

# STROKEARCS

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# THE FEMALE ATHLETE

## BARBIE DOESN'T PLAY SPORTS

How can you get female athletes to embrace their weight-room workouts and throw away their desire to look like thin fashion models? The keys are to listen, understand, and educate.

"Do you want to be a runway model or a healthy competitive athlete?" I have asked this question to many female athletes. I ask the question because, when I listen to their words, they say, "I want to be strong and explosive." The problem is that when I listen to their actions, some say, "I want to look like a thin fashion model."

One of my goals as a strength and conditioning coach is to inspire my athletes to do progressively more work in the weight room. The combination of progressive overload with the genetics of most competitive athletes eventually results in a small increase of lean body mass. Research suggests that increases in lean body mass begin around week six. But it is common for the female athletes I coach to stop by my office for a meeting long before week six.

Meetings usually start with, "Red, I am worried that I am gaining weight and getting too big." I sometimes want to smile because I know that a majority of women do not have the genetic predisposition for Ms. Olympia-size muscles, and certainly they won't be showing increased muscle mass by week three. I don't smile, though, because I know that body weight and cosmetic shape are no laughing matter for most females.

The conflict between the duty of strength coaches to increase lean body mass in female athletes and many females' desire for social acceptance through thinness can be a difficult issue. How can strength coaches deal with this tug-of-war? In this article I'll offer some specific strategies I use at Michigan State to motivate our female athletes to embrace improvements in lean body mass.

### LISTEN, ACKNOWLEDGE, TEACH

When it comes to most issues, the more communication you can share, the less the conflict. Communication on this issue starts with the strength and conditioning coach acknowledging how focused many females are on slender shape and social acceptance, as opposed to physical competitive readiness.

Listening to female athletes over the years has been an interesting education for me. The biggest surprise has been how much time and energy they spend thinking and talking about food, diet, body weight, and cosmetic shape. For some women, these topics are a constant preoccupation. Based on my experience, I believe that if four female athletes went out for lunch to discuss a team issue, each could recount what the others ate and how they looked in their clothes with greater clarity than the topic discussed.

This may seem silly to a coach who thinks about body shape, oh, maybe once a year when he has to put on that suit and tie for the year-end awards banquet, or who comes from a football background where bigger is better. That's why it's important to commit to hearing and understanding females' thoughts and feelings regarding their desire for thinness. This is the first step to making a connection from which they will listen, trust, and commit to our goals and plans.



Along with listening to my athletes and acknowledging that they may constantly struggle with body image issues, I try to teach them why this problem exists. Females are taught from a very early age that attractiveness, acceptance, personal happiness, and self worth are based on a very thin shape. The message is simple: If you are thin, you will be confident, well-liked, and successful. They see it in every advertisement, women's magazine, and celebrity photo shoot.

I educate my athletes that they are being sold this unrealistic body ideal by marketers pushing products. The diet, fashion, and cosmetic industries take advantage of female body image insecurities through the promotion of an "ideal" body shape. The ideal shape is usually small muscled and thin. This distorted social norm is then linked to an extensive list of products to make your "perfect body" dreams come true. It is important to teach female athletes awareness about this deceit and how they are being manipulated.

Furthermore, it is not uncommon for fashion models' and celebrities' pictures to be digitally altered. In 2003, *GQ* magazine buffed, trimmed, and altered actress Kate Winslet's photos in order to flatten her stomach and thin her legs. Winslet said the editors reduced the size of her legs by a third. Cover and photo shoots are often the culmination of weeks of personal preparation—along with professional lighting, make-up, costume design, air brushing, and computer manipulations.

It is unrealistic and unwise for women to use these fantasy advertisements as role models. This is especially true for athletes, whose goals are health and triumph, not product sales. But the reality is that it's extremely hard for females to ignore all these images.

So we talk about the issue. I listen attentively to the female athlete who wants to talk about her fears, no matter how many times I've heard the same story. I try to empower each young woman by educating them on how the body image phenomenon has arisen. And I try to teach them that confidence and acceptance comes from within.

At the same time, I tell them not to give themselves permission to succumb to these unrealistic social pressures. Rather, they should embrace their genetic gifts and physically prepare to dominate. Changing their focus is their challenge, and I tell them I believe in their ability to do so.

### **FEARS VS. FACTS**

When women are afraid that strength training will cause them to bulk up and dramatically change their body size, one of the best things I can do is provide them with scientific evidence that this is probably not going to happen.

I start with this: Studies show that over a nine-week period, most women who engage in resistance training gain a little over one pound of lean body mass, while experiencing a corresponding decrease in body fat of just under two percent. I usually repeat that. A mere one pound!

Females who weight train may see muscular size increases of 20 to 30 percent, depending upon body type and other genetic factors. However, increases do not appear to meaningfully affect external girth measurements, because they simultaneously lose body fat. Of two studies reviewed, one showed no overall change in girths and the other showed less than a quarter of an inch.

Research clearly shows that a majority of females will gain muscle and lose fat while staying close to the same body weight and size. For most females, the meaningful result should be a more shapely and taut physique.

I also tell them about the benefits that can be derived from weight training. A properly designed and implemented weight training program may contribute to increases in

strength, speed, endurance, and flexibility. Further benefits include a decrease in the chance and severity of musculoskeletal injuries and increases in psychological well being. Finally, because muscle is a metabolically active tissue, small increases in lean body mass through weight training may lead to a higher metabolic rate (more calories expended during both exercise and recovery) and potentially less body fat.

### **SMART EATING**

Many female athletes who are afraid strength training will make them too big also fear that eating adequate calories to fuel their workouts will lead to unwanted weight gain. So another important method of ridding female athletes of their fear of gaining weight is to give them a constant flow of nutrition education.

We talk a lot about the benefits of eating a variety of wholesome foods throughout the day and immediately following exercise. I explain how doing so can provide a constant flow of energy, delayed onset of fatigue, enhanced healing of injuries, faster recovery from illness, improved concentration, and enhanced athletic performance. Ultimately, the benefits of healthy eating probably give athletes a competitive edge without spending more time practicing.

To assist with nutrition education, we recently hung four 32-inch flat screen television monitors in our weight room. We have the monitors hooked into a computer that continually runs a nutrition PowerPoint presentation throughout the day. Each slide then answers one nutrition question or presents one important nutrition fact. For example, one slide answers the question, "Why shouldn't you restrict caloric intake?" while another explains how to make great food choices. The PowerPoint idea has worked extremely well to educate our athletes without taking up any extra time.

We also educate them about what constitutes healthy and unhealthy eating in a psychological sense. Because we want to avoid disordered eating, we teach them what it means to have a balanced approach to meal planning.

For example, smart eating can include refined sugar and foods with fat. Many dietitians suggest eating your favorite "fun" foods in moderation as part of a balanced, nutrient-wise plan and as a strategy to keep from bingeing.

