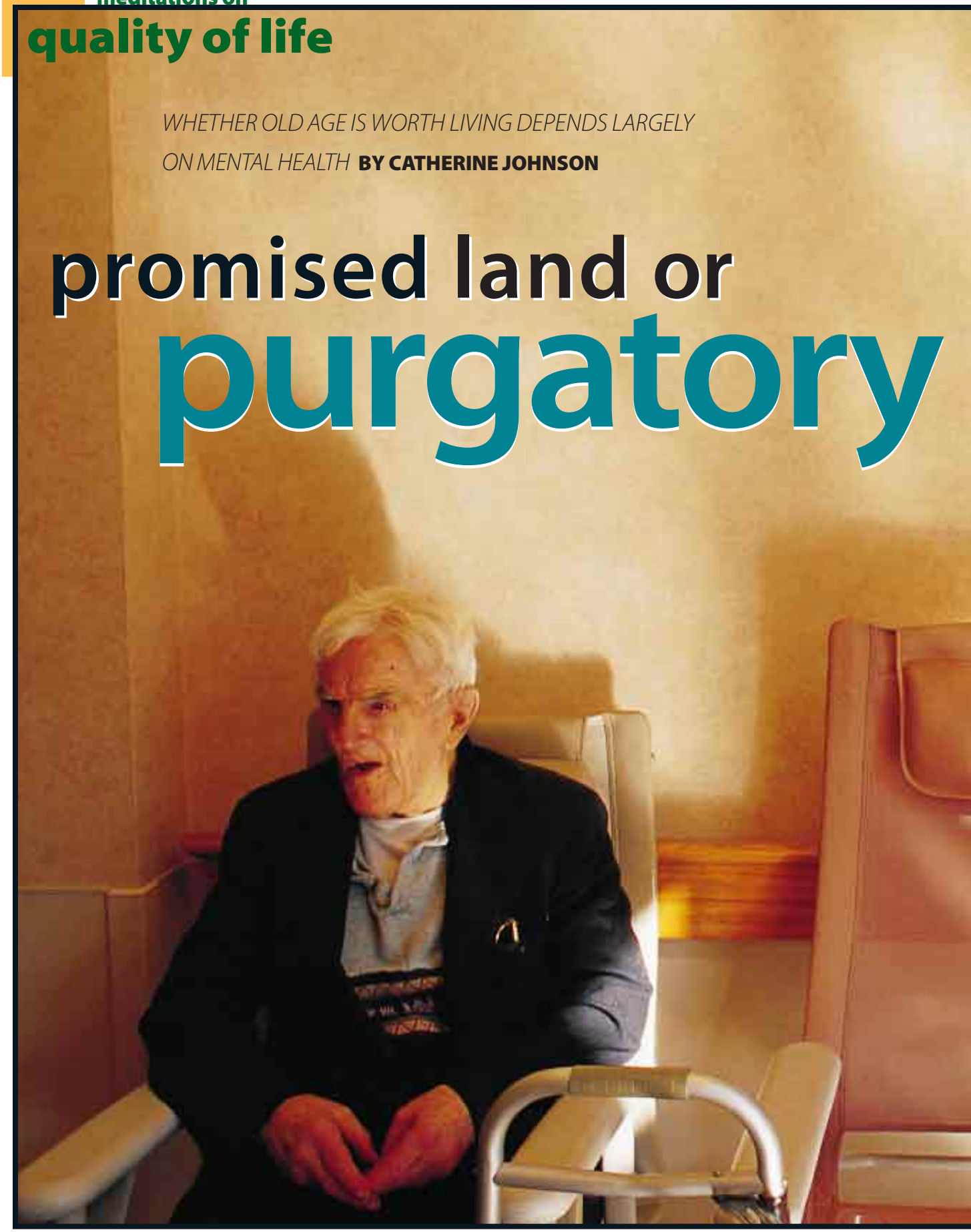
meditations on

quality of life

WHETHER OLD AGE IS WORTH LIVING DEPENDS LARGELY ON MENTAL HEALTH **BY CATHERINE JOHNSON**

promised land or purgatory



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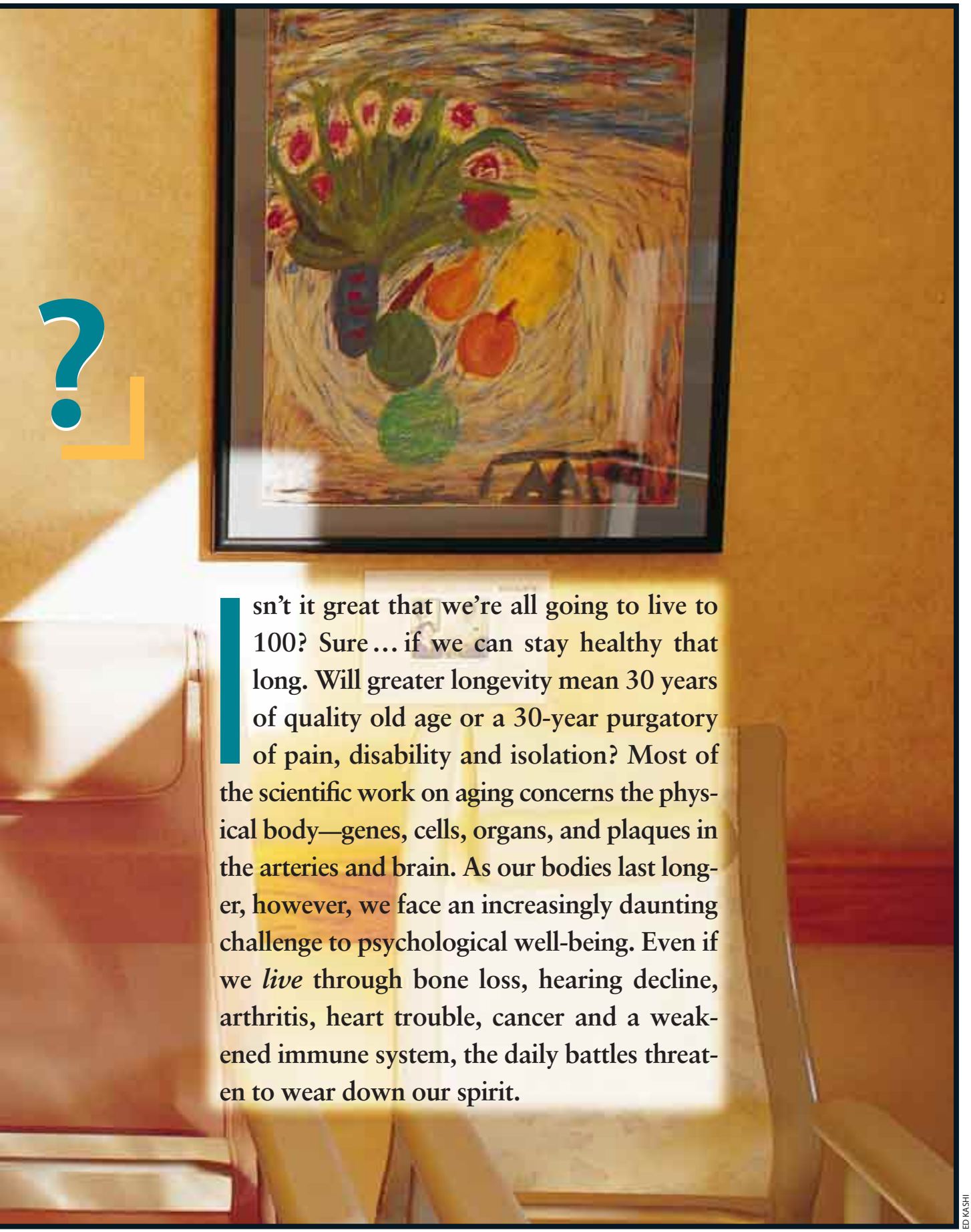

Isn't it great that we're all going to live to 100? Sure… if we can stay healthy that long. Will greater longevity mean 30 years of quality old age or a 30-year purgatory of pain, disability and isolation? Most of the scientific work on aging concerns the physical body—genes, cells, organs, and plaques in the arteries and brain. As our bodies last longer, however, we face an increasingly daunting challenge to psychological well-being. Even if we *live* through bone loss, hearing decline, arthritis, heart trouble, cancer and a weakened immune system, the daily battles threaten to wear down our spirit.

ED KASHI

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Indeed, with a growing arsenal of countermeasures to the physical ailments of aging, quality old age will depend more and more on good mental health. And that's a tough nut to crack, because age weakens our minds as much as our bodies, severely challenging our ability to remain mentally acute and emotionally positive. There is hope, though: science is beginning to provide clues about how to overcome the major mental challenges of old age.

