

FROM THE MAGAZINE

How Yoga Can Wreck Your Body



Danielle Levitt for The New York Times

Members of the Broadway cast of "Godspell" do their flexible best. From left: Uzo Aduba (doing the wheel), George Salazar (extended-hand-to-big-toe pose) and Nick Blaemire (headstand).

By **WILLIAM J. BROAD**

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On a cold Saturday in early 2009, Glenn Black, a yoga teacher of nearly four decades, whose devoted clientele includes a number of celebrities and prominent gurus, was giving a master class at Sankalpah Yoga in Manhattan. Black is, in many ways, a classic yogi: he studied in Pune, India, at the institute founded by the legendary B. K. S. Iyengar, and spent years in solitude and meditation. He now lives in Rhinebeck, N.Y., and often teaches at the nearby [Omega Institute](#), a New Age emporium spread over nearly 200 acres of woods and gardens. He is known for his rigor and his down-to-earth style. But this was not why I sought him out: Black, I'd been told, was the person to speak with if you wanted to know not about the virtues of yoga but rather about the damage it could do. Many of his regular clients came to him for bodywork or rehabilitation following yoga injuries. This was the situation I found myself in. In my 30s, I had somehow managed to rupture a disk in my lower back and found I could prevent bouts of pain with a selection of yoga postures and abdominal exercises. Then, in 2007, while doing the extended-side-angle pose, a posture hailed as a cure for many diseases, my back gave way. With it went my belief, naïve in retrospect, that yoga was a source only of healing and never harm.



Salazar: I would say I'm a 7 out of 10 on the flexibility scale.



Aduba: You know when people jump up into those crazy positions, like they stand on their eyeballs or something, while you're sitting there just trying to figure out which side of the mat you used the last time? I envy them.



Blaemire: The plow was the easiest position of the day — though it is quite a strange feeling having your face that close to your knees.

At Sankalpah Yoga, the room was packed; roughly half the students were said to be teachers themselves. Black walked around the room, joking and talking. “Is this yoga?” he asked as we sweated through a pose that seemed to demand superhuman endurance. “It is if you’re paying attention.” His approach was almost free-form: he made us hold poses for a long time but taught no inversions and few classical postures. Throughout the class, he urged us to pay attention to the thresholds of pain. “I make it as hard as possible,” he told the group. “It’s up to you to make it easy on yourself.” He drove his point home with a cautionary tale. In India, he recalled, a yogi came to study at Iyengar’s school and threw himself into a spinal twist. Black said he watched in disbelief as three of the man’s ribs gave way — pop, pop, pop.

After class, I asked Black about his approach to teaching yoga — the emphasis on holding only a few simple poses, the absence of common inversions like headstands and shoulder stands. He gave me the kind of answer you'd expect from any yoga teacher: that awareness is more important than rushing through a series of postures just to say you'd done them. But then he said something more radical. Black has come to believe that “the vast majority of people” should give up yoga altogether. It's simply too likely to cause harm.

Not just students but celebrated teachers too, Black said, injure themselves in droves because most have underlying physical weaknesses or problems that make serious injury all but inevitable. Instead of doing yoga, “they need to be doing a specific range of motions for articulation, for organ condition,” he said, to strengthen weak parts of the body. “Yoga is for people in good physical condition. Or it can be used therapeutically. It's controversial to say, but it really shouldn't be used for a general class.”

Black seemingly reconciles the dangers of yoga with his own teaching of it by working hard at knowing when a student “shouldn't do something — the shoulder stand, the headstand or putting any weight on the cervical vertebrae.” Though he studied with Shmuel Tatz, a legendary Manhattan-based physical therapist who devised a method of massage and alignment for actors and dancers, he acknowledges that he has no formal training for determining which poses are good for a student and which may be problematic. What he does have, he says, is “a ton of experience.”

“To come to New York and do a class with people who have many problems and say, ‘O.K., we're going to do this sequence of poses today’ — it just doesn't work.”

According to Black, a number of factors have converged to heighten the risk of practicing yoga. The biggest is the demographic shift in those who study it. Indian practitioners of yoga typically squatted and sat cross-legged in daily life, and yoga poses, or asanas, were an outgrowth of these postures. Now urbanites who sit in chairs all day walk into a studio a couple of times a week and strain to twist themselves into ever-more-difficult postures despite their lack of flexibility and other physical problems. Many come to yoga as a gentle alternative to vigorous sports or for rehabilitation for injuries. But yoga's exploding popularity — the number of Americans doing yoga has risen from about 4 million in 2001 to what some estimate to be as many as 20 million in 2011 — means that there is now an abundance of studios where many teachers lack the deeper training necessary to recognize when students are headed toward injury. “Today many schools of yoga are just about pushing people,” Black said. “You can't believe what's going on — teachers jumping on people, pushing and pulling and saying, ‘You should be able to do this by now.’ It has to do with their egos.”