An example of an unhealthy eating attitude is the habit of labeling foods "good" or "bad." Female athletes should not shudder at the offer of a cookie or small bag of chips. High-caliber female athletes should feel relaxed and comfortable eating a wide variety of foods. Calories from the "bad food" list have no greater influence on weight than do the low calorie items from the "good food" list. A calorie is a calorie—weight gain results from going over your total caloric needs. What is needed is balanced meal planning.

I encourage balanced eating through both motivation and education. I motivate by first establishing a relationship of trust and loyalty to both the person and the athlete. The women I coach know that I care about them personally and am passionate about their athletic goals. They know this because I show up, inquire, listen, and try to understand them personally before professionally solving and leading. Then, I try to motivate them by sharing exchanges about the joys and purposes of eating. When the athletes and I talk there is little judgment, just education and some laughs.

I also try to demonstratively celebrate those who are healthy eaters in front of the group. I tell stories about champions and championship teams I have worked with who committed to purposeful eating and benefited because of it. I also remind athletes of the times they were successful because of proper fueling or failed because of their lack of healthy eating. Furthermore, I practice what I preach. The women know that I generally fuel myself with healthy foods, but they also know that my "fun foods" are Little Debbie's and Gummies.

When I hear athletes say, "I am having one brownie after I get done eating a balanced plate that consists of a rainbow of wholesome foods ... and, yes, I did eat breakfast!" I know we're making strides. I give them a high five and a big smile.

### MEETING STANDARDS

At the same time, we make it clear that our goals in the weight room are to increase their strength and lean body mass. We acknowledge reality around body image, but we also invoke standards and apply them through consequences and rewards.

Because many females are not that excited about the prospect of lifting weights and getting stronger, they tend to need more incentives than male athletes. Many females want to start with five pounds on each side of a bar or machine and progress by just two and a half pounds. This would mean we wouldn't arrive at a challenging resistance or improve body composition until a week before they graduated.

To ensure that our females are challenging their muscles, I assign the standards of "DF" meaning "demonstrated fatigue" and "NF" meaning "not to fatigue" next to all of the prescribed exercises. The effort level assigned to

each exercise depends on the degree of technique involved. Low technique exercises have an NF assigned to them instructing athletes to stop when the goal repetition is achieved or technique significantly breaks down. DF means female athletes must continue to lift until they achieve demonstrated fatigue. Demonstrated fatigue

means continuing until exercise technique is significantly affected or the player cannot achieve a repetition without assistance from her partner. DF's inspire trainees to start with a challenging weight load so they don't have to lift a weight 50 to 100 times before they reach DF and are allowed to stop.

Progressive improvement on both DF and NF exercises is also a

measured standard. If athletes fail to meet these standards after being taught, reminded, and reinforced, they are told to leave the weight room for the day and their name goes on a "Throw Outs" list that is posted in the middle of the room. Those who do attain the standards are demonstratively celebrated and treated like the heroes they are.

### A MATTER OF BALANCE

Just as it is important to individualize strength and conditioning prescriptions, it is sometimes important to acknowledge aesthetic demands of the sport and how this affects body image. For example, if we are working with a naturally muscular and strong gymnast (mesomorph), we may decrease weight training volume and address higher priority rate limiting factors like explosiveness or flexibility. Additionally, if we are working with a slightly stocky wide framed diver (endomorph), we may decrease total quantity of weight training and add anaerobic conditioning to address the aesthetic requirements of her sport.

But, for the majority of the athletes we train, we build bodies with the goals of enhanced performance potential and reduced chance and severity of injuries, and we don't worry about whether or not the body is attractive. We empathize and work with those females who feel dissatisfied with their bodies. However, we do not compare athletes to the standards talked about in the general public, and we do not try to solve the "my muscles are too big" problem unless it legitimately exists.

To explain our focus, I sometimes tell a story about one female non-athlete and one female athlete who were eating at a local restaurant. When the non-athlete female was asked what she was doing she replied, "I'm eating



lunch." When the female athlete was asked, she replied, "I'm building a champion."

Selfless commitment to team victory is our main focus. To accomplish it, we individualize sport-specific programs so that our athletes can safely and dominantly perform their sports skills. To this end, we listen, learn, educate, and lead.

At Michigan State, exercise is a tool for fitness, fun, health and victory, not weight control or body downsizing. To the Spartans, the weight room is a place to experience the joy of team interaction, connection, and accomplishment—a place to celebrate the strong, powerful, fit female.

#### **Sidebar: ON THE LOOKOUT**

*Most of the athletes I work with respond to the approach I describe in the mainbar of this article. Some are even enlightened by it and gain new confidence. But a handful do not hear what I'm trying to say no matter how much we talk. So I also am constantly on the lookout for athletes who have begun a cycle of disordered eating.*

*At the end of a hard week of training, I once asked an exhausted female athlete, "What have you been eating this week?" She replied, "Cereal." When I said, "Cereal and ..." She replied, "Milk." That's right, she ate nothing but cereal and milk for five days straight.*

*Disordered eating often starts with restricted caloric intake and includes bizarre eating habits. Restricting whole food groups is an example of disordered eating, as is making very strict rules about what or where one eats. Other examples of behaviors that set off alarms include having an intense fear of weight and size gain, a constant preoccupation with food and thinness, a perception of being overweight when nothing could be further from the truth, significant weight loss, denial regarding significant weight loss, infrequent or absent menstrual periods, constant guilt regarding eating, always eating alone, and excessive exercising.*

*Disordered eating can create a variety of secondary problems, including insufficient intake of vitamins and minerals, low energy, impairment of immune function, reduced strength, poor motor control, fatigue, menstrual irregularities, or the loss of menstrual periods altogether. If untreated, loss of menses can lead to poor bone health, stress fractures, and premature osteoporosis.*

*Eating disorders can take the forms of anorexia and bulimia. Dangers associated with these situations can include loss of teeth and hair, heart conditions, kidney dysfunction, liver trouble, and even death.*

*People who have reached this point of being at war with their body don't need to be blamed. They simply need help in the form of professional guidance and treatment. When I see any signs of disordered eating, I communicate with our sports medicine department, which has an outstanding system of professionals in place to help*

*athletes with eating disorders. The sooner a person can be treated, the more quickly she can overcome the issue.*

#### **Sidebar: SAYING YES TO LESS**

*Last year one of my women's teams asked to do less work at a point in their off-season training. They said they were not physically recovering and were feeling mentally burnt out. I believe in listening and responding to the troops, so I did lessen the workload.*

*However, the team asked for less volume multiple times. I started getting frustrated because I secretly wondered if they were doing their part. Were they being responsible eaters for the goal of recovery? Did they have a rejuvenation plan? I suspected they were eating for appearance and not being professionals regarding their mental rejuvenation. In response, I researched and wrote a two-part test that I now hand out to people who ask to do less. If they can answer yes to at least 80 percent of the questions on both parts of the test, I consider reducing the volume of training. If they score less than 80 percent, I do not lower the planned workload. Below are the test questions:*

