

A statement about exercise for survivors of polio

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 program is designed for the individual following a thorough assessment and is supervised initially by knowledgeable health professionals. Polio survivors and their health professionals who are knowledgeable about the complete health status of the individual survivor should make the ultimate decision on the advisability of exercise and the protocol of the exercise program.

Clinical research studies support exercise programs that are prescribed and supervised by a professional for

many polio survivors, including those with the symptoms of post-polio syndrome.* (References are listed on page 6.)

Acute paralytic polio can result in permanent muscular weakness when the viral infection leads to death of anterior horn cells (AHCs) in the spinal cord. Recovery from paralysis is thought to be due to the re-sprouting of nerve endings to orphaned muscle fibers creating enlarged motor units. Recovery is also attributed to exercise that facilitates the enlargement of innervated muscle fibers. For example, some polio survivors regained the use of their arms and have walked for years with crutches. Others regained the ability to walk without the aid of braces, crutches, etc., and have continued to walk for decades.

The increased muscle weakness recognized in those with post-polio syndrome is believed to occur from the degeneration of the sprouts of the enlarged motor units. The premature death of some of the AHCs affected by the poliovirus is speculated to also cause new weakness, and some new weakness is caused by disuse, or a decline in activity or exercise.

There is agreement that repetitive overuse can cause damage to joints and muscles, but can repeated overuse and excessive physical activity accelerate nerve degeneration or nerve death? This is the crux of the physical activity/exercise debate.

Physical activity is movement occurring during daily activities. Exercise is defined as planned, structured, and repetitive body movement.

*Criteria for diagnosis of post-polio syndrome

- Prior paralytic poliomyelitis with evidence of motor neuron loss, as confirmed by history of the acute paralytic illness, signs of residual weakness and atrophy of muscles on neurologic examination, and signs of denervation on electromyography (EMG).
- A period of partial or complete functional recovery after acute paralytic poliomyelitis, followed by an interval (usually 15 years or more) of stable neurologic function.
- Gradual or sudden onset of progressive and persistent new muscle weakness or abnormal muscle fatigability (decreased endurance), with or without generalized fatigue, muscle atrophy, or muscle and joint pain. (Sudden onset may follow a period of inactivity, or trauma or surgery.) Less commonly, symptoms attributed to post-polio syndrome include new problems with breathing or swallowing.
- Symptoms persist for at least a year.
- Exclusion of other neurologic, medical, and orthopedic problems as causes of symptoms.

Source: *Post-Polio Syndrome: Identifying Best Practices in Diagnosis & Care*. March of Dimes, 2001.

Therapeutic exercise is conducted for a health benefit, generally to reduce pain, to increase strength, to increase endurance, and/or to increase the capacity for physical activity.

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 survivors' weakness can be explained by the lack of exercise and physical activity that clearly leads to muscle fiber wasting and cardiovascular deconditioning.

The research supports the fact that many survivors can enhance their optimal health, their range of motion, and their capacity for activity by embarking on a judicious exercise program that is distinct from the typical day-to-day physical activities. These same polio survivors need not fear "killing off" nerve cells, but do need to acknowledge that the deterioration and possible death of some nerve cells may be a part of normal post-polio aging.

Exercise programs should be designed and supervised by physicians, physical therapists, and/or other health care professionals who are familiar with the unique pathophysiology of post-polio syndrome and the risks of excessive exercise. Professionals typically create a custom-tailored individualized exercise program that is supervised for two – four months. During this period, they will monitor an individual's pain, fatigue, and weakness and make adjustments to the protocol, as needed, to determine an exercise program that a polio survivor can follow independent of a professional.

