

Good for the BONES?

Swimming Might Increase Skeletal Density After All

>>> by Jim W. Harper

A running joke among Masters swimmers is that if you live long enough, you will get a record. Actually, the first empty spaces on the FINA list of world records appear for the women's 90-94 group in the 100 fly, 200 fly and 400 IM, and the men need to reach 95

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before those same races, plus the 200 IM, become open. Your chances may also be better if you are older than Dara Torres, who seems capable of smashing records just by looking at them.

So far only two swimmers have written in the 100-104 record book, and the 105+ category is wide open. But a huge roadblock standing in the way of your 105th birthday is your skeleton. After 30, everyone's bone mineral density begins to decline. By 50, one in four men

and half of women become candidates for a fracture. Nearly half of senior citizens suffering a hip fracture cannot fully recover, and as many as 20 percent die within one year. (See information on U.S. Surgeon General's report later in this article.) As you can imagine, setting swimming records is difficult from six feet under.

But swimmers don't suffer broken bones, right? Wrong. They may not happen underwater, but the exercise of swimming does little to prevent them, according to the current medical and scientific consensus. Instead, most scientific research emphasizes the need for weight-bearing exercise, such as jumping rope or lifting weights, to keep bones healthy as they age.

The problem that skeletons have with swimming is buoyancy. Our bodies are not designed for floating horizontally all day; in fact, astronauts

have to worry about losing bone mass if they spend extended periods weightless in outer space. Studies show that even young men placed on bed rest will lose bone mass.

"The skeleton needs to be loaded to maintain its strength," says Dr. Joan M. Lappe, a professor at Creighton University and part of the school's Osteoporosis Research Center. "Swimming is an outstanding exercise, but you do need some type of weight-bearing exercise. Most studies have shown you cannot increase bone mass with swimming alone," she adds.

But don't dry out your suit just yet. Although the balance of research may tilt towards other sports, a growing body of research posits that swimming can strengthen bones.

It turns out that lab rats have been swimming lots of laps lately. In a 2001 study, female rats had their ovaries removed to create a post-menopausal effect, which is a risk factor for osteoporosis – the leading disease that causes bone degeneration over time. The rats were forced to swim five days a week in a deep tub for 12 weeks. Compared to a

control group, the swim-trained rats showed greater bone growth and strength.

The lead author of this study knows a thing or two about swimming, as she trains for the 1500 with Utah Masters. Kim Hart of the University of Utah saw herself as a "rat lifeguard" during the study, and she was encouraged by the results. Bone density increased despite the swimming rats becoming thinner, which can be another risk factor for osteoporosis (thinner bodies place less stress on the skeleton).

On the other hand, a 2005 study that trained rats for four weeks found that the swimming group lost bone density through bone resorption, which releases calcium from bones and accelerates their breakdown (Kim). But a 1992 study over 10 weeks that compared swimming versus running rats found a more positive result for swimming, which counteracts the typical recommendation of running as a greater weight-bearing exercise (Snyder).

So which is it, to swim or not to swim? The wet rat can only tell us so much, but there

Editor's Note: Typically, *SWIMMER* articles do not cite references the same way scholarly articles do. In this article, much of the information is based on medical research, and some readers might want to learn more about these studies. So, look for a list of references at the end of the article. In the text of the article, we identify studies by using the last name of the principal author in parentheses.



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is research on wet humans that gives the green light to swimming.

One scientific study used competitive Masters swimmers as their subjects. Swimmers selected from the 1986 Masters Long Course National Championship in Portland, aged 40 to 85, were compared to non-swimmers. The women's groups did not display differences, but the men's groups displayed greater bone density among the swimmers (Orwoll).

The disparity of the sexes in this study points out a major

consideration for bone loss: women are at much greater risk than men, especially post-menopausal women. In fact, osteoporosis until recently was considered a women's disease. But the risk for men increases later in life, and it is recommended that everyone over 65 obtain a bone density test.