Battling Depression

People are notorious minimizers of unpleasant realities. As University of California at Los Angeles psychologist Shelley E. Taylor and others have shown, "positive illusions" are a standard feature of the psychologically healthy person. On the face of it, there's no reason why people shouldn't simply continue deluding themselves into old age. Many do. When very old and sick people are asked whether they would rather live one year in their current condition or die sooner in good health, they choose quantity over quality.

Still, choosing to live instead of die is a far cry from enjoying a life that is happy or even marginally satisfactory. The truth is, the elderly suffer very high rates of depression compared with the rest of the population. Old age can be a mental grind.

Boston psychiatrist John J. Ratey, author of the forthcoming book *A User's Guide to the Brain*, sees a number of elderly patients in his practice. "Loneliness is a huge issue for them. They don't interact as much. They get a little depressed because they're losing people, structure, function and purpose." Add the physical challenges, and a negative feedback loop begins to spiral. They don't feel like doing *anything* productive, physically *or* mentally. As Ratey observes, "They're losing energy, arousal and vigilance. Going into retirement the large majority of people think, 'Oh, I'm going to have so much time to do stuff,' and then they end up watching TV. Nonaction begets nonaction—these older people don't move enough and slide into lethargy."

A global state of mental and physical torpor is not much of a life. But snapping out of depression by means of self-generated positive illusions gets harder, because with advanced age, positive illusions become difficult to sustain.

No one knows precisely why this is so, but researchers believe that age-related changes in the serotonin system play a key role. Serotonin is the neurotransmitter most closely linked to feelings of happiness, confidence and calm, and it declines with age. Although the neurological basis of emotion is far more complicated than the relative level of one neurotransmitter, researchers nonetheless find that people with low levels of serotonin are more likely to feel depressed, anxious or angry. Car-

the dangers of
overmedication

By the time the average American has turned 70, the seven-day pill organizer may be overflowing with colored capsules. As medicine finds more fixes for the maladies of old age, the elderly are in danger of becoming increasingly dependent on scores of pills, reducing their quality of life and potentially killing themselves via overdose or unintended drug interactions.

The Golden Years are exactly the wrong time to face a panoply of pills. Neither our memories nor our kidneys are up to processing half a dozen different prescriptions half a dozen times a day. It's just too easy to mess up (as this author—a long way from "elderly"—discovered one morning when she took her aging dog's medication instead of her own).

One major cause of the problem is polypharmacy—the prescribing of numerous drugs by different doctors for the same person, often for the same disorder. The marketplace is also implicated. "The elderly obtain drugs from many different sources—over the counter, their local pharmacies, and mail-order sources their insurance companies mandate," notes Joseph J. Bova, owner of Cary's Pharmacy in Dobbs Ferry, N.Y. "They can end up receiving the same medication with different names and not realize they are taking it twice."

CORBIS

CONTRAINDICATION: Too many pills can confuse or harm.

Brian White, a registered nurse at the Community Hospital in Dobbs Ferry, says senior citizens are routinely admitted to the emergency room who are in grave danger from overdoses of necessary medication. And it doesn't even take an overdose to cause serious complications. "As you get older, you don't metabolize drugs as efficiently," White explains, "so medications can build to toxic levels in the blood. Just being dehydrated can cause a dangerously high level."

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olyn Meltzer, associate professor of radiology and psychiatry at the Positron Emission Tomography (PET) Center in Pittsburgh, has found a 55 percent reduction in serotonin receptors in older subjects. (Aging women suffer the further complication of a sharp decline in estrogen after menopause. Estrogen is a precursor to serotonin in the brain.)

Battling depression becomes harder still because the elderly find themselves in the constant company of death. Old people lose friends and loved ones at rates far higher than the rest of us. And when you're 90, you know that your own death is likely to be close.

Reducing Stress

Maybe the most ironic fact concerning the neurology of aging is that while practically every other significant hormone in the body declines precipitously with age, cortisol, the stress hormone, shows no drop-off whatsoever. In fact, old people may show *more* sustained cortisol production when subjected to stress tests. Apparently, we simply cannot exhaust the body's ability to flood itself with cortisol when life gets hairy.

This sounds like some malevolent Greek god's idea of a joke. If so, it gets funnier: the body's ability to *recover* from stress diminishes with age. The stress from a virus, an argument with a friend or a dip in a cold swimming pool stays with you longer when you're old than when you're young. As we age, we get better at becoming stressed and worse at letting stress go.