#### **Part I: Physical Recovery Test**

- Do you eat breakfast every day?
- Do you eat and drink every three hours regardless of whether you are hungry or thirsty?
- Do you rest, via night sleep or a combination of night sleep and naps, between 7.5 and 8.5 hours every day?
- Are a majority (60-65%) of the foods that you eat carbohydrates (whole grains, fruits, vegetables)?
- Do you eat a balanced variety of foods to ensure adequate levels of sodium, potassium, calcium, and iron (bananas, meats, milk, cheese)?
- Is the color of your urine always light yellow?
- Do you drink at least two cups of water or sports drink two hours before and immediately after practices and competitions?
- Do you drink at least eight 8-ounce cups of caffeine-free nonalcoholic fluids every day?
- Do you drink one-half to one cup of water or sports drink every 15 minutes during practices and competitions?
- Does a majority of your dining plate look like a rainbow (filled with red, orange, yellow, and green foods)?
- Because alcohol affects metabolism, sleep, hydration, and your need for certain vitamins and minerals, do you abstain or strictly limit your frequency and amount?
- Do you consume calories during practice (one-quarter or one-half piece of fresh fruit, 3-4 pieces of dried fruit, 10-12 Teddy Grahams, 5-6 vanilla wafers, one-half an energy bar, one-quarter cup sports drink??)
- Do you eat a combination of both carbohydrates and protein within 15 minutes of cessation of activity (practice and weight training)?
- Do you choose more wholesome and natural foods rather than heavily processed and refined foods?
- Do you increase the amount of food you eat per day during times of increased training?
- Are you menstruating? If you are not, is there a valid medical reason?

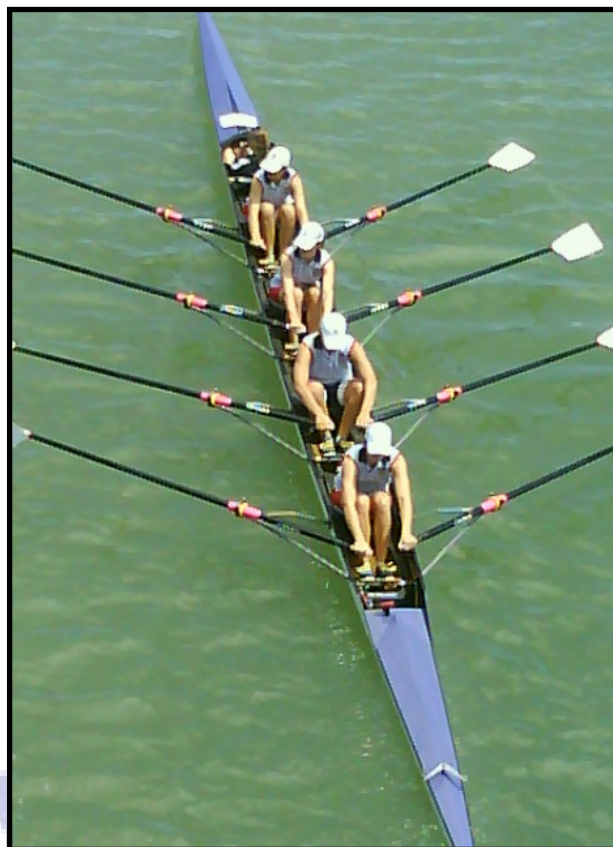
If you cannot answer "yes" to at least 13 of the 16 listed questions, we do not want to lower the frequency or volume of your training. Our experience demonstrates that you are choosing to do less than is your responsibility in order to win consistently. Organize and commit yourself to smart recovery strategies in order to fully ignite your talents and abilities. Stronger energy management skills can be the difference for you, your team, and your dreams.

### Part II: Mental and Emotional Recovery Self-Test

- Have you planned and taken mini vacations that allow you to "disconnect" from your sport personality and "reconnect" with other parts of who you are (your creative, adventurous, and fun sides)?
- Have you planned and used daily "time-outs" when you can relax your mind and calm your emotions? Common time-out activities include naps, meditation, yoga, and deep breathing.
- Do you have a list of activities that help you totally disconnect from your sport so that you are able to come back to it refreshed and hungry?
- Do you implement some of your disconnect activities as part of your daily, weekly, and monthly rituals? Positive rituals are more successfully implemented when they are scheduled at the same time and on the same day every week. This way, you do not have to try to squeeze them in. Your positive rituals should be as common as waking up and brushing your teeth.
- Do you keep a daily schedule to help you manage your time?
- Do you delegate authority and responsibility to those around you?
- Do you have realistic goals?
- Do you exercise patience in your expectations of results?
- Do you focus on success?

If you cannot answer "yes" to at least seven of the nine listed questions, we do not want to lower the frequency or volume of your training. Our experience demonstrates that you are choosing to do less than is your responsibility in order to win consistently. Organize and commit yourself to smart rejuvenation strategies in order to fully ignite your talents and abilities. Stronger energy management skills can be the difference for you, your team, and your dreams.

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## COACHING SKILLS COACHES AS LEADERS

Leadership is a concept that is often discussed but frequently misunderstood. Literature in fields ranging from business to education to sport examines the concept of leadership, but often fails to provide a pragmatic outline or blueprint for those in leadership positions. This article describes leadership strategies that coaches can employ to improve their own as well as their team's effectiveness. The strategies examine leadership from both a personal and organizational perspective. It is only when coaches critically examine their own leadership styles that their individual skills and abilities improve, and result in enhanced team performance. While the strategies described were written with coaches in mind, they are relevant to other sport leaders, such as athletic directors and team captains.

Plato once noted, "The first and best victory is to conquer self" (in Maxwell, 1999), and as coaches we pursue victory. While one never completes the task of conquering self, the pursuit of one's own growth and development is key. Coaches can facilitate their own success by attending clinics or conferences, giving presentations, taking classes, reading professional literature, staying on top of current trends, pursuing certification programs, and learning from other top performers in the field.

Using Jerry Rice as a role model, Rick Pitino (1997) stated that "... what is important is that I take the essence

of what makes him successful and incorporate that into my philosophy." Coaches should look to individuals who have achieved high levels of competence and success. These role models can be found not only in the sport arena, but also in other professions. Ideal candidates have effective communication, decision-making and conflict management skills; they are able to appreciate the needs and goals of others. While adopting the strategies of successful leaders is effective and essential, each coach must determine what is consistent with his or her own personality and circumstances. Some techniques used by coaches at the professional level may not be applicable to coaches teaching in an academic environment.

