The Importance of Resistance Training for the Aging Competitive Swimmer

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Introduction

Research has consistently shown that competitive swim performance decreases with increasing age. This finding holds across genders, strokes and distances. Many physiological and training-related factors have been suggested to explain this age-related decrease in swim performance. These include:

1. Decreased aerobic capacity
2. Decreased anaerobic capacity
3. Decreased muscular strength and power
4. Decreased flexibility around joints
5. Decreased nervous system activity
6. Increased fat mass
7. Decreased muscle mass
8. Decreased training volume
9. Decreased training intensity

Importantly, the age-related decrease in muscle mass has been shown by scientific studies in both older athletes and non-athletes, to be related to decreases in aerobic capacity, anaerobic capacity, and muscular strength and power. These factors are crucial to optimising swim performance in all strokes and distances in masters swimming.

Resistance training has been shown to increase muscle mass in both aging athletes and inactive older persons, some as old as 90 years of age. Thus, it would appear that resistance training that increases muscle mass (called \textit{hypertrophy} training) become crucial for the older competitive swimmer. The purpose of this paper is to examine the advantages, principles and methods of implementing a resistance training program for the masters swimmer.

Advantages of Resistance Training

Resistance training in a gym or at home has both health and performance benefits for the aging swimmer. The health benefits of any resistance-training program that increases muscle mass or simply increases muscle strength in the older person are numerous and include:

- Increased joint stability
- Improved posture
• Reduction in risk of falls
• Improved balance and coordination
• Reduction in risk of cardiovascular disease
• Help with rehabilitation after injury or surgery
• Reduction in symptoms of osteoarthritis
• Improved bone mineral density

The above evidence strongly suggests that from a health and well-being perspective, resistance training for any older person is essential.

From a sports performance perspective, the arguments for resistance training are just as great. The advantages of resistance training, especially hypertrophy resistance training, include:

- Increased muscle mass
- Decreased fat mass
- Increased nervous system response
- Increased muscular strength and power
- Improved mobility
- Increased resting metabolism
- Improved diabetes control
- Improved muscle tone
- Increased independence
- Social interaction
- Improved well-being

Developing a Resistance Training Program for the Older Athlete

In 2002, the American College of Sports Medicine (ACSM) has developed a series of guidelines that should be adhered to when an older person commences a resistance-training program. Firstly, they should discuss the matter with their family doctor in order to gain a clearance to undertake the program. Resistance training can be stressful for the older athlete who has never undertaken such training.

Once ready to commence a weight training program, the following guidelines are recommended by the ACSM:

1. *Choice of Exercise.* The focus should be on large muscle groups used in the event or stroke. 4-6 large muscle groups should be exercised with 3-5
supplementary smaller muscle groups exercised in the same session. In the next section are some recommended exercise for swimmers but again see an expert for advice.

2. **Order of Exercise.** A warm-up should be followed by the large muscle group exercise, then the small muscle groups, and then a cool-down. For total body workouts, rotate exercises between upper and lower body and between opposing muscle groups (eg triceps and biceps).

3. **Resistance Used.** The most common percentage of maximum lift range used is 50-85% and 8-12 repetitions. Lighter loads are recommended initially.

4. **Lifting Velocity.** Slow-moderate is recommended for strength and hypertrophy training crucial for the older swimmer. Once developed, this strength can be turned into power by lighter loads and faster repetitions.

5. **Number of Sets.** Initially, just one set per exercise for 8-10 repetitions is recommended. Progressively increase the number of sets from 1 to 3 over time.

6. **Rest between Sets.** Typically, 1 to 2 minutes are recommended. Shorter rest is associated with lighter loads.

7. **Frequency.** 2-3 days per week is recommended.

Ensure you or your swimmers have a clearance from the family doctor and then consult an expert in the area of resistance training, before you or they commence such a training program.

