Bibliography
Studies Supporting High Intensity, Slow Controlled Movement Strength Training

Is slow-motion, high-intensity strength training really more effective? Westcott, W.L. et al. *Effects of regular and slow speed resistance training on muscle strength.* Journal of Sports Medicine and Physical Fitness. 41: 154-58, 2001. Dr. Wescott (Director of Strength Training for the YMCA) conducted a study of male and female subjects between 25 and 82 years of age. Over a 10 week period, subjects in the SS group showed a 59% increase in overall strength compared to a 39% increase with traditional rep speed.

Is one set of exercise really enough? Carpinelli, R.N. and R.M. Otto. *Strength Training: single versus multiple sets.* Sports Medicine 26(2):73-84, 1998. Many exercise authorities claim that single set training is insufficient; however, the literature does not support this. This study out of Adelphi University surveyed all of the known literature that compared single set versus multiple set resistance training. The results showed overwhelmingly that multiple sets resulted in NO increase in results compared to single set training. 45 studies reached this conclusion, while only 2 studies showed a marginal improvement with multiple sets. Bottom line: the extra sets produced nothing but more time spent in the gym.

Is once a week really often enough to work out?

- Graves JE, et al. *Effects Of Reduced Training Frequency On Muscular Strength.* International Journal of Sports Medicine 9(5):316-319, 1988
- DeRenne, C. et al. *Effects Of Training Frequency On Strength Maintenance In Pubescent Baseball Players.* Journal of Strength and Conditioning Research 10(1):8-14, 1996. Subjects trained for 10-18 weeks at a higher frequency and then decreased frequency for 12 weeks. Subjects who trained 3X/week decreased to 2X/week and subjects who trained 2X/week decreased to 1X/week. Reduction in training frequency produced improved rates of strength gain.

Is the response to physical training really genetic? Thibault MC, et al. *Inheritance Of Human Muscle Enzyme Adaptation To Isokinetic Strength Training.* Human Heredity 1986;36(6):341-7. This study subjected five sets of identical twins to a 10 week strength training program. Biochemical markers of strength were monitored. There was a wide range of response between twin sets, but responses of the identical twin sets were…well…identical.

Will strength training help prevent or reverse osteoporosis? Kerr, D et al. *Exercise Effects On Bone Mass In Postmenopausal Women Are Site-Specific And Load-Dependent.* J. Bone Miner Res 1996 Feb; 11(2):218-25. 56 subjects were randomized to either heavy or light resistance training. Only resistance training that involved heavier loads increased bone mineral density.

Is strength training useful for cardiac patients?

- Verrill, D. et al. *Resistive Exercise Training In Cardiac Patients- Recommendations.* Sports Medicine 1992 Mar 13(3):171-93. This position paper states "…Circuit weight training has been recommended and has been reported to improve strength, lean body mass, self-efficacy, and may decrease risk factors for coronary artery disease. There appears to be considerable benefit and minimal risk of resistive exercise training for patients with cardiovascular impairment. This mode of exercise may allow patients to perform daily strength tasks safely, more efficiently, and with greater self-confidence."
- Sparling PB, et al. *Strength Training In A Cardiac Rehabilitation Program: A Six Month Follow-Up.* Arch Phys Med Rehab 1990 Feb; 71(2):148 - 52. This study looked at 16 middle aged men with history of myocardial infraction, coronary bypass, ventricular arrhythmias, angioplasty or other cardiac conditions. Blood pressure data revealed no change in mean systolic or diastolic blood pressure during actual training. "In no instance did circuit training appear to elevate a patient's BP above clinically acceptable levels for controlled hypertension."

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● Parker, ND et al. *Effects Of Strength Training On Cardiovascular Responses During A Submaximal Walk And Weight-Loaded Walking Test In Older Females.* J. Cardiopulmonary Rehab 1996 Jan - Feb; 16(1):56-62. After 16 weeks of weight training, women aged 60-77 showed reduced heart rate, systolic blood pressure, and rate pressure product while treadmill walking with and without a weight load of 40% bodyweight. Their conclusion: strength training reduces cardiovascular stress during daily tasks in healthy older women.

Is strength training useful for arthritis/rheumatoid patients? Rall, LC et al. *The Effect Of Progressive Resistance Training In Rheumatoid Arthritis. Increased Strength Without Changes In Energy Balance Or Body Composition.* Arthritis Rheum 1996 Mar;39(3): 415-26. "High intensity strength training is feasible and safe in selected patients with well-controlled RA and leads to significant improvements in strength, pain, and fatigue without exacerbating disease activity or joint pain."

Is strength training an acceptable from of exercise for the elderly?

● Evans, WJ. *Reversing Sarcopenia: How Weight Training Can Build Strength And Vitality.* Geriatrics 1996 May; 51(5):46-7, 51-3. "Progressive resistance exercises can produce substantial increases in strength and muscle size, even in the oldest old. For many older patients, resistance training represents the safest, least expensive means to lose body fat, decrease blood pressure, improve glucose tolerance, and maintain long-term independence."

● Meulman, JR et al. *Exercise Training In The Debilitated Aged: Strength And Functional Outcomes.* Arch Phys Med Rehab 2000 Mar;81(3):312-318. 58 elderly subjects with at least one impairment in activities of daily life, completed an 8 week strength training program. Strength increased an average of 32.8% with the most debilitated showing the greatest improvement. "This group of debilitated elderly patients effectively performed resistance training and increased their strength, with the most impaired gaining the most function. Few in the group could effectively perform endurance training."

● Fielding, RA *Effects Of Exercise Training In The Elderly: Impact Of Progressive-Resistance Training On Skeletal Muscle And Whole-Body Protein Metabolism.* Proc Nutr Soc 1995 Nov; 54(3):665-75. This review article states…"The overwhelming evidence presented in the present review suggests that loss of muscle strength and function observed with advancing age is reversible even in the frail elderly. Exercise programs designed to improve muscle strength are recommended for older individuals as an effective countermeasure to the sarcopenia of old age."

● Ades PA, e al. *Weight Training Improves Walking Endurance In Healthy Elderly Persons.* Ann Intern Med 1996 Mar 15; 124(6):568-72. 24 subjects, 65-79 years old, underwent a 3 month weight training program. Participants increased their walking endurance by 38%. There was no change in peak aerobic capacity to account for the improvement. "Resistance training for 3 months improves both leg strength and walking endurance in healthy, community dwelling elderly persons. This finding is relevant to older persons at risk for disability, because walking endurance and leg strength are important components of physical functioning."

If I drop out of training for a long time, is there any point in coming back? Straton, RS et al. *Strength And Skeletal Muscle Adaptations In Heavy-Resistance -Trained Women After Detraining And Retraining.* J Appl Physical 1991 Feb: 70(2):631-40. Subjects were trained for 20 weeks, followed by 30 weeks of detraining, followed by 6 weeks of retraining. During retraining, women quickly gained back to a level attained after their initial 20 weeks.