



Chapter 6: Physical Conditioning

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Part 1: Basic Physiology

Topic Questions:

1. What is the relationship between exercise intensity and duration of exercise?
2. Why is the aerobic pathway the primary source of energy production for swimmers?
3. Why is it incorrect to associate aerobic training only with long slow swimming?
4. What is the difference between continuous training and interval training?
5. What is meant by the acronym DIRT?

Generation of Energy through Metabolism

Metabolism is the ongoing interrelated series of chemical interactions taking place in the body that provide the energy and nutrients needed to sustain life. Physical work, like swimming, places increased energy demands on the body. The body must generate energy through pathways that break down fuel stores. Dietary consumption of fats, carbohydrates and proteins provide the building blocks for stored fuels within the body. The breakdown of the fuel stores occurs in the skeletal muscle cells and is responsive to the energy demands. Exercise training or performance can be classified in relation to both the intensity and duration of the activity. These two components are critical in generating the energy demand.

An inverse relationship exists between exercise intensity and duration. This means that when the intensity is high the activity can only last a short period of time. On the opposite end, when duration is long the intensity that can be maintained is relatively low.

Metabolic Pathways

Swimming is dependent upon the constant generation of energy by the skeletal muscles. Without energy the athlete is unable to move in the water. Energy can be generated within the body through three pathways: the ATP-CP, anaerobic glycolysis, and aerobic pathways.

- **ATP-CP Pathways**

Adenosine triphosphate (ATP) and creatine phosphate (CP) are stored in the muscle and serve as immediate energy reservoirs. These energy stores can be utilized very rapidly but are limited in supply. This source of energy production can maintain activity for approximately 10 seconds. After this point another source of energy production must contribute for muscular contraction to continue. The ATP-CP pathway is used when energy demand is high—in short bouts of activity and at the start of exercise. There are no actual borders between the energy systems. After 10 seconds of work, the ATP-CP system may still be involved, but its contribution will be diminished.

- **Anaerobic Glycolysis Pathways**

Muscle glycogen is another source for energy production in the muscle that can be maintained for longer periods of time. If the energy demand is relatively high, the muscle breaks down glycogen through anaerobic pathways. There are several by-products or metabolites produced during the breakdown of glycogen including inorganic phosphate, hydrogen ions, creatinine and lactic acid or lactate. Lactate has actually been shown to be useful in that it is converted back to energy sources. However, some of the metabolites accumulate in the muscles affecting muscle contraction and future energy production. The glycolytic pathway can produce relatively high amounts of energy for up to about two minutes. If continued work is necessary, energy must be generated by the aerobic pathways.

- **Aerobic Pathways**

When the activity lasts longer than a minute and a half to two minutes, the aerobic pathways are used. Because the metabolic pathways are interconnected, the aerobic pathways are also used for activities shorter than one minute, but the contribution is very small. Aerobic pathways use oxygen in the process of generating energy. Energy production can be maintained for long periods of time with this system, but the intensity of the work must be reduced.



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The energy demand (how much and how long energy is needed) will determine the primary source of energy delivery. These pathways are interconnected to produce a constant supply of the energy the body needs for various demands and tasks. Note that intensity of exercise and duration are inversely related, meaning that highly intense work can be maintained only for short periods of time. On the other hand, low-intensity work can be performed for long periods of time.

Practical Implications for Coaches

Young athletes need a progressive program of aerobic training. They will respond to this style of training over time. Both anecdotal and scientific evidence supports the benefits of a strong aerobic base in both children and adults. Research on sensitive periods of development indicates that the aerobic system can be developed the most during the prepubescent and pubescent states of development. Many world-class sprinters trained and successfully swam distance events early in their careers. An aerobic base must be pursued early in the swimmer's career and it should be maintained throughout his or her entire career. In fact, studies indicate that the contribution of the aerobic system is quite high in sprint events.

Quantity and quality are not polar opposites when used to describe aerobic training. Terms that are more appropriate are volume/duration and intensity. The use of appropriate volume/duration and intensity in a progressive manner during a training cycle allows for maximization of the training load. The term aerobic is often incorrectly associated with slow, easy swimming. Aerobic intensities range from very easy to very intense. A swimmer's aerobic potential can be developed by exposing the swimmer to practices that are progressively longer in duration at a relatively low intensity. Repeat distances for very young athletes may consist only of 25 yard swims with the focus on good technique maintained throughout the swims while older, experienced athletes might complete a 3,000 meter swim for time. Few athletes would consider this as an easy practice. Therefore, it is very important to remember that aerobic training is not merely slow swimming for hours.

Continuous Training and Interval Training

Straight swimming without a rest interval is considered continuous training. Continuous training is pursued in two general types—slow-paced and fast-paced. In most swimming programs, continuous training is used for warm-up or cool-down periods. The T30, or 3,000 for time swim would be other examples of continuous training.

Interval training consists of periods of work followed by rest intervals. Interval training design comprises four primary components. Depending on the manner in which these four components are manipulated, aerobic or anaerobic pathways will be primarily taxed by the set. The four components of interval training design can be referenced using the acronym DIRT:

- D = the Distance of the swim, which also includes the number of swims in the set
- I = the Interval of the swim, which is determined by the time of the swim plus the rest
- R = the amount of Rest between swims, determined by the interval and how fast the swimmers complete each swim
- T = the Time for each swim

Applying the DIRT acronym to the set 10 X 100 @ 1:30:

- D = the Distance which is 1,000 yards or meters (10 x 100)
- I = the Interval which is 1:30 per 100
- R = the Rest which is the time between the end of the swim and the beginning of the next swim. If the swimmer does 1:20 per 100, the rest is 10 seconds
- T = the Time for each swim. How fast is the swimmer completing each repeat? This time should be guided by the coach. Is the swimmer going as fast as possible on each swim? Trying to maintain a certain pace throughout the swim? Trying to go faster on each swim?

Put together, the elements of the DIRT acronym determine the INTENSITY of the set. It is the responsibility of the coach to design the intensity of the set by indicating not only the length and intervals but how fast the swimmers are expected to swim.

Design of practices and specific set design based on continuous or interval training will be discussed in a later section.



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Part 2: Season Planning

Topic Questions:

1. How does a coach plan or breakdown the season in macrocycles, mesocycles, microcycles and taper time?
2. Why must a coach apply the principles of overload and progression to training planning?
3. What are some additional considerations when planning a season?
4. Why is it a good idea to share appropriate aspects of the season plan with athletes and parents?

