



Rest, Recover, Race by Richard Thornton (1995)

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Coach Thornton is currently the Head Coach at the San Ramon Valley Livermore Aquatics (SRVLA). Coach Thornton began coaching in 1981 after serving as Captain of the 1981 USA National Team with Tracy Culkins. He also represented the United States as a member of the USA Olympic Team in Moscow. Coach Thornton received the Pacific Swimming Coach of the year award in 1991. One of Coach Thorntons swimmers, Sarah Anderson, represented the USA on the 1994 USA World Games Team in Rome.

I think that slow swimming, and I mean easy swimming in relation to your race times, is very misunderstood. It's very important and I don't think we do enough of it. Some Germans once said that 76% of your swimming needs to

be sub-threshold, and they took steroids to do that. Many of us are training at a much higher percentage of hard, anaerobic swimming or anaerobic mixture type of swimming and we are drug-free, so it's going to be awful hard on the kids. I think the endurance swimming I'm talking about is not the hard distance type of set like 10 x 500s on a hard interval, barely making the interval. I'm talking about doing a lot of what we used to call LSD, long, slow distance. It wasn't really slow if you've moved your threshold where you should.

The Russians try to have their threshold very close to their max pace. A good distance swimmer in very good shape, someone who knows how to swim very well and who's in very good shape, can swim easy very close to their threshold time. In some cases, you've all seen those distance swimmers with no speed, they can swim very close to their max time easily. So a lot of this easy swimming might be at the 140 or 150 beats per minute heart rate. Now, if you're a drop-dead sprinter, I'm not so sure it's important. I think just getting the laps in is important as opposed to the pace.

The reason I'm dealing with pace is we did not do very well this summer in our 1500 meters at our championship meets. We were very good in the other races. For example, take a set like 400 easy, 500 fast, and do that with 10 seconds rest, and repeat that five times, progress the 500's 1 to 5. One girl who swims for me has the mile as her best race. On the easy swimming she can go really fast; it's slower than her 500 pace, but she can lap people on the 400's. Everybody was kidding her about, "Oh, you're racing everything, you're supposed to go slow, you're supposed to go easy." She did slow down, she buckled under peer pressure, and by the end of the summer her mile was miserable. If I were to watch Kieran Perkins work out, five years ago I would say, "My God, he's fast. We've got to go home and work harder." But I don't

know if he's working hard, I think he's just fast. You need to find out what paces they swim.

The Australians right now are saying that they work less than us. They don't swim as hard, they do a lot less yardage and easier swimming, and they go fast occasionally. I think they're right on. But that Swimming World article is a little misleading. When an Australian miler goes 20 x 500's at 150 heart rate and his interval gives him about 10 seconds rest, and he's holding 5:10 or 5:15 or whatever — yes, that's easy. And yes, he's getting some aerobic benefits, and he's developing his stroke, he's setting his neuromuscular patterning for his technique, but he's probably still recovering. That's why later on I'll go through the cycle.

I think part of training is working hard and also recovering. But we don't like to waste time. Our kids have jobs and have to go to school. During cycle swimming, you can rest a system while you work another system. For instance, by doing an anaerobic practice, I'm probably resting the aerobic system. I know it's hard to talk about how the body works because it never works in one system, it's always a combination. But it seems like long, slow, easy swimming and drills and such is the one type of training that we really need a lot of and it doesn't hurt us. It does nothing but help us. I have a lot of people come home from their college teams or they come new to my team and they say, "Yeah, we do recovery twice a week, and we swim 2000 yards and then get out and go home." And I think they're missing a chance to get in great aerobic shape.

The Webster's Dictionary definition of stress says "Physical, chemical, and emotional factors that causes bodily or mental tension." I think you have to

recover from stress as well as from physical work. When I talk about recovery practice I'm talking about recovering from stress and anaerobic training more than anything else.

These are types of stress: Fatigue means just being physically fatigued from training; sickness is when the body finally just breaks down and you're sick; joint and muscle pain, and when I say pain, I mean the kind when you know you're hurting yourself if you continue; shoulder injury or knee injury; anaerobic stress, we talked about that a little bit; and your mental stress.

