



# TRAINING AND NUTRITION

*"The daily routine built on good habits and discipline separates the most successful from everyone else"*

*- Michael Jordan*



## STRENGTH TRAINING & INJURY PREVENTION

Incorporating strength and conditioning components in your program is crucial for creating a well-rounded program. USA Water Polo, through its relationship with Bridge Athletics, has developed a series of resources to assist coaches in developing strength training and injury-prevention components for their programs. Strength training is a critical component for any serious water polo athlete. Obviously water polo is a unique sport that requires special consideration for any strength-training program.

**Website** - [ODP Strength and Conditioning Resources](#) (USAWP)

### ACTIVE STRETCHING

The purpose of an active stretching warm-up is to prevent injury, as well as to improve overall athleticism flexibility. Bridge Athletics has partnered with USA Water Polo to develop various resources for their members. The following two articles were produced by Bridge Athletics and provide a general dryland routine that will prepare the athlete for the water.

**Website** - [Pre-Workout Warm-Up](#) (Bridge Athletics)

**Website** - [Movement Prep Warm-Up](#) (Bridge Athletics)

**Video** - [Active Stretching 1](#) (Performance Water Polo)

**Video** - [Active Stretching 2](#) (Performance Water Polo)

### SHOULDERS (BAND WORK)

\*The importance of band work and how to implement

For all of these exercises do 10 to 15 reps, full range of motion, and then find a weak spot in the range of motion and do 15 to 20 seconds of fast paced/short arc work. Former Stanford coach Dante Dettamanti also provides a well-rounded [shoulder routine](#) in his book and serves as another great resource in developing shoulder routines for your athletes.

**Video** - [Land Band Work](#) (Performance Water Polo)

**LEGS**

There are a handful of beneficial leg exercises that can be done in the weight room, but the most effective way to develop the water polo player's legs is through functional training—strengthening the legs with resistance exercises in the pool. Doing eggbeater drills while pushing on a teammate or holding a teammate up works well. Doing water jugs or heavy balls is also a great leg workout. Good leg exercises outside the water include running stairs or riding a bike. (Of course, on the stairs run up and walk down.) Be creative with your training! Instead of simply running up and down bleachers, athletes can hop on them two feet up.

**WEIGHT LIFTING**

It's important that water polo athletes stress balance during strength training. Reduce the number of chest exercises and increase the number of back exercises. Less pushing and more pulling. A rule of thumb used by most coaches is having a 2:1 ratio of pull to push. For example, athletes do two sets of bench presses (pushing), they should do four sets of rows (pulling). Water polo athletes will get plenty of chest work in the pool. This is why you should have them do more back exercises in the weight room.

**Video** - [How the U.S. Men's Water Polo Team Increases Full-Body Power and Strength](#)

**Website** - [An Introduction to Strength Training for Swimmers](#)

**CORE**

Throwing a ball in land-based sports like baseball uses a closed-chain principle. This means that when you throw a baseball, you're using muscles from your feet all the way to your shoulder. The power to throw a baseball is generated in this chain reaction from the ground up. But this closed chain doesn't exist when throwing a ball in water polo, and a great deal of pressure is placed on your core and lower back region. This is where we develop the torque and power to throw a water polo ball.

**Video** - [Increase Core Strength With the U.S. Water Polo Team](#)

**Website** - [STACK: 15 Core Strengthening Exercises for Athletes](#)

Be aware that strength training will cause some muscle soreness. It's important for each athlete to become in tune with his/her body and to be able to differentiate between muscle soreness and fatigue (as a result of a good workout) and pain that may be a precursor to injury. Listen to your body, and you will be healthier. It's also important to try to vary your routines. In the early part of the year (pre-season) you may want to lift heavier weights and do fewer reps. But as the season progresses, I recommend lighter weights and more reps. Try to always train with a teammate. You not only will have more fun, but you can watch out for each other and make sure your training partner is doing the exercises properly.

**NUTRITION**

A proper eating program is just as important to an elite athlete's success as a strength-training program. Think of your body as a car and food and drink as fuel. Elite athletes are like finely tuned cars that require high-quality fuel to achieve optimal performance. Putting low-quality fuel into your body can lead to compromised health and poor performance.

The following nutritional information is designed to provide a foundation for getting the most out of your body during training and games. The hydration information was pulled from an Internet source ("Proper Hydration for Exercise" by Elizabeth Quinn, MS Sports Science) and reviewed by Dr. Ken Fujioka, the father of a former NCAA Division I water polo athlete. Dr. Fujioka specializes in endocrinology, diabetes, and metabolism.