Periodization

The success of the swim season begins with planning. Whether a coach works with novice, age group or senior level swimmers, the coach must plan the season with the desired end results in mind. With the end in mind, the coach must decide and plan how to get there. Periodization is the process of varying a training program at regular time periods to bring about optimal gains in physical performance. Periodizing an exercise program aims to optimize training during short (weeks, months) as well as long periods of time (years, a life time, or an athletic career). The goal of periodization is to be able to achieve peak performance at a particular time, such as for a major competition.

Structuring the Season

- **Macrocycles**

A season or a year-long plan is called a macrocycle. Determine the date of the key competition where a peak performance is desired. The season could be a year in length, six months in length or as with some high school seasons, only 10 weeks in length. The coach's philosophy and the swim schedule in the area both help to determine the length of the season and the culminating competition.

- **Rest/Taper**

Determine the amount of rest or taper time needed to achieve optimum performance. The decision will be based on the age, experience, body size, amount of training and other related factors. Younger, weaker, less trained swimmers may require little or no taper. They perform well by keeping their skills sharp and their techniques refined while continuing with their normal practice routine. With a good night's sleep, they are ready to go! Older and bigger senior level swimmers will require a longer taper period to race effectively at the end of a season of training. The taper phase will range from 7 days up to several weeks. Subtract the time that has been planned for the taper phase to determine the time available for actual training. With a 10 week season, a coach cannot plan to taper for three weeks!

- **Mesocycles**

Training periods of approximately six-weeks are called mesocycles. Look at the remaining time and calculate training blocks based on six-week periods. An effective training period allows a swimmer to benefit from adaptations of the body that are a result of training. As a general rule of thumb, the body will need roughly six weeks to make significant physical and chemical changes in its ability to provide energy to the muscles. While mesocycles may last from four to eight weeks, six weeks is a good average number to use when planning. A three-month season, September through November and part of December, allows for a two block period of time plus a short taper. In planning a long course season of April to August, there is a total of 16-18 weeks for training and a taper which would give the coach almost three full six week training blocks. On the other hand, the typical high school season has only one six-week block and perhaps a second partial training block before taper time. This does not allow much time to stimulate significant changes in the body. Keep in mind that there are no real boundaries or borders between blocks or cycles. All changes of training emphasis should be gradual.

- **Microcycles**

Microcycles are generally weeklong training periods, but can range from 4-10 days in length. Determine what the training emphasis will be in each training block. After looking at the training blocks, a decision must be made regarding what type of training will be emphasized in each block. This does not mean that ONLY one specific type of work will be done; however, this will be the training emphasis during that training block. Plan each week's emphasis, then plan what will be emphasized each day, each practice. Don't forget to plan rest and recovery into the schedule.



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Principles of Training

- **Overload Principle.** The training stimulus must provide a greater workload than the swimmer has experienced before. The body will make initial adaptations but if the workload is always the same adaptation and improvement will stop. Overload can be achieved by manipulating the components of DIRT:
 - D = Distance. How far? How many?
 - I = Interval. How intense? How hard?
 - R = Rest. How much?
 - T = Time. How fast?
- **Progression Principle.** The overload must be increased progressively. Sudden, radical increases in workload may result in inappropriate adaptation or injury.
- **Individual Difference Principle.** Individuals will respond differently to training. Even though training may be planned for the entire team or group, consider and track individual differences and responses. Individuals may also respond differently to the same training load during different seasons.
- **Specificity Principle.** The muscles and movement patterns involved in the training sessions will be the ones stimulated to adapt. Train speed and speed will improve. Train endurance and endurance will improve.
- **Reversibility Principle.** If a type of training is neglected for a period, its benefits can decline or reverse. Thus, a certain amount of maintenance work must be done to retain the benefits from all types of training.
- **Recovery Principle.** Research shows that actual adaptation takes place during recovery. Appropriate recovery needs to be built into the training plan so athletes can benefit from and adapt to the work done in pool. Determining appropriate recovery is dependent on the ability and training level of the athlete.

Additional Considerations

- **Long Term Training.** The best improvements result from a multi-year approach to physical improvement and development. Short-term or seasonal training may bring immediate positive results, but may limit the ultimate potential of the swimmer. A club should have a long term training progression plan.
- **Adaptation and Stress.** Typically the body will adapt positively to a stress placed on it if the stress is applied gradually. The body will break down and fail to respond if the stress is applied too radically. Remember that stress, for an athlete, can come from many sources other than training. School, family, peers, nutrition and sleep patterns are common sources of added stress.
- **Background of the Athletes.** The age, experience and training backgrounds of the athletes will provide information about where to start their training program. Are the swimmers novice level 12 and younger or experienced 15 and older athletes? When in doubt, begin with a less challenging practice and adjust accordingly.
- **Variety.** Mixed forms of training in every practice ensure that athletes receive varied and appropriate training stimuli.
- **Emphasis.** In the overall long term development of the swimmer concentrate first on skill and technique development and then on aerobic development.

Buy-in from Athletes and Parents

Sharing appropriate aspects of the season plan with athletes and parents can increase support and understanding. Parents will want to know the overall plan and emphasis. They should understand that the emphasis is on skill, technique and athletic fitness rather than speed with their 10 year olds. Parents of older athletes should understand that the swimmers may “train through” some meets while focusing on peak performance at other times. For young children it is enough that they understand “we practice so that we can succeed in races.” Older swimmers will benefit from knowing and understanding the focus of the season, i.e. the key meets. They can understand training cycles, training emphasis and yardage goals. Knowing the plans and emphasis can help them get through the toughest parts of the season while focusing on their peak performance goals.



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Part 3: Energy Zones

Topic Questions:

1. Why is it important to understand energy zones in the process of training athletes?
2. What are the four/seven basic energy zones?

Understanding Energy Zones

Metabolism is the process of storing and releasing the energy. (See Part 1: Basic Physiology.) Energy for the body is stored in different forms. Various metabolic pathways are used to convert these forms into accessible energy that an athlete can use to perform work. There are no "borders" to energy pathways in a body. At any given time, several pathways, not just one, may be engaged in energy production but dominance of an energy source depends on the duration and intensity of the exercise. Usually workload is broken into several energy "zones" based on the duration and intensity of the training. Energy "zones" allow athletes and coaches to develop a specific pathway of energy recycling and to quantify, track, and plan the physiological adaptations desired.