Lower levels of serotonin combined with higher levels of cortisol make for a harsh cocktail. This is the very hormonal makeup found in clinically depressed young people. Yet researchers are not sure how meaningful this resemblance might be. Owen M. Wolkowitz, professor of psychiatry at the University of California at San Francisco, points out that although the elderly have higher cortisol levels, they are still within normal limits. The real villain might be a drop in DHEA, a hormone that regulates cortisol. "DHEA goes down dramatically with age," Wolkowitz says. "The important thing may be the ratio between DHEA and cortisol." The "grumpy old man" view of the aged takes on new meaning considering the hormonal state elderly men (and women) often endure. If your balance of cortisol is off, those crying children in the supermarket can be *really* irritating.

Here again, negatives beget negatives. A person whose stress response system is permanently stuck on high will develop strategies designed to limit his exposure to stress—strategies that are likely to result in even less involvement with the social world than his fading energy has already decreed.

Stanford University neuroscientist Robert M. Sapolsky observes that when old people are faced with a difficult situation, they are more likely than younger people to distance themselves from it. It may be that the intense stress reaction, accompanied by slow recovery time, makes the cost of a direct approach to life's stressors too great. Withdrawing from society, however, is one of the worst things an elderly person can do; study after study has shown that social support and active engagement with other people combat depression.

Taking Charge

Forcing yourself to fight depression and stress requires initiative and planning. But the single most fundamental change gerontologists see in the normal aging brain is a 5 to 10 percent loss of tissue in the frontal lobes, which are largely responsible for these very skills, notes Mony J. de Leon, professor of psychiatry at the New York University School of Medicine. Although the brain declines slightly in size overall, no other part undergoes a change of this magnitude.

The frontal lobes are the seat of what neuropsychologists call "executive function" (EF), a cognitive capacity defined in the 1990s. Executive function is a person's ability to plan, organize time, stay focused and motivate oneself. Any degree of impairment to EF is going to hamper an elderly person's ability to ward off depression by creating an active, purposeful and structured existence—or even to want to do so. Ratey observes that for all people, a sense of purpose in life—a mission—is essential to happiness as well as to good brain function.

An impaired EF can also interfere with an individual's ability to establish and maintain social support. Motivation to see friends and family may wane. Unattractive personality traits may arise, making others less inclined to spend time with that individual, because another EF function is impulse control. The "grump" was there all along, but it was controlled. Now the older person can no longer manage this behavior.

Stimulants may help counteract brain deficits such as frontal lobe loss. Ratey and his colleagues have begun to treat the loss of energy associated with advanced age with the new medication Provigil, a novel compound that is the first to be approved for narcolepsy in 40 years. No one has pinned down exactly how Provigil affects brain cells, but it has been shown to promote alertness. Ratey describes one patient as "an 86-year-old woman who would have to return to bed for hours each day because

Better drug management strategies are the key to safety. Bova cites the Brown Bag program sponsored by New York State's Pharmacists Society, available at most pharmacies, as one approach. "Patients are asked to bring in the contents of their medicine chests for their pharmacist's review," Bova explains. "We can pick up problems such as duplication of drug therapy and help avoid mistakes." Midwesterners can find local Brown Bag help through the Meijer Online Pharmacy (www.meijer.com/pharmacy/ askpharm_frameset.html).

Ultimately, though, advances in medicine itself will provide the best solution. Researchers anticipate that when the Human Genome Project is completed we'll discover hidden links among disorders we have traditionally viewed as distinct. If, say, we find an underlying genetic link among heart disease, Type II diabetes and high blood pressure, it's possible we'll need only one highly refined medication to treat them all.

Until then, if you're elderly, keep the organizer organized, and if you're not, offer to help someone who is. —*C.J.*

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of tiredness. Now she is 'thrilled' with a restored energy level and sense of well-being. Instead of being slumped over in bed, she is reading, catching up on her correspondence and exercising." Ratey has also found that Provigil can counteract the sedation that often accompanies the many medications taken by seniors. Soon the elderly may routinely be given medications like this to treat frontal-lobe deficits.

Mental Exercise Pays Off

If by now you're becoming depressed and stressed about the prospects for a mentally healthy old age, cheer up. Help may come from sustaining simple daily habits in our lives. The key tactic is to keep challenging the brain.

Although some decline in hormones is inevitable, mental decline is not. One of the most fundamental research findings of the 1990s—"the decade of the brain"—is that neurons and their interconnections can remain remarkably plastic into one's 80s and beyond. The brain is not a preset, unalterable network of cells. Aging connections can remain flexible, and new ones can even be formed, regardless of how old that gray matter becomes. This is extremely important because it indicates that the brain can reroute connections around areas that may be growing rigid with age or even bring those areas back to greater functionality.