## SECTION I - HYDRATION

### Before Exercise

- Drink 15-20 ounces of water 2-3 hours before exercise.
- Drink 8-10 ounces of water 10-15 minutes before exercise.
- What's somewhat new is that you can actually drink 6-8 ounces of a sports drink before getting in the pool, specifically before high-intensity games.
- It turns out that the body actually will use some of the sugar in the sports drink before pulling from its own glycogen stores (which athletes want to save). This means athletes could drink a small carb drink of 6-8 ounces just before warm-ups.

### During Exercise

- Drink 8-10 ounces of a sports drink every 10-15 min during exercise.
- For water sports, athletes will lose about 35 ounces of fluid per hour (at most). Most team members could drink 6-8 ounces. Bigger athletes should be drinking 8 ounces.
- If exercising longer than 90 minutes, drink 8-10 ounces of a sports drink (with no more than 8 percent carbohydrates) every 15 minutes.
- Some say if you're exercising longer than 60 minutes (at high intensity), then consume sports drinks. The reason is because water polo is so much more intense than any other sport.
- For a game (duration about an hour), 6-8 ounces of sports drink every 15 minutes is the goal, as it will facilitate replacement of electrolytes and glycogen.

### After Exercise

- Weigh yourself before and after exercise and replace fluid losses.
- Drink 16 ounces of water for every one pound lost.
- Consume a 4:1 ratio of carbohydrate to protein within 2 hours after exercise to replenish glycogen stores. But for recovery, studies show that a bit more protein is needed, so make the ratio 2:1 carbohydrates to protein and a lot more salt at about half gram per liter.

Easy hydration guideline: 15-20 ounces of water over the course of 2-3 hours prior to training/game; 6-8 ounces of sports drink just prior to training/game and then every 15 minutes during exercise; 8 ounces of chocolate milk immediately following training/game; another 8 ounces an hour later.

## SECTION II - DAILY FOOD INTAKE

Healthy snacking throughout the day is important. Examples include peanut butter and jelly sandwiches, turkey sandwiches, hard-boiled eggs, yogurt and granola, apple slices, bananas, trail mix, almonds, dried fruit, cottage cheese, and instant oatmeal. Make sure every meal includes protein. Fish and chicken are best, but pork and beef are fine also. Protein intake is important for strength gains. Your body can break down only so much protein at one time, so it needs to be consumed consistently throughout the day. A protein shake with 50 grams of protein taken once a day won't get the job done.

Make sure every meal has a good complex carbohydrate. Examples include: baked potato, brown rice, or pasta. Try to add a salad or steamed vegetables to dinner each night. Eat plenty of fresh fruits and vegetables; focus on what you like rather than trying to force down something you hate (e.g., spinach or broccoli).

Athletes don't necessarily have to avoid junk food (candy and other sweets, pizza, French fries, fried food, fast food, soda, etc.). Age-group and high school athletes are growing like weeds and can get away with eating junk and do fine. For them, it's just a game of taking calories in to match the huge number used for growth and burned in practice. But other kids who are done growing and put on fat quickly will have to avoid these foods.

### SECTION III - RECOVERY DRINKS AND PROTEIN SUPPLEMENTS

Consuming recovery drinks after training workouts are a good way to replace what was lost during a workout. The body needs a certain type of fuel and within a specific amount of time (less than an hour) in order to recover properly. Most kids will need about 50 to 70 grams of carbs over 4 hours with about 25 to 35 grams of protein over this same period. In regard to "less than an hour," think in terms of them needing 15 to 20 grams of carbs in the first hour. They can then spread out the rest of the 50 to 70 over the next three hours. They would do well with 20 to 30 grams of protein over those four hours. So if they eat dinner or lunch, then they'll probably get that amount of protein. But if it's just fluid intake, then they'll need protein in the drink. The current rage in sports recovery drinks is low-fat chocolate milk, and actually the data is pretty solid.

Eight ounces of chocolate milk has 25 to 30 grams of carbs and about 10 grams of protein. If kids have one drink after a hard practice and then another one in the next hour or two, that will be fine for most players. Recovery drinks are more important than protein in regard to not feeling negative effects the following day. Athletes don't need a lot of protein following their workouts in the pool (25-35 grams is good). What often works is kids going out to eat after practice, so they'll get their protein needs met and can consume a simple carbohydrate drink just to reload the glycogen. For this all the sports drinks work.

