

# Research Review: Seniors and Weights - Why Golden Girls Need to Hit the Iron

by [Helen Kollias](#), April 10th, 2009.

If you're the average gym rat, you probably know that post-workout nutrition is important to increase performance and to gain muscle. But what about the average person who isn't interested in either? Should they care about proper workout nutrition?

One word: Yes.

One group whom you might not expect to benefit from post-workout nutrition is post-menopausal women. [Cory Everson](#)'s future self notwithstanding, most of these women probably don't care about stepping on a bodybuilding stage or winning the Master's division of a strongwoman contest. They just want to increase their bone mass — not something you would think post-workout nutrition would increase.

Now you may be thinking either:

- a) this sounds really interesting or
- b) I'm not a post-menopausal woman so why should I care?

Well, do you have a mom or grandmother? Unless you're currently quarantined on some kind of Lord of the Flies island with other schoolboys, you probably know at least one post-menopausal woman either personally or professionally (as a personal trainer).

Nearly every post-menopausal woman I know takes a drug for osteoporosis called Fosamax (generic name: alendronate sodium). Fosamax increases the rate of bone turnover, which results in a significant increase in BMD (bone mineral density) of the spine, hip, wrist and total body, and significant reductions in the risk of vertebral (spine) fractures, wrist fractures, hip fractures, and all non-vertebral fractures.

While that's all fine and good, once someone is on Fosamax they are on it for years, if not the rest of their life. And like any drug, there are side effects such as bone, muscle, or joint pain; constipation; diarrhea; dizziness; feeling bloated or full; flu-like symptoms at the start of treatment; gas; headache; mild stomach pain; nausea; taste changes; vomiting. That sounds like a problem to me.

There are alternatives, especially before women reach menopause or become osteoporotic. Middle-aged postmenopausal women should exercise to increase bone mineral density, and lifting heavy weights seems to be the best exercise to do that.[1-3]

Yes, women who avoided lifting heavy weights because they feared they were too fragile (their uterus could fall out) or they would become grotesquely disfigured (big muscles are icky) have become fragile (increased fractures) and disfigured (with a stooped posture called "dowager's hump") by avoiding lifting heavy weights. I would say that as far as increasing quality of life in their later years, women have more to gain than men by lifting heavy weights. I bet *that* doesn't come up with Madonna's trainer, Tracy Anderson, who argues that no woman should lift more than 3 pounds! (Sorry, I couldn't help myself.) So, you can lift more than 3 pounds now and gain some muscle, or you can look like Quasimodo later. Your call, ladies.



"Dang it! Why did I waste my time on those pink dumbbells?!"

Beside drug interventions, most women should also get enough calcium, magnesium, and vitamin D to help with bone formation. But what about nutritional timing after working out? Bodybuilders and athletes know that post-workout nutrition can improve muscle adaptations, but can post-workout nutrition affect bone? Looks like it.

This week's review examines the effect of supplementing post-workout with protein, carbohydrates, calcium and vitamin D on bone health. (Well, you can kind of figure out what happened by the title, but pretend to be surprised, OK?)

Holm L, et al. [Protein-containing nutrient supplementation following strength training enhances the effect on muscle mass, strength, and bone formation in postmenopausal women](#). J Appl Physiol. 2008 Jul;105(1):274-81. Epub 2008 May 8.

## Methods

38 post-menopausal women, with an average age of 55, were included in this double blind randomized study.

### **Double blind and random assignment**

Double blind means that neither the researchers nor the participants knew if they were in the control (placebo) group or in the experimental (supplement) group. Wait — how do they know what happens if everybody is “blind” to the groups? Don't worry, not everybody is “blind”. Either a few people know — usually the ones handing out the placebo and supplements — or there is a master list with who got what.

Participants were randomly put into one group or the other, which sounds great! No bias so this must be the best way to go... right!? Well, sometimes random assignments cause problems. For example, maybe one group will weigh more or have different body mass indexes (BMIs), as in this case. This is especially a problem with smaller sample sizes. With 1,000 people, things

usually sort themselves out. With 38, there's a much bigger chance of unequal distribution. In this study, random assignment resulted in a control (placebo) group with a larger BMI (27 versus 24).

Now, I don't think the imbalance was a big problem for this study. But what if this was a fat loss study and one group had a higher percentage of fat? Then what? Did your intervention work or not? Were differences or lack of differences really because of the intervention? Or because you started from two different body fat percentages?

While double-blind randomized studies are one of the best designs for drug and supplement studies, sometimes pairing groups gives you a better idea of the effectiveness of your drug or supplement. When you pair groups, you try to put individuals with similar measures in opposite groups so in the end the measurement averages have no differences.

Okay, now back to the study!