I have a girl in my group who can swim 500's straight with a minute rest and can hold 1:15 long course. But if I put 100's on the 1:20 or on the 1:16 and have her try to hold under 1:15, she is totally stressed because of the interval and she cannot do it. Surprisingly she does fairly well in competition. So somewhere in there she has a mental block. I need to do interval work with her and work that and stress that but not every single workout eleven times a week. She needs days where we back off and say we'll do that tomorrow.

The definition of recovery, out of Webster again, is "to get back, regain; to bring back to normal position or condition." The archaic definition is "to rescue; to save from loss and restore to usefulness and reclaim." In other words, try to break them down and then let them recover. I like to think of the swimming season as a staircase. Each time you come back you're a little higher and a little better. That's kind of where we're at without getting into the nuts and bolts of it.

I did think you want to make those recovery workouts worthwhile, and I do think that there's some recovery in every practice that you have, as well as whole practices. During the school year, we take more mornings off because of academics and sleep. But in the summer, or over Christmas, or Thanksgiving, or those type of times, I try to fill those mornings in with practices. Still, I try to stay fairly easy on them, and pick up some aerobic conditioning. But how do you make it worthwhile? I think that if it's easy, many swimmers quit thinking and think it's a day off. I want a day off from stress and intensity, but I don't want a day off from thinking about technique. We put drills into many of the practices. If you put a drill every third lap, they can't go for time and they can't race. They slow down and swim at their own pace. I think that's very important for the sprinters.

Sculling: I don't like to just do 20 x 25's sculling. I like to scull every third lap. We do a lot of long swims these days, because it flushes the system of lactate. I also think if you do 10 x 100s on 1:30, they'll swim it with no heart rate. But if you do 3 x 1000's, kick one with fins, pull one with a breathing pattern, and drill/swim one in your best stroke with zoomers on, they don't want to be there forever. They want to get done and they want to talk so they'll pick up the pace just enough to get some aerobic conditioning out of it, but they won't hurt themselves. They know that tomorrow there will be a hard practice. I think that's very important.

If you get any of the running magazines, they're really good. I read an article in Runner's World about recovery practices. These are for the guys who go out cross-country, the triathletes, the marathoners. They train cross-country and they come in once a week and they go to the track as their recovery day. They run easy around the track and maybe every 4th or 5th straightaway they try to build to 10K best time pace and then slow down again. It's something that doesn't hurt them, but they do something fast. It's not proven, but

supposedly it kicks in the human growth hormone at a higher level. And so obviously if the human growth hormone is kicking in at a higher level after practice you're going to recover faster. This is just what I'm speculating from the article.

So what we try to do is go some 25's, or maybe some 15 yard sprints on a minute. Something that's fast, not all out, maybe goal 200 or 100 pace. Fast but controlled. You're almost rehearsing your first 25 of a 100 yard or meter race. Try to do something like that at the end of practice, or occasionally through practice. I think the sprinters stay in tune with practice more if they know they're going to get to race people at the end of practice. Perhaps do them from a dive in an indoor pool. If you look at the sample workout here, at the end of practice there's a 400 for technique, and that might be drill if necessary. Then they might go 4 x 25s on 1:00, 15 yards fast, no breath, and 10 yards cruise to the wall. We might go through that four times.

The last two springs we've had high school meets in our program on Friday afternoons, so I lose all the kids on Friday and we normally don't swim on Friday mornings. I started bringing them in for an hour on Friday mornings to try to make up part of the yardage they miss when they go to high school meets. Most of the high school meets, until the League meet, aren't too exciting. They can be close, but very rarely do they have to warm up, loosen down, race hard. They don't really have to get up for it that much, so usually I like to do something aerobic in the morning so we did a recovery practice. We got in and we went one hour, for probably five of the seven weeks. We might do a 400 drill down/swim back (this was a yard practice); then they went 4 x 25 on 1:00, and they did that repetitively for an hour at their own pace. It was their choice of stroke. They could work on their bad stroke if they were an IM'er. It was their choice of equipment. They could swim on long belts, or Zoomers, or paddles. I didn't want them to do pulling and I didn't