When yoga teachers come to him for bodywork after suffering major traumas, Black tells them, “Don't do yoga.”

“They look at me like I'm crazy,” he goes on to say. “And I know if they continue, they won't be able to take it.” I asked him about the worst injuries he'd seen. He spoke of well-known yoga teachers doing such basic poses as downward-facing dog, in which the body forms an inverted V, so strenuously that they tore Achilles tendons. “It's ego,” he said. “The whole point of yoga is to get rid of ego.” He said he had seen some “pretty gruesome hips.” “One of the biggest teachers in America had zero movement in her hip joints,” Black told me. “The sockets had become so degenerated that she had to have hip replacements.” I asked if

she still taught. “Oh, yeah,” Black replied. “There are other yoga teachers that have such bad backs they have to lie down to teach. I’d be so embarrassed.”

Among devotees, from gurus to acolytes forever carrying their rolled-up mats, yoga is described as a nearly miraculous agent of renewal and healing. They celebrate its abilities to calm, cure, energize and strengthen. And much of this appears to be true: yoga can lower your blood pressure, make chemicals that act as antidepressants, even improve your sex life. But the yoga community long remained silent about its potential to inflict blinding pain. Jagannath G. Gune, who helped revive yoga for the modern era, made no allusion to injuries in his journal *Yoga Mimansa* or his 1931 book “Asanas.” Indra Devi avoided the issue in her 1953 best seller “Forever Young, Forever Healthy,” as did B. K. S. Iyengar in his seminal “Light on Yoga,” published in 1965. Reassurances about yoga’s safety also make regular appearances in the how-to books of such yogis as Swami Sivananda, K. Pattabhi Jois and Bikram Choudhury. “Real yoga is as safe as mother’s milk,” declared Swami Gitananda, a guru who made 10 world tours and founded ashrams on several continents.

But a growing body of medical evidence supports Black’s contention that, for many people, a number of commonly taught yoga poses are inherently risky. The first reports of yoga injuries appeared decades ago, published in some of the world’s most respected journals — among them, *Neurology*, *The British Medical Journal* and *The Journal of the American Medical Association*. The problems ranged from relatively mild injuries to permanent disabilities. In one case, a male college student, after more than a year of doing yoga, decided to intensify his practice. He would sit upright on his heels in a kneeling position known as *vajrasana* for hours a day, chanting for world peace. Soon he was experiencing difficulty walking, running and climbing stairs.

Doctors traced the problem to an unresponsive nerve, a peripheral branch of the sciatic, which runs from the lower spine through the buttocks and down the legs. Sitting in *vajrasana* deprived the branch that runs below the knee of oxygen, deadening the nerve. Once the student gave up the pose, he improved rapidly. Clinicians recorded a number of similar cases and the condition even got its own name: “yoga foot drop.”

More troubling reports followed. In 1972 a prominent Oxford neurophysiologist, W. Ritchie Russell, [published an article](#) in *The British Medical Journal* arguing that, while rare, some yoga postures threatened to cause strokes even in relatively young, healthy people. Russell found that brain injuries arose not only from direct trauma to the head but also from quick movements or excessive extensions of the neck, such as occur in whiplash — or certain yoga poses. Normally, the neck can stretch backward 75 degrees, forward 40 degrees and sideways 45 degrees, and it can rotate on its axis about 50 degrees. Yoga practitioners typically move the vertebrae much farther. An intermediate student can easily turn his or her neck 90 degrees — nearly twice the normal rotation.

Hyperflexion of the neck was encouraged by experienced practitioners. Iyengar emphasized that in cobra pose, the head should arch “as far back as possible” and insisted that in the shoulder stand, in which the chin is tucked deep in the chest, the trunk and head forming a right angle, “the body should be in one straight line, perpendicular to the floor.” He called the pose, said to stimulate the thyroid, “one of the greatest boons conferred on humanity by our ancient sages.”

Extreme motions of the head and neck, Russell warned, could wound the vertebral arteries, producing clots, swelling and constriction, and eventually wreak havoc in the brain. The basilar artery, which arises from the union of the two vertebral arteries and forms a wide conduit at the base of the brain, was of particular concern. It feeds such structures as the pons (which plays a role in respiration), the cerebellum (which coordinates the muscles), the occipital lobe of the outer brain (which turns eye impulses into images) and the thalamus (which relays sensory messages to the outer brain). Reductions in blood flow to the basilar artery are known to produce a variety of strokes. These rarely affect language and conscious thinking (often said to be located in the frontal cortex) but can severely damage the body's core machinery and sometimes be fatal. The majority of patients suffering such a stroke do recover most functions. But in some cases headaches, imbalance, dizziness and difficulty in making fine movements persist for years.

