

## Resistance Training Improves Blood Pressure

Martel GF, Hurlbut DE, Lott ME, Lemmer JT, Ivey FM, Roth SM, et al. Strength training normalizes resting blood pressure in 65- to 73-year-old men and women with high normal blood pressure. *J Am Geriatr Soc* 1999;47:1215-21.

### Study Overview

**Objective.** To evaluate the impact of heavy resistance strength training on resting blood pressure (BP) in older inactive men and women.

**Design.** Prospective intervention study.

**Setting and participants.** Twenty-one previously inactive, healthy older men ( $69 \pm 1$  year,  $n = 11$ ) and women ( $68 \pm 1$  year,  $n = 10$ ) with "high normal" BP (ie, 130 to 139 mm Hg systolic and/or 85 to 89 mm Hg diastolic). The subjects received a 6-month regimen of progressive whole-body strength training involving 3 sessions of 9 exercises each session per week; they were observed at the University of Maryland Exercise Science Laboratory.

**Main outcome measures.** One-repetition maximum (1-RM) strength was measured for 7 different exercises, and resting BP was measured on 6 separate occasions. Measurements were made before and after the training regimen.

**Main results.** Substantial increases in 1-RM strength were observed for upper body (UB) and lower body (LB) muscle groups for men (UB, 215 versus 265 kg; LB, 694 versus 838 kg;  $P < 0.001$ ) and women (UB, 128 versus 154 kg; LB, 441 versus 563 kg;  $P < 0.001$ ). Reductions in systolic ( $131 \pm 2$  versus  $126 \pm 2$  mm Hg;  $P < 0.010$ ) and diastolic ( $79 \pm 2$  versus  $75 \pm 1$  mm Hg;  $P < 0.010$ ) BP were also observed. Systolic BP was reduced significantly in men ( $134 \pm 3$  versus  $127 \pm 2$  mm Hg;  $P < 0.01$ ) but not in women ( $128 \pm 3$  versus  $125 \pm 3$  mm Hg;  $P < 0.01$ ), whereas diastolic BP was reduced following training in both men ( $81 \pm 3$  versus  $77 \pm 1$  mm Hg;  $P = 0.054$ ) and women ( $78 \pm 2$  versus  $74 \pm 2$  mm Hg;  $P = 0.055$ ).

### Conclusion

Six months of strength training may increase strength and lower systolic and diastolic BP in older persons.

### Commentary

The positive impact of aerobic exercise in lowering BP has

been documented repeatedly in older and younger men and women [1,2]. The current study is limited by its small sample size and the absence of a comparative group, but it shows that conventional strength training can be used as an additional intervention to reduce BP in older persons. The subjects experienced reductions in resting BP of 5 mm Hg systolic and 4 mm Hg diastolic, which were sufficient to move them from the "high normal" to the "normal" category (as defined by the Joint National Committee on the Detection, Evaluation and Treatment of Hypertension [JNC VI]) [3].

### Applications for Clinical Practice

Cardiovascular disease (CVD) is the leading cause of morbidity and mortality in persons older than 65, and elevated resting BP is a significant CVD risk factor [4]. Because CVD occurs with increased frequency in patients with high normal BP [5], lifestyle changes to reduce resting BP are recommended for persons with high normal readings [3]. Regular strength training offers older patients an effective means for reducing BP and, in turn, may help to lower their risk for CVD and its resultant mortality and morbidity.

### References

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