

**Vol 3, 2006 CEC ARTICLE:
Basics of Deep Water
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INTRODUCTION

Deep versus shallow: They both have benefits and precautions and use the muscles very differently. In a good cross training program both deep and shallow water should be used. Hip, shoulder and core activation is more important in the deep water. Ankle and foot activation is important in the shallow.

Deep Advantages over Shallow

- 15 bpm lower heart rate than land and 9 bpm over shallow at the same intensity. (Better for patrons with heart conditions)*
- Lower exercise induced blood pressure than land or shallow.*
- More core and upper body workout than shallow*
- Zero impact*
- Spinal decompression in suspension*
- Develops more proprioception (special awareness)*
- Better for patrons with knee, hip and back problems.*
- Develops more joint stabilizers*

Deep Disadvantages over Shallow

- Harder to stay in alignment*
- Requires equipment (belts)*
- Requires some swimming skills for safety*
- Requires better body awareness*
- Less reactive and closed chain activation*
- Requires 8 or more feet of depth*

1. BIO-MECHANICS

ALIGNMENT

-Vertical. The body should hang vertically in the water. Belts should be put on the participants so they hang vertically in the water. This may require the belt to go on backward or upside down in order to maintain alignment. NOTE: For poor swimmers with weak CORE muscles, this is of particular importance. If they carry a lot of body fat in the hips, butt and thighs and put a belt on with most of the floatation in the back they can face plant and be unable to right themselves causing a potential drowning situation.

-Chest lifted, shoulders relaxed and down with the neck relaxed and the head level. After putting the belt on check that the person floats high enough in the water to keep the head and neck in alignment. Unfortunately lean participants sink and small belts may not hold them up enough so they stick out their chin in order to keep their head out of the water. They may need more floatation. Balancing a kickboard on top of the head is a good way to check for proper alignment.

MOVEMENT

-Let the feet and legs fall naturally under the body. Do not whip the body to generate action, but push & pull the water with the whole arm and leg. Activate from the shoulder and hips not the feet and hands.

2. WATER DYNAMICS

How this affects performance

How it can benefit special populations

Archimedes' principle: When a body at rest is immersed in water, either completely or partially, it experiences an upward force equivalent to the weight of the fluid it displaces. A body will float if it displaces water weighing more than its own weight and will sink if it displaces water weighing less than its own weight.

Affect – Participants with more lean body mass will sink and need more floatation to work comfortable and in proper alignment unless they are very good swimmers.

Unfortunately, the small belts have less floatation and the large belts have more when it is usually not needed. The larger participants usually float to high in the water and are more likely to tip over.

Buoyancy: The upward force/lift exerted by the water, when a body is submerged.

There must be sufficient displacement of water to buoy up the body. Ideally we associate this with deepwater training, but the effects of buoyancy can be felt in shallow water training when using looping types of movement.

Affect s– Because of the buoyant and hydrostatic pressure of the water, the resting and exercise heart rates and blood pressures are lower than on land at the same O₂ uptake.

The more of the body that is submerged the greater the affect. In navel deep water the heart rate is roughly 6 PBM less than land and in shoulder deep it is roughly 15 BPM less. This means for people with high blood pressure, cardiac or circulatory problems the deeper the water the safer for them to workout as long as they are comfortable in the water and the risk of drowning is low.

Secondly – This buoyant and hydrostatic effect helps with circulation and the return of blood and fluids from the lower extremities. This means for Pre/post natal, seniors and those with blood vessel valve problems, edema is reduced, and circulation is improved while in the water.

Viscosity: The internal friction of the water that tends to resist motion. Water is more resistant than air, most sources agree it is 12x more resistant, thus acts as a resistance/drag to movement.

Affect – A more balance workout is attainable with using both the upper and lower body effectively and working out the opposing muscle groups synergistically. Without equipment deep water is double concentric. If you add buoys, noodles, bands, balls, or resistance equipment other than neutral devices like gloves, you will have eccentric contractions and can work the muscles in an unbalanced manner unless the instructor programs accordingly.

3. LEVERAGE AND EDDY

Leverage: more force will be required in the longer the lever. More energy is required to move longer levers. De-conditioned or new participants should use shorter levers i.e. bent arms and legs. Intermediate can use full-length arms and legs and advanced can lengthen their levers with gloves, paddles, and fins.

Eddy: a current, as of water (or air) moving contrary to the direction of the main current, especially in a **circular motion. The more changes of direction the greater the energy expenditure. Also having one or more groups moving in different directions passing near each other creates currents and increases the energy expenditure.**

4. OPEN AND CLOSED CHAIN KINETICS

Closed chain kinetics: Using the property of action and reaction against a solid object like the floor. The foot pushes off of the floor transmitting the energy up through the leg propelling up and forward. Shallow water is closed chain kinetics. Kickboxing utilizes the closed chain kinetics to generate power.

Open chain kinetics: There is no solid object to generate power and push off of. The movement is generated in and transmitted out. The hips and shoulder activate motion in the deep water not the feet. THUS deep water is open chain kinetics. NOTE: Remind new participants to activate at the hip and use their whole leg as an ore to generate movement. If they point and flex their feet excessively they will get a calf cramp and not travel very well.

4. DEEP WATER CIRCUITS

The circuit class offers a format alternating between muscular strengthening with cardiovascular conditioning. Depending upon the size of the pool, a number of stations are set up which alternate between aerobic training and muscular strengthening.

