

# HEART HEALTH

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"Our mission is to empower and educate people about the changes their bodies go through and teach them how to reconnect on a neuromuscular level and heal themselves in a way that allows them to optimize their function and restore their core foundation so they can return to their desired fitness levels safely and with better long term results."

Heart disease is widespread. It resulted in 859,125 deaths in the United States in 2017, according to the American Heart Association. It also is the leading cause of death globally, with 17.8 million related deaths in 2017. This number is expected to grow to more than 2.2 million by 2030. Heart disease is the world's leading cause of death each year, taking more lives than cancer and lung diseases combined.

Heart failure affects an estimated 6.2 million Americans older than age 20. This number is expected to increase to affect greater than 8 million adults by the year 2030.

## RECOVERY THROUGH EDUCATION

When you begin your rehabilitation, one of the most important steps is education. Your physical therapist is dedicated to helping you better understand your own heart health and will work with you every step of the way.

Education methods include:

- Understanding the current state of your heart and why you are experiencing heart-related issues.
- Learning about proper exercise procedures and how to safely practice them.
- Being taught how to monitor your own heart rate and assess your exertion levels during exercise.
- Knowing what to avoid in the healing process and understanding what will help you achieve success.
- Identifying stressors that hurt your heart and learning how to tackle sources of stress.
- Setting goals for your heart health that will give you something to work toward.

Through education, patients are often more confident in their ability to heal and have a smoother recovery period. By getting familiar with your own heart health, you can make better lifestyle choices post-recovery.

## SIGNS & SYMPTOMS

People with heart disease may not even know they have it. The disease is sometimes "silent." It may not get diagnosed until a person:

- Has a heart attack.
- Experiences heart failure.
- Notices or a health care provider detects an abnormal heart rhythm.

A heart attack occurs when the flow of blood to a section of the heart is blocked. This is most often due to coronary artery disease when plaque builds up on the artery wall. If the blood flow is not restored, that section of the heart can begin to die. Signs and symptoms of a heart attack may include:

- Chest pain or discomfort.
- Pain into the arms, shoulders, neck, jaw, or abdomen.
- Shortness of breath.
- Fatigue.
- Nausea.
- Dizziness.
- Racing heart (palpitations).

## A New Beat

Research shows Cardiac Rehabilitation can prevent a second cardiac event and improve the quality of life.



Reduces hospital readmission by 30%. 1 year post discharge



Helps patients return to work and engage in life activities



Reduces cardiovascular disease mortality by 30%



Helps improve adherence to preventative medications

## INITIAL EVALUATION

During the very first visit, the PT will interview you and perform various tests to measure the breadth of your affliction. The purpose is to create a baseline for your therapy. Some of the assessments include:

- Heart rate
- Blood pressure
- Oxygen saturation
- Upper extremity function, including strength and range of motion (ROM)
- Lower extremity strength and ROM
- Functional mobility such as walking and self-care tasks
- The Timed Up and Go test (TUG)
- Six Minute Walk Test

# HOW CAN A PHYSICAL THERAPIST HELP?

Your physical therapist will work with you and other members of your health care team to address problems caused by heart disease or heart failure.

Your physical therapy treatment plan will include a personalized exercise program and prescribed movement. This program will help you decrease the signs and symptoms of heart disease and/or failure. It also will improve your ability to take part in a home, work, and other activities. Research shows that physical activity and exercise can improve exercise capacity. Physical activity and exercise also can help people with heart failure live longer than they would otherwise.

Your treatment plan may include:

**Education.** Your physical therapist will educate you on physical activity and exercise that is safe for you to do. They also will design a personalized exercise program and teach you how to increase your exercise capacity. Education may include recommendations for lifestyle changes and self-management behaviors. They also may teach you about any signs and symptoms to watch out for. Your physical therapist may refer you to other health care providers as needed.

**Aerobic endurance.** Patients with heart disease or heart failure are at risk for decreased exercise tolerance and endurance. Your physical therapist will help you increase your aerobic endurance through monitored exercise. They also will develop a home exercise program based on your needs and goals. Research shows that an aerobic exercise program:

- Improves quality of life.
- Helps to decrease hospital admissions.
- Improves time on walk tests.
- Decreases the risk of severe disease leading to death.

