



Golden Hills

Orthopedic and Sports Physical Therapy

j o u r n a l

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Our Mission...

To further the prevention, diagnosis and treatment of movement dysfunction in order to enhance the physical health and functional abilities of our patients.

To maximize the patient's potential for regaining full physical health by providing rehabilitation through the use of advancements in physical therapy techniques and state-of-the-art equipment.

To establish a self-management program for the patient through education and a personalized home exercise program for each individual to enable the patient to maintain their physical health at home and at work.

Part II: **Resistance Training:** **Creating an Effective Patient Program**

The July issue of *Golden Hills Journal* was the first in a two-issue series focused on the importance of resistance training. In July, we defined resistance training and discussed basic principles, including individualization, specificity, progressive overload, repetition maximum and variation. This month, we discuss how to build an effective workout.

Anaerobic exercise, when performed with high resistance, develops strength and explosive power. An exercise prescription for strength training is based on scientific principles and decisions about individual responses and quantifiable data (e.g., baseline testing, training logs and subsequent evaluation). An effective program is individualized, engages multiple joints and measures progress toward meeting both the demands of a sport and the goals of the patient.

Criteria for Resistance Training Therapy

According to research conducted by Holten, a Norwegian physiotherapist, any resistance training therapy program that is medically indicated should adhere to the following criteria:

The exercises are exclusively active and occur without the manual intervention of the physical therapist.

- The exercises take into account factors such as range of motion (ROM), maximal resistance and number of repetitions in order to ensure specific, localized treatment leading to the enhancement of strength, endurance and coordination.
- Rooted in the physician's diagnosis, the overall treatment plan is individualized to the patient's daily demands and goals.
- Each training session must be at least 60 minutes long.

Sessions should emphasize muscle coordination, whereby the patient will consciously make the effort to learn correct motor patterns so that they become engrained in daily activities.

Building an Effective Workout Program

As a fundamental principle, every specific muscle stimulation in resistance training therapy is followed by a specific response and adaptation. The stimulus must be large enough to allow specific functional improvement. The physical therapist's role is to develop a workout program that comprises a very specific combination of variables to produce a targeted exercise stimulus and adaptation. Termed the "acute program variables," the choices the physical therapist makes for each variable define the physiologic demands of the workout.

Resistance Training: Creating an Effective Patient Program (Continued)

The training adaptations that occur will be specific to the choices made for each variable. The acute program variables the therapist employs are:

Choice of Exercise

Typically matched to the biomechanical characteristics of each sports-related skill, the choice of exercise is determined to:

- Use each of the major muscle groups (e.g., legs, thighs, lower back, abdomen, chest, upper back, shoulders and arms)
- Exercise both sides of each joint
- Include structural closed-kinetic-chain, whole-body exercises

It is especially important to include structural multiple-joint exercises in a strength training program because most sports and functional activities depend on such movements.

Sequence of Exercises

The order in which exercises are performed during a workout affects muscle fatigue. Exercising the larger muscle groups first allows the use of heavier resistance in a given exercise. Working the large muscle groups before the small muscle groups creates a more effective training stimulus.

Number of Sets

Not all exercises in a training session need to be performed for the same number of sets. The number of sets is one of the factors in any volume of exercise equation (e.g., sets 2 reps).

Rest Periods

Rest periods between sets and exercises determine how much of the adenosine triphosphate/creatine phosphate energy source is resynthesized and how high lactic acid concentrations become in the muscles and blood. Lactate and hydrogen ion concentrations dramatically contribute to muscle fatigue and loss of force-production capabilities. The length of the rest period significantly influences the metabolic, hormonal and cardiovascular responses to an acute bout of resistance exercise, as well as performance of subsequent sets.

When training for absolute strength or power, rest periods of at least 3 to 5 minutes are recommended. Incorporating gradual reductions in rest periods in a strength training program requires about 6 to 8 weeks to improve tolerance to high muscle and blood lactate concentrations, improve local muscle endurance and stimulate anabolic hormones.

Intensity

The amount of resistance used for a specific exercise is one of the key variables in any strength training program. Again, using either the repetition maximum, or “RM,” is probably the easiest method for determining the correct resistance. Some exercises (e.g., power cleans) that rely on recruitment of many muscles across several joints are better suited to using a percent of the 1 RM. The repetition continuum from heavy resistances to lighter resistances allows one to predict the primary training outcome based on the intensity used. It appears that RM resistances of 6 or fewer have the greatest effect on muscle size, strength and power, and those of 20 or more show the greatest effect on muscle endurance.

Over the course of the resistance training program, the physical therapist will work closely with the patient to help him or her learn the correct form and movement patterns so that they become unconscious during physical activity, thus enhancing results.

Contact Golden Hills today at (408) 274-0888 to find how our skilled therapists can develop customized training programs for patients with a wide range of goals.

Body Position, Form and Posture

During any resistance training program, athletic activity or other strenuous physical activity, body position, form and posture play an integral role not only in maximizing performance but in reducing the risk of injury. These illustrations indicate the proper posture for a number of physical activities.