Coaches should utilize their power to accomplish the goals and objectives they set for, or with, their team. They should have good interpersonal skills in order to foster relationships that go beyond name, rank and serial number. They can do so by employing an open door policy and being empathetic listeners. They will also need to strike a balance between personal and professional relationships. If balance is weighed too heavily on the personal, coaches may not be objective enough to critically evaluate a player's performance. Or, the coach who develops a friendship with a player's family may be conflicted when a disciplinary action is required. A player may also attempt to take advantage of the relationship to promote a personal agenda. Well-balanced relationships encourage players to work toward team goals consistent with the coach's intent.

While it is preferred that coaches consciously work to enhance their verbal skills, they communicate with others on less conscious levels. As humans, we all communicate by our personal appearance, actions, body language, pitch, tone, rate, inflection, emotion, volume, silences and pauses (Qordan, 1996). Communication is also multidimensional, so one must consider people, environment and circumstances in interpreting messages. An effective leader's messages "...are simple and direct and can serve as a battle cry of sorts for people across all organizational levels" (Carlzon, 1997). It involves sending clear, appropriate messages, reducing extraneous distractions, responding to feedback, selecting the correct channel, and actively listening. In order to ensure that messages are received as they are intended, coaches need to evaluate their own communication skills. This can be done by employing feedback from others (i.e., assistant coaches, supervisors) or by recording tapes of interactions with players for objective viewing later. This kind of feedback helps to clarify goals and reduce the possibility of being misunderstood by others.

Sometimes it is necessary for coaches and team members to let go of old habits or preconceptions. However, habits are often hard to break, and conflict may result when there is a breakdown in communication. Effective coaches can manage the conflict in ways that produce positive results. When conflicts arise over minor issues, they can usually be managed by talking it through with team members. When conflicts become more critical, they can be better managed through mediation or conflict resolution techniques. For example, if a serious issue

such as racial bias or discrimination surfaces, formalized mediation through a counselor and/ or administrator would be appropriate. Through conflict, players can examine their own concepts, give evidence to support their position, stimulate creativity and devise resolutions that promote group identity and harmony (Qordan, 1996). Conflict is unavoidable, but "...conflict is healthy when dealt with in a mature, respectful, and open manner and ... it can enhance understanding and communication among team members and the coach" (Vernacchia, McGuire & Cook, 1996).

Just as internal conflict can yield positive outcomes, a variety of fresh ideas can be generated from both internal and external collaboration. Forming internal alliances takes place through team building, fostering open and honest communication, and clearly defining roles and responsibilities. Individuals are not always able to attain the same levels of achievement alone that they can when they are members of a team. For example, players who have limited talent but work cooperatively are often victorious over more talented players who do not cooperate. Such cooperation, then, generally results in an esprit de corps among all team members.

### A Successful Coach

- Has good interpersonal skills
- Strikes a balance between personal and professional relationships
- Manages conflicts in ways that produce positive results
- Defines team roles and responsibilities
- Collaborates with others to enhance his/her sports programs
- Helps players establish their personal goals
- Develops a consensus on team goals Strives for excellence rather than perfection
- Trusts team members to achieve goals
- Attends professional professional seminars and workshops

Partnerships, coalitions, and alliances with organizations that have similar missions can enhance sports programs. The collaboration can be formal or informal, and depends upon the needs of those involved. Benefits of collaboration include streamlining services, increasing credibility and visibility of all parties, and developing networking opportunities (Yoder & Ham, 1999). For instance, coaches from a specific region might work to develop and implement a summer fitness program or competitive developmental league to enhance the skills of their players and to better understand the methods of their opponents. Coaches should conduct an assessment of their program before they consider an alliance. Assessment should include measuring the knowledge, skills, and abilities of team members to identify specific areas in which players as individuals or a team can benefit. Coaches should then work to develop strategies that focus on sharing the team's vision, thinking conceptually, facilitating opportunities for growth and development of team members and building trust and respect.

To be successful, coaches and players must share the same goals, with personal goals synonymous with team goals. Success is not always possible, but failure does not have to be devastating. Coaches work best when they provide a non-threatening environment that allows for failure, but encourages the creativity and risks that lead to fresh, new strategies and techniques. Fresh ideas help teams reduce the possibility of stagnation. What others may perceive as failure, cooperative teams view as stepping stones to success. Teams and individuals operate best when challenged; the coach's role is to clearly communicate the ends to which the challenges are directed.

When a team or individuals strives for perfection, they limit creativity by playing it safe. Excellence, on the other hand, is not perfection, and is a process, not an end. It is what every player and team should strive for. When coaches demand perfection, they limit team knowledge, skills and abilities. The best the team can do is meet the coach's expectation, never exceed it. The pursuit of excellence involves going beyond expectations, not simply staying within the established confines of perfection.

Coaches can foster excellence and satisfaction when they encourage motivation. To motivate team members, coaches must first recognize their individual needs. Needs such as achievement, power, affiliation, autonomy, esteem, safety, security and equity can serve as motivators for individuals (Berryman-Fink & Fink, 1996). Coaches should have a professional relationship with each player in order to identify and meet those needs, and do so within the context of the team's operational goals. Methods include assisting players in establishing their goals, developing consensus on team goals with the players, then clarifying the connection between the two. Coaches who attend to each player's progress through feedback and recognition produce higher levels of individual and team performance required to achieve goals.

A coach must have the confidence and trust that team members will achieve the defined goals. Confidence means s/he puts the team in a position of authority and imbues the players with the power to accomplish specific tasks. By delegating authority, the coach assigns responsibility and accountability. For instance, if a coach assigns an assistant coach to conduct summer workouts, the assistant should be held accountable for the success of the workouts provided s/he had the authority to conduct them as supported by the coach. Similarly, the coach must supply the assistant with the tactical, mental and physical

preparatory support necessary for success. The concept also applies to the coach's relationship with the team. The coach offers the support and guidance, and makes the appropriate decisions-but the game is largely in the hands of the players, who must be trusted to pursue and achieve individual and team goals.

The blueprint for effective sport leadership includes, but is

not limited to, the strategies described above. A thorough understanding of these strategies will allow coaches to be more effective leaders on and off the playing field.

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ASSOCIATION OF ROWING COACHES, SOUTH AFRICA

# PHYSIOLOGY

## THE LACTATE THRESHOLD

In exercise physiology, there have been few topics more frequently investigated, or more vigorously debated than the lactate threshold. It is the details, not the basics that create the big research problems. However, it is the basics that have great application to training and performance. So, we'll stick to those.

### ***What is Lactic Acid and Where Does it Come From?***

When you consume carbohydrate, it consists of several different sugar molecules; sucrose, fructose, glucose to name a few. However, by the time the liver does its job, all of this sugar is converted to glucose which can be taken up by all cells. Muscle fibers take up glucose and either use it immediately, or store it in the form of long glucose chains called glycogen. During exercise, glycogen is broken down to glucose which then goes through a sequence of enzymatic reactions that do **not** require oxygen to proceed. All of these reactions occur out in the cell fluid, or cytosol. They can occur very rapidly and yield some ATP in the process. This pathway is called

the **anaerobic (no oxygen) glycolysis (glucose breakdown) pathway**. Every single glucose molecule must go through this sequence of reactions for useful energy to be withdrawn and converted to ATP, the energy molecule, that fuels muscle contraction, and all other cellular energy dependant functions.