Note: if athletes get in a bunch of carbs right after workout, the protein does not matter that much as high loads of carbs can take away most of the immediate protein needs until they eat a meal.

**Electrolytes:** This area is wide open, and there are no great current recommendations other than electrolytes are good—but we don't know to what degree they're good. Too much sodium is generally not a problem in athletes, and they often will need the sodium in these drinks. So any of the balanced drinks (Gatorade, Powerade, etc.) are fine. Healthy snacking in addition to the recovery drink is important immediately after workouts. Any bar of food that has some protein (not a lot—5 to 10 grams) and a fair amount of carbs (15 to 30) is fine.

**Protein Supplements:** Surprisingly, either powder or pre-made works well, as the digestive tract will tear down the proteins to basic amino acids (the building blocks of protein), absorb them into the bloodstream, and then distribute them throughout the body. The protein supplement should be taken throughout the day and doesn't need to be taken right after weights. Boys instead should consume carbs right after lifting to refill glycogen stores. Rebuilding and use of protein should occur throughout the next few days—so yes, spreading it out is probably better.

I get my share of high school kids who "need to get bigger" for a college sport, and the trick is to have reasonable protein throughout the day but to push the carbs to drive up insulin. The reason for this is that insulin in adolescents is good for muscle growth (actually a big growth factor). The best source for protein is still food: eggs (no need to worry about cholesterol at their age, as they will use it and build with it), beef, chicken, fish, and dairy. If the player is a vegetarian, then soy is the best choice.

### VEGAN & VEGETARIAN DIETS FOR ATHLETES

*\*The information below was authored by Charlotte Furman for the University of Washington and adapted for use in this manual.*

Can a plant-based diet meet the nutritional needs of an athlete? The position statement of the Academy of Nutrition and Dietetics states: "To train and perform optimally, athletes of all levels—from recreational to elite—should consume a diet comprised of wholesome foods high in carbohydrate, low to moderate in fat, and adequate in protein, vitamins, minerals, and fluid. A vegetarian diet easily meets these needs and offers additional health and performance advantages."

For all athletes, adequate caloric intake is required to provide energy for cells and muscles. Because athletes are burning more energy, they need to consume more calories to maintain energy balance. Eating enough calories



allows the body to use protein to build muscle instead of using it as a source of energy. Calorie needs will vary based on gender, body size/composition, age, and activity level.

Calories come from the macronutrients we eat (carbohydrates, fats, protein). Because a vegetarian diet is typically high in carbohydrates and low in fat, it's well suited to meeting an athlete's needs. Each day make sure to eat a wide variety of foods and a wide variety of different colored fruits and vegetables to ensure you're taking in a variety of nutrients.

Carbs should come from a variety of sources, including whole grains such as brown rice, fruits, vegetables, and legumes. These complex carbs provide fiber, protein, vitamins and minerals, and antioxidants that can help protect the body from the stress of exercise. It's important that athletes eat post-workout (between 30 minutes to 2 hours) to replenish muscle and liver glycogen stores. A piece of fruit, fruit juice, or a fluid replacement beverage makes a good post-workout snack, followed by a mixed high-carbohydrate and protein meal (examples include pasta with lentil spaghetti sauce, tofu with vegetables and rice, or a mini bean burrito).

**Website - [Sports Nutrition Guidelines for the Vegetarian](#)** (Enette Larson, Ph.D., R.D., CSSD)

One of the most frequent questions asked of vegans, especially vegan athletes, is how they get enough protein. Adequate protein intake is needed for maintenance and growth of cells, organs, and muscles, as well as for the immune system. Inadequate intake of protein can cause fatigue and loss of muscle mass. Daily protein requirements for the vegetarian athlete range from 1.3-1.7g/kg, a number that's quite achievable from a plant-based diet. For a 180-pound male, this would be in the range of 105-125g of protein/day.

Proteins are made of chains of amino acids, and in addition to meeting overall protein needs, it is also important to have adequate intake of the individual essential amino acids. Soy (tofu, tempeh, edamame), seitan, lentils, and other legumes all provide good sources of the amino acid lysine, which is generally low in other plant foods. Other sources of protein in the vegan diet include nuts and seeds, whole grains, and vegetables. For example, a breakfast of two cups of oatmeal, a half cup of soymilk, an ounce of almonds, and a slice of wheat toast with peanut butter provides 30 grams of protein.