**General Principles of Resistance Training**

The science and art of resistance training warrants much attention. It is strongly advised that a masters swimmer or coach consult an expert in the field before commencing a resistance training program. Speak to other swim coaches on who best to talk to or look for a gym that employs those qualified in the area. The qualifications to look for include a Level 1 or 2 Strength and Conditioning accreditation from the Australian Strength and Conditioning Association, a Certificate 3 or 4 in Fitness, or a graduate of sport and exercise science or Human Movement Science from a University. As with any physical training program, the following principles of training apply:
1. **Specificity** – That is, train the specific muscles at the specific speed and specific action that is required for the event. For the older swimmer, the following muscle groups and exercise examples are important to be developed:
   a. Chest – Bench Press
   b. Upper back – reverse dumbbell flyes
   c. Shoulders – Upright row, external and internal shoulder rotation, seated row
   d. Pulling muscles – Lat pull-down, Supine pulleys, seated row
   e. Upper arm – bicep curls and tricep pulldowns
   f. Torso – abdominal curls and back extensions, swiss ball or Pilates exercises
   g. Lower limbs – squats, calf raises, hip extensions, leg curls and extensions

2. **Progressive overload** – That is, over time, we must progressively make the training harder by training more often, with more intensity, or for longer. In general, a resistance training program should start with general strength (more repetitions and less weight), then hypertrophy training, then maximal strength training, then power development that is so important for sports performance.

3. **Recovery** – Too many athletes young or old train hard but don’t recover harder. Smart older athletes use nutritional, physiological, neurological and psychological methods to recover.

4. **Core exercise before limbs** – Get the tummy and lower back strong so the limbs can pump off that core.

5. **Flexibility before strength** – Ensure the joints are flexible to allow length of stroke and prevent injury.

6. **Stabilisers before prime movers** - The stabiliser muscles hold the joint in place so the prime movers can pull or push to generate force.
While the above principles are general, it is crucial that the older the swimmer embarking on a resistance training, the more the need to focus on developing muscle mass. Thus, apart from the general principles above, other principles relate specifically to hypertrophy training.

**Principles of Hypertrophy Training**

Given that older persons beyond 50 years of age lose muscle mass gradually while those over 65-70 years lose it quickly, it is logical that resistance training that develops muscle mass (hypertrophy training) be done the older the swimmer. The basic principles of hypertrophy training include:

1. *Develop general strength first* by lighter weights and more repetitions
2. The *Load* should be 70-80% of the maximum lift for the exercise – what we call 1 RM (repetition maximum).
3. The *Sets* should be 3-5 for each exercise chosen.
4. The *Repetitions* should be 8-15 per set.
5. The *Tempo* should be 2/1/2 meaning out for 2 seconds, rest for 1 second, then back in 2 seconds.
6. The *Rest* between sets should be 30-90 seconds.
7. *Frequency* should be a minimum of three times per week to develop hypertrophy and 1-2 times per week to maintain strength and hypertrophy.

Again, please consult an expert in the area of resistance training to get advice on the structure of the training program.

**Conclusion**

There is conclusive scientific evidence that resistance training is crucial for the older athlete for reasons of improved health and well-being as well as improved sports performance. A well-structured weight training program developed and monitored by an expert with an understanding of aging physiology and swimming as a sport, can maximise your swimming performance for years to come.

**Further Reading**


• http://www.acsm.org/index.asp is the home of American College of Sports Medicine and an excellent web page to browse and search for older athletes and coaches.

• http://www.acsm.org/health%2Bfitness/comments.htm is a website run by the American College of Sports Medicine, the premier sport and exercise science organization in the world, and has a wide range of sport and exercise-related topics to peruse.

• http://www.physsportsmed.com/ is the homepage of the journal The Physician and Sportsmedicine. It has numerous free on-line articles on all matters relating to athletic performance and good health.

• http://www.gssiweb.com is the homepage of the Gatorade Sports Science Institute. It has an excellent range of articles relating to sports performance and good health and an easy-to-use search engine.