want them to do kicking, but they could do anything other than that. And they could go at their own rate. They had social time — with 25s on a minute, they got to talk. Sprinters probably got in seven easy 400s that morning, or at least five or six and they got that conditioning in. Distance swimmers got a break, and got to work on speed work a little bit. It was quite good. It was amazing how well they were swimming at the end of practice technically. All I had to do was walk around and work with them. The beauty of it is that the breaststrokes and the sprinters didn't have to try to keep up with the intervals we set for the distance swimmers. They didn't have to get sloppy with their strokes.

That leads me to a point. I think all of our swimmers need to go over-distance training, but I'm not sure how many of the swimmers need to go distance training. Take, for example, 15 x 500's on 5:15, where you have to hold under 5:00 or they don't count — that's a distance set. But an over-distance set might be a little easier. It might be your stroke, or there might be some drill work in there. It doesn't have to be slow, necessarily. For the average 100 and 200 swimmer who goes a 400 IM or a 500 for fun, sometimes I think some of us are overworking those kids. 76% of their swimming needs to be over-distance, but I think they have to do the things that promote the technique necessary to race at the 100 and 200, if that's their best event.

I heard an old story of Brian Goddell when he was coming up. In his junior year in high school he won the mile, and he won the 400 at Montreal. He was in the "animal" lane, and he was the best distance swimmer in a great group of distance swimmers. I heard stories that there were days where he went third or fourth and just went through the motions. And he went fast, because he was a fast swimmer, but he knew his body and he knew what days not to work too hard. I heard that his coach was up there saying, "Come on, get going, you should be up there in the front!" and he just knew that he

shouldn't go too hard that day. He should do all the yardage and not miss any training. I think you can plan that into your weekly cycle.

We first started using cycle swimming in Northern California when I was in high school. Don Schwartz was using it in Moran and we started using it. We just did distance free on Monday, IM's on Tuesday, and quality in your strokes on Wednesday. It was a very simple cycle. Personally, I was a 200 flyer and distance freestyler, and I hated 400 IM's and all that stroke stuff, so I pretty much cruised on Tuesdays. It was not the kind of set that I liked. So I was probably getting four recovery practices a week. And I'm sure your sprinters, when you go distance day, cruise more or less, and so these people had found ways through the 70's and the 80's to get their recovery days. We used to go a 2000 warm up from time to time at Cal, and the distance swimmers would go easy in the beginning and get kind of warmed up, and come in sub-10 minutes in the second 1000. The sprinters just swam easy and when the first guys stopped, they'd go another 50 and then they'd stop. But they were getting 1600 yards of long, easy freestyle two to three times a week. If you're going to swim the 50 and the 100, that's all you need. They were getting what they needed, but it drove the distance swimmers crazy.

We had a bulkhead at Cal, and one day we were so fed up with the distance work I climbed over the bulkhead and every time guys finished, I'd get them to climb over the bulkhead and get their feet up off the bottom. The sprinters kept going, and going, and going, and at about 2500 one guy put his head up and said, "Who's counting?" We thought that was pretty good.

I think it's very important to train in your off strokes. When I was swimming, we tapered quite a bit and then in the 1980 Olympic year we did all this IM

work during taper. It wasn't a lot of work, but the coach made us do an IM set every day, at least one practice a day. For years we got down to our best two strokes and got ready for those. I thought it was mindless yardage but I swam great. I'm not a physiologist, but I think what happens is you have muscle fibers, and you have muscle fiber firing systems. In other words, they work in patterns. So each stroke is close but slightly different, and so the patterns may be different. If you go for four weeks without doing any IM work, you probably are losing some of that ability. What happens, I think, is any muscle fibers you use, and in breaststroke you might use different muscle fibers in the legs than you would in freestyle, you keep a capillary system built up to those muscles and muscle fibers. When you race, I think your body eliminates lactate, and it gives it more places to get rid of it and get it out of the muscles you're using.