Two studies offer some hope for female swimmers. A 1998 study that investigated elderly rats found that the swimmers showed greater bone density and elasticity, and the effect was greater for females than for males (Hoshi). A study of middle-aged, human women published in 2000 found that swimmers obtained high bone density before menopause, but only long-term swimmers maintained bone health benefits after menopause (Harumi). In other words, if you have been training in the pool since your 30s, you may have stronger bones than your 65-year-old competitor who just started.

Due to their greater overall risk, however, women do need to be more vigilant than men about the onset of osteoporosis and its less severe cousin, osteopenia, a measure of lower than normal bone mineral density. The problem with diagnosing these conditions is that there are no obvious symptoms, and the most common way of discovering osteoporosis is a broken bone. Millions of people have the disease without knowing it.

Everyone should take serious consideration of the main risk factors for osteoporosis and should be proactive in seeking screenings (see the Osteoporosis Risk Assessment Questionnaire accompanying this article.) Doctors have been criticized for not recommending screenings even after older patients have suffered fractures, and awareness of bone health remains low. A risk factor for women not noted in the sidebar is nulliparity, meaning the lack of a pregnancy.

The U.S. Surgeon General published the federal government's first major report about bone health in 2004. "Bone Health and Osteoporosis" says little about swimming, but it does promote exercise as one of the three key ingredients for healthy bones. "Relatively few individuals follow the recommendations related to the amounts of physical activity, calcium, and vitamin D that are needed to maintain bone health," the report states.

People with a higher risk for osteoporosis will most likely need to supplement their diets with calcium and vitamin D. Vitamin D is available freely through sunshine, but the possibility of skin cancer may make pills the more inviting choice for obtaining the recommended amount of 400 mg per day, for those over 50, and 600 mg for those older than 71.

Sufficient calcium is difficult to obtain through diet alone, "unless you drink 10 glasses of milk a day," warns Dr. Lappe. People over 50 need 1,200 mg per day.

The best defense against bone disease is an early offense. Children need a healthy diet and sufficient exercise, especially during the fast bone growth years of ages 9 to 12. When the question of exercise and bone health comes into play, swimming is not included as a recommended sport by the government (see the Healthy Girls Healthy Bones website at girlshealth.gov). Young bones need to work against gravity, and young people who exist as couch potatoes are at risk for all kinds of health complications.

Masters swimmers will have to decide if swimming alone is enough to ward off the effects of bone loss. Jessica Seaton, a chiropractic orthopedist and member of the USMS Sports Medicine and Science Committee, says it is not, but she is also careful to

Risk Assessment Questionnaire

The website (usbjd.org) for the U.S. Bone and Joint Decade (2002-2011) publishes a "Fit-to-a-T" questionnaire designed to help people determine whether they might have a higher risk for osteoporosis. This questionnaire does not provide a medical diagnosis. Only a skilled and licensed health care provider may provide patients with a diagnosis.

- I went through menopause (either naturally or due to surgery or other treatments) before the age of 45.
- Since I was 45 years old, I have broken a bone while falling from a standing or sitting height.
- I have a close relative with osteoporosis.
- I have a close relative who broke a bone after the age of 45.
- I have lost more than one inch from my tallest height.
- I weigh less than 125 pounds.
- I smoke.
- I drink more than 2 servings of alcohol several times a week.
- On average, I do fewer than 3 weight-bearing activities, such as walking, running, dancing, or tennis, each week (at least 20 minutes each time).
- I avoid the sun or use sunscreen every time I go outside.
- I don't eat at least 2 servings a day of dairy or green leafy vegetables or calcium-fortified foods (such as 1 cup of milk, yogurt, or calcium-fortified orange juice or soy milk, 1½ ounces of cheese).
- I don't take a calcium or vitamin D supplement.
- I have a serious medical condition, such as chronic lung disease, kidney disease, rheumatoid arthritis, Cushing's disease, liver disease, inflammatory bowel disease, thyroid disease, cancer.
- I take or have taken medications such as oral glucocorticoids (steroids, such as prednisone), cancer treatments (such as chemotherapy or hormone treatments for breast cancer or prostate cancer), thyroid medicine, anti-seizure medicine, immunosuppressive medicine (for such conditions as rheumatoid arthritis or inflammatory bowel disease).
- I am older than 65.