MEDICAL ADVISORY COMMITTEE

MARTIN B. WICE, MD, Chair, St. John's Mercy Rehabilitation Center, Saint Louis, Missouri

SELMA H. CALMES, MD, Anesthesiology, Olive View/UCLA Medical Center, Los Angeles, California

MARINOS C. DALAKAS, MD, National Institute of Neurological Disorders & Stroke (NINDS), Bethesda, Maryland

BURK JUBELT, MD, Neurology, SUNY Health Science Center, Syracuse, New York

JULIE G. MADORSKY, MD, Clinical Professor of Rehabilitation Medicine, Western University of Health Services, University of California-Irvine, Encino, California

FREDERICK M. MAYNARD, MD, U.P. Rehabilitation Medicine Assoc., PC, Marquette, Michigan

E.A. (TONY) OPPENHEIMER, MD, FACP, FCCP, Pulmonary Medicine (retired), Los Angeles, California

OSCAR SCHWARTZ, MD, FCCP, FAASM, Advantage Pulmonary, Saint Louis, Missouri

MARK K. TAYLOR, MLS, CPO, Director, Clinical and Technical Services, Orthotics and Prosthetics Center, University of Michigan, Ann Arbor, Michigan

DARIA A. TROJAN, MD, Assistant Professor, Physical Medicine and Rehabilitation, Montreal Neurological Institute and Hospital, Montreal, Quebec, Canada

When designing a program, these general principles are followed to achieve specific goals and/or maintenance levels.

- The intensity of the exercise is low to moderate.
- The progression of the exercise is slow, particularly in muscles that have not been exercised for a period of time and/or have obvious chronic weakness from acute poliomyelitis.
- Pacing is incorporated into the detailed program.
- The plan should include a rotation of exercise types, such as stretching, general (aerobic) conditioning, strengthening, endurance, or joint range of motion exercises.

Polio survivors who experience marked pain or fatigue following any exercise should hold that exercise until contacting their health professional.

Researchers and clinicians cannot make a more definite statement until additional studies on the long-term effects of exercise and the effects of exercise on function and quality of life are undertaken. ❧

continued on page 6

A statement about exercise for survivors of polio

continued from page 5

References

- Agre, J., Grimby, G., Rodriquez, A., Einarsson, G., Swiggum, E., & Franke, T. (1995). A comparison of symptoms between Swedish and American post-polio individuals and assessment of lower-limb strength – a four-year cohort study. *Scandinavian Journal of Rehabilitation Medicine*, 27, 183-192.
- Agre, J., Rodriquez, A., & Franke, T. (1997). Strength, endurance, and work capacity after muscle strengthening exercise in postpolio subjects. *Archives of Physical Medicine & Rehabilitation*, 78, 681-685.
- Agre, J., Rodriquez, A., & Franke, T. (1998). Subjective recovery time after exhausting muscular activity in postpolio and control subjects. *American Journal of Physical Medicine & Rehabilitation*, 77, 140-144.
- Agre, J., Rodriquez, A., Franke, T., Swiggum, E., Harmon, R., & Curt, J. (1996). Low-intensity, alternate-day exercise improves muscle performance without apparent adverse affect in postpolio patients. *American Journal of Physical Medicine & Rehabilitation*, 75, 50-58.
- Agre, J.C., Rodriquez, A.A. (1997). Muscular function in late polio and the role of exercise in post-polio patients. *Neurorehabilitation*, 8, 107-118.
- Ernstoff, B., Wetterqvist, H., Kvist, H., & Grimby, G. (1996). Endurance training effect on individuals with postpoliomyelitis. *Archives of Physical Medicine & Rehabilitation*, 77, 843-848.
- Grimby, G., Stalberg, E., Sandberg, A., Sunnerhagen, K.S. (1998). An 8-year longitudinal study of muscle strength, muscle fiber size, and dynamic electromyogram in individuals with late polio. *Muscle & Nerve*, 21, 1428-1437.
- Jones, D.R., et al. (1989). Cardiorespiratory responses to aerobic training by patients with post-poliomyelitis sequelae. *Journal of the American Medical Association*, 261(22), 3255-3258.
- Kriz, J.L., Jones, D.R., Speier, J.L., Canine, J.K., Owen, R.R., Serfass, R.C. (1992). Cardiorespiratory responses to upper extremity aerobic training by post-polio subjects. *Archives of Physical Medicine & Rehabilitation*, 73, 49-54.
- Prins, J.H., Hartung, H., Merritt, D.J., Blancq, R.J., Goebert, D.A., (1994). Effect of aquatic exercise training in persons with poliomyelitis disability. *Sports Medicine, Training and Rehabilitation*, 5, 29-39.
- Spector, S.A., et al. (1996). "Strength gains without muscle injury after strength training in patients with postpolio muscular atrophy. *Muscle and Nerve*, 19, 1282-1290.