We try to do a lot of IM work, especially on recovery days. Some days we just do IM's. It doesn't always have to be in IM order; it can be stroke switching. Other days we might just spend 1000 to 1500 yards on each stroke. I learned from Skip Runckle that you have to do some straight swims on the different strokes. Each swimmer learns differently; some learn by swimming laps, some learn by listening, some learn by seeing. Some swimmers will learn a stroke better if they spend some time on it in a set. I know Skip has had great success with 400 IM's. Throughout the course of each week he has had an easy set in each stroke where, through repetition, they can learn. He has also had a hard interval set in each stroke where they can learn under stress. I think that's very wise.

But getting back to this, we do a lot of off strokes. Even the kids who love to race tend to slow down when they're not doing their best stroke. I heard recently that about 40% of Kieran Perkins' training is non-specific, meaning not fast intervals and race pace, and good hard swimming. I heard 40% of

that is backstroke. So he doesn't swim just freestyle on his easy days. I think you can use those strokes and drills and sculling and things to tell the kids to take it easy and slow down. I shouldn't say slow down, it's the wrong word. Kids think that fast means hard and slow means easy, and I think you have to get away from that. The faster you can go easy, the faster you're going to go fast and hard. You know, something that really hit home about recovery is that we tell kids after races, "Loosen up a long time. The more you loosen up, the better your next race will be." I tell my kids the first step to preparation for your next day's race is to loosen up now. Though it doesn't make sense to me to just sit out of the pool and take a workout off for a recovery practice, it makes sense to me to get in there and swim and flush the system.

I wrote the sample workout so that so people could see exactly what we're doing in a recovery practice. We'll try to use a lot of equipment, especially at the end of practice, so the kids will think a lot about their strokes. The practice is two hours, and a lot of them have been at school all day, and they can't think for two hours about swimming. They get distracted when they're talking to their friends. The equipment we use is to promote the proper stroke technique when they go fast. We use a lot of paddles and fins and buckets and all kinds of things these days. The yardage might be less, but when you use a bucket, you have proper hand pitch. You've probably noticed all around the country, you see swimmers and you look at them warming up and loosening down, and then you watch them race, and you go, "My God, it's a totally different stroke!" And if 76% of your swimming is supposed to be sub-threshold, and that means it's done at the wrong neuromuscular-muscular fiber firing pattern, then that means it's done wrong.

The Cal tennis team is usually in the top 10 in the country, and they've been as high as second. I didn't know why the coach did this when I was swimming, but I know now. When it rains, they will always play basketball. It's the same

footwork, the same cardiovascular work, maybe more. They don't go play badminton, because badminton is too close to the tennis stroke. Badminton has a flicky wrist and tennis has what they call a laid-back wrist. So basketball is far enough different that it's not going to affect your tennis skills. I think a lot of the swimming we do can slow us down if it's not done right. So we spend a lot of time counting strokes: even when we drill one arm freestyle and one arm butterfly we count strokes.

We're going to do more recovery swimming coming up than we did in the past. I wasn't pleased with the last summer season. We might dive in and warm up a 600 with underwater turns. What that means is I'm giving them something to do so they don't start racing. I really don't ever tell them to go slow, it's a recovery day. But instead of telling them it was a good swim or a great time, I tell them their stroke looks good. I give them a different type of reinforcement on those days. We will go a 600 free with underwater turns where you come in, you dive down and you turn under water and your feet and butt cannot pop over the surface. If you stay tucked and keep your chin on your chest the way you're supposed to and spin very quickly, that won't happen. The kids that open up after they start to turn are the ones who can't do it. So I'm giving them something to think about. We used to go reverse 800 IM kick/swims for warm-up at Cal but this is better.

