

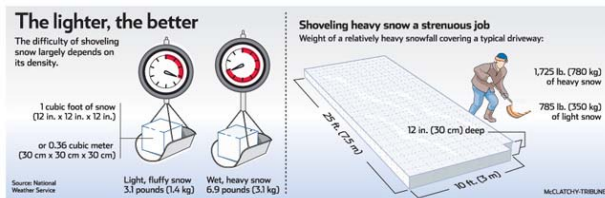
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## It snows. You shovel. Here's the scoop.

While you're clearing the driveway or sidewalk this week, ponder this: Research shows that shoveling snow can be good for you — if you do it carefully.

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Scoop up the snow. Throw the snow. Repeat about 1,000 times. Simple, right?

But there's science behind shoveling snow. At least, that's what we discovered when we wondered what researchers could tell us about the job at which many of us will be toiling over the weekend.

Apparently, it's pretty hard to get a lab rat to pick up a snow shovel. Most of the research we saw involved recruiting volunteers to clear the laboratory driveway.

From the obvious to the heart-stopping, here's a sample of what happens when scientists put parkas over their white lab coats to study Homo shovelis.

Cardiac experts at a Detroit-area hospital tested 10 inactive men as they shoveled a 4-inch-deep tract of

heavy, wet snow. The test subjects averaged about 12 shovel loads a minute. In only 10 minutes, the average test subject threw nearly 1 ton of snow, "equivalent to the weight of a midsize automobile."

No wonder that after only two minutes of shoveling, the heart rate of most of the participants reached 85 percent of the maximum heart rate, the upper limit commonly recommended for aerobic exercise. The Michigan researchers also found that exertion-related sudden cardiac deaths increased significantly during two snowstorms in Detroit, with four of 36 fatal snow-removal heart failures occurring while using a snow thrower rather than shoveling.

Michigan State University researchers found that among young men, snow shoveling isn't a bad thing. They got a dozen healthy men about age 25 to shovel and snow blow a driveway filled with snow scraped off an ice rink by a Zamboni. Then the researchers took blood samples. They found an increase in a blood enzyme that can help fight the effects of coagulation, which causes blood clots, which can lead to a heart attack. For healthy young men, "they can go out and shovel away," one researcher said.

Exercise scientists at North Dakota State University recruited 15 college-age students, strapped heart-rate monitors on them, gave each a snow shovel, pointed them at a drift and told them to pitch shovelfuls over a 4-foot fence for 14 minutes. The results: The students' heart rates reached an average of about 153 beats a minute. About half the session was spent at a moderate intensity heart-rate level and another third was at a vigorous intensity. But for a half-minute on average, the guinea pigs reached maximum intensity, "working as hard as if he or she were running a sprint that demanded total physical exertion."

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Japanese researchers got test subjects to toss "simulated snow" using both a regular shovel and a shovel with a second handle mounted to the main shaft. The shovel with the modified handle resulted in less stooping, squatting and



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energy consumption.

From the industrial engineering department at the University of Buffalo, where we assume they have plenty of raw material to work with, a "kinematic evaluation of two snow-shovel designs" found that shovels with bent handles "will reduce lumbar sagittal flexion," which sounds like a good thing.

Finally, from the Liberty Mutual Center for Safety Research, an experiment where a group of 10 "non-professional" snow shovelers" were equipped with winter coveralls, gloves, boots, a heart-rate monitor and a lumbar-motion monitor and told to

shovel for eight minutes, "as if they were being paid for the amount of shoveling they did, but not to become unusually tired or out of breath."

The subjects used a straight-handle shovel and a bent-handle shovel modified with force gauges. The results: In eight minutes, the subjects tossed on average of nearly 150 shovel loads, or more than 1,100 pounds of snow. The bent-handle shovel reduced bending at the trunk, slightly decreased heart rates and was preferred by six of the 10 shovelers.

The researchers also tested shoveling technique. Instead of turning around when they reached the end of the driveway, the shovelers were asked to clear the next shovel width by walking backward. Nine of the 10 subjects didn't like doing that, and it resulted in a slightly higher heart rate.

"An alternate recommendation might be to walk back to the start upon reaching the end of the walk or driveway. This, in essence, could serve as a brief rest break and allow for a change of posture," according to the researchers.

But we bet you already knew that.

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