>>> If you checked one or more of these risk factors, you are at risk for osteoporosis. Discuss your bone health and possible lifestyle changes with your primary health care provider.

customize her recommendations based on age.

“When you’re older, you have to ease into exercise more slowly. The recovery is just as important as working out,” says Seaton, who trains with West Hollywood Aquatics. “I recommend that people in their 30s do other impact sports, like running or weight lifting.” For the retirement-aged set, she cautions against impact sports that might lead to an injury, and she sees swimming as a great launching pad to gravity-based exercise. “Often people who swim are more active in general,” she says.

Seaton also recommends a supplement of vitamin K-12 in addition to calcium and vitamin D. “It’s the most effective of the Ks for increasing bone density,” she says.

Meanwhile, debate in the scientific community continues, while common sense dictates that vigorous swimming confers all sorts of benefits that might extend to healthy bones. The greatest benefit of all may be the prevention of a fall. “Some activities that are not weight bearing or are low impact may help improve balance and coordination and maintain muscle mass, which can help prevent falls,” the Surgeon General’s report states.

In fact, a recent study claims that a third of all hip fractures could be avoided through any type of vigorous exercise. This 2007 study followed a group of men in Sweden as they aged from 50 to 85 (approximately half of the subjects survived to this point). Of the 2,205 men studied, 482 experienced fractures. The most active group, defined as those who participated in sports at least three hours a week, were less likely to have an osteoporotic fracture and two-thirds less likely to suffer a broken hip. The term “sports” was broad, although it did not include casual walk-

ing or cycling (Michaelsson).

Still, plenty of research points to the need for exercise on land and against gravity to maintain a healthy skeleton. Studies of relatively young female athletes demonstrate benefits from high-impact sports such as gymnastics, but one study did not confirm bone density benefits for weight-lifting (Taaffe; Nikander). A possible interpretation of such results is that “jumping” may be better for the skeleton than pushing and pulling.

One point highlighted by such studies is that the repetitive motions of swimming may not stress the skeleton in the best ways. The most beneficial activities were those deemed high-impact and “odd-impact,” meaning that they stress the body from various directions. For example, playing soccer forces the body to move in odd and unexpected ways.

One point where lap swimming does stress the skeleton is the push-off. Hitting the wall hard with the feet may confer a benefit similar to jumping. Likewise, water pull-ups could be used to stress bones of the upper body.

For swimmers wishing to increase bone mass, they must recognize that “the stimulus must be greater than that which the bone usually experiences,” according to the Surgeon General’s report. Therefore, if you know that your bones need improvement, you will need to alter your exercise routine.

Masters swimmers wishing to add weight-bearing exercises can draw upon their muscle strength, but they should be careful and make any changes gradually. As everyone knows, swimming is kind to the joints compared to most activity on land.

Unfortunately, bone disease is on the rise. Unless habits change nationwide within the coming decade, the Surgeon General warns that as many as 50 percent of all people over

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50 will become at high risk for developing osteoporosis. Masters swimmers may be somewhat insulated by their overall health, but they are not immune.

Anyone over 65 should demand a bone density test from their physician, and they may want to consider supplements in the form of minerals, vitamins and dryland exercise. While some Masters swimmers may wish to die in the pool, we all have to live on land. Maintaining healthy bones is vital to ensuring a high quality of life for as long as possible.

Dr. Lappe has an easy recipe for swimmers wishing to add in some dryland activity: “Maybe when they go to the swimming pool, they just park away from the pool and walk.” Or better yet, hop and skip.

Just don’t skip on a slippery pool deck. You could break a hip and miss out on that 400-plus relay. <<<

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