This is what they've been doing at Cal recently: they go a 900, reverse IM order, drill/scull/swim by 25s. You warm up with some drilling; you warm up with some sculling to get feel for the water; and then they swim a lap. And you can even do it long course by 25s, and it's great because it develops all the things you want to get started and get going before you start practice. Then butterfly is at the end and you get your heart rate up a little bit before you start your first set. I really like that one. Then they might go a 2000 pull. We usually pull early in practice, breathing 3/5, 3/7, 3/9 by 50s. And I like to

work on distance per stroke and hip rotation because I think the paddles get their arms in the right position. It warms up their arms and works some strength. By taking the legs out of it they can really get their hips going the right way. Sometimes we'll follow that with taking the paddles off and putting a bucket on and doing 8 x 25s with a bucket, and then we'll follow that with the main set.

We try to work the legs a lot in our program, and on this next set we might go a 400 kick with fins. We might do some dolphin work as well as flutter kick because I want to work the abdominals and the back and all the muscles. Maybe then they will go fly/free by 100s, and they can do it on their back or their side as well. Then maybe we will do a 500 breast with paddles where they go back and count strokes. Maybe we will do three rounds of that and give them 20 seconds to change equipment. Then maybe you might go four rounds of what we talked about earlier, the 400 and the 25s. We might go free to fly, free to back, free to breast, or free to choice by 25s. That's a lot of changing strokes, and very rarely on a day like this do we sit down and go a 3000 set of one stroke. I want the aerobic conditioning, I want the recovery, I want all the strokes covered, and I want to flush the system. I also want the body to be tired from a workout, but when they go home and they eat and sleep, they're ready to go. The total yardage is 8500 yards. That's not that long, and they'll probably get out early. But I keep them moving. Sometimes, especially early in the season, they'll just go from set to set and when they finish I'll just walk over and give them the next thing and send them off. I won't give them much more than 30 seconds between sets. We do that about twice a week when we go 11 workouts a week. When we go nine workouts a week and they're getting two mornings off during the school year, I adjust and I don't necessarily give them whole recovery workouts.

I'll explain the weekly cycle. If you look at Tuesday night, after the first four or five weeks we start doing medicine balls and running about twice a week. We put a recovery practice after dryland on Tuesday night. Actually, anywhere it says EN1, that's about a 150 heart rate set, or an easy, long swim set. They're not recovery per se, but they're very close to it, and for the distance swimmers they're right on recovery. I don't give them full recovery practices because they have two mornings off. But over Christmas if I were to go up to eleven workouts a week, I would probably fill in recovery practices on Wednesday and Friday mornings. It's not that much harder, but just enough, and they pick up 16,000 yards for the week.

During the season, we don't rest much for meets because we don't have any pressure from our athletic director to win any meets until the end of the season. If they have a meet on Friday, Saturday, or Sunday, they're going to miss training. They're going to miss aerobic training mostly, because they're going to race three races in the morning, three races in finals, and a relay. If I give them a 2000 and then let them out, I've lost four days of training. If they have an away meet far away and have to drive home or fly home and miss Monday morning, they miss another day of training. We'll probably swim one of these recovery type practices the night before a meet unless we had to fly somewhere. But if it's just driving distance, we'll swim about 6500. We won't go 8500, but we'll go about 6500, very long, easy, stroke drills, sculling, that type of thing. We'll make up some of that aerobic work they're going to miss during the course of the meet, because they're going to get plenty of anaerobic work for the next three days from all the racing. So hopefully it doesn't interrupt our cycle too much and we can go right into the next week of training. Then Monday morning we come back and do another recovery practice. Even if it's not slated for one, if we've had three days of competition, I don't come in and make them go hard stuff.

We had a coach in our area years ago and he was very successful because he had great athletes. I don't know if he was old-fashioned or if we thought this way then, but he would come home and during the quality phase of the season, which was to him broken swims and time trials, he would go to a three day meet, with trials, finals, and relays. He'd come home the very next day with an easy practice, and then go another three days of broken swims. So he'd end up with six days and I just thought that was too hard on most of them.

