Part 2: Applying the Basics of Growth and Development

Topic Questions:
1. What are some strategies to keep both early and later maturers involved in swimming?
2. How are aerobic capacity, anaerobic capacity and muscular strength affected by the growth and development of the athlete?
3. What are some strategies to deal with female athletes who are negatively affected by physical changes to their bodies?
4. How can competition be tailored to make it developmentally appropriate?

Strategies to Deal with Early vs Late Maturers

Keep in mind that early success does not predict later success. This is illustrated in a study looking at growth and development in boys (Medford Boys Growth Study) and its relation to sport abilities. Specifically, coaches were asked to rate boys in terms of their abilities in elementary school and again in junior high. They found that only 25% of the boys who were rated outstanding in elementary school were also rated outstanding in junior high. This suggests that early talent/ability is a poor predictor of future abilities since only one fourth of the boys that demonstrated ability in elementary school also demonstrated ability in junior high.

Given this, be cautious about focusing attention and energies onto only the young athletes who are showing initial talent. The success demonstrated by early maturers is due to a biological advantage and biological maturation is genetic. Late maturers, who are at an initial physical disadvantage, don't have control over biology.

Parents and athletes must be aware of some of the factors involved in why some are experiencing much success (as is the case with early maturers) or limited success (late maturers). An awareness of the situation will aid in keeping both success and failure in perspective while maintaining an eye towards individual skill development. Help athletes focus on long-term development rather than performance today.

With early maturers, who have trouble keeping early success in perspective, think about moving them "up" in competitions, when possible, so they are competing on a more level playing ground and experiencing some defeat along with their successes. They can still practice with their peers (so social development is not affected) but compete against others of a similar maturational age.

Search for strategies to keep late maturers involved in skill development programs since they are the ones getting left behind. Be creative in structuring situations so they can experience success and see improvement. Some examples that have been used include: post and reward personal improvement in training that focuses the athletes on themselves rather than peer comparison; design team competitions that emphasize skill development; find a way to get the athletes to compare themselves to others of the same maturational age.

Gender plays a role in the influence of the maturation process on performance, dropout and self-esteem. Specifically, pay special attention to early maturing females and late maturing males. An early maturing female develops a woman's body at a young age and may become very self-conscious. Conversely, the late maturing male is ridiculed for being small and also becomes very self-conscious. Parents and coaches need to help these athletes with self-confidence, self-image and self-worth.

- Educate athletes regarding growth cycles so they understand what is happening to their bodies. Help manage parental expectations. Explain that rapid growth can lead to awkwardness and that performance may plateau or even temporarily decline.
- Encourage the early maturer to develop good technique and take on new events. Take active steps to keep late maturers involved by encouraging and recognizing individual improvement.
- Understand gender differences and allow time for young athletes to get comfortable (physically and emotionally) with their changed bodies. Adaptation to the growth changes lags behind the actual change.

Fostering Long Term Development Through Structured Training and Skill Development

There are three primary physiological performance components that undergo quantitative changes (increased size or
Aerobic Capacity

V0\textsubscript{2}max, the ability to take in, transport, and utilize oxygen, is the common parameter used to measure aerobic capacity. V0\textsubscript{2}max shows significant growth from 11-13 years for females and 12-14 for males. This time frame, when significant growth can occur is also called a sensitive period. It should be maximized in the training program to develop the athlete's long term potential. The athlete is able to rapidly increase workload during this sensitive period. Pre-pubescent athletes show significant improvements in long duration, low intensity events and are able to enhance the utilization of their aerobic capacity.

Recommendation: Coaches should optimize aerobic training during this sensitive period (11-13 years for females/12-14 years for males) to maximize athletes’ aerobic development. It is suggested that pre-pubescent athletes (ages 9-12/14) focus on longer distances (i.e., longer repeats and longer competitive events) for reasons related to both skill development and aerobic capacity development. This does not mean that swimmers do not need to train the aerobic system after age 14! Athletes should continue to increase training volumes and train the aerobic system throughout their careers.

Anaerobic Capacity

Anaerobic training involves high intensity, brief activities such as short repeats on long rest or 25 yard or shorter sprints. It has been found that high volume pre-pubescent anaerobic work results in insignificant long-term anaerobic improvement for young athletes (10-13 years). It may result in short-term time drops. However, higher aerobic work during this time results in increased performance across all distances not just longer distances. Early increased anaerobic load leads to potential mal-adaptation in young athletes…it is said to “tax their tank” and their ability to adapt. 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.

Recommendation: Coaches must first develop the athlete's aerobic capacity and then gradually increase anaerobic load for maximum development of anaerobic capacity.

Muscular strength, power and endurance

A frequently asked question is whether young athletes should strength train. It is suggested that there can be muscular gains and adaptations but only if strength training is done under the right scenario: with close supervision to ensure proper technique. Prior to puberty, the gains come from neuromuscular changes not changes in muscle size. With increases in steroid hormones (puberty), we see gains due to changes in muscle size, predominantly in males. As muscle size increases, so does strength. But, typically there is a year lag time between size/mass increases and maximum effects of strength gains in young athletes. Additionally, the translation of land-based strength, power and endurance to pool performance can take up to six months. The age of 14-15 is when peak gains occur; quantitative muscular changes can occur with proper training. However, it is not until half a year to two years later that this will be translated into an increase in strength.

Recommendation: First, keep in mind that young athletes are not miniature adults. Because of hormonal and biological differences between children and adults, children will not increase muscle size through strength training. However, neuromuscular adaptations can occur. It is only after puberty that muscle growth occurs. The ability to translate muscular work to swimming velocity is the key, as the concern is helping children swim faster. Therefore, ensure that strength training is implemented or modified to meet this objective.

Physical Readiness for Competition

"Can a child be too young for competition?" The answer is "yes" if we are strictly referring to the adult model of competition such as the organized swim meet. Young athletes often do not have the psychological, social and physical skills necessary for the competitive environment. However, if competition is structured to make it developmentally appropriate for young athletes, they can benefit from the experience and develop the necessary skills.

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At the developmental level, the important element is skill. In addition, evaluating performance based strictly on time is an injustice to our late maturing athletes who are at a biological disadvantage relative to their early maturing peers. Be creative in using different evaluation criteria or rewards that recognize areas we want to emphasize i.e., stroke, technique, individual improvement. Following are varied examples of appropriate competitions for developmental athletes:

- Technique meets
- Alter events based on physical abilities, i.e., allow 5 butterfly strokes then 5 butterfly kicks
- Race strategy competitions
- IMX meets
- Intra-squad and inter-squad meets
- Single age events

Set up a sound and appropriate program for entry level swimmers to develop a firm foundation; a foundation that includes proper skill development and the development of self-esteem. This will help to instill in children a love of swimming. Rely on best judgment and knowledge of the swimmer to determine physical readiness for appropriate levels of competition.