There are several reasons for understanding energy zones in swimming:

- Swimming sets of different duration and intensity are supported by energy from different sources. During high intensity short-term swimming bouts, most energy is recycled through the anaerobic pathway. During low intensity long-term swimming bouts the energy is recycled aerobically using oxygen.
- Different swimming events require the training of different energy pathways.
- Pre-pubescent athletes show significant improvements in long duration, low intensity events and are able to enhance the utilization of their aerobic capacity. Higher aerobic work during this time also results in increased performance across all distances not just longer distances. A gradual increase in the proportion of anaerobic work beginning at ages 12-14 for girls and 13-15 for boys maximizes development and enhances performance, but only if preceded by ample aerobic work. (See Growth and Development, Part 2.)
- The same swimming set can be swum in different energy zones. For example, swimmers can swim sets with higher or lower intensities. One of the keys in determining intensity is work to rest ratio. Another is time or speed. Different pathways of energy recycling will be recruited.
- Adaptation in athletes to the same swimming intensity depends on their current condition, types of muscle fibers, training history and other factors. Therefore it is important to test athletes during a season and select appropriate swimming intensities to train different energy zones.

Energy Zone Charts

USA Swimming recommends the use of a simplified 4 category system of energy zones or a more complex 7 category system. The following charts give introductory coaches an easier starting point, and allow them to increase the number of categories when they are comfortable within the basic system. The sets shown as for "Senior Age Group Swimmers" refer to experienced, teenaged swimmers.



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Four Energy Zone System	Set Distance (meters)	Set Duration (Minutes)	Heart Rate		Work:Rest	Sample Sets (for Senior Age Group Swimmers)
			(Beats/Minute)	(% of Max)		
Aerobic	500 - 4,000	Variable	≤ 160	≤ 80	:10 - :30 rest	4-8 x 500 Swim @ :20 rest or 18 x 75 S-K-S @ :15 rest
Aerobic/Anaerobic Mix	600 - 2,000	8-40	160 - Max	80 - 100	:15 - :60 rest	6-10 x 200 Swim @ :20-:30 rest or 6-8 x 100 IM @ :30 to :45 rest
Anaerobic	200-600	2-15	Max	100	2:1 - 1:4	6 x 50 Swim @ 2:00 rest or 3 x 100 Swim @ 4:00 rest
Sprint	25 - 100	1-2	Max	100	1:3 - 1:4	4-6 x dive 15m @ 1:00 rest or 6-8 x 12.5 Swim @ :45 rest



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Seven Energy Zone System	Set Distance (meters)	Set Duration (Minutes)	Heart Rate (Beats/Minute)	Heart Rate (% of Max)	Work:Rest	Sample Sets (for Senior Age Group Swimmers)
Aerobic (Recovery)	Variable	Variable	≤ 140	<70	Not Applicable	600 Easy Swim
Aerobic Development (old EN1)	1,500 - 4,000	≥ 15	140-160	70-80	:10-:30 rest	6-10 x 400 Swim @ :10 rest
Aerobic/Anaerobic Mix 1 (old EN2)	800 - 2,000	10-40	160-180	80-90	:15-:30 rest	4-6 x 300 Swim @ :15 rest
Aerobic/Anaerobic Mix 2 (old EN3)	600-1,600	8-30	180-Max	90-100	:30-:60 rest	4-8 x 150 Swim @ :30 rest
Anaerobic 1 (old SP1)	200-600	2-15	Max	100	2:1 - 1:1	2-3 sets of 6-8 x 50 race tempo @ :10-:30 rest or 4x125 Rotate IM @ :45 rest
Anaerobic 2 (old SP2)	200-600	4-12	Max	100	1:2 - 1:4	4 x 75 Swim @ 3-4:00 rest of 6 x 50 @ 2:00 rest
Sprint (old SP3)	25 - 100	1-2	Max	100	1:3 - 1:4	4-6 x dive 15m @ 1:00 rest or 6-8 x 12.5 Swim @ :45 rest



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Part 4: Planning Novice and Age Group Practices

Topic Questions:

1. How can disciplinary problems be minimized?
2. What are the basic components of an age group practice?
3. What are the basic components of a novice practice?
4. Why should a coach emphasize kicking and racing in a novice practice?
5. What are the more advanced practice elements to introduce to age group swimmers?

Definition

Although there is no universally accepted definition, we are defining age group swimmers as aged 9 through 12 (and quite possibly up to age 14 depending on the situation) and having the skills to swim in USA Swimming or similar competition. We define novice swimmers as generally aged 12 and under and still developing stroke and turn skills as well as learning how to complete a workout. (Swimmers aged 8 and under are yet another group and where staff and pool space allow these young swimmers should have the opportunity to practice together as a separate group regardless of their ability or experience.) Novice swimmers aged 13 and over have more developed cognitive, conceptual and social abilities and should not be practicing in the same group as much younger novices. Where possible they should have their own group or be integrated into a group of swimmers of similar age. See Chapter 3 Part 3: Organizing the Wet Side for more on Training Group design.

Planning

Planning age group and novice practices is no less important than planning for senior workouts. While age group and novice swimmers do not need the work buildup followed by rest cycles of senior swimmers, they do need to have “points of focus” for keeping their attention and for systematically preparing them for the next level. Plans should be written and based on larger goals for the group. What is the goal for the group? How do daily and weekly practice routines bring the group closer to its goals?

Organizing a Safe and Disciplined Practice Environment

Safety, fun, teaching and racing are the priorities. These elements are much more important for the novice group and young age groupers than training. Parents expect that their children will be in a safe environment. To achieve this, provide both structure and discipline. Lack of structure leads to increased disciplinary problems and wasted time. Have clearly stated rules that are enforced consistently. Make use of time-outs for disciplinary problems. Keep the activities fresh, keep the swimmers moving and, especially for the boys, provide opportunity to race and compete during each practice. Control the size of the area being used so that the swimmers are not too spread out. Divide them into heats or groups and remember that young children do not instinctively understand send-offs, who should go first or how to organize themselves. The coach must teach them. Refer to Chapter 3: Organizing the Wet Side for additional information.

Novice Practices

Many coaches are used to designing sets or thinking about yardage as the primary goal. But novice swimmers are not just miniature seniors. They have special needs and considerations. First of all, forget about making yardage the primary objective. Begin with the end in mind, which is to get the swimmers ready for moving to the age group team and swim meets. These considerations determine what to teach. The most basic elements to teach are:

1. Kicking: for strength and endurance
2. Body and head position: streamlining, underwater swimming, balance
3. Fundamental stroke skills: teach freestyle and backstroke first, then breaststroke and butterfly
4. Fundamental starting and turning skills
5. Racing: streamlining, controlled breathing, controlled pace, fast finish
6. Dryland skills: basic athleticism and core strength
7. Practice skills: pace clock, circle swimming etiquette



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• Example of a Basic Practice Plan for a Novice Practice Group

Here is a basic practice plan if you have 3 days a week for one hour each day in the pool. Dryland such as push-ups or calisthenics can take place for 5-10 minutes either prior to or following pool time.

	Day 1	Day 2	Day 3
12 minutes	Kick set	Kick set	Kick set
12 minutes	Teach	Teach	Drill set
12 minutes	Drill set	Kick set	Teach
12 minutes	Kick set	Teach	Kick set
12 minutes	Racing	Relays	Racing

• Example of a Specific Lesson Plan for a Novice Practice Group

Here is a specific lesson plan sample based on the practice plan shown above.

Time	Component	Activity
6:00	Kick Set	Freestyle kicking with board (widths)
6:12	Teach	Backstroke streamline to one arm side glide to switch; hold (widths)
6:24	Drill set	Free streamline to one arm side glide to switch; (widths)
6:36	Kick Set	Backstroke kick with fins (widths)
6:48	Relays	Freestyle relays (widths)

• Kick Sets For Novice Swimmers

For novice and young age group swimmers, a kick set is an aerobic and strength building activity. Because kicking strength is so fundamental, it is wise to start every day with a kick set. The swimmers will know what to expect each day and it serves as both a warm-up and an aerobic set. In addition, even the most novice swimmers can kick with a kickboard. As they become experienced, vary the exercise so that they do some of the work with boards, some without, some with fins, some without. Kick sets can include many repeats of short distances (widths, 25's or 50's) with short rest done in heats. Some examples of kick sets are:

- 5 x (50 free with board, 25 back no board, 25 fly no board) with 10 sec. rest between each kick
- 16 x 25: 4 x (2 free, 1 back, 1 breast) with 10 sec. rest
- 4 x 100 IM kick no boards with 20 sec. rest

• Racing For Novice Swimmers

Most kids love to race. This is also a skill that they need to learn and practice. Teach racing by having the swimmers go from a start to mid pool, widths, or 25's and 50's as skills progress. Allow plenty of rest, at least a 1:1 work rest ratio. This can easily be accomplished by having the swimmers race in two heats. One heat swims while the other rests. Other skills to work on while teaching racing include controlled breathing patterns, fast finishing, streamlined starts and finishing touches. Relays are also a great way to teach racing and incorporate fun.

Age Group Practices

It is a good idea to plan, in writing, the progressions for workout sets, total yardage per week, and moving from a stroke development oriented practice to aerobic development to racing development. While progressing, always maintain stroke development, aerobic development and racing. With age groupers, work on everything, but shift the emphasis every 3 to 6 weeks for variety and to coincide with the meet schedule. Of the components listed below, the coach can determine the



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relative importance of each component and how that importance may change during the season. Creating a general plan based on those priorities then leads to a more specific weekly plan and finally to a detailed daily workout.

Basic Components of an Age Group Practice

With an age group practice, yardage is more important than with a novice group, but still does not have the importance that it has with a senior group. Many coaches are used to designing sets or thinking about yardage as the primary goal. Just as we mentioned with novice swimmers, age group swimmers are not miniature seniors. They continue to have special needs and considerations, just as the novice group does. The primary goal is to get the swimmers ready for moving to the senior group. By focusing on what it takes to develop age groupers into senior swimmers the coach creates appropriate components of the workout. The most basic elements to teach are:

- **Progressive Aerobic Development.** Begin to introduce aerobic sets of longer duration (approximately 15-20 minutes) on predetermined intervals. An example would be 5 x 200 free on 3:00 or 4 x 200 breaststroke on 4:00. On these sets, work on stroke count or other skills that need to be emphasized. Turn the same sets into challenge sets by reducing the intervals each week. It's fine to build up to 40 or 60 minute aerobic sets. Vary the distances, strokes, and intensity to keep the sets interesting. Doing a set of 20 x 100 free on 1:20 or doing a 6000 yard workout in 90 minutes are both laudable workout goals for an advanced age group team but they should not be the singular and everyday focus of the age group workout. Getting to this level should be the result of reasonable progressions over time while continuing to develop the other components listed below.
- **Kicking.** Quality kicking should be incorporated every day. Kicking is the foundation of good stroke technique and shouldn't be de-emphasized just because the swimmers have graduated from the novice group.
- **Long Quality Swims.** Timed 400m, 500y, 800m, 1000y, 1500m and 1650y swims. Swimmers don't turn 13 and suddenly and magically know how to swim a distance event. Teach them early.
- **Race Preparation.** Learning how to race. Do 50's, broken 50's, broken 100's, and broken 200's on a 1:2 work-rest ratio. It is not physiological training as much as "brain training."
- **Sprinting.** 25's or less on lots of rest. Let 'em race!
- **Test Sets.** On a regular basis incorporate some type of test to monitor improvements in aerobic ability and workout ability.
- **Stroke, Start and Turn work.** Not drills, but actual teaching. (Do drill work as part of aerobic development.)
- **Games and or Relays.** Let them have some fun! Keep safety in mind.
- **Dryland Training.** Young swimmers benefit greatly from calisthenics, body-weight exercises such as push-ups and core body abdominal work. A program as short as 5 minutes up to 30 minutes is appropriate for age group swimmers, depending on age and ability. Dryland can be incorporated either prior to or following pool time.

Working with Multiple Groups

A coach should always write a workout that challenges the best swimmers. However, with a large group of swimmers, this may mean that some of the slower swimmers can become discouraged. So the challenge for the coach is meeting the needs and challenging the swimmers of all levels.

Some coaches will use the "same but less" method in writing workouts where the sendoff interval stays the same but the distance will vary. The top swimmers might be doing 10 x 100 on 1:30, a second group might be alternating 75's with 100's on 1:30, and a third group might be doing 10 x 75 on 1:30.

Another method is to write two or three or more separate and distinct workouts for each ability group on the age group team. The down side of this is that it requires careful planning and excellent discipline. The upside is that workouts are designed to be suited to each ability level. A recommendation for dealing with multiple distinct workouts is that to divide the workout time into 15 or 20 minute blocks of time and design all sets to last 15 or 20 minutes so that each group begins and ends at about the same time. The coach can then rotate from group to group at the end of the set. This requires that one group can do a set on their own with the pace clock, while one coach works with one group and another coach works with the third group.

Whichever method is chosen, remember that the goal is to meet the needs of swimmers of varying abilities within the group.



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Part 5: Planning Senior Level Practice Sessions

Topic Questions:

1. What are the important considerations when planning a senior practice session?
2. What are the basic elements of a practice session?
3. What are some ways to incorporate dryland training into the practice session?
4. What are the steps in designing an interval set?
5. How can you track athlete improvement or progress?

Definition

As stated earlier, it is hard to precisely define “senior” swimmer. In general, senior swimmers are high school aged and are experienced in skills, training and competition. Often, talented and experienced 13 and 14 year olds not yet in high school are included in the senior group. See Chapter 3 Part 3: Organizing the Wet Side for more on Training Group design.

Important Considerations for Senior Swimmers

Daily practices are the most visible element of the training cycle. Each daily practice has its place in the micro (weekly), meso (6 week) and macro (season) cycles. Daily practices must be planned before stepping onto the pool deck. Planning begins by asking a few basic questions:

1. Where does this practice fit in the weekly cycle?
2. What is the main focus or objective of this practice?
3. What will be taught today?
4. What secondary objectives are there?
5. Are there any unusual distractions or obstacles to deal with today?

Remember, practices are a progression and a preparation. Everything that is done in practice should lead a swimmer on a progression from training to competition. Progression also needs to occur within the training plan. Changes in practice intensity, frequency, and volume should progress throughout the period of development over the course of a season, the year and the entire career of the swimmer.

Following are some elements to be included or considered when designing senior practices.

- **Warm-up.** To prepare the body for hard work, every practice should begin with a warm-up. The warm-up should include activity to increase the heart rate and respiration rate, loosen the limbs and prepare psychologically. Some stretching on land can precede the water warm-up. The duration of the water warm-up could be very short comprising only one set or continuous swim or a bit longer with a few sets. The coach should control the pace and type of work done in the warm-up.
- **Main Set.** A main set can follow warm-up. This set should be the primary focus of the practice and require a higher level of mental concentration and physical fatigue. It can be structured in many different ways but should always work toward the goal(s) or focus of the practice and training cycle. For senior swimmers it should be at least 20-30 minutes in length.
- **Other Sets.** Following the main set, recovery work, drill work or skill work could be incorporated.
- **Fun.** Swimmers report that fun includes successful completion of challenging sets, interaction with teammates and coaches and learning new skills. Depending on the age and focus of the athletes, games, relays and planned play could be incorporated.
- **Cool-down.** End every practice with some type of a cool-down period. The cool-down, such as slower swimming at “recovery pace” will facilitate the repair of physiological stress resulting from the practice. Not only does the cool-down aid in recovery from the current practice, but it also is vital in preparing the swimmer for the next practice.
- **Heart Rate.** This is one of the most important factors in determining which energy system is being stimulated. Heart rate is controlled mainly by the speed or velocity at which the distances are swum plus the amount of rest given.

Building a Set for Experienced Swimmers

Interval training is the most common form of training. Remember the acronym DIRT (Distance, Interval, Rest, Time). A practice is designed based on using a number of training sets that involve time intervals as send-offs for given distances.



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Set design is only limited by the imagination of the coach. Research has shown that intensity and work-to-rest ratio are the most important components in determining the physiological adaptation that takes place. Following is the process of designing a set. Use the charts shown in Part 3: Energy Zones.

1. **Energy Zone.** Decide what type of adaptation is desired as a result of the interval set. This adaptation will dictate the intensity category. (First column on the Energy Zone Charts.)
2. **Duration.** Decide the duration of the set from within the recommended range. (Second and third columns on the Energy Zone Charts.)
3. **Repeat Distance.** Pick an appropriate repeat distance within the recommended ranges. (See the last column on the Energy Zone Charts for samples.)
4. **Number of Repeats.** Calculate the number of repeats that will give the desired total length of the set.
5. **Rest Interval.** Choose a rest interval within the recommended range (Fifth column on Energy Zone Chart.) The rest interval should be selected with consideration of both the length of each repeat and the intensity of each swim. Of these two factors, intensity should be given more weight in selecting the rest interval. For example, if the repeat distance is at the low end of the range but intensity is in the middle of the range, select a rest interval toward the middle of the recommended range. If an intensity at the upper end of the range is chosen, a longer rest interval towards the upper end of its range would allow the swimmer a better chance of being able to complete the set at the desired intensity.

With experience, a coach will be able to design sets quickly. Always remember to make technique and mechanics a priority. Insist on proper stroke mechanics throughout a set. If the swimmers repeatedly fail to maintain mechanics, the set may need to be redesigned with more rest or a slightly lower intensity. Stop the swimmer(s) or revise the set immediately rather than continue with incorrect mechanics. Otherwise what is occurring is mal-adaptation; the muscles being trained may not be the ones you want trained.

Use variety, but not to the point of chaos or confusion. Vary repeat distances, intensities and rest intervals to keep things fresh and challenging, but do not try to cover too much ground in one set. The result may be too little effective targeted training.

Incorporating Dryland Training

Many senior coaches incorporate dryland work into their daily planning. Scheduling, space, supervision and available equipment are often the determining factors when planning to incorporate dryland training. Even minimal dryland work can greatly increase the general fitness levels and athleticism of younger swimmers and no equipment is necessary. Older swimmers can do a wide variety of dryland work including core strength training, running, medicine ball work and rubber tubing. Dryland training may comprise 30 minutes or more of dryland circuitry for senior athletes. All dryland training must be directly supervised by a coach.

Dryland work can be done before or after the pool session. If done before, be sure to warm-up with some stretching or light calisthenics prior to beginning a dryland routine. Similarly, after an extensive dryland routine following a pool session, cool-down with light stretching.

Coaches must consider how the dryland training can be structured to improve swimming performance. Very strong athletes may not need to work very much on dryland. They may benefit more from working on the transition of strength to the water. This would include swimming with paddles, swimming with resistance and surgical tubing. If the athletes' strength level is low, they can increase their strength on dryland and benefit their swimming. Swimmers need specific strength for the muscle groups involved in swimming so concentrate on pulling strength and core stability.



Part 6: Fueling for Performance

Topic Questions:

1. What are the basic nutrients and the primary functions of each?
2. What are some easy guidelines to teach athletes concerning fueling for recovery and competition?
3. Why is it important to educate parents about nutrition?

Coaches have no control over what swimmers eat at home. However coaches can play a major role in educating swimmers about the importance of good nutritional choices and the value of fueling for performance. The analogy of fuel in the gas tank of a car and fuel in the body of the swimmers is one that even young swimmers can relate to. Emphasize that fueling for performance means:

- Always having a full tank.
- Getting the most economical fuel.
- Fueling at the right times and places.

