

#### GETTING BY WITH A LITTLE HELP FROM YOUR FRIENDS

Scientists are heralding the discovery of “mirror neurons,” a new class of brain cells that may track the emotional flow, movement, and intentions of the person we are with, and induce this perceived state in our own brain by activating it in the same areas that are active in the other person.<sup>48</sup> What this means is that we are physiologically affected by those we spend our time with (not that we needed data about mirror neurons to know that!). So choose your friends wisely, and try to spend time with those who give you a sense of equanimity rather than amplify your stress levels.

#### BEYOND CROSSWORD PUZZLES: BUILDING UP A COGNITIVE RESERVE

Medical guidelines consistently emphasize the importance of staying cognitively stimulated in one's later years—more commonly expressed in the phrase “Use it or lose it.” Doing crossword puzzles and playing cards or chess are often mentioned as offering some protection against brain aging because they help maintain and build neuronal connections in the brain, but cognitive stimulation during your entire life can potentially be a key preventive factor against AD. In a broad sense, *cognitive reserve* refers to the brain's ability to build up resiliency against neurological damage—the capacity of neuronal connections to tolerate a greater amount of brain pathology (BAP plaques and NFT) before you exhibit dementia. Having an enhanced cognitive reserve capacity that the brain can muster in response to damage may alter your neurological adaptive capacity. The mechanisms might include:

- Building a higher synaptic volume of connections between your neurons
- Increasing cerebral blood flow
- Developing resistance to the neurotoxic effects of excess levels of hormones like cortisol and other glucocorticoids
- Promoting resistance against the depletion of neurotransmitters such as acetylcholine and dopamine, which occurs with age

- Recruiting other brain regions to perform tasks
- Increasing cerebral blood flow and metabolism and conferring greater resistance to the neurotoxic effects of environmental toxins

#### A STIMULATING METHOD FOR BUILDING YOUR COGNITIVE RESERVE

A study published by the journal *Psychological Medicine* combined data from 29,000 individuals taken from twenty-two other studies. It found that individuals reporting higher levels of mental stimulation throughout their lives had a 46 percent decreased risk of dementia. The conclusion may seem simplistic, but there is often great wisdom in simplicity. As Leonardo da Vinci once said, “Simplicity is the ultimate sophistication.”

The cognitive reserve theory was first developed in the 1980s. In 1988 a study undertaken by pioneering researcher Dr. Robert Katzman and colleagues looked at findings from postmortem examinations on 137 elderly persons and revealed this discrepancy, confirming what researchers such as David Rothschild and others had said years ago, but which had since been forgotten. Besides showing that some brains with high degrees of pathology often exceeding the criteria for AD had very few manifestations of the disease, Katzman's study also demonstrated that these persons had higher brain weights and a greater concentration of neurons as compared to age-matched controls. The most plausible theory seemed to be that some subjects had built up more neuronal connections over the course of their lives, and that their resilience to AD pathology might be said to represent a greater “cognitive reserve.”<sup>49</sup> As you know, subsequent studies of nuns and other religious orders, as well as other populations, have continued to demonstrate that plaques and tangles do not equate with clinical dementia.

Animal studies have shown that when adult rats are placed in a complex, stimulating environment they have a higher synaptic density (number of synapses per unit volume of brain tissue) than rats kept alone in individual cages and rats kept with other rats. The lesson these studies have taught us is that the level of stimulation in our environment may potentially build the cognitive reserve for human beings just as it does for rats. Moreover, physical and cognitive exercise opportunities slow the deterioration of animals in a variety of models of human disease, like AD, Hunting-

ton's disease, and amyotrophic lateral sclerosis.<sup>50</sup> Despite the results of these studies, remember my earlier caveats that science has not firmly proven the "Use it or lose it" axiom to be an empirical reality, and that animal models are inherently limited. Even so, it seems intuitively true that we will benefit in numerous ways from living an active and engaged life.

### The therapeutic power of story

The neurological benefits of narrative (storytelling-based) therapy for those with dementia are becoming increasingly known throughout the field. Since storytelling emerges from memory and imagination, and since narrative springs from an instinctive desire we have to communicate with others, guided reminiscence exercises can stimulate the prefrontal cortical regions of the brain most affected by dementia and directly engage the personhood of affected individuals. In my clinical practice, we are currently assessing whether these narrative-based therapies that facilitate interactive social exchange actually do more to promote quality of life than the drugs we give to our patients. Most assisted-living facilities are starting to integrate narrative therapies into the range of services they provide residents.

One such therapy, called TimeSlips, has been pioneered by Anne Basting, a professor of theater arts and a researcher at the University of Wisconsin–Milwaukee. Anne has recognized that, while a person's memory may degenerate, the human hunger for creative expression never entirely vanishes. Her TimeSlips project, in which volunteers both young and old lead storytelling sessions with older individuals, provides patients the opportunity to celebrate their creative narrative instinct and weave themselves into a multigenerational community through storytelling. As patients peer at ambiguous photographs held in front of them, they are encouraged to respond verbally and emotively to open-ended questions asked by volunteers. While they appraise and interpret the picture, a volunteer transcribes all of the verbalizations into a communal prose poem narrative, which is often vivid and wildly dithyrambic in its nature. The imaginative expression fostered by the TimeSlips narrative therapy grants individuals the enjoyment of agency, selfhood, and creativity once again, and allows them to access and articulate memories that have long eluded them. Even more, by the end of each TimeSlips session, a group of persons with memory challenges has together authored a prose poem that can be enjoyed by others. Anne catalogues these poems online, and has produced an off-Broadway play based on the stories collected from TimeSlips sessions, en-

titled *Are We More than Memory?*, thereby transferring the stories told to her by people with dementia back into the community at large. Anne has training centers set up regionally in the United States that offer a one-day training in her technique. Learn more by going to [www.timeslips.org](http://www.timeslips.org).

There are other Web sites that capture the power of story for those of us who are aging:

- [www.storycorps.net](http://www.storycorps.net) A fascinating initiative that is recording the life histories of our elders and storing them in the Library of Congress.
- [www.duplexplanet.com](http://www.duplexplanet.com) A site designed to portray the stories of elders who are in decline.
- [www.memorybridge.org](http://www.memorybridge.org) An organization with a mission to foster intergenerational communication and facilitate relationships between younger persons and people with dementia.
- [www.storycenter.org](http://www.storycenter.org) A nonprofit organization that assists young people and older adults in using tools of digital media to craft, record, share, and value stories of individuals and communities in ways that improve all our lives.
- [www.elderssharethearts.org](http://www.elderssharethearts.org) A Web site that affirms the time-honored role of elders as bearers of history and culture by using the power of the arts to transmit stories and life experiences throughout communities.

### Education and the cognitive reserve

Not so surprisingly, the quality and quantity of education we receive as children has been suggested as a predisposing factor for Alzheimer's disease. A study in Shanghai found the risk of developing dementia to be double for those with no education compared with those who had achieved an elementary or middle-school education.<sