

Then this would be increased by 10%, or 3 minutes, to 9 minutes, 3 to 4 times a week for another month, then a further 10% to 12 minutes for a further month. After 3 to 4 months patients have reported an increase in their general stamina or endurance. If an arm ergometer or exercise bike is used, the same basic principle can be used. Clearly this is a long term programme. Conditioning or aerobic exercise at this submaximal level allows the individual to regain a healthier sense of stamina without damaging delicate old motor units. It is imperative that the concept of pacing and spacing within the non-fatiguing general conditioning exercise programme is understood, meaning that rests are to be taken every few minutes. This 20% rule is sometimes also applied to polio survivors when they are given instructions in a home flexibility and stretching programme so they do not exercise too vigorously. This exercise programme can be modified with the supervision of a physio-therapist, depending on the progress made. This programme may not eliminate fatigue for those who have a significant element of deconditioning contributing to their sense of fatigue.

Range of Motion Exercises - The National Center on Physical Activity and Disability recommends an exercise called the Breathing Tree.

To begin, stand with your arms at your sides and your legs hip-width apart. As you inhale, bring your hands over your head and then back down as you exhale. Repeat this motion several times. Proceed to lift your hands to shoulder height and turn your head to the side. Twist at the waist to move your body in the same direction as your head. Repeat the move on the other side of your body.

Cardio Exercise - According to the National Institute of Neurological Disorders and Stroke, cardio training is typically more often recommended to post-polio patients over resistance training exercises. Heavy lifting is not advised since over training may further weaken the muscles rather than strengthen them. The ideal cardio exercise for post-polio

patients is swimming since you are not putting any stress on the muscles and joints.

Swimming - Swimming can increase your strength and endurance while avoiding stressing your joints. You build strength gently, working against the resistance of water to move across a pool or body of water. Warm water allows tense muscles to relax and stretch out, and the buoyancy of water provides a sense of freedom and well-being. Water aerobics and water walking provides alternate swimming exercises that let you work out in a vertical position, ideally under the supervision of a trained instructor.

Swimmers with post-polio syndrome must take care to stay within their comfort zone to avoid injury and pain. No two people experience post-polio syndrome the same way, and for some, just the effort of getting to a pool, changing and navigating the locker room may prove exhausting. Post-polio sometimes also impacts your ability to breathe freely. Chemicals used in the pool disinfection process irritate the lungs of sensitive swimmers, so choose a well-ventilated indoor pool, or swim outdoors when the weather permits.

Yoga - The Post-Polio Health International organisation say the benefits of yoga include better balance, improved flexibility and a reduction in pain symptoms. If you are taking a class, take a gentle or beginner's class that has you do a mix of stretching, deep breathing and meditation exercises. In the class, you should have access to a chair or wall for support during the moves if you need it.

Pilates - The Pilates exercise method strengthens muscles by using your body's own weight as resistance. Pilates is low-impact, and it emphasizes the core and back muscles, which can be important areas for people with post-polio to strengthen. Pilates is a way to safely stretch and strengthen your body without further damaging your neurons. It was originally developed as a rehabilitation exercise, but it's commonly used as a fitness exercise, too. Go to a Pilates studio that has a physiotherapist.



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Exercise

Polio Survivors should be aware that some amount of exercise is beneficial, but caution should be taken in ensuring that **each individual** has a programme that is tailored to fit their unique needs. The following are excerpts from a Handbook, published by Post-Polio Health International, *Handbook on the Late Effects of Poliomyelitis for Physicians and Survivors* (reprinted 1999) and past articles from *Polio Network News* (now *Post-Polio Health*) that address exercise issues and which remain applicable and pertinent today. Here are the important messages taken from the full texts:

1. “Advising all polio survivors not to exercise is as irresponsible as advising all polio survivors to exercise.

Current evidence suggests that exercises are often beneficial for many polio survivors provided that the exercise programme is **designed** for the **individual** following a **thorough assessment** and is **supervised** initially by **knowledgeable** health professionals.” Polio survivors’ who over exercise their muscles experience excessive fatigue that is best understood as depletion of the supply of muscle energy. But some polio survivor’s weakness can be explained by the lack of exercise and physical activity that clearly leads to muscle fibre wasting and cardiovascular deconditioning.”

2. “Muscle stretching and joint range-of-motion exercises are important wherever there is muscle weakness.

Preventing tightness, where muscles are weak, is important to maximise function and is particularly important in the chest wall and abdominal musculature if there is a limitation of breathing capacity. Preventing tightness in the hip and knee is important to maximise walking ability when there is significant weakness of the hip and thigh musculature.

General conditioning exercises or aerobic exercises, specifically to maintain or improve cardiovascular endurance, are good for many polio survivors and have been shown to be effective. The best endurance exercise is swimming, because it minimises mechanical stress on tendons and joints, but beneficially stresses the cardiovascular system. Conditioning exercises or any repetitive activity, including walking, which causes pain or a sense of excessive muscle fatigue and increased weakness should be discontinued. The primary focus of any exercise programme should be on building endurance, not strength.

In general, muscles that are significantly weakened by previous polio respond poorly to vigorous strengthening exercise programs. Very gradual strengthening exercises which are guided in intensity and duration by the individual’s level of fatigue and/or pain can lead to modest but significant improvements in strength.”

3. “To exercise or not to exercise, that is not the question for polio survivors. Rather the questions are these: what amount of exercise is enough; what amount is too much? There is no easy answer as everyone is different, but there are some general observations with regard to inactivity and exercise. These have been supported by research carried out over the years.

Beneficial Effects of Regular Exercise

- Reduction in heart rate and blood pressure
- Changes in both skeletal and cardiac muscle resulting in improved physical work capacity and an enhancement of cardiovascular efficiency in delivering oxygen and nutrients to the tissues
- Increased muscular endurance
- Reduced blood coagulability
- Reduction in fatness and increased lean body mass
- Increased cellular sensitivity to Insulin

- Favourable changes in blood lipids and cholesterol
- Beneficial psychological changes include;
 - Reduction in muscular tension
 - Improved sleep

Possible increased motivation for improving other health habits such as changes in diet, cessation of smoking, reduction in drinking etc.

Adverse Effects of Inactivity

- Limitation in physical activity results in progressive deterioration of cardiovascular performance and efficiency
- Metabolic disturbances
- Difficulty in maintaining normal body weight
- Disturbed sympathetic nervous system activity
- Reduction in muscular strength and endurance
- Possible emotional disturbances

“Non-Fatiguing General Conditioning Exercise Programme (The 20% Rule)”

The non-fatiguing general conditioning exercise programme using the 20% rule was designed to help restore stamina or endurance for those individuals who have continued to be bothered by profound fatigue following surgery, illness or trauma. The programme begins by determining the polio survivor’s maximum exercise capability with the help of the clinic physical therapist. The types of exercise can be in a pool or on dry land, using an arm ergometer or an exercise bicycle, depending on the individual’s abilities or preferences. If it is swimming, you measure the maximum laps, or time they can swim, as their maximum exercise capability. Having established this the polio survivor is instructed to begin their aerobic swimming programmes at 20% of the determined maximum capability. They swim 3 to 4 times per week at that level for 1 month, and then increase the level by 10%. For example, if the maximum capability was 30 minutes, you would start the programme at just 6 minutes per session, 3 to 4 times a week for 1 month.