"The brain remains plastic until death," says Arnold B. Scheibel, a robust 78-year-old professor of neurobiology and psychiatry at U.C.L.A. and former director of the Brain Research Institute. "With plasticity we can short-circuit evolution. We can force ourselves to evolve within our own lifetimes."

Scientists are only beginning to understand how we can maintain our brain's plasticity, but a few promising avenues have been found. Physical exercise is one. Although the mechanism has not been pinned down, the physical exertion of the cardiovascular and muscular systems seems to keep the brain more pliable. One study shows that aerobic walking improves executive function in people between the ages of 60 and 75, and there is no reason to believe that this would not hold true for 80- and 90-year-olds. The subjects' ability to switch rapidly from one task to another improved, their distractibility decreased, and their ability to *stop* doing whatever they were doing (like taking their foot off the accelerator while driving) increased.

All three of these skills, by the way, are the ones affected in childhood disorders such as attention-deficit hyperactivity disorder. It is easy to see how the notion of old age as a second childhood developed—and how age-related brain deficits may one day be treated in much the same way.

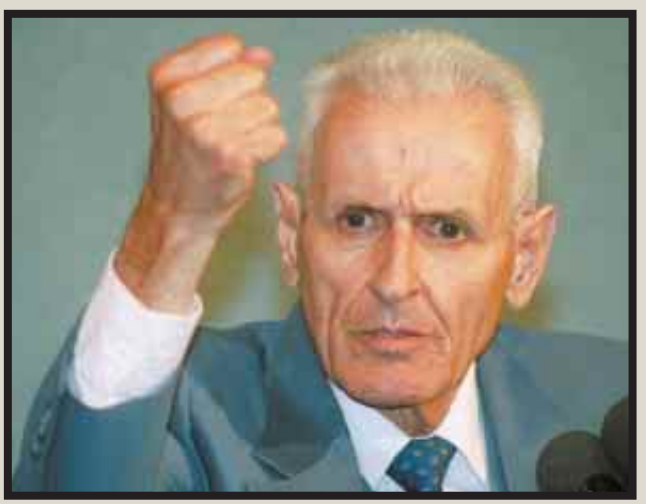
There are reams of evidence that old people who stay in touch with family, friends, church and society stay in better shape physically and mentally. Data even show that an active social life bene-

a right
to die?

Advocates of the right to die—as well as journalists covering the issue—routinely raise the horrors of old age as an argument in favor of assisted suicide, championed by Jack Kevorkian. But oldness, like beauty, is in the eye of the beholder. Although an 80-year-old might look miserable to a middle-ager, she is most likely to compare herself to a 90-year-old—and to conclude that she is doing reasonably well.

This positive outlook is a standard feature of human psychology. Even major illness and loss cannot put a dent in an ordinary person's sense of well-being for more than a few years. In study after study, victims describe themselves as being as happy overall as they were before their trauma.

The trick to happiness may be social contact. Researchers have found that a sick or disabled senior who is surrounded by friends and family will tend to characterize his or her life as satisfactory. Studies by Joel Tsevat of the University of Cincinnati Medical Center found that 43 percent of his subjects in the worst physical condition and 51 percent with severe pain described their quality of life as good. In short, no one can divine an old person's state of mind by looking at the state of his or her body.



WILFREDO LEE *AP Photo*

ASSISTED SUICIDE CRUSADER: Jack Kevorkian.

It is a slippery slope from believing in assisted suicide to simply assuming that a sick old friend or relative wants someone to help him or her die. Older Americans, who have a strong collective voice in politics and culture, should be allowed to speak for themselves. —*C.J.*

