's asking, "Please discuss your opinions on machines versus free weights," which we kind of talked about a little bit, "and how we should determine number of sets and repetitions."

JC: OK, machines versus free weights. I'm old-school. I'll go with free weights every day of the week, twice on Sunday. However, if I were you I would explore the functional training modality such as body weight, medicine balls, stability balls, bands and dumbbells as well, and functional movements such as reaching lunges, single-leg squats, one-leg presses and so on and so forth. All of those can be found in the "To the Max" project that we talked about. Those would be my ideal.

First free weights, I would use that during my strength-building phase. But I always, always would incorporate what we call transfer exercises. Those are functional exercises that teach the body how to work exactly as it works in a triathlon.

Sets and reps depends on what phase you're in. I figure about ten sets per body part for a triathlete, ten sets per body part per week. Eight to fifteen reps for the anatomical adaptation hypertrophy. I would stay about the same, about three to four sets of four to six reps during the strength phase. During the power phase I would go three to four sets of five reps of a traditional exercise followed by an explosive exercise, which we call complex training. And during the power endurance phase I would be doing complexes without recovery and going from one traditional exercise to a plyometric event or a power event immediately. I would at that point in time bring up my reps to reflect the type of event that I was involved in. So your sets and reps depends on the cycle and I just briefly went through them.

KERRY: Awesome. Here is an interesting question for you. And again guys, all the stuff that he's talking about in terms of functional exercises are in his "To the Max" program. You can go to triathlonsummit.com/jc and you can take a look at it. It's definitely worth a look. We've got an interesting question right here. "I've been using a Mark Allen triathlon training program for about eight weeks and I'm getting stronger but my swimming performance has decreased as I'm getting bulkier, even though I'm using light weight. Any suggestions?"

JC: Number one, light weight, I would like to know what that is as a percentage of the one. Also, I'd like to know what the rep ranges are because if you stay in that hypertrophy range, which is that eight to fifteen, you're going to get that classic pump, that cell volumizing, which is the catalyst for muscle growth, which is what you want. However, you don't want that before the season.

So once we get enough muscle then we've got to convert that muscle into doing higher and higher intensities at lower volumes. So what happens is that the training shifts from this pump training that occurs through body building, eight to fifteen reps, to this more neural and firing and activation

training which occurs during strength training when you drop the reps down to four to six reps. At that point in time you don't have enough reps to get that pump but you keep getting stronger. How do you get stronger? You get stronger neurally by firing bigger motor units and firing high threshold units. So what happens is you get neurally stronger without packing on more muscle and getting that pump. So that, I think, you should look at and make sure you're doing strengths and make sure you're periodizing your training and not staying in that body building pump all the time because you might get that pump feeling and feel a little bit slower, especially in the water.

KERRY: Yeah. You hear some people out there say that you can't really bulk up if you're doing tons of endurance sports. What do you think about that, in terms of weight lifting and doing endurance sports?

JC: That's another thing, Kerry, it also depends on your genetic predisposition. If you stand at the finish line in any Ironman, you're going to see a host of bodies come through. You're going to see the real thin rails that look like they just walked out of a concentration camp. You're going to actually see some people that are on the verge of being obese. And you're going, "How the heck did you finish this race, much less, are you involved in the training?" And then you'll see some people that could probably win an amateur body building contest. And you're going, "How did you carry this much muscle this far?" So we have a host of different morphologic animals passing through the finish line.

But in general, making general statements, the triathlete becomes a triathlete because they were not very good in the morphic sports like football, body building, power lifting, Olympic weight lifting, wrestling. These people were thinner in nature, like the endurance events. So through evolution or through natural selection they end up in triathlons. And they're very good at triathlons because of their genetic makeup.

Add to that the amount of volume and caloric output that you're putting out. So here we have, in general terms, we know there's exceptions all the time, but in general terms, we have these isomorphs which are what we call "hard gainers" in the body building world, putting on miles and miles and hours and hours of caloric turnover, fearing that they're going to get big and shying away from weights. Now is that crazy?

KERRY: Yeah, absolutely.

JC: As a general rule triathlon individuals don't have to worry about putting on muscle. Now let's say that you're one of those gifted individuals and you look like Arnold Schwarzenegger and you're getting ready to turn in record times, ok? If you're that person my recommendation is don't spend

so much time in the anatomical adaptation or the hypertrophy phase. You're big enough. Go straight to strength and work on power and power endurance, which both will not put muscle on you because it is more neural training than it is morphological training. That's a very simple fix.

KERRY: Right on. One more question. In terms of talking about balance. Can you tell us why balance is important for sports and how your type of training incorporates that?

JC: Much has been made about balance and I've got to tell you that there's a shift going on right now Kerry, away from balance and towards stability. We can get into this conversation for three days but I'm going to give you a visual that's going to bring the concept home to you. For many years in the functional training world we were involved in standing on stability balls and rocker boards and air pillows and tight ropes. You name it, we stood on it for the purpose of getting balance because we know that balance requires a certain level of stability of every joint, or at least body control. We thought that this body control was really good, right?

