

Aging Gracefully -- It's a Real Workout

By Jonah Lehrer
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The most depressing thing about getting older is that it can't be stopped. Or so we've been told. The aging process seems to be one of inevitable decline, the withering away of both body and mind. No matter how much we rage against the dying of the light, we're still going to forget where we put our car keys.

But is our fate really so fixed? Is the march of time always so cruel? All signs point to . . . not really. Consider [Dara Torres](#), the 41-year-old U.S. swimmer, who is nine years older than her closest-in-age teammate in Beijing. Although now competing in her fifth Olympics, Torres is swimming faster than ever before. Or what about Madonna? The pop star may have turned 50 yesterday, but the synth beat goes on. She's currently preparing for her "Sticky and Sweet" tour, where diehard fans will pay up to \$350 to see the former [Material Girl](#) perform, clad for part of the time in what the designer overseeing her look described as "Gangster Pimp"-inspired fashion.

And then there's the presidential campaign, which has put age and generational differences front and center. [John McCain](#), at 71, is attempting to become the oldest first-term president in American history. His run, along with the unretirement of 38-year-old [NFL](#) quarterback [Brett Favre](#), is part of this recent parade of public age defiance. This doesn't mean, of course, that weekend warriors pushing 40 now think that their pro-football dreams still have a glimmer of hope, or that 50-somethings are demanding, en masse, higher age cutoffs on "[American Idol](#)." But it does show, on a broad variety of prominent stages, that more and more, people aren't clinging to empty platitudes about age being just a number. Instead, they're ignoring age as a limiting factor entirely. Time, it turns out, is something you can bargain with.

As a 27-year old science writer who still gets carded at bars, I often find discussions of the aging process pleasantly abstract. I'm more likely to use Clearasil than anti-wrinkle cream. But the spectacle of Torres's competing and McCain's campaigning has rekindled an important scientific debate about the inevitability of the aging process and what even young and middle-aged people can do to blunt the adverse effects of time.

New research demonstrates that Torres, Madonna and McCain's mother, Roberta -- who is still campaigning for her son at the age of 96 -- aren't rare outliers, but rather examples of a somewhat common phenomenon. According to scientists, it's entirely possible to grow significantly older without getting much slower -- as long as we're willing to put in the work. The elixir of youth, it turns out, is an old-fashioned cocktail: blood, sweat and tears.

This scientific research arrives just as the graying of the baby boomers is leading to an explosive growth in medical treatments that promise a perpetual adolescence. With its offerings of dietary supplements and caloric-restriction diets, face creams infused with fetal stem cells and injections of [Botox](#), the anti-aging industry has managed to turn an inescapable biological process into a lucrative source of anxiety. What the latest science suggests, however, is that the best anti-aging

treatment isn't something you apply to your skin or buy in a bottle: It's what you already have in your head. The bad news, of course, is that the same research shows that the passage of time is not an equal opportunity eroder.

Last year, a large study led by researchers at [Harvard University](#) compared the brains of young adults and senior citizens. As expected, the scientists found consistent differences between the two groups. The most significant occurred in a brain system known as the "default network," which is active when people turn their attention inward, as when they're trying to remember a name. The default network is defined by a series of pathways between the front of the brain -- this includes areas of the prefrontal cortex -- and the "back" of the brain, such as the cingulate cortex.

Under normal circumstances, the default network ensures that these two brain areas work in perfect sync. "When the front of the brain fires, you want to see the back of the brain fire right back," says Jessica Andrews-Hanna, the study's lead author. "Unfortunately, this connection seems to weaken with age, so that older people can end up with a rather disconnected brain." Andrews-Hanna suggests that deficits in the default network might be responsible for many of the classic symptoms of old age, such as an inability to focus and problems with memory retrieval.

So far, so depressing. The aging process is a biological wrecking crew. But buried in all the bad news are some optimistic data. It turned out that nearly half of the older subjects exhibited brain activity that appeared indistinguishable from that of the young adults: Their default system was nearly as synchronized as those of people in their 20s. Furthermore, these differences in brain activity were correlated with performance on a battery of tests that measured short-term memory, abstract reasoning powers and processing speed. "There really was tremendous individual variation," Andrews-Hanna says, "and this variation was evident both in the brain and in observed behavior."

The question, of course, is what causes this variation. How do some people manage to maintain such a spry cortex? Some scientists argue that the secret to thinking like a young person is cognitive exercise. "The brain is a learning machine, and like all machines it needs to be continually maintained," says Michael Merzenich, a professor emeritus at the [University of California at San Francisco](#). "If you stop exercising the brain -- and this is what often happens during retirement -- then you shouldn't be surprised when it starts to die off."

Merzenich has developed a software program, Posit Science Brain Fitness, that helped reverse the cognitive effects of aging in 93 percent of elderly subjects, according to a 2006 study. After a few months of intensive training, the brains of 75-year-olds had the memory function of people decades younger, at least when tested in a lab. Just as Dara Torres maintains her edge through a relentless practice schedule -- in addition to hours of swimming and extensive weight-lifting sessions, she also reportedly stretches for several hours multiple times a week -- Merzenich argues that the aging brain requires rigorous workouts to stay in shape. There are no shortcuts. Even people blessed with ideal genetics -- those lucky souls at low risk for wrinkles and memory loss -- still need to exercise the mind to preserve their mental vigor.

But the mind does have one crucial advantage over the body: It can rewire itself as it tries to cope with the challenges of getting older. According to Denise Park, a neuroscientist in the Productive Aging Laboratory at the University of Texas at Dallas, the inevitable atrophy caused by the aging process means that older brains must continually find new ways to perform the same mental tasks. The cortex deals with cell death by re-directing its traffic, becoming more reliant on those neural pathways that remain viable.

Although it's still unclear where such mental flexibility comes from, several studies suggest that it's largely an ancillary benefit of "sustained cognitive engagement," or thinking intensely on a regular basis. Not only does an active mind have more cortical matter to lose -- scientists refer to this as "cognitive reserve," since the extra tissue serves as a buffer against cell death -- but it also seems better able to adjust its activity in response to the insults of age. "The brain operates on a use-it-or-lose-it principle," says Merzenich. "And the ability to cope with change seems to really be something you either use or lose."

What this suggests is that successful aging has little to do with stopping the aging process, because that can't be done. Our flesh is mortal; there is no fountain of youth. Dara Torres herself talks about how much longer it takes her body to recover at the age of 41, which is one reason she chose to race individually only in the 50-meter freestyle at the Beijing Olympics. Nevertheless, as she demonstrates, these anatomical changes don't need to become handicaps. The brain is a flexible machine: If we put in the effort -- and it takes lots of effort -- our cells will find a way to stay fit. Nobody ever said aging gracefully was easy.

jonah.lehrer@gmail.com

Jonah Lehrer is an editor at large at Seed magazine and the author of "Proust Was a Neuroscientist."