Russell also worried that when strokes hit yoga practitioners, doctors might fail to trace their cause. The cerebral damage, he wrote, "may be delayed, perhaps to appear during the night following, and this delay of some hours distracts attention from the earlier precipitating factor."

In 1973, a year after Russell's paper was published, Willibald Nagler, a renowned authority on spinal rehabilitation at Cornell University Medical College, published a paper on a strange case. A healthy woman of 28 suffered a stroke while doing a yoga position known as the wheel or upward bow, in which the practitioner lies on her back, then lifts her body into a semicircular arc, balancing on hands and feet. An intermediate stage often involves raising the trunk and resting the crown of the head on the floor. While balanced on her head, her neck bent far backward, the woman "suddenly felt a severe throbbing headache." She had difficulty getting up, and when helped into a standing position, was unable to walk without assistance. The woman was rushed to the hospital. She had no sensation on the right side of her body; her left arm and leg responded poorly to her commands. Her eyes kept glancing involuntarily to the left. And the left side of her face showed a contracted pupil, a drooping upper eyelid and a rising lower lid — a cluster of symptoms known as Horner's syndrome. Nagler reported that the woman also had a tendency to fall to the left.

Her doctors found that the woman's left vertebral artery, which runs between the first two cervical vertebrae, had narrowed considerably and that the arteries feeding her cerebellum had undergone severe displacement. Given the lack of advanced imaging technologies at the time, an exploratory operation was conducted to get a clearer sense of her injuries. The surgeons who opened her skull found that the left hemisphere of her cerebellum suffered a major failure of blood supply that resulted in much dead tissue and that the site was seeped in secondary hemorrhages.

The patient began an intensive program of rehabilitation. Two years later, she was able to walk, Nagler reported, "with [a] broad-based gait." But her left arm continued to wander and her left eye continued to show Horner's syndrome. Nagler concluded that such injuries appeared to be rare but served as a warning about the hazards of "forceful hyperextension of the neck." He urged caution in recommending such postures, particularly to individuals of middle age.

The experience of Nagler's patient was not an isolated incident. A few years later, a 25-year-old man was rushed to Northwestern Memorial Hospital, in Chicago, complaining of blurred vision, difficulty swallowing

and controlling the left side of his body. Steven H. Hanus, a medical student at the time, became interested in the case and worked with the chairman of the neurology department to determine the cause (he later published the results with several colleagues). The patient had been in excellent health, practicing yoga every morning for a year and a half. His routine included spinal twists in which he rotated his head far to the left and far to the right. Then he would do a shoulder stand with his neck “maximally flexed against the bare floor,” just as Iyengar had instructed, remaining in the inversion for about five minutes. A series of bruises ran down the man’s lower neck, which, the team wrote in *The Archives of Neurology*, “resulted from repeated contact with the hard floor surface on which he did yoga exercises.” These were a sign of neck trauma. Diagnostic tests revealed blockages of the left vertebral artery between the c2 and c3 vertebrae; the blood vessel there had suffered “total or nearly complete occlusion” — in other words, no blood could get through to the brain.

Two months after his attack, and after much physical therapy, the man was able to walk with a cane. But, the team reported, he “continued to have pronounced difficulty performing fine movements with his left hand.” Hanus and his colleagues concluded that the young man’s condition represented a new kind of danger. Healthy individuals could seriously damage their vertebral arteries, they warned, “by neck movements that exceed physiological tolerance.” Yoga, they stressed, “should be considered as a possible precipitating event.” In its report, the Northwestern team cited not only Nagler’s account of his female patient but also Russell’s early warning. Concern about yoga’s safety began to ripple through the medical establishment.

These cases may seem exceedingly rare, but surveys by the Consumer Product Safety Commission showed that the number of emergency-room admissions related to yoga, after years of slow increases, was rising quickly. They went from 13 in 2000 to 20 in 2001. Then they more than doubled to 46 in 2002. These surveys rely on sampling rather than exhaustive reporting — they reveal trends rather than totals — but the spike was nonetheless statistically significant. Only a fraction of the injured visit hospital emergency rooms. Many of those suffering from less serious yoga injuries go to family doctors, chiropractors and various kinds of therapists.