Aerobic exercise can be achieved in many forms, including:

- Walking.
- Cycling.
- Treadmill walking.
- Dancing.

**Muscle strengthening.** Strength training is important to overall health. Maintaining muscle strength will help you perform functional activities and maintain or improve your overall strength. Research shows that exercise is safe and effective for most patients with heart disease.

Your physical therapist will work with you to determine the appropriate amount and intensity of your exercise training. They will design a safe, personalized program based on your unique needs and goals.

Improving your ability to breathe during activity. Research shows that increasing the strength of the muscles that aid breathing can improve exercise tolerance in people with heart failure. Your physical therapist will assess your muscles and ability to breathe during physical activity and design an exercise program for your condition.

***“Setting goals with a professional can help you hold yourself accountable to your own growth.”***



# AQUATIC THERAPY – APPLICATIONS IN CARDIOVASCULAR AND CARDIOPULMONARY REHABILITATION



Because an individual immersed in water is subjected to external water pressure in a gradient, which within a relatively small depth exceeds venous pressure, blood is displaced upward through the venous and lymphatic systems, first into the thighs, then into the abdominal cavity vessels, and finally into the great vessels of the chest cavity and into the heart. Central venous pressure rises with immersion to the xiphoid and increases until the body is completely immersed [9].

There is an increase in pulse pressure as a result of the increased cardiac filling and decreased heart rate during thermoneutral or cooler immersion [10,11].

Central blood volume increases by approximately 0.7 L during immersion to the neck, a 60% increase in central volume, with one-third of this volume taken up by the heart and the remainder by the great vessels of the lungs [9].

Cardiac volume increases 27%–30% with immersion to the neck [12]. Stroke volume increases as a result of this increased stretch. Although normal resting stroke volume is about 71 mL/beat, the additional 25 mL resulting from immersion equals about 100 mL, which is close to the exercise maximum for a sedentary deconditioned individual on land and produces both an increase in end-diastolic volume and a decrease in end-systolic volume [13].

Mean stroke volume thus increases 35% on average during neck depth immersion even at rest. As cardiac filling and stroke volume increase with progress in immersion depth from symphysis to xiphoid, the heart rate typically drops and typically at average pool temperatures the rate lowers by 12%–15% [14,15].

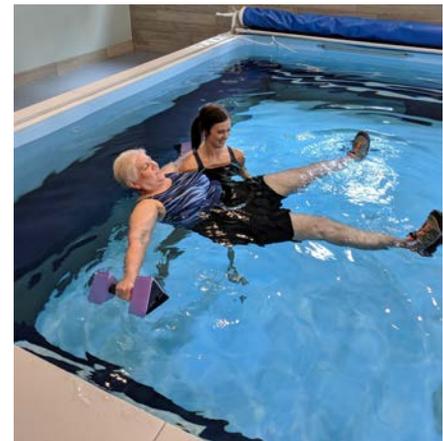
This drop is variable, with the amount of decrease dependent on water temperature. In warm water, heart rate generally rises significantly, contributing to yet a further rise in cardiac output at high temperatures [16,17]. During aquatic treadmill running, oxygen consumption ( $VO_2$ ) is 3 times greater at a given speed of ambulation (53 m/min) in water than on land, thus a training effect may be achieved at a significantly slower speed than on land [18-20].

The relationship of heart rate to  $VO_2$  during water exercise parallels that of land-based exercise, though water heart rate averages 10 beats/min less, for reasons discussed elsewhere [9]. The metabolic intensity in water, as on land, maybe predicted from monitoring heart rate.

Cardiac output increases by about 1,500 mL/min during clavicle depth immersion, of which 50% is directed to increased muscle blood flow [17]. Because immersion to this depth produces a cardiac stroke volume of about 100 mL/beat, a resting pulse of 86 beats/min produces a cardiac output of 8.6 L/min and is already producing an increased cardiac workload. The increase in cardiac output appears to be somewhat age-dependent, with younger subjects demonstrating greater increases (up 59%) than older subjects (up only 22%) and is also highly temperature-dependent, varying directly with temperature increase, from 30% at 33°C to 121% at 39°C [17,21].

During immersion to the neck, decreased sympathetic vasoconstriction reduces both peripheral venous tone and systemic vascular resistance by 30% at thermoneutral temperatures, dropping during the first hour of immersion and lasting for a period of hours thereafter [9]. This decreases end-diastolic pressures. Systolic blood pressure increases with the increasing workload but generally is approximately 20% less in water than on land [17].

Most studies show either no change in mean blood pressure or a drop in pressures during immersion in normal pool temperatures. Sodium-sensitive hypertensive patients have been noted to show even greater drops (–18 to –20 mm Hg) than normotensive patients, and sodium-insensitive patients smaller drops (–5 to –14 mm Hg) [22].



# AQUATIC THERAPY cont

Based on a substantial body of research, aquatic therapy in pool temperatures between 31°– 38°C appears to be a safe and potentially therapeutic environment for both normotensive and hypertensive patients, in contrast to widespread belief as manifested by the public signage. Recent research has generally supported the use of aquatic environments in cardiovascular rehabilitation after infarct and ischemic cardiomyopathy.

Japanese investigators studied patients with severe congestive heart failure (mean ejection fractions  $25 \pm 9\%$ ), under the hypothesis that in this clinical problem, the essential pathology was the inability of the heart to overcome peripheral vascular resistance. They reasoned that because exposure to a warm environment causes peripheral vasodilatation, a reduction in vascular resistance and cardiac afterload might be therapeutic. During a series of studies, these researchers found that during a single 10-min immersion in a hot water bath (41°C), both pulmonary wedge pressure and right atrial pressure dropped by 25%, whereas cardiac output and stroke volume both increased [23,24]. In a subsequent study of patients using warm water immersion or sauna bath one to 2 times per day, 5 days per week for 4 weeks, they found improvement in ejection fractions of nearly 30% accompanied by a reduction in left ventricular end-diastolic dimension, along with subjective improvement in quality of life, sleep quality, and general well-being [25].

Studies of elderly individuals with systolic congestive heart failure during warm water immersion found that most such individuals demonstrated an increase in cardiac output and ejection fractions during immersion [26,27]. Caution is prudent when working with individuals with severe valvular insufficiency, because cardiac enlargement may mechanically worsen this problem during full immersion.

Swiss researchers have studied individuals with more severe heart failure and concluded that aquatic therapy also is probably not safe for individuals with very severe or uncontrolled failure, or very recent myocardial infarction [28-30]. That said, a recent summary of published research in this area has concluded that aquatic and thermal therapies may be a very useful rehabilitative technique in individuals with mild to moderate heart failure [31]. It is entirely reasonable however to conclude that uncompensated congestive failure or very recent myocardial infarction should be a contraindication to aquatic therapy, to hot tub exposure, and perhaps even to deep bathing. Programs typically used include aerobic exercise at light to moderate levels in a neutral temperature environment. See the clinical decision-making algorithm by Bücking and colleagues [3].

## TIPS FOR PROGRESS

When you suffer from a sports injury, medical procedure, or chronic soreness, you should use the tips below (in no particular order) to help ensure that your rehabilitation process is a success.

1. Choose a progressive program that fits your goals and challenges you to move forward without causing any unnecessary flare-ups.
2. Set goals, and work to achieve them. Use the SMART procedure to rehab from your pain or injury.
3. Determine your start point and move forward, with the assistance of a trained physical therapist.
4. Set realistic goals that you can meet, such as your healing timeline.
5. Maintain a rehabilitation diary, and mark when you have met a goal or made significant progress in your physical therapy recovery process.
6. Learn about flare-up management, and how to manage it effectively.
7. Use a mirror or actual people to give you feedback. You can improve your movement patterns, and change the approaches you are taking during your rehab process.
8. Choose an environment where you can solely concentrate on your recovery and healing process.
9. Rehabilitation consists of various aspects, including education, endurance, posture, functional exercise, motor control, and strength.
10. Vary the tasks you have outlined for yourself. This is a learning process, and in order to recover from your injury and eliminate any chronic soreness that you have, you will need to learn what forms of treatment and exercise work; you will learn as you go.



**NO REFERRAL NEEDED**

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