Looking at the cycle, I guess EN3 is now max VO2 so we'll do some kind of progressive set on Monday morning. We'll swim about 4000 really easy, just to get used to swimming again. Monday morning the kids might have some energy, but they don't feel good in the water because they've been out of the water for a day and a half. A really good set we did a lot last year was 400 back to free easy, distance per stroke and technique, and then we'd go a 600 fast. We'd go four or five rounds of that, at their own pace. They don't wait for anybody and go on maybe 10 seconds rest. The first 600 might be a 600 straight. The next might be a 300 and two 150's. The next 600 might be two 150's and three 100's, and the last one might be three 100's and six 50's, with 10 seconds rest. Your distance guys just start cranking right away, and your sprinters, even if they float through the first few, are probably above a 150 heart rate and are getting some aerobic work. You'd be surprised the last 600 or two that you get out of sprinters with great stroke. If you can get a couple hard 600's out of them at the end of practice, they're not going to have any fear of the 200 long course free or whatever else they have to swim. It's really great and the kids are going goal race pace in broken swims at the end of practice, and it's still if not an anaerobic set, it has anaerobic components. That evening would be more threshold type of work.

Now these are what the important parts of practice are. We still might warm up with some easy 500's and we might do some work where you go some 75 easy/25 fast ten times to get the body warmed up. This is the main concern of practice — what we want to stress. The other things are more for maintenance work and getting the body warmed up because you have all those energy systems you have to warm up. Tuesday morning we might go 50's on the minute long course and try to hold goal 200 pace. At first they can't do it, but yards they can do it. If you want to go 1:44 in the 200 free this year in yards, you've got to hold 26 flat. It's not supposed to be hard, but it's fast. At first it's really hard, but by mid-season it's one of those workouts where you get in and you go really fast but you're in control of it. Then the rest of practice might be a long endurance set. It could be 10 x 300's where you just want a 150 heart rate and you want them to swim it even. You want your blood to be pumping and your lungs to be going, but no muscular pain.

The pain you get from anaerobic swimming and lactate production is different from being tired. We try to teach feeling and what they're supposed to feel like. A kid might want to do that set in his stroke, and for backstrokers it's pretty easy. With some of the new techniques they're using in backstroke and butterfly and breaststroke, it's hard to go 10 x 300's in your stroke. "" used to do a lot of breast to free, or best stroke down and freestyle back. They tended to do a better job of keeping their stroke that way. I think we had 10 x 500's once back to free, it was a progressive set, and I had a young backstroker who was 2:02 long course for the 200 backstroke in high school, and he went 4:48 in the practice, and that was a very good day for him. But if he's going 4:48, his backstroke is probably pretty good quality. I find that when you go a 3000 back you tend to use a different stroke than if you go free to back or drill down and swim back.

We try to keep dryland at night as aerobic as possible. Weights and stuff have an anaerobic component to them. It's not like an anaerobic race but it is anaerobic. I think too much anaerobic swimming really hurts us. What many of the Canadians and Europeans are doing during the first six weeks of training is a lot of long, easy swimming with heavy weights and really working them. The day when they take their first hard stroke in practice, they're off the weights and on to more aerobic type things. For example, medicine balls are very good. They work the core, and kids love doing dryland because they get to play with the ball. We don't have weights available to us, so we don't have a choice. I try to keep my dryland as aerobic as possible, going from exercise to exercise without stopping.

We give them Wednesday morning off. I was talking to Skip this summer and he was telling me they're very successful doing what they call three aerobic peaks. If you look at Monday morning and Monday night you're at threshold or slightly over it. Wednesday night and Thursday morning you're the same, and Friday night and Saturday morning you're over it also. We tried something new this spring and summer.

On Saturdays we always did someone else's practice. I spent a lot of time getting practices from other coaches we did some Michigan practices, some Cal practices, and some of Chuck Rigg's practices. We tried to do a very hard workout on Saturday, since they had a day and a half to recover. Just doing a workout that someone else wrote is harder on the kids because it flows differently and they're not used to it. For instance, if I run for 30 minutes each day on the exact same course and then I go run a different course that might have a few more hills in it you can really feel it. I try to do something different as much as possible, while staying in the same beliefs about swimming.