Around this time, stories of yoga-induced injuries began to appear in the media. The Times reported that health professionals found that the penetrating heat of Bikram yoga, for example, could raise the risk of overstretching, muscle damage and torn cartilage. One specialist noted that ligaments — the tough bands of fiber that connect bones or cartilage at a joint — failed to regain their shape once stretched out, raising the risk of strains, sprains and dislocations.

In 2009, a New York City team based at Columbia University’s College of Physicians and Surgeons published an ambitious worldwide survey of yoga teachers, therapists and doctors. The answers to the survey’s central question — What were the most serious yoga-related injuries (disabling and/or of long duration) they had seen? — revealed that the largest number of injuries (231) centered on the lower back. The other main sites were, in declining order of prevalence: the shoulder (219), the knee (174) and the neck (110). Then came stroke. The respondents noted four cases in which yoga’s extreme bending and contortions resulted in some degree of brain damage. The numbers weren’t alarming but the

acknowledgment of risk — nearly four decades after Russell first issued his warning — pointed to a decided shift in the perception of the dangers yoga posed.

In recent years, reformers in the yoga community have begun to address the issue of yoga-induced damage. [In a 2003 article in Yoga Journal](#), Carol Krucoff — a yoga instructor and therapist who works at the Integrative Medicine center at Duke University in North Carolina — revealed her own struggles. She told of being filmed one day for national television and after being urged to do more, lifting one foot, grabbing her big toe and stretching her leg into the extended-hand-to-big-toe pose. As her leg straightened, she felt a sickening pop in her hamstring. The next day, she could barely walk. Krucoff needed physical therapy and a year of recovery before she could fully extend her leg again. The editor of Yoga Journal, Kaitlin Quistgaard, described reinjuring a torn rotator cuff in a yoga class. “I’ve experienced how yoga can heal,” she wrote. “But I’ve also experienced how yoga can hurt — and I’ve heard the same from plenty of other yogis.”

One of the most vocal reformers is Roger Cole, an Iyengar teacher with degrees in psychology from Stanford and the University of California, San Francisco. Cole has written extensively for Yoga Journal and speaks on yoga safety to the American College of Sports Medicine. [In one column](#), Cole discussed the practice of reducing neck bending in a shoulder stand by lifting the shoulders on a stack of folded blankets and letting the head fall below it. The modification eases the angle between the head and the torso, from 90 degrees to perhaps 110 degrees. Cole ticked off the dangers of doing an unmodified shoulder stand: muscle strains, overstretched ligaments and cervical-disk injuries.

But modifications are not always the solution. Timothy McCall, a physician who is the medical editor of Yoga Journal, called the headstand too dangerous for general yoga classes. His warning was based partly on his own experience. He found that doing the headstand led to thoracic outlet syndrome, a condition that arises from the compression of nerves passing from the neck into the arms, causing tingling in his right hand as well as sporadic numbness. McCall stopped doing the pose, and his symptoms went away. Later, he noted that the inversion could produce other injuries, including degenerative arthritis of the cervical spine and retinal tears (a result of the increased eye pressure caused by the pose). “Unfortunately,” McCall concluded, “the negative effects of headstand can be insidious.”

Almost a year after I first met Glenn Black at his master class in Manhattan, I received an e-mail from him telling me that he had undergone spinal surgery. “It was a success,” he wrote. “Recovery is slow and painful. Call if you like.”

The injury, Black said, had its origins in four decades of extreme backbends and twists. He had developed spinal stenosis — a serious condition in which the openings between vertebrae begin to narrow, compressing spinal nerves and causing excruciating pain. Black said that he felt the tenderness start 20 years ago when he was coming out of such poses as the plow and the shoulder stand. Two years ago, the pain became extreme. One surgeon said that without treatment, he would eventually be unable to walk. The surgery took five hours, fusing together several lumbar vertebrae. He would eventually be fine but was under surgeon’s orders to reduce strain on his lower back. His range of motion would never be the same.

Black is one of the most careful yoga practitioners I know. When I first spoke to him, he said he had never injured himself doing yoga or, as far as he knew, been responsible for harming any of his students. I asked him if his recent injury could have been congenital or related to aging. No, he said. It was yoga. “You have to get a different perspective to see if what you’re doing is going to eventually be bad for you.”

Black recently took that message to a conference at the Omega Institute, his feelings on the subject deepened by his recent operation. But his warnings seemed to fall on deaf ears. “I was a little more emphatic than usual,” he recalled. “My message was that ‘Asana is not a panacea or a cure-all. In fact, if you do it with ego or obsession, you’ll end up causing problems.’ A lot of people don’t like to hear that.”

*This article is adapted from “[The Science of Yoga: The Risks and Rewards](#),” by [William J. Broad](#), to be published next month by Simon & Schuster. Broad is a senior science writer at *The Times*.*

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