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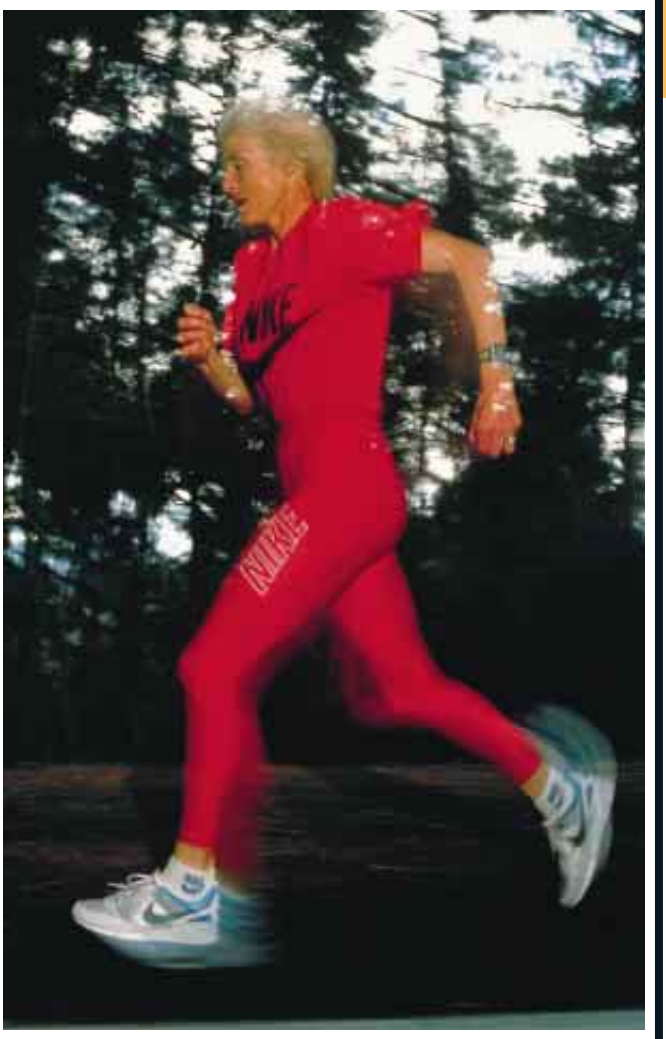
fits brain function as much as physical fitness does. Staying socially active also helps maintain a positive attitude, by improving feelings of self-worth. One study showed that older adults who attended religious services at least once a week had a survival advantage over those who did not attend. Whether it was the activity or a spiritual boost, the message is clear: you've got to stay engaged.

Elderly people who simply cannot get around may find help from the Internet. An aged person who can no longer walk or drive can find great cheer in keeping up with friends and family via exchanging e-mail, electronic photos and on-line chats.

Perhaps the most critical act in maintaining plasticity is mental exercise. As Scheibel points out, mental exercise keeps the brain alive. "We now realize, through some very exhaustive work, that the so-called aging brain is just as powerful in learning as younger brains. The old phrase 'You can't teach an old dog new tricks' is simply not true." Indeed, mental challenges, from crossword puzzles to political debates with friends, keep neuronal connections strong, just as physical exercise keeps muscle fibers strong. The "workout" lesson is the same: use it or lose it.

Undertaking completely new hobbies, vocations, or intellectual pursuits can help even further. Learning in old age may take a little longer, Scheibel says, but we remain potential learners our entire lives.

More exact advice on how to preserve mental health will surely expand as millions of baby boomers gray. The sheer numbers will change everyone's view of what old age can and should be. Robust mental health will be seen as an entitlement, not the minor miracle it is today. As a result, a significant segment of medicine will change. "Geriatrics as a specialty is only 15 or 20 years old—there was such a small clientele until 25 years ago," Scheibel says. "And research interest in aging goes back only another 15 years before that."



USE IT OR LOSE IT: Physical exertion helps to keep the brain supple; mental exercise keeps it sharp.

ED KASHI

At the social level, retirement will change substantially or be done away with altogether. Scheibel himself exemplifies the trend: forced retirement has been abolished in the University of California system, and he has continued to teach and conduct research at U.C.L.A. Scheibel believes the social custom of retirement may itself be responsible for the loss of frontal-lobe function that we now accept as normal. He notes that research work at the University of California at Berkeley by his wife, Marian Diamond, "has shown that if you stimulate [brain function] you keep it; if you don't, you lose it. One of the worst things we did for high-achieving people was to make them retire. Now we're developing legislative acts to reject this."

At 78 years old, Scheibel is a committed optimist. "In most cases," he says, "aging brings about wisdom." The growing ranks of elderly, he feels, will be "like having a vastly expanded senate in our civilization." We humans will not go gently into a 30-year state of disability and despair. Once we know what the problems are going to be, we will do our best to figure out how to thrive.

Catherine Johnson *of Irvington, N.Y., is co-author with John Ratey of* Shadow Syndromes *(Pantheon, 1997).*

Further Information

Why Zebras Don't Get Ulcers. Robert Sapolsky. W. H. Freeman, 1998.

Time of Our Lives: The Science of Human Aging. Tom Kirkwood. Oxford University Press, 1999.

Treatment of Depression with Antiglucocorticoid Drugs. Owen M. Wolkowitz and Victor I. Reus in *Psychosomatic Medicine* , Vol. 61, pages 698–711; September/October 1999.

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