### The Metabolic Fork in the Road

There is a critical metabolic fork in the road at the end of this chemical pathway. At this fork, glucose has been converted from one 6 carbon molecule to two, 3 carbon molecules called pyruvic acid, or pyruvate. This pyruvate can either be shuttled into the mitochondria via the enzyme pyruvate dehydrogenase, or be converted to lactic acid via the enzyme lactate dehydrogenase. Entry into the mitochondria exposes the pyruvate to further enzymatic breakdown, oxidation, and a high ATP yield per glucose. Conversion to lactate means a temporary dead end in the energy yielding process, and the potential for contractile fatigue due to decreasing cellular pH if lactic acid accumulation proceeds unchecked. Like a leaf floating in a river, the pyruvate molecule has no "say" in which metabolic direction is taken.

### Which Way will MY pyruvate go during exercise?

I am sure you have surmised that that is a critical question with big implications for performance. I will try to answer the question at three levels: a single muscle fiber, an entire muscle that is active during exercise, and the entire exercising body.

### The Muscle Cell at Work

In a single contracting muscle fiber. The frequency and duration of contractions will determine ATP demand. ATP demand will be met by metabolizing a combination of two energy sources: fatty acids and glucose molecules (ignoring the small contribution of protein for now). As ATP demand increases, the rate of glucose flux through glycolytic pathway increases. Therefore at high workloads within the single fiber, the rate of pyruvic acid production will be very high. If the muscle fiber has a lot of mitochondria (and therefore more Pyruvate Dehydrogenase), pyruvate will tend to be converted to Acetyl CoA and move into the mitochondria, with relatively little lactate production. Additionally, fatty acid metabolism will account for a higher percentage of the ATP need. Fat metabolism does not produce lactate, ever! If lactate is produced from glucose breakdown, it will tend to diffuse from the area of high concentration inside the muscle cell to lower concentration out of the muscle fiber and into extracellular fluid, then into the capillaries.

### The Whole Muscle at Work

Now let's look at an entire muscle, say the vastus lateralis of the quadriceps group during cycling. At a low workload, glycolytic flux is low and the pyruvate produced is primarily shuttled into the mitochondria for oxidative breakdown. Since the workload is low,

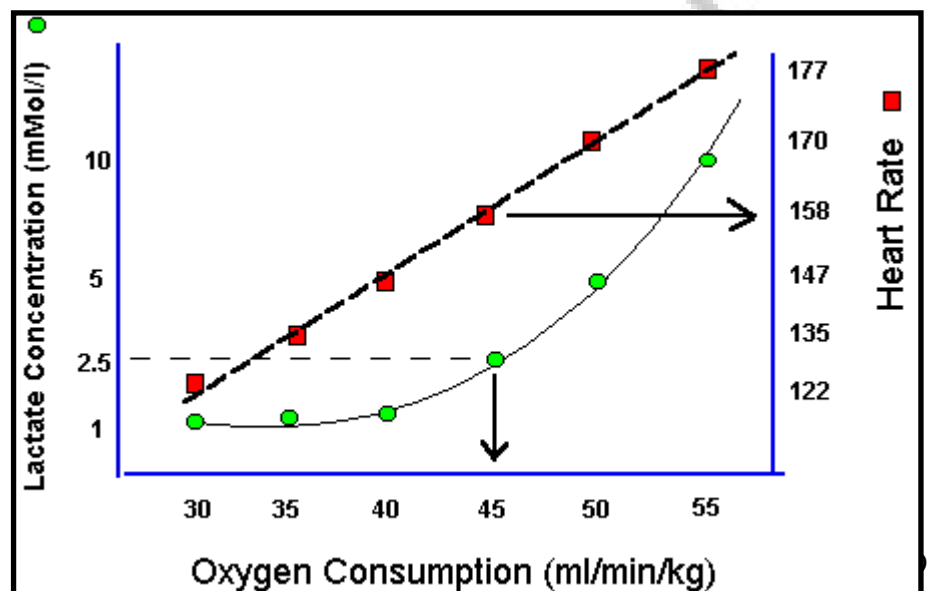
primarily slow twitch fibers are active. These fibers have high mitochondrial volume. As workload increases, more fibers are recruited and recruited fibers have higher duty cycles. Now ATP demand has increased in the previously active fibers, resulting in higher rates of pyruvic acid production. A greater proportion of this now is converted to lactic acid rather than entering the mitochondria, due to competition between LDH and PDH. Meanwhile, some Fast twitch **motor units** are starting to be recruited. This will add to the lactate efflux from the muscle due to the lower mitochondrial volume of these fibers. The rate of lactate appearance in the blood stream increases.

### The Body at Work

The vastus is just one of several muscles that are very active in cycling. With increasing intensity, increased muscle mass is called on to meet the force production requirements. All of these muscles are contributing more or less lactic acid to the extracellular space and blood volume, depending on their fiber type composition, training status and activity level. However, the body is not just producing lactate, but also consuming it. The heart, the liver, the kidneys and inactive muscles are all locations where lactic acid can be taken up from the blood and either converted back to pyruvic acid and metabolized in the mitochondria or used as a building block to resynthesize glucose (the liver). These sites have low intracellular lactate concentration, so lactic acid diffuses INTO these cells from the circulatory system. If the rate of uptake or disappearance of lactate equals the rate of production or appearance in the blood, then blood lactate concentration stays constant (or nearly so). When the rate of lactate production exceeds the rate of disappearance, lactic acid accumulates in the blood volume, then we see the ONSET of BLOOD LACTATE ACCUMULATION (OBLA). This is the "Lactate Threshold" (LT).

### Performance Implications

Lactic Acid production is not all bad. If we could not produce lactate, our ability to perform brief high intensity exercise would be almost eliminated. However, As I am sure you are aware, lactic acid is the demon of the endurance athlete. Cellular accumulation of the protons (increased acidity) that dissociate from lactate results in inhibition of muscle contraction. Blame those heavy legs on the protons! The bottom line is that exercise intensities



above the OBLA point can only be sustained for a few minutes to perhaps one hour depending on how high the workload is above the intensity at OBLA. Exercise at or below this intensity may be sustainable for hours. The causes of fatigue at these sub-LT intensities include carbohydrate depletion and dehydration.