The Basic Nutrients

The basic nutrients are carbohydrates, proteins, fats, vitamins, minerals and water. Carbohydrates are the primary fuel source for aerobic athletes and, contrary to popular opinion, are not fattening. If taken in reasonable amounts, carbohydrates are used for energy, leaving little to be converted to body fat. Protein builds and repairs muscle, produces hormones, supports the immune system and replaces red blood cells. Protein is not a main source of energy except in cases of malnutrition or starvation. Most athletes do not need extra protein. They get adequate protein from a normal diet. Again contrary to popular opinion, protein does not build muscle bulk, only exercise does that. Fats are essential for hormone production, storage of vitamins and delivery of essential fatty acids. The body needs fat, but the average American diet contains more than enough. High fat foods should be traded for low fat substitutes so that fat intake is limited to 25% of total calories. The necessary vitamins and minerals are also readily available in the foods consumed in a healthy diet. Vitamins, minerals and water make the body more efficient at accessing carbohydrates, fats and proteins when they are needed during exercise and recovery.

In terms of total calories, swimmers should aim for a diet of:

- 60% carbohydrate
- 15% protein
- 25% fat

Of course this will vary but carbohydrate intake shouldn't drop below 50%, protein should not go above 25% and fat should not go above 30%.

There are no magic foods and no magic food groups! Extra vitamins, minerals and supplements are not necessary in a healthy diet. The easy guidelines for your athletes are as follow:

- Eat colorful foods. The more naturally colorful the more vitamins, minerals, antioxidants and carbohydrates are available for recovery and general health.
- Eat early and often. The first two hours post-workout are the most critical.
- Drink early and often. Hydration must be continuous. (See Part 7: Hydration.)

Recovery Nutrition

After exercise, the dietary goal is to provide adequate energy and carbohydrates to replace muscle glycogen and ensure rapid recovery. Start the replenishment process immediately. The "window of opportunity" to maximize glycogen replacement lasts only about 2 hours. It is also advisable to pulse the system, i.e. eat something substantial every hour rather than waiting for a large meal or eating only every 3 to 4 hours. The replenishment should be adjusted according to the intensity of the practice. A less intense workout requires less replenishment. Finally, something is better than nothing so emphasize consuming some carbohydrate fuel immediately after workout rather than waiting until the next full meal.

Nutrition for Competition

Once again, teach athletes that there is no magic food and that they must focus on long term nutritional choices. When it comes to swim meets, they need to prepare nutritionally for the entire competition. There is no way to fuel for a particular



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race. It is important to maintain constant energy, blood sugar levels and hydration by snacking and replenishing throughout the competition. Shown below are some recommendations for “competition cuisine”:

One Hour or less to go	2-3 hours to go	3-4 hours to go
Fruit and vegetable juice such as orange, tomato or V-8	Fresh fruit and vegetable juices	Fresh fruit and fruit and vegetable juices
AND/OR	AND	AND
Fresh fruit such as apples, watermelon, peaches, grapes, or oranges	Breads, bagels, English muffins with limited amounts of butter, margarine, cream cheese, or peanut butter	Breads, bagels, baked potatoes, cereal with low-fat or skim milk, low-fat yogurt, sandwiches with a small amount of peanut butter or lean meats and cheese
AND/OR	AND/OR	AND/OR
1 ½ cups of a sport drink	4 cups of a sport drink	7 ½ cups of a sport drink

Educating the Parents

Since the parents are normally responsible for the food that swimmers eat, it is crucial that parents have good nutritional information. Nutrition is the number one topic that parents ask about because it is something that they can directly influence. Begin right away to educate both the swimmers and their parents about fueling for performance. The main question parents ask is, “What should my child eat before practice? At meets?” Here is a very practical answer to that question along with practical suggestions.

The best pre-practice or pre-meet meal should contain primarily carbohydrates. Carbohydrate-rich foods like pasta, breads and cereal are easily digested and absorbed. (Rule of thumb: 0.5 - 2.0 grams of carbohydrate per pound of body weight one to four hours prior to exercise.)

Remind parents and swimmers that it is crucial that swimmers eat before morning practice. Some swimmers will resist a meal before morning practice or the early morning session of a swim meet. Remind swimmers of the analogy of the empty gas tank. If they have not eaten since the previous evening, the gas tank is empty and there is no fuel to produce energy for competition or training. Some of the items below are well tolerated before morning practice or competition.

Meals that provide 100 grams of carbohydrates

- 1 bagel with peanut butter and 2/3 cup of raisins
- 1 cup of low-fat yogurt, 1 banana and 1 cup of orange juice
- 1 turkey sandwich with 1 cup of applesauce
- 2 cups of spaghetti with meat sauce and 1 piece of garlic bread
- 8 oz. of skim milk, 1 apple, 1 orange, 2 slices of bread and 3 pancakes
- 1 serving of sports drink and 1 bagel



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Part 7: Keys to Hydration

Topic Questions:

1. What is a guideline for how much fluid should be consumed during a swim practice?
2. Why is a 6-8% carbohydrate drink a good recommendation following a workout?
3. What are some hydration guidelines and tips for swimmers to follow in their daily lives?

Water is one of the basic nutrients necessary for overall health and athletic performance. Fluids are necessary for two primary reasons: to stay hydrated and to provide the body with fuel.

During Workout

Regardless of age or length of practice, all athletes need fluids to stay hydrated. This is easily accomplished with a couple of sips from a water bottle every 15-20 minutes. As athletes progress, practices get longer and tougher. It's well established that athletes who exercise beyond 90 minutes benefit from a supplemental fuel source which a sports drink can provide. Years of research shows that drinks that are 6-8% carbohydrate by weight provide the perfect balance between fuel and hydration. A couple of sips every 15-20 minutes keep the body fueled, helps prevent unnecessary tissue breakdown and maintains hydration. Gatorade and Powerade fit this 6-8% rule.

After Workout

Water is an excellent choice to replenish fluids after practice. It's always wise to drink at least one cup. But after a hard workout, replenishing fuel stores is equally important. Each hour after practice, athletes need a little over 1 gram of carbohydrate for every kilogram (2.2 lbs.) they weigh. This replenishing must begin within the first hour.

A sports drink that is 6-8% carbohydrate by weight is easily digested and quickly absorbed and can provide a convenient way to get some of the necessary fuel within the first 20 minutes. High protein drinks often forgo the carbohydrate and carbohydrate is what must be replenished within the first hour after workout. A little protein won't hurt; in fact it may actually help by supporting the tissue repair and re-building processes. But too much protein, especially when it comes in place of carbohydrate, may be detrimental to the post-workout recovery process.

