



**USA Swimming, Inc.**  
**Operational Risk Committee**  
**Hypoxic Training Recommendations**  
**Wednesday, September 21, 2016**

If hypoxic training is utilized by coaches in the development of advanced competitive swimmers, it must be conducted only when following appropriate principles and under the direct supervision of an experienced coach. These principles are:

1. Coaches should stress to athletes that they should never ignore the urge to breathe.
2. Hypoxic training should involve progressive overload, in line with the athlete's physical and skill development – for example, beginning with efforts over 5m, 10m, then 15m etc. - as the swimmer develops the appropriate skills and physiological capacity.
3. Coaches should ensure adequate rest between hypoxic efforts to ensure full recovery.
4. Athletes should not hyperventilate (take multiple, deep breaths) prior to any underwater or other hypoxic efforts.
5. Hypoxic training should not involve competitive efforts of maximum duration, or distance covered.

**Hypoxic Training – On the Surface and/or Underwater**

Drills may be conducted as part of on top of the water training or under water training. Extreme care must be undertaken by the coach when under water training is being conducted. The risk of a swimmer losing consciousness when on the surface is lower than during underwater swimming drills. While on the surface, swimmers are more likely to take a breath when needed whereas underwater they may resist the urge to breathe. In addition, any loss of consciousness while swimming on the surface is more likely to be noticed by coaches or aquatic supervisors, allowing for a faster rescue response. If a swimmer loses consciousness underwater, that swimmer may go unnoticed for a period of time thereby increasing the likelihood of injury.

Common risk reduction strategies include:

- Hypoxic training should involve progressive overload, in-line with the swimmer's physical and skill development – for example, beginning with efforts over 5m, 10m, then 15m etc. - as the swimmer develops the appropriate skills and physiological capacity.
- Adequate aquatic supervision is provided. Swimmers should never swim alone.

- Never hyperventilate (take multiple, deep breaths) prior to any hypoxic training or efforts or before any underwater swims.
- Structuring sessions to minimize involuntary hyperventilation immediately prior to a hypoxic set.
- Encouraging swimmers to breathe as needed and to stay within their comfort zone.
- Ensuring adequate rest for full recovery between hypoxic efforts. Recovery time will vary from swimmer to swimmer.
- Hypoxic training should not involve competitive efforts of maximum duration, or distance covered. Coaches and swimmers must not engage in breath holding games or challenges.

### **Underwater Drills**

Common underwater activities that can lead to hypoxic blackout include repeated underwater swims or underwater kicking drills as well as stationary breath holding competitions for time. In all instances, the nature of the risk can be high. Even with successful resuscitation, complications including hypoxic brain damage and respiratory infection can occur.

The following considerations must be factored into hypoxic underwater training:

1. Coaches should be aware of the dangers and understand the risks of hypoxic training.
2. Swimmers should be instructed to surface and breathe when they feel it necessary when swimming underwater. Never resist the urge to breathe.
3. Stationary breath holding should never be used as a training method.
4. Only one deep breath should be allowed prior to submersion. Hypoxic blackout is closely linked to hyperventilation.
5. Underwater drills should be at the start of a workout when swimmers are not close to their maximum aerobic capacity (VO<sub>2</sub> max).
6. In general, the drill distance should not exceed 25 yards for a one time attempt. No immediate repeat attempts or challenges should be undertaken. More experienced, elite, athletes may attempt longer distances but should only do so under direct supervision of an experienced coach.
7. Allow adequate time for recovery, which will vary from swimmer to swimmer. Some guidelines suggest at least a two minute recovery time should be allowed before attempting another underwater swim, depending on age and experience.
8. No competitions or challenges; i.e. see who can swim the greatest distance underwater or hold their breath for the longest time will be conducted by coaches or swimmers.
9. There will be no pressure or penalties for swimmers who are unable to hold their breath as long as other swimmers.