Now on Tuesday morning and Friday night, I have SP1 and SP2 in parentheses. On Christmas day or January 1, depending on when Senior Nationals, Junior Nationals, and Olympic Trials are, we'll start doing some peak lactate work. When we do a peak lactate practice, we'll try to keep the warm-up very short, but still like they'd do in a meet, maybe 2000 yards. We'll do some speed work, some drills, and many times I'll give them 35 minutes to do whatever they want. Then we'll do something very fast. It might be 100's on 8:00 or broken swims where they have to beat their best time. Then we will swim easy for an hour to an hour and a half afterwards. If the hard part of the workout is over in the first hour, we'll go 4000-5000 yards of long, easy swimming, and I don't even care if their heart rate is up to 150 or not. We might do a lactate set, and then do 8 x 50s kicking on 1:30 as hard as you can in the same stroke, and then I might give them 3 x 800's with a minute rest, kick down/swim back, choice. Maybe the first 800 is with no equipment, the second is with zoomers, and the third is with zoomers and paddles. As they start getting bored, you put more equipment on them so they have to continue to do their stroke properly. And, as they get tired, they have to use the same neuromuscular patterns as when they compete.

I'm finding that the more easy swimming we do, the better we swim. We're better in season because we're not as tired; we're better at the end of the year and we're improving the easier we go. However, after last summer, I think we need to spend more time monitoring the heart rates on the easy days. The 140 and 150 heart rate, the low-end aerobic training, is very important. As you get older, and you have a 21-year old coming home from college, his max heart rate may be lower than it was when he left at 18. So 150 for him might be too high now. If the kids train real hard all those years, I don't think that their max heart rate changes as dramatically as a non-athlete's. I think they tend to stay very young inside. You have to watch that, and their threshold training will be the same way.

Ernie Maglischo had given a talk entitled, "When To Train Hard, When Not To, and How To Tell the Difference." There were one or two statements which I found that summarized my whole talk. I quote, "Traditional treatments for over training have involved complete rest, increased consumption of carbohydrates, reduced training and changes in types of training. Our experience that all but complete rest are effective methods for dealing with over training." That means as far as they body goes, taking the day off is the worst thing you can do. However, you have school and sleep considerations. Continuing, he says, "The swimmers recovered just as rapidly when they trained at lower intensities and/or changed the training as they did by resting completely. The difference was that those who continued to train had higher levels of endurance once the condition was corrected." Then to paraphrase another part of it, tissue is repaired regardless of whether athletes trained or rested completely. That's very important.

Here's a little tool. If you are ever training your athletes really hard and it's been a good week of training, even if they don't look tired and they keep coming back and going faster and faster, I learned something from Dick Jochums years ago. He's coached many world record holders and he's now the new Santa Clara Swim Club coach. He said if you took a heart rate immediately following their last repeat and then you wait one minute and do it again and wait one more minute and do it again, you'll come up with three heart rates. Where those are and how fast they recover and how high they are or low they are tells you a lot about whether you can come right back the next day and work hard again or whether you need to back off not give up training time but maybe go into an easier mode of training. We take a six-second pulse count, and I know a longer pulse count is more accurate, but we've just always done it that way so we still do it. But many of the swimmers when they're in great shape and training will get somewhere between 19-22 for six seconds, and a minute later they'll get a 9 or an 8. They'll come down that fast, and if they do that keep working. If they get a 16 or 17 reading and they recover in a minute and they're 14 and then they're 12 that means they

can't get their lactate up because they're too tired, too fatigued. It also means they can't get their heart rate up, and they can't recover quickly. If you get that type of reading even on one of your better swimmers, then that swimmer needs to back off and swim easy for a couple days. It's a great tool, if you're ever in doubt, should I work them hard again? It's also really good when you're in the middle of taper you take a long taper and you're about 1 1/2 weeks out and you're saying to yourself, "Boy, we've been tapering a long time and we've haven't done anything fast in weeks." If you use that same test and if they recover quickly and that heart rate comes down really fast after a hard set, a short fast set, then they're still in great shape and you can just keep resting.