### Factors that Influence the Rate of Lactate Accumulation in the body

- **Absolute Exercise Intensity-** for reasons mentioned above.
- **Training Status of Active Muscles-** Higher mitochondrial volume improves capacity for oxidative metabolism at high glycolytic flux rates. Additionally, improved fatty acid oxidation capacity results in decreased glucose utilization at submaximal exercise intensities. Fat metabolism proceeds via a different pathway than glucose, and lactic acid is not produced. High capillary density improves both oxygen delivery to the mitochondria and washout of waste products from the active muscles.
- **Fiber Type Composition-** Slow twitch fibers produce less lactate at a given workload than fast twitch fibers, independent of training status.
- **Distribution of Workload -** A large muscle mass working at a moderate intensity will develop less lactate than a small muscle mass working at a high intensity. For example, the rower must learn to effectively distribute force development among the muscles of the legs back and arms, rather than focusing all of the load on the legs, or the upper body.
- **Rate of Blood Lactate Clearance-** With training, blood flow to organs such as the liver and kidneys decreases less at any given exercise workload, due to decreased sympathetic stimulation. This results in increased lactate removal from the circulatory system by these organs.

### Measuring the Lactate Threshold

We have previously discussed the value of a high [maximal oxygen consumption](#) for the endurance athlete. A big VO<sub>2</sub> max sets the ceiling for our sustainable work rate. It is a measure of the size of our performance engine. However, the Lactate Threshold greatly influences the actual percentage of that engine power that can be used continuously.

Most of you will never have this measured in a laboratory, but a brief description of a lactate threshold test is still useful, because it will lead us into some specific applications for your racing and training. The test consists of successive stages of exercise on a treadmill, bicycle ergometer, swimming flume, rowing machine etc. Initially the exercise intensity is about 50- 60% of the VO<sub>2</sub> max. Each stage generally lasts about 5 minutes. Near the end of each stage, heart rate is recorded, oxygen consumption is measured, and a sample of blood is withdrawn, using a needle prick of the finger or earlobe. Using special instrumentation, blood lactate concentration can be determined during the test. After these measurements,

the workload is increased and the steps repeated. Through a 6 stage test, we would expect to achieve a distribution of intensities that are below, at, and above the intensity of OBLA or the lactate threshold. The data from a test would generally look similar to the example below.

### Interpreting the Data

For purposes of interpretation, let's say that the athlete above had a maximal heart rate of 182, and a VO<sub>2</sub> max of 61 ml/min/kg. These were also determined using a bicycle test. So they are good values for comparison. Looking at the green dots, we see that blood lactate concentration does not begin to increase until during the 4th workload, from a concentration of about 1 mM to 2.5 mM. This is the break point. The subject's VO<sub>2</sub> was 45 ml/min/kg at this point. So we determine that his LT occurs at 45/61 or about 74% of VO<sub>2</sub> max. If we look at the heart rate at this point, it is 158. Now we have a heart rate at lactate threshold. 158 = about 85% of his max heart rate. This is useful for the athlete. When he is cycling, he can judge his training intensities based on this important value. If he is a time trialist, this would approximate his racing heart rate for the hour long event.

### So, Do I race at My LT Intensity?

This depends on your race duration. If you are rowing 2000 meters, running a 5k race etc., your exercise intensity will be well above the AT. Consequently, the blood lactate measured after these events is extremely high in elite athletes, on the order of 15mM (resting levels are below 1 mM). In races lasting from 30 minutes to 1 hour, well trained athletes also perform at an intensity above LT, but by a smaller margin. It appears that in these events, top performers achieve what might be termed a "**maximal lactate steady state**". Blood lactate may increase to 8 to 10 mM within minutes, and then stabilize for the race duration. A high but stable lactate concentration may seem to contradict the idea of the LT. But, remember that blood lactate concentration is the consequence of both production and clearance. It seems likely that at these higher lactate concentrations, uptake by non-working muscles is optimized. At any rate, measurements in cyclists, runners and skiers demonstrate the fact that elite performers can sustain work levels substantially above the LT for up to one hour.

### Specificity of the Lactate Threshold

It is important to know that the lactate threshold is highly specific to the exercise task. So if this cyclist tries to get on his brand new, previously unused, rowing machine and row at a heart rate of 158, he will quickly become fatigued. Rowing employs different muscles and neuromuscular patterns. Since these muscles are less trained, the cyclist's rowing LT will be considerably lower. This specificity is an important concept to understand when using heart rate as a guide in "cross training activities", as well as for the multi-event athlete.

### Effect of Training

For reasons mentioned above, training results in a decrease in lactate production at any given exercise intensity. Untrained individuals usually reach the LT at about 60% of VO<sub>2</sub> max. With training, LT can increase

from 60% to above 70% or even higher. Elite endurance athletes and top masters athletes typically have LTs at or above 80% of VO<sub>2</sub> max. Values approaching 90% have been reported. The lactate threshold is both responsive to training and influenced by genetics.

thirty years. Where did it come from? How was it used? Those are things we must know to make better use of it as a training method today. Understanding historical context always means that we will learn from others mistakes. Remember those that ignore history are condemned to repeat it.



## COACHING

### THOUGHTS ON THE STATE OF COACHING

Last night on CSPAN I was watching a program broadcast from the Cato Institute on the state of the US Military focusing on leadership. The first speaker (sorry I don't recall the name) highlighted some of the failing of US Military Commanders. Three items that he mentioned made me think immediately about coaching. They were 1) Ahistorical. 2) Technologically infatuated. 3) Culturally clueless. Let look at these in the context of coaching

**Ahistorical** – Most coaches that I talk to today have no historical context. They think that that everything is new, invented by some guru. I strongly believe that in order to know where you are going you have to know where you have been. There is very little that is new. For example vibration training is not new, it has been used for at least

**Technological Infatuated** – We have a fascination with technology, with machines that go beep. The more dials, lights and cables the better. Wrong! Coaching is about teaching the athlete to be better in tune with their bodies. It is not about bigger and better machines. The body is a very high tech machine. We are as Kelvin Giles says “performance engineers.” Coaching is high touch not high tech.

**Culturally Clueless** – Do we really understand the culture that we are working in. The athlete today at every level has so much more going on good and bad in their lives than when I first started coaching 37 years ago. I would love to turn back the clock on some things, but it is not going to happen. Our culture of affluence and instant results is the culture we must work in. That does not mean to compromise your principles, but it does mean being more aware. It does mean being a better communicator.



## RECOVERY

### GET CAUGHT NAPPING

Right up front I want to tell you that I am not a betting person. But if I were I would bet a bundle that Thomas Edison would have made one heck of a rower. Come to think of it, I would even bet that Leonardo Da Vinci, Albert Einstein, and Winston Churchill would have made good rowers too.

I say that without having any idea how many pull-ups they could manage, what their VO<sub>2</sub> uptake levels were, or if they ever had managed to run a mile in their life. None of that makes a bit of difference. What does matter is that these folks all did one thing well that good rowers should do—they took naps. You see, some time during their day these folks would sneak away, take a break from what they were doing, and zonk out. And these were really busy folks.