Remember, carbohydrate is the primary fuel source during hard exercise. Glycogen, the storage form for carbohydrate, is what the body taps into for fuel when exercise is very intense. Protein is used as a fuel source during exercise only when carbohydrate and fat are not present in sufficient quantities. If an additional carbohydrate source is not supplied, the body taps into stored protein, the muscles. This is why it is good to drink carbohydrate-electrolyte solutions during workout, to spare muscle protein. This is also why it is important to replace carbohydrate stores lost during a workout in order to start the next workout with a full tank of gas.

During the Day

Staying hydrated during the day is just as critical as hydrating during and after workouts. Most athletes can do this by incorporating a variety of fluids into their daily diets such as water, fruit juice, milk and soups. Remember that variety is the key to a healthy diet. If swimmers use a sports drink during and after practice, it may be better to drink water and juice during the day to stay hydrated. Juices are often healthier than sports drinks in that their sugars are natural. Always keep in mind that juices and sports drinks contribute to total caloric intake.

Fluid Replacement Tips for Swimmers

- Keep a fluid bottle by the side of the pool when working out and drink between repeats and sets.
- Choose sports drinks that taste good, stimulate fluid absorption in the body, maintain proper fluid balance in the body and provide energy to working muscles.
- Avoid carbonated drinks which can cause stomach bloating and may reduce fluid intake.
- Avoid caffeine-filled beverages which are diuretics and contribute to fluid loss.
- Check the color of the urine. Dark-colored urine may indicate dehydration and the need to consume additional fluids.



Part 8: Disordered Eating

Topic Questions:

1. What is the difference between disordered eating and an eating disorder?
2. What are the early warning signs and symptoms of disordered eating?
3. What is the role of the coach when disordered eating is suspected?

Disordered Eating and Eating Disorders

There are many hypotheses regarding what causes disordered eating or eating disorders and why athletes appear to be predisposed to these conditions. Biological factors, such as gender and neurotransmitter imbalances (chemicals that help regulate emotions in the brain), as well as psychological influences, such as family issues, emotional trauma, low self-esteem and perfectionism appear to be key factors. In addition, sociological influences, such as a culture that equates thinness with success, power and beauty also play a critical role.

Disordered eating includes various combinations of unhealthy eating patterns such as food restriction, preoccupation with food (counting calories or fat grams with every food intake), preoccupation with weight, skipping meals or rigid food patterns, not eating around others, fasting or exercising to compensate for eating.

An eating disorder is a medical condition that requires a diagnosis. It is characterized by the limitation of food intake such that the body's needs are not met. This may involve restricting foods, bingeing, purging (includes vomiting, using laxatives, diuretics, and/or diet pills), compulsive exercise to "work off the calories", or any combination of these. Eating disorders stem from a distorted perception of one's self, both physically and emotionally. An eating disorder is not about food. It is primarily psychological. Controlling food is merely the mechanism by which the individual attempts to cope with underlying emotional issues.

Both eating disorders and disordered eating are characterized by a spectrum of unhealthy eating behaviors. The difference is that an eating disorder is a clinical condition that exists at the extreme of this spectrum and can result from both physical and emotional stresses. While 90% of eating disorder sufferers are said to be female, men have become increasingly at risk. Over the last few years there has been an explosion in the number of men with eating disorders, body image issues, and compulsive exercise patterns.

Degrees of Disordered Eating

At the extreme end of the disordered eating spectrum are clinical eating disorders. The two most common eating disorders are Anorexia and Bulimia.

- **Anorexia.** Anorexia is an eating disorder characterized by refusal to maintain body weight at 85% of expected weight for height, intense fear of gaining weight or being fat, disturbance of the way the body is perceived and, in females, the absence of the menstrual period (amenorrhea). Typically anorexics are severely underweight.
- **Bulimia.** Bulimia is an eating disorder characterized by recurrent episodes of binge eating, recurrent inappropriate compensatory behavior to prevent weight gain, and self-evaluation that is unduly influenced by body shape or weight. Binge and purge behaviors must occur at least twice a week for three or more months and are not exclusively linked with episodes of anorexia. Bulimics are often of normal weight or slightly above.

Early Warning Signs of Disordered Eating

- Preoccupation with food; a lot of talk about food
- Preoccupation with weight
- Dissatisfaction with body
- Skipping meals
- Repeated comments about "feeling fat"
- Severe food restriction
- Eating only "safe," "healthy," or "fat-free" foods



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- Not eating around others
- Often cold or chilled on and away from pool deck
- Wearing baggy clothes
- Binging/purging
- Excessive exercise (i.e. additional exercises which is not part of the program)

Keep in mind that a swimmer can exhibit any of the above signs without having disordered eating. A swimmer who exhibits several signs for an extended period of time (more than one to two months) is the one to be concerned with. This will never be an exhaustive list, but one sign may be a flag to look for others.

Reducing the Risk: The Role of the Coach

Reduce the risk of disordered eating by creating an environment in which swimmers feel comfortable and confident. Focus on performance and how important fuel/food is to enhancing both strength and endurance. De-emphasize weight by eliminating weigh-ins, body composition testing and comments about weight. Avoid talking about appearance, good or bad. An innocent comment like, "you look fit" can be easily misinterpreted. Say instead, "your stroke looks good" or "that was a great set." A negative comment like "you need to be leaner" could be addressed more effectively by addressing the real performance issues. If an athlete is performing well, she may not need to be leaner, and if the athlete is performing poorly it may not have anything to do with weight or body size. Factors such as strength training, technique and sport psychology play key roles in improving performance. Focus on coaching to improve performance, not controlling body type.

The coach has a responsibility to step in as soon as he or she becomes aware of signs or symptoms of disordered eating or disordered eating patterns. Get the parents involved early, as soon as suspicions are aroused. In the meantime, generate conversations that reinforce the idea that fueling the body is about performance, not weight. Ultimately turn the situation over to a professional. It is not something a coach can deal with or "fix" alone.

For more information see [Prevention, Recognition and Action: A Comprehensive Guide for Coaches \(2003\)](#)



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Part 9: Advocating for Drug-free Sport

Topic Questions:

1. What is the role of the coach in advocating for sport free of performance- enhancing substances?
2. Why are dietary supplements considered “take at your own risk”?
3. Do athletes need to take vitamins “just in case”?
4. What do athletes need to do to check on the status of any medications they may be taking?

The coach has important responsibilities when it comes to supplements and performance-enhancing substances.

- Educate the athletes and their parents about the dangers of supplements and performance-enhancing substances.
- Be an advocate and role model for a level playing field in sport, free of performance-enhancing substances.