Fats provide energy, essential fatty acids, and fat-soluble vitamins (vitamins A, E, and K). Dietary fats also help athletes meet their caloric needs, as they're the most calorically dense macronutrient. Saturated fats—which are found mostly in animal products and tropical oils—should be limited as they've been shown to increase the risk of cardiovascular disease and stroke. In order to increase your intake of beneficial Omega 3 fatty acids and monounsaturated fats, choose canola, olive, or avocado oils to bake and cook with, and incorporate walnuts, ground flaxseed, and other nuts into your daily diet.

In addition to getting enough calories and protein, several micronutrients require additional attention in the vegetarian athlete's diet:

## **IRON**

Iron found in plant foods is not as well absorbed as iron in meat, but it's possible to get enough iron from a well-balanced vegan diet. Iron-rich foods include dark green vegetables such as broccoli, dried fruits, legumes (lentils, dried peas/beans, tofu), and whole and enriched grain products. Cooking with a cast-iron skillet can also increase the iron content of foods. Eating iron-containing foods in conjunction with foods high in vitamin C improves iron absorption. Some good ways to increase iron intake include drinking a small glass of orange juice with your morning oatmeal, sprinkling pumpkin seeds on your soup and salads, and combining tomatoes (high in vitamin C) with high-iron foods such as beans.

**Website - [Iron Rich Foods](#)** (National Institute of Health)

**VITAMIN B12**

Vitamin B12 is involved in the formation of red blood cells, protein metabolism, and helps maintain the central nervous system. Sources of B12 in the vegan diet include fortified grain products and nutritional yeast (unless they are fortified, plant foods do not contain vitamin B12). It's recommended that vegetarians and vegans eat supplemented foods or take a B12 supplement. The recommended daily amount of B12 is 2.4 mcg/day for those 14-64 years old. The recommended supplementation for vegans is 2-3.5 mcg of B12 twice per day, or 25-100 mcg once per day.

**CALCIUM AND VITAMIN D**

Calcium and vitamin D are both important for maintaining bone health. For adults up to 50 years old, the daily recommended intake of calcium is 1,000 mg; for vitamin D it's 600 IU. Vegetarians and vegans should aim for the recommended daily intake of both. Calcium can be obtained through foods such as calcium-set tofu, fortified orange juice, or fortified non-dairy milks, as well as blackstrap molasses. Leafy greens high in absorbable calcium include kale, mustard greens, Bok Choy, turnip greens, collard greens, and watercress. Aim to eat at least three servings of these high calcium foods daily. Vitamin D sources are limited in the vegan diet, so especially in areas with limited sunlight, consider taking a supplement of 600-1,000 IU of vitamin D.

**ADDITIONAL RESOURCES (LINKS)**

[Eating Frequency Fact Sheet](#), [Eating on the Road](#), [Energy Availability Fact Sheet](#), [Fueling During Exercise Fact Sheet](#), [Fueling for Recovery Fact Sheet](#), [Nutrition Facts Label Fact Sheet](#), [Vegetarian Eating for the Student-Athlete](#), [Understanding Dietary Supplements](#), [USOC Nutrition Information](#), [USOC Recipe List](#)

**CONDITIONING FOR THE WATER POLO ATHLETE****SWIM TRAINING FOR WATER POLO PLAYERS**

Elite-level coaches agree that quickness in the water, as well as water polo savvy, are far more important for the water polo player to develop. Sure, there will be times where putting on the goggles and doing actual swim sets is appropriate. But the more we can engage our athletes and have them train in an environment that best replicates the environment they'll be asked to perform in, the better. There are no starting blocks in water polo, no stopwatches, flip turns, etc. So why train them like they're swimmers when you want to develop water polo players?

Dante Dettamanti was quoted in 2008 saying the following regarding his thoughts on swim training and the water polo athlete:

*"It would be a mistake to train a water polo player like a middle or long distance swimmer. Training as a sprinter and then adding the nuances of playing water polo, such as heads-up swimming, eggbeater kick, bursts of speed, changing direction, etc., would be much more effective for training the water polo player."*

Dante recommends in his book "Water Polo Coaches Series - Book 1" the following when utilizing ultra-short swim sets to condition water polo players:

1. All sets should be performed with 1:1 work to rest ratios.
2. The work interval should be somewhere between :05 - :15 seconds.
3. The sprints should start from a horizontal position in the water and performed with the head out of the water.
4. Sets of this sort can be performed daily during the competitive season, including prior to a game, without the debilitating effects of lactate accumulation and glycogen depletion.
5. Typical sets include 10-40 reps of distances of 10, 15, 20, 25, and 30 yards.
6. No additional swim training is required during a practice as long as the coach also utilizes water polo related conditioning drills, counter attack training, and gamerelated scrimmages.
7. An all-out 100% effort is required of all swims.