Visit www.ncpad.org and review "To Reap the Rewards of Post-Polio Exercise" by Sunny Roller, MA, University of Michigan Health System, Ann Arbor, Michigan, and Frederick M. Maynard, MD, U.P. Rehabilitation Medicine Associates, PC, Marquette, Michigan.

Endorsers of 'A statement about exercise for survivors of polio'

Developed by the Medical Advisory Committee of Post-Polio Health International (See page 5.)

- Ulrich Alsentzer, MD, Greenville Rehabilitation Medicine Associates, Greenville, North Carolina
- Patti Brown, MD, HealthSouth Rehabilitation Hospital of Reading, Reading, Pennsylvania
- William L. Bockenek, MD, Charlotte Institute of Rehabilitation, Charlotte, North Carolina
- K. Ming Chan, MD, FRCPC, Centre for Neuroscience, University of Alberta, Edmonton, Alberta, Canada
- William DeMayo, MD, Conemaugh Health System, Johnstown, Pennsylvania
- Marny Eulberg, MD, St. Anthony's Family Medical Center West, Denver, Colorado
- Stuart J. Glassman, MD, HealthSouth Rehabilitation Hospital, Concord, New Hampshire
- Gunnar Grimby, MD, Sahlgrenska University Hospital, Göteborg, Sweden
- Lauro S. Halstead, MD, National Rehabilitation Hospital, Washington, DC
- Pesi H. Katrak, MBBS, MD, FRCP, Prince Henry Hospital, Little Bay, New South Wales, Australia
- Mary Ann Keenan, MD, University of Pennsylvania, Philadelphia, Pennsylvania
- Kerri Kolehna, MS, MD, Coastal Post-Polio Clinic, Charleston, South Carolina
- Julian Lo, MD, FRCPC, FAAPMR, West Park Healthcare Centre, Toronto, Ontario, Canada
- Burton W. Marsh, MD, Ocala, Florida
- Frans Nollet, MD, PhD, Academic Medical Center, Amsterdam, Netherlands
- Richard R. Owen, MD, Eden Prairie, Minnesota
- Paul E. Peach, MD, Palmyra Post-Polio Clinic, Albany, Georgia
- Susan L. Perlman, MD, University of California Los Angeles, Los Angeles, California
- Raymond P. Roos, MD, University of Chicago Medical Center, Chicago, Illinois
- Alexander Shapira, MD, Assaf Harofhe Hospital/ Tzrifin, Tzrifin, Israel
- Andrew Sherman, MD, University of Miami School of Medicine, Miami, Florida
- Julie K. Silver, MD, Spaulding-Framingham Outpatient Center, Framingham, Massachusetts
- Jennine Speier, MS, MD, Sister Kenny Rehabilitation Associates, Minneapolis, Minnesota
- Walter C. Stolov, MD, University of Washington Medical Center, Seattle, Washington
- Katharina Stibrant Sunnerhagen, MD, PhD, Sahlgrenska University Hospital, Göteborg, Sweden
- Carol Vandenaeker, MD, University of California Davis Medical Center, Sacramento, California
- William Waring, III, MD, Froedtert Memorial Lutheran Hospital, Milwaukee, Wisconsin
- Jane Pendleton Wootton, MD, Sheltering Arms Rehabilitation Hospital, Richmond, Virginia
- Stanley K. Yarnell, MD, Saint Mary's Medical Center, San Francisco, California