The circuits can also include on-deck exercises performed on a mat, followed by exercises done in the water. The circuit should be set up so the participants can easily transition from one station to another. Equipment is not necessarily needed for each station; however, if it is used, the equipment should be easy to pick up, put down, or strap on. Instead of getting an exceptional work out from a large variety of equipment, the participant may become frustrated and waste time trying to figure out the equipment if the stations are not well marked and easy to initiate.

Because it takes longer to get to each station and longer to set up, participants should spend more time at each station. In contrast to a land circuit routine, which would typically allow 10 – 20 seconds at each station, the water circuit should allow 2 full minutes at each station.

Stanchions should be set up in the sequencing order around the pool with exercise printed on them.

Samples: Also see next section on Strengthening and Toning and Moves

Upper Body Stations	Lower Body Stations	Aerobic Stations
Jack Arms with Buoys Or Noodles	Jacks with noodle under feet Jacks bands around feet Scissor 3 out	Power Jacks propelling up
CC Arms with Buoys Or Noodles	Front Kick Noodles under feet V kick with noodles under feet	CC Propelling up Dolphin kick upright
Pushups with Buoys Or Noodles	Squats with noodles under feet Wide Knee Jog noodles under feet	Flutter kick hands overhead throwing ball overhead

D. Muscle strengthening and toning

Biceps – Long Band Curls under foot, Long Band curls hooked to wall feet up,
Triceps – Buoys Noodles kickboards arms Curl vertical
Bicep and Tricep Combined - Gloves arm curl Buoys Noodles kickboards arms
Curl along surface
Note reverse grip to work opposing side of forearm

Chest - buoys, noodles or kickboards pushup or flys in horizontal position. Long
band hooked to wall push facing away.

Lats - buoys, noodles or kickboards jack arms vertical

Mid Traps - Long band hooked to wall pull facing wall. - buoys, noodles or
kickboards pushup or flys in horizontal position face up pulling arms down and into
water. Figure 8 band pulling out chest level.

Chest and Back combined - buoys, noodles or kickboards in vertical position
sweeping in and out with straight arms

Ant/Post Delt - Buoys Noodles CC arm or arm raise front. Or arm press down V
sit position.

Med Delt and Lat – Gloves Jumping Jack arm

Med Delt Long band hooked on ladder feet up on wall to horizontal position
shoulder press.

External Internal Rotator – Buoys Elbow by waist rotate in and out.

External Rotation – Figure 8 Band elbow in double hitchhiker out.

Inner Thigh – noodles under feet Jacks

Outer Thigh – Figure 8 band around feet Jacks. On side noodle under lower leg,
push lower leg to floor of pool.

Quads – Dolphin backwards no arms. Noodle hooked on instep behind body extend down.

Hamstring – Noodle under foot in front Leg Ext. and curl

Gluts – Noodles under feet straight leg kick. Squats with noodles or kickboards. Noodles under feet bent knee stomp

Hip Flexors – figure 8 Band around feet pull one knee up and in.

ABS - See CORE Stability section.

Final cool-down stretch on wall with calves, hamstring, IT band, rotators, quad, chest, back, neck, shoulder....

5. ADDITIONAL DEEP WATER TRAINING TECHNIQUE- LATERAL MOVEMENT

A mode of cross training that has several physiological benefits. Lateral movement utilizes the inner thigh, gluteals, back and abdominal muscles. It helps improve joint stabilization and proprioception at the ankle, knee and hip. It helps improve body awareness, lateral awareness, spatial awareness and muscular imbalance awareness. It promotes finding out imbalances and working to correct them,

A. What IS lateral movement? Traveling laterally with front back moves or forward and back with lateral moves. It can also specifically use only right side or left side to check muscular balance and coordination. I.e. one leg skateboard over to wall counting number of strokes and repeating on opposite leg over the same distance with no arms. Are the number of strokes the same?

B. Maintaining Balance – Muscular balance is not only for opposing muscle groups but also right and left. Certain injuries, dominances, daily activities and habits can cause imbalances right to left. Imbalances right left abductors can cause low back and IT band pain if the imbalance is severe. Using lateral movement training to become aware of the imbalances and help correct them can be of great benefit to your participants.

CONCLUSION -This overview of deep water is designed to make sure that as an instructor you understand some of the advantages and disadvantages. Remember shallow water moves and deep water moves and how you create intensity are very different. Just like understanding that land moves do not translate to water for the most effective programming; shallow water moves do not translate to deep for the most effective programming.

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1. What is the main activation difference between deep and shallow?

2. What are the advantages of deep over shallow (list 7)?

3. What are the disadvantages of deep over shallow (list 6)?

4. What is the proper alignment for deep water?

5. T or F Belts should be put on with the buckle in front in the standard position as per the manufacturers recommendation.

6. How do you move through deep water?

7. How does the Archimedes principle affect deep water?

8. How does buoyancy affect deep-water workouts?

9. How can we use eddy current to affect deep-water workouts?

10. What is the difference between open and closed chain kinetics?

11. When adding equipment and achieving eccentric contraction, what must the instructor be aware of and program accordingly?

12. T or F you can add deck stations to a circuit anywhere for greater intensity.

13. What are the considerations and reasons behind equipment at stations and how long each station should be

14. List an exercise for each of the following muscle groups.

Biceps

Triceps

Chest

Back

Anterior Delt

Posterior Delt

Medial Delt

Quads

Hamstrings

Inner Thigh

Outer Thigh

15. Do all stations have to have equipment?

16. List 3 examples of aerobic stations?

17. What is lateral movement training?

18. Why is lateral movement training a benefit?

19. T or F Shallow water moves can easily be adapted to deep water for optimal training.