Okay, so right about now you're probably thinking, “What the heck does taking a nap have to do with rowing?” Ahha...let me explain.

If you are immersed in the world of rowing, especially if you're an early riser and have morning practices, you can expect some major disruptions in your sleep patterns. Stick a hectic work schedule, or family duties, or a typical school calendar in there and those sleep patterns can go from being disrupted to almost nonexistent. And when our sleep patterns are messed with, our waking hours suffer.



If you happen to be short changing yourself on sleep then some nasty things can happen. Little stuff—like you get sick, worn down, or you suffer mood swings. Or maybe you'll see hallucinations. This is what I thought was happening to me the very first time I saw Oxford Blues. (Okay, okay, I admit it. I've seen it more than once—but just for research for this column you understand.)

It just so happens that these are just small problems when compared to one of the biggest problems of not getting enough sleep—you might snooze when you aren't suppose to. Like when you are recording the erg splits for this really enormous rower, and she breaks a world record, and you missed a few splits cause you happened to nod out at the wrong time, and the record doesn't count, and she has to do it again, and she is looking at you like she is getting ready to put you to sleep for good.

Okay, sleep deprivation isn't good. What are you supposed to do about it? Go lie down and take a nap! You might be thinking "Yeah, right, a nap. Man, there is no way I can do that. I'm way too busy to lie down and take a nap." Listen, if Churchill could nap while trying to keep the invaders from busting down the front door, then you should be able to find time for a little nap.

And to take this even one step further, there are folks out there in the field of sleep research who have discovered that human beings are designed to take naps each day. Most people would disagree with this and say that our day should be rigidly divided into one period of wakefulness, followed by one period of sleep. You go to sleep at night, and you stay awake during the day. I am here to tell you that there is a bunch of data that suggests that humans may not want that type of pattern at all, instead preferring two periods of sleep—one at night and one in the afternoon.

For example, ever notice yourself getting a little sleepy in the afternoon? Probably thought it was lunch making you sleepy, didn't you? Nope. More than likely it is not the food but instead it's your body telling you it is time to nap. Over across the ocean there are a lot of Europeans who would agree with this. For years they have been taking siestas while we Americans have been walking around half asleep.

So exactly what can a nap do for you? First, it can change your outlook. Second, it can improve your alertness and reduce stress. Third, if you fall asleep on corduroy it can put some pretty neat patterns on your face. And the one benefit that you probably would not expect—you may sleep better at night. If you are a healthy rower a nap won't make it more difficult for you to sleep at night, it might actually help. And another really cool thing about naps is that they make people jealous. There are a lot of folks who would love to do nothing more than to take a nap but can't, because they either are working or were brought up anti-nap.

Okay, so let's say that you are now all excited to take a nap (my column does tend to have that effect on some folks). Here are a few hints for succesful napping:

- *Get the length of nap right for you.* It appears that the most restful nap is around 20 minutes. This length will generate the least amount of sleep hangover, but again that depends on you. When I nap, and I'll tell you right now that I nap about as much as a cat on a hot day, I have to time my naps for either 20 minutes, or 2 hours. If I get a one hour nap I am in trouble. Then I end up in a twilight zone. I usually wake up in such a thick fog, that not only do I not know what is going on, I don't know where I am, who I am, or what planet I am on.
- *Get a wake up system.* Naps are suppose to be relaxing. To help relax get yourself a wake up system so that you don't worry about over sleeping. Old Tom Edison used to nap with a lead weight in each hand. He would fall asleep in a chair and when the weights crashed to the floor he knew it was time to get up.
- *Get comfy.* Keeping with the relaxation theme, it is important that you find a place that you are comfortable. Granted, it might be difficult to pull out a bed, pillow, and quilt each time you want to nap, but get as comfy as you can. The last thing you want to do is to wake from a nap with a stiff neck, especially if you are rowing a single. Also, pick a safe spot. The rowing world is full of practical jokers and no one wants to arise from a nap with their shoe laces tied to an ergometer.
- *Drop the guilt.* And finally, don't feel guilty for napping. You are meant to take them, researchers say so, go ahead and nod out. Just make sure you are not in a bad place for it—like behind the wheel of a shell trailer, or during your coach's meeting.

There you have it. Naps are good for you and can help make you a better rower. Now I'm off to see if I can find information that says the same thing about ice cream.

# TECHNIQUE

## IDENTIFICATION AND CORRECTION OF ERRORS

### 1. A Long Oar Stroke

Problem	Effects	Possible Causes
Angle of rowers legs too small when leaning forward	<ul style="list-style-type: none"> <li>&gt;Insufficient work in the water</li> <li>&gt;Insufficient forward driving force (push)</li> <li>&gt;Uneconomic use of effort</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Stretcher incorrectly adjusted (height, angle, longitudinal direction)</li> <li>&gt;Lack of flexibility on the part of the rower</li> <li>&gt;Gate not high enough</li> <li>&gt;insufficient body height</li> <li>&gt;inboards too small</li> <li>&gt;feelings of insecurity when legs are stretched out</li> </ul>
Angle of rowers forward lean to great	<ul style="list-style-type: none"> <li>&gt;Encourages "bum shoving"</li> <li>&gt;Rower ducks trunk of body when stretch out</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Stretcher too low</li> <li>&gt;trunk between knees</li> </ul>
Backwards lean too small	<ul style="list-style-type: none"> <li>&gt;Insufficient room for oar-stroke</li> <li>&gt;No room for inboard and hands</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Distance between slide and gate</li> <li>&gt;Dimensions of the inboards</li> <li>&gt;Strength in the shoulders and upper body</li> </ul>
Upper body leans over inboard	<ul style="list-style-type: none"> <li>&gt;Oar stroke not balanced</li> <li>&gt;Reduction of forward thrust</li> <li>&gt;messy finish</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Muscles of shoulder and upper body underdeveloped</li> <li>&gt;Position of the head</li> </ul>

#### Possible Remedies

- >Check the dimensions of the boat, adjust the oars and the distance between the gates
- >Flexibility training
- >Balancing exercises (in the case of any lack of confidence)
- >Strengthening of the shoulder and back muscles
- >Rowing with fixed seat and square blades with gradual lengthening of the oar stroke
- >Let new rowers row with a crew that can row correctly

## 2. Rapid Connection Onto The Water And Exertion Of Pressure

Problem	Effects	Possible Causes
Missed oar stroke (oar blades too far away from the water "skying")	<ul style="list-style-type: none"> <li>&gt; Too short a stroke in front of the gate</li> <li>&gt; Forward driving force too weak</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Insufficient flexibility in the shoulders</li> <li>&gt; Height of the rigger</li> <li>&gt; Position of the head and hands</li> </ul>
Arms bent too early	<ul style="list-style-type: none"> <li>&gt; Forearms cramp</li> <li>&gt; Body leans too shortly forward</li> <li>&gt; Ineffective use of arms causes fatigue</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Upper part of body too upright (stiff)</li> <li>&gt; Hands in the wrong position</li> <li>&gt; Lack of balance when leaning forward</li> </ul>
Premature use of upper trunk	<ul style="list-style-type: none"> <li>&gt; Favors vertical movement</li> <li>&gt; Ineffective use of strength due to neglect of leg muscles</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Angle of stretcher too sharp</li> <li>&gt; Heels too high</li> <li>&gt; Missed oar stroke (upper trunk straightens)</li> <li>&gt; Inboard too hard</li> </ul>
"Bum Shoving" pushing the legs and hips backwards before driving the oar through the water	<ul style="list-style-type: none"> <li>&gt; Ineffective transfer of strength</li> <li>&gt; Back complaints</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Underdeveloped back muscles</li> <li>&gt; Position of head</li> <li>&gt; Inboard too hard</li> <li>&gt; Lack of ability to coordinate limbs</li> </ul>

### Possible Remedies

- > Coaching in flexibility, relaxation
- > Strengthening of the muscles under stress
- > Verbal hints e.g. on position of the head
- > Check dimensions of the boat (inboard, stretcher, rigger and fittings)
- > Getting a feel for the rowing position by scrapping the oars over the water up to the catch
- > Rowing only with the inside arm
- > Exaggerated movements e.g. sliding both hands down the loom to the gate
- > Have the crew row with a team that can row properly



### 3. Minimizing Vertical Movements

Problem	Effects	Possible Causes
The upper body moves jerkily during the final pull on the oar	<ul style="list-style-type: none"> <li>&gt;The boat pitches, causing movements that sap the rowers strength</li> <li>&gt;Rower pulls on oars with maximum strength several times per stroke</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Stretchers are mispositioned</li> <li>&gt;Strength lacking in arms</li> <li>&gt;Incorrect understanding of movement</li> </ul>
Extreme straightening of the rowers body	<ul style="list-style-type: none"> <li>&gt;Inboards lifted over the knee</li> <li>&gt;Upper body collapses after final pull of the oar</li> <li>&lt;The boat rocks</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Rigger (gate) too low</li> <li>&gt;Incorrect understanding of movement</li> <li>&gt;Spine too stiff</li> </ul>
Extreme backwards lean	<ul style="list-style-type: none"> <li>&gt;Reduction of pressure on the oar</li> <li>&gt;Straightening of the upper body costs time and strength</li> <li>&gt;The boat pitches</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Incorrect understanding of movement</li> <li>&gt;Insecure balance in the first part of the oar stroke</li> <li>&gt;Stretcher needs adjustment</li> </ul>
The upper body jerks into the forward position	<ul style="list-style-type: none"> <li>&gt;Oar stroke misses the water</li> <li>&gt;The boat losses speed</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Stretcher needs adjustment</li> <li>&gt;The sliding seat jerks to a stop</li> <li>&gt;The upper body does not accompany the seat when it slides</li> </ul>

#### Possible Remedies

- >Correct the rowers understanding of movements through demonstration and explanation e.g. with the use of videos of very good teams
- >Check the adjustments of the boat and stretcher
- >Rowing without an oar (pitching too and fro)
- >Demonstrating the movement with pictures
- >Training in flexibility
- >Rowing slowly with a low stroke frequency from ten strokes/ to twenty strokes per minute
- >Rowing with square blade with the inside arm and then the outside arm
- >Rowing with the hand gripping the oar 20-30cm closer to the gate

## 4. Even Speed and Acceleration of Oar Movements

Problem	Effects	Possible Causes
The oar blade is used like a saw	<ul style="list-style-type: none"> <li>&gt;Oars are used less effectively</li> <li>&gt;Lower Arms become cramped</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Height of rigger</li> <li>&gt;Angle of oar</li> <li>&gt;Quality of the oar</li> <li>&gt;Position of the hands</li> <li>&gt;The arms are incorrectly coordinated</li> </ul>
The legs push unevenly during the stroke	<ul style="list-style-type: none"> <li>&gt;Uneven pressure during each stroke</li> <li>&gt;Oars are used less effectively</li> <li>&gt;The rower may become tired quickly</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Adjustment of the stretcher</li> <li>&gt;Hip or leg muscles are not strong enough</li> </ul>
The oar blade turns in the water	<ul style="list-style-type: none"> <li>&gt;Braking effect, requiring extra effort</li> <li>&gt;Onset of fatigue</li> <li>&gt;Rower catches a crab with the oar</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Stretcher too far forward in the bow</li> <li>&gt;Rigger set too low</li> <li>&gt;Incorrect understanding of movement</li> <li>&gt;Premature breaking off of the oar stroke</li> </ul>
Hands too slow or too fast	<ul style="list-style-type: none"> <li>&gt;Speed peaks</li> <li>&gt;Braking effect when raising oar out of water</li> <li>&gt;Oar stroke broken off too soon</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Lack of power at end stage of oar stroke</li> <li>&gt;Wrong instructions on how to move</li> <li>&gt;Lack of coordination</li> </ul>
Jerky or uncoordinated use of inboards	<ul style="list-style-type: none"> <li>&gt;Balancing problems</li> <li>&gt;Loss of speed</li> <li>&gt;Coordination problems with the team</li> </ul>	<ul style="list-style-type: none"> <li>&gt;In sculls: Compare height of riggers</li> <li>&gt;Over long strokes</li> <li>&gt;Lack of coordination</li> </ul>

### Possible Remedies

- >Explanations of actions
- >Let the crew row with a good team
- >Have the crew row with square blades, including more rapid strokes
- >Check the dimensions of the boat and oars
- >Give help with matters of rowing rhythm
- >Use varying rates over short periods e.g. 16-22-18 etc



## 5. Problems In Team Coordination

Problems in team coordination are caused mostly by individual technical errors.

### Possible Remedies

- >Help with rhythm
- >Compare video if the crew with very good crews
- >Rowing interspersed with breaks
- \*Checkpoint 1 Directly after lifting the oars out of the water, the hands should still be drawn into the body
- \*Checkpoint 2 When the hands are in front of the knees, the upper body leans slightly forward and the legs stretch
- >Rowing with the eyes closed
- >Varying the rating without major work in the water
- >Start rowing then let the oars trail in the water with no pressure
- >Rowing with fixed seat, then with body swing, then with 1/4, 1/2 slide
- >Rowing with one arm then the other
- >Row long stretches of water together
- >Train in rhythm, sliding forward and pulling in a set ratio
- >Rowing with square blade
- >Measure the boat at regular intervals
- >Let parts of the crew row together e.g. in fours and doubles
- >Vary exercises, do not allow monotony
- >Do not talk too much about technique. A few intensive endurance units are often enough to restore team coordination

