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[The man who wants to kill crunches](#)

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After three decades of figuring how out the spine works, Stuart McGill has come to loathe sit-ups. It doesn't matter whether they are the full sit-ups beloved by military trainers or the crunch versions so ubiquitous in gyms. "What happens when you perform a sit-up?" he asks. "The spine is flexed into the position at which it damages sooner."

The professor of spine biomechanics at the University of Waterloo knows a thing or two about snapping spines. In his lab, McGill proudly shows off a machine that's probably created more disc herniations than any other in the world. "We get real [pig] spines from the butcher and we compress them, shear them and bend them to simulate activities such as golf swings and sit-ups, and watch as unique patterns of injury emerge." A disc has a ring around it, and the middle, the nucleus, is filled with a mucus-like liquid. Do a sit-up and the spine's compression will squeeze the nucleus. On his computer, McGill shows how the nucleus can work its way out of the disc, hit a nerve root and cause that oh-so-familiar back pain. "From observing the way your total gym routine is performed, we can predict the type of disc damage you're eventually going to have."

While there are lots of ways to injure a back, the sit-up is an easily preventable one. According to his research, a crunch or traditional sit-up generates at least 3,350 newtons (the equivalent of 340 kg) of compressive force on the spine. The U.S. National Institute for Occupational Safety and Health states that anything above 3,300 newtons is unsafe.

So McGill suggests replacing sit-ups with exercises to strengthen the core while not bending the spine: bridges, planks, leg extensions, bird dogs, and “stir the pot.” The bird dog, for instance, simply involves getting on all fours and, while keeping the core muscles tight, extending the opposite arm and leg, then switching limbs. “Stir the pot” is a more complex movement: moving shoulders in a small circle while in a prone push-up position with forearms balanced on an exercise ball.

The results of McGill’s decades of spine research is slowly being accepted outside the worlds of academia and elite athletics. Ian Crosby of the Calgary Fire Department saw the shift first-hand. He’s on a committee of the International Association of Fire Fighters that establishes criteria for the make-or-break fitness test. A few years ago, they reviewed the annual sit-up test, which involved doing steady crunches in time to a metronome. The problem, for Crosby, is that anyone being assessed “will train to get better. And that involves repeated bouts of sit-ups.” So last year, after talking to Stuart McGill and other experts, the IAFF dropped the sit-up in favour of the prone plank—basically a static push-up that will leave the unfit trembling with fatigue.

For those who believe sit-ups are the only key to strong abdominals, Crosby points to research that shows the new movements can be just as effective in improving core strength. A study of U.S. soldiers published earlier this year in *Medicine & Science in Sports & Exercise* compared sit-ups with back-friendly core stabilization exercises, including bird dogs, and found there was no difference in overall fitness between the two groups. In fact, those who did core exercises showed significant improvement in the army’s sit-up test.

The decline of the crunch can also be seen at ordinary sweat-filled gyms. Anthony Ierulli, manager of fitness programming for the YMCA in Brampton, Ont., says that while in the past all anyone “did were crunches, now they’re doing some Pilates and yoga that engage the abdomen in different ways.” But Ierulli emphasizes that changing routines isn’t enough if the technique isn’t there. And that requires finding a teacher who can fine-tune those unfamiliar exercises.

As for McGill, he keeps spreading his message. Recently, Asia Nelson, a local Waterloo-based trainer of yoga instructors, invited the expert to talk to her class of student teachers about his philosophy. She knows that not all traditional yoga postures are back-friendly. One example Nelson gives is the sun salutation’s forward fold—basically a standing crunch with the added hanging weight of the body. Now, after the professor’s lecture, she’s figuring out ways to modify that and other movements. While Nelson and the Y’s Ierulli recommend people find a balance between old and new techniques, McGill’s message is more blunt: “There are only so many bends in your spine until the discs eventually herniate.”

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