Now we start to understand that I can turn you into a tightrope walker but that don't mean you're going to run a better 40 or that you're going to run a better marathon. So we said, "Balance sounds like it's good but we're doing all this balance training and people aren't really getting any stronger. They can't pick up anybody. They can't throw anybody around. They can't run any faster. What's happening here?" What we did was we exchanged balance and confused balance and low-level stability that is used in balance for the high-level stability and stiffness, I repeat, stiffness, that is used in athletic endeavors.

Now we're finding out that stability is much more important because when you're stable you're balanced by definition. Here's the visual that I'm' going to give you where all of you are going to understand. Imagine a pyramid on its base. That pyramid is stable and balanced by definition, if you want to say the definition of balance as manipulating opposing forces to create a stable state. That pyramid has manipulated opposing forces and has created a stable state and it is stable. Now take that pyramid and put it on its end and balance it perfectly on its end. You've manipulated opposing forces to create a balance but it's really not stable because if you hit it, it will fall on its base. Correct?

KERRY: Yeah.

JC: So what kind of pyramid do you want to be, the one on its base or the one on its point? Everybody is going to say, "Of course we want to be the pyramid that's stable." Why? Because a stable core fires at high levels. It creates a stiff core. When you create a stiff core the arms can pull on that

spine through the lattisimus. The legs can push on the pelvis through the glutes and hams. Do you see what I'm saying? The ankle can propel forward if it's stiff, if the Achilles tendon or what they call the tricep complex, is stiff. You don't want a mushy, flaccid ankle. You'll be the slowest person running. So sport is about what we call, what Stu McGill, one of the greatest spine stability researchers of our time right now, working out of the University of Waterloo, I had the great pleasure of being published with him last November in the Journal of Strength and Conditioning, what we measure core stiffness. Core stiffness is key. In his book he calls it "super stiffness." This is what we're trying to do now. That's one of the reasons we want to get away from stretching because stretching kills that super stiffness that is required at all joints at the moment of truth to transfer forces from one bone across the joint to the other bone. So that, I think, is a fascinating subject where again, we're looking to do more stability work.

I'll give you an example of balance versus stability. Let's say that we do a single-leg balance and we put you on an air pillow or one of those little discs full of air. We go, "Because you may be running on terrain, you may be running on grass or a little bit of sand through your transition, you need ankle balance." So I'll put you there. But how much do you want to stand on that thing? Versus saying, "How many steps are you going to take on concrete?" With every step you need stability at the hip to the tune of seven to ten times your body weight. Why don't we stand you on a single leg, give you two twenty-five, thirty pound dumbbells, and have you do alternating curl and presses giving fifteen sets per arm, two sets, one on each leg and let's see what gives you better core stiffness and plant stability, the air pillow or that one leg, feet on the ground, twenty-five pound dumbbells, curl and presses, alternating pattern, on one leg. Which one do you think is going to give you stiffer core and better plant for each stride? I will take that dumbbell on a single leg. That's just one very small, simple example so your listeners can get a view and a visual. One is stability, the other one is balance.

KERRY: That's great. I've been reading some of the same stuff out there. That's awesome to hear your opinion on it. Do you have anything else that you think we should know?

JC: Know that your sport is in transition. You're getting ready to see some really good training coming along. You, like many other sports, shy away from the concept of strength training, but I think more and more you're going towards that genre, however you're going to find when you get there that strength training goes beyond machines. There's wonderful modalities and a lot of great science and a lot of great anecdotal evidence, or empirical evidence, that can really take your performance to the next level. So I think all of you should be very excited because what is getting

ready to hit your sport from the area of functional training and strength and conditioning is something that is going to take the endurance athletes to a level that I don't think we fully appreciate yet. So I'm very excited for you and I think you should be excited as well.

KERRY: Yes, definitely. If you guys would like to see a little bit of what he's talking about you can go check out his "To the Max" product. You can go to triathlonsummit.com/jc and you can check that out.

JC: If they go to your website will they be able to get eventually to mine, if they want to ask me questions?

KERRY: Yeah, that's just a redirect. Oh, to ask questions?

JC: Yes.

KERRY: Yeah, that link right there is actually just a redirect to your site.

JC: So if you guys go to my site and you go to the top header to the right-hand side, it says "email JC." If you guys have any questions, please email me. I respond to every single email myself. I don't ditch my emails off to anybody and I will take the time and honor your questions with an accurate and prompt response. So please free to ask me any questions. I'll be more than happy to help everybody out.

KERRY: Well there you go. That's awesome too. You can check that out, it's just a redirect to his site. It should be good to go. JC Santana, thank you very much for coming on the call with us tonight.

JC: Thank you, Kerry. It was a pleasure. I look forward to being with you again.

KERRY: All right, awesome. Me too. All right guys, that's it for tonight. Thanks for coming. We'll see you next Tuesday. Bye.