For 24 weeks (6 months) the women performed resistance training (weight training) 3 times a week for the first 12 weeks (Period I and II) and twice a week for the last 12 weeks (Period III). Each workout included:

- high foot position leg press
- low foot position leg press
- knee extensions
- sit ups
- back extensions
- lat pull-downs

### The workouts

Exercise	Period I (Week 1-2) sets x reps @ intensity*	Period II (Week 3-12) sets x reps @ intensity	Period III (Week 13-24) sets x reps @ intensity
Low foot position leg press	3 x 15 @ 20 RM	4 x 10 @ 10RM	5 x 8 @ 8RM
Sit-ups	10 reps	10 reps	20 reps
Lat pull-downs	1 x 15 @ 20RM	1 x 15 @ 20RM	1 x 15 @ 20RM

\*Intensity is defined in terms of maximum repetitions for a given weight. For example when doing 15 reps at 20RM they are doing 15 reps with a weight they can lift for 20 reps (RM=rep max).

Another example is 10 reps at 10RM – meaning 10 reps with weight they could only lift for 10 reps.

Right after the workout the participants drank a post-workout shake. The post-nutritional supplement for the nutrition group included:

730 kJ (175 kcal)  
10 g of whey protein  
31 g of carbohydrate (no mention of the type)  
1 g of fat  
5 µg (200 IU) of vitamin D  
250 mg of calcium

The control group got a drink with 102 kJ (24 kcal), 6 g of carbohydrate, 12 mg of calcium, artificial sweetener and taste additives.

## Results

First, and most important, the women actually did the workouts, at least according to the training compliance response. The control group worked out an average of 2.61 times a week, and the nutritional supplement group worked out an average of 2.75 times a week during the first 12 weeks (they were scheduled to work out 3 times a week). In the next phase, the averages were 1.82 and 1.88 for the control and nutritional group, respectively. They were scheduled to work out twice a week.

Over 24 weeks, the nutritional group increased their lean body mass more than the control group. Both groups had an increase in quadriceps muscle cross-sectional area (which is an indication of muscle mass) after 12 weeks (there were no 24 week results because of “technical difficulties”), but there was no difference between groups.

The women were also stronger after 24 weeks as measured by isokinetic knee extensions. You may wonder what defines “isokinetic” exercise. Basically, it’s any exercise with a set max speed where the more effort you put into the exercise the more resistance is given. If you’ve ever been swimming you’ve experienced isokinetic exercise. In the water the quicker you move, the more resistance you get from the water. An isometric knee extension exercise machine uses air pressure to limit the max speed you can extend your leg. It turns out that the nutritional group was stronger than the control group after 24 weeks during isokinetic knee extensions (60 degree/second speed). It’s important to know that both groups improved over the 24 weeks.

At this point the results aren’t really a huge surprise. Exercise increases muscle mass and strength and nutritional supplementation increases both even more.

The interesting part is that after 24 weeks there was an improvement in bone mineral density at the lumbar spine (L2-L4) in both groups. There were no differences in overall bone mineral density that might show up with a longer study. There was a difference in femoral neck (the relatively thin part of the femur right before the ‘ball’ that makes up your hip) bone mineral density in the nutrition group compared to the control group (after adjusting for BMI).

## Conclusion

Six months of “heavy” resistance exercise in post-menopausal women increases strength, muscle mass and bone mineral densities. While I’d call this resistance exercise protocol “moderate” instead of “heavy”, the results speak for themselves.

As far as nutritional supplementation – post-workout protein-containing nutritional supplements following strength training enhanced:

1. Muscle mass
2. Strength
3. Bone mineral density and bone formation

So if you are, know of, or train a post-menopausal woman (or any woman for that matter) and need to convince or be convinced that weight-training and proper post-workout nutrition is the way to go — you now have some ammunition.



Tampa Bay resident Ida Wasserman hits the gym on her 100th birthday. Her workout routine includes lifting weights. Great start -- might we suggest a postworkout shake afterwards? Visit <http://www.precisionnutrition.com/cmd.php?af=293236> to discover healthy ways to feed your newfound muscle!

Photo credit: Greg Fight, Tampa Tribune.

## References

1. Nelson ME, et al. [Effects of high-intensity strength training on multiple risk factors for osteoporotic fractures](#). A randomized controlled trial. JAMA. 1994 Dec 28;272(24):1909-14.
2. Pruitt LA, et al. [Weight-training effects on bone mineral density in early postmenopausal women](#). J Bone Miner Res. 1992 Feb;7(2):179-85.
3. Ryan AS, et al. [Resistive training maintains bone mineral density in postmenopausal women](#). Calcif Tissue Int. 1998 Apr;62(4):295-9.

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