Team rules and policies should reflect a drug-free position, but the coach must be clear about what “drug-free” means. It is important to stress the difference between performance-enhancing substances and necessary medications such as asthma inhalers. Educational efforts must be age appropriate, but it is never too early to start talking to athletes about the dangers of supplements and performance- enhancing substances as well as the value of good nutritional choices to fuel for training and performance.

What is a Dietary Supplement?

A dietary supplement is defined as a product that is intended to supplement the diet, contains one or more dietary ingredients, is intended to be taken by mouth and is labeled on the front panel as a “dietary supplement.” Dietary supplements are a category of food and are regulated by the US Food and Drug Administration (FDA). However, regulation can be lax and often depends on information provided by the manufacturer.

USA Swimming’s Position on Supplements

In an effort to maintain the integrity of the sport and the safety of athletes, USA Swimming has taken a proactive role in making athletes and coaches more aware of the risks involved in the use of commercially available dietary supplements that have been linked to enhancing performance. Along with the US Anti-Doping Agency (USADA), USA Swimming considers dietary supplements “take at your own risk,” placing full responsibility for any effects and repercussions on the athlete.

It is the role of USA Swimming to educate swimmers, coaches and parents on the issues of dietary supplements, including general and specific risks, normal values and toxicity, drug testing and drug interactions, stacking, and conventional dietary alternatives. It is also the role of USA Swimming to validate or repudiate via research review or sanctioned research the answers to the many questions that surround scientific and anecdotal evidence versus actual application. Any recommendations or opinions offered by USA Swimming regarding the use of dietary supplements are based on a yellow-orange-red light continuum [Health & Contamination Risk Chart for Dietary Supplements](#) and the most current publicly available scientific and consumer-specific information.

Claims made by the manufacturers/ distributors of dietary supplements regarding the effectiveness of their products are not strictly regulated by the FDA. Any commercial dietary supplement is susceptible to containing substances that may appear on the Prohibited Substance list(s) of the International Swimming Federation (FINA) and/or the International Olympic Committee (IOC). The potential exists for commercial supplements to contain substances that do not appear on the product’s list of ingredients. Statistics indicate that in some cases, the use of legal dietary supplements has been linked to positive test results for prohibited substances in athletics. Therefore, because supplements are not strictly regulated by the FDA, there is no guarantee that what is actually in the product is on the label.

Vitamins

Many athletes take a vitamin and/or mineral supplement “just in case” their diets are inadequate. In most cases this is highly unnecessary. Eating a variety of foods from all of the food groups and eating them in quantities that are sufficient to support the caloric demands of training and recovery is one of the keys to success. Turning to supplements for a quick fix is not the answer.



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For more information please visit [Supplements Info](#) on the USA Swimming website or [Dietary Supplements-Important Information for Parents](#).

Energy Drinks

As a consumer and also as someone who gives advice to swimmers and parents, remember that the coach is part of a target audience for the manufacturers of so-called energy drinks. Advertisements, images and slogans are created for a purpose – to convince consumers to buy the advertiser’s product. Each drink is different, but most energy drinks contain a cocktail of fancy, high-tech-sounding ingredients which are not regulated, have little or no nutritional value, and can be potentially harmful given that many of them can enhance the potency of stimulants in the drinks. The amount of caffeine and other stimulants or stimulant-like herbs in energy drinks can also be a cause for alarm as the side effects from the repeated or misused consumption of these drinks could potentially be a health threat. Stimulant abuse has a range of possible side effects including:

- Addiction and withdrawal symptoms
- Dehydration – For instance, the diuretic quality of caffeine can have a dehydrating effect, potentially leading to other side effects, including less blood being pumped with each heart beat, cramping and, ultimately, exhaustion
- Anxiety
- Tremors
- Increased heart rate and blood pressure
- Possible cardiac arrhythmia (an abnormality of the rhythm or rate of the heart)
- Insomnia

Thus, in many cases, energy drinks may actually bring on fatigue and interfere with optimal athletic performance. Any stimulant effect may be short lived or non-existent. Not only can high amounts of stimulants be harmful to the athlete’s body, but there is no documented health benefit in consuming “stimulant” drinks. A person may feel good for a short period, but once the body starts to use up the substantial quantities of sugar in these drinks, the effects of the caffeine and other stimulants wear off causing a “crash” and leaving a tired and drained feeling.

When energy drinks are consumed and a short-term “rush” or feeling of stimulation is experienced many people think that they are getting energy. This is not true. What they are frequently getting is a large dose of caffeine with some carbohydrates thrown in as a side order. It is a recipe for short-term stimulation and long-term fatigue.

The best piece of advice to teach athletes and parents is that the energy needed to sustain difficult and long training schedules and other daily activities and responsibilities is not going to be found in a can or a bottle. The only reliable way to maximize peak performance is to evaluate and modify the dietary intake to ensure that the athlete is meeting the nutritional requirements for the body and level of energy output. For more information visit the [website of United States Anti-Doping Agency \(USADA\)](#).

Doping Control

Doping Control rules are in place for all athletes. These rules can be confusing for athletes, coaches and parents and it is critical that any questions/concerns be clarified. Costly mistakes can be made that not only count against the athlete, but count against all of USA Swimming.

Doping Control takes place during major competitions. Individuals attending major competitions are subject to drug testing regardless of whether or not they are National Team members, Olympians or first place finishers. Athletes competing in these competitions should make sure to file all necessary paperwork in advance to be in the strictest compliance with doping control rules.

All athletes should check the status of all medications prior to using them. This includes both over-the-counter and prescription medications and will help athletes to determine if a medication requires documentation in advance, as well as if a medication is prohibited. Be aware that there are over-the-counter medications that are prohibited. Make athletes and parents aware that they should always check to see if a substance is prohibited by calling the United States Anti-Doping



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Agency (USADA) Drug Reference Line at 1-800-233-0393 or check the [Drug Reference Online](http://www.usantidoping.org/dro) (www.usantidoping.org/dro) before consuming the medication or substance. This is a resource that young athletes and their parents should begin utilizing from the starts of their careers.

The most commonly asked question is "Why can't there be a list of prohibited drugs using common over-the-counter names rather than scientific 30 letter words?" A simple answer is there are so many drugs on the market and many more being brought on each day that no list would ever be complete. It would put the athlete at risk to check a list that may or may not be accurate.

The US Anti-Doping Agency (USADA) has created a variety of educational resources geared towards young athletes, teenagers, and elite athletes that focus on the health risks associated with the use of performance enhancing substances. Coaches should encourage parents and athletes to link to these valuable educational resources via the doping control section of the USA Swimming website.

For more information please visit [Doping Control](#) on the USA Swimming website.