An eighth point could be added to this list: make it fun! Conditioning is tough, both physically and mentally. The best thing you could do is to provide opportunities to teach your athletes to compete. A great example of this would be as follows:

Three players to a team with the first on the starting block. When the pace clock hits double zero, you blow your whistle and this athlete dives in and sprints 100 yards. As the first player is swimming their 100, the second player gets on the block. When the first swimmer hits the wall, the second swimmer dives in and swims their 100. The first player gets out and rests and the third player prepares for their swim. This cycle is repeated 4-8 times (depending on how much you want to do).

**PDF** - [Sprint Salo: A Cerebral Approach to Training for Peak Swimming Performance](#) (Dave Salo)

**Website** - [Training for Water Polo](#) (Dante Dettamanti)

### **CIRCUIT TRAINING**

While swim training does have its place in water polo, circuit training is great as it prepares them for the versatile necessities of our sport. The best part about circuit training is the endless possibilities that can be organized to address specific areas of need. For example, a circuit largely could encompass swimming and legs exercises, or it could involve some sprinting and shooting/passing to develop the vertical game.

**Video** - [Water Polo Circuit Training & Conditioning](#) (Performance Water Polo)

**Website** - [Swimming Speed vs. Quickness and Water Polo Savvy](#) (Terry Schroeder)

## **DEVELOPING BALANCE AND STABILITY**

When we talk about athleticism in water polo, we're really talking about how an athlete moves, as well as that athlete's overall balance in the water. Being balanced in the water gives an athlete stability, which in turn allows the player to move fluently. Stability gives the player control over his or her body and thus more decision-making power. Good players maintain their balance and, when lost, quickly regain their stability throughout a game. The only way to master this skill set is to practice it. A few ways to develop balance and stability include:

1. [Spidering](#). This will teach athletes how to work efficiently while maintaining balance and stability in the horizontal position. Athletes will lay on their stomachs with their hands sculling and legs eggbeatering. The player's chest and stomach should be angled toward the bottom of the pool and slightly above their hips (in other words, their hips, back, and shoulders are not flat).
2. [Skating](#). Building from Spidering, the athlete should begin in the same position in the water. The player will then give a strong breast kick 45 degrees to the left or right, reaching with the lead hand. The chin should follow the finger tips. It's very important that as this movement runs its course and momentum begins to slow, the player gathers his or her legs, and resets his or her body back into the starting position. This is key as the player is now prepared for what might come next.
3. [Rainbow Self-Passing](#). In the vertical position with eggbeatering legs, begin with arms to the side, on the water, with the ball in one hand. As you progress forward in the vertical position, eggbeatering to provide stability, pass the ball up and over your head, catching the ball with the other hand.
4. [Controlled Passing](#). This should be done in groups of three. Have athletes stay 2 inches above their normal passing position in the water (i.e., they elevate their entire body 2 inches higher in the water and perform the entire drill this way). Then have them pass clockwise, first for 5 minutes and then repeat the drill counter clockwise after a short break. When the athletes are working their legs, they are much more likely to stay on balance with good stability.



5. [Bad Pass Drill](#). This drill is best done in groups of two. The player throwing the pass purposefully throws a bad pass. The pass should be catchable but out of normal range to the left or right. The goal is to force the receiver off balance and make him or her receive the ball off balance and then recover and quickly find balance before making the next pass. This is a great drill for teaching awareness. The players go from balance to off balance back to balance. Once again, focus on the legs. They should go from an eggbeater kick to a breaststroke kick and back to an eggbeater kick as they find their balance.

All passing drills should be done with a coach giving constant feedback and concentration. These are opportunities to develop fundamental skills that teach body balance, and repetition is the best way to build good habits. This cannot be done without feedback and concentration. Players should focus on finding their balance before they pass the ball. Basic body position is essential for playing water polo, and it's the foundation for all movements in the water. Work on finding your balance in the water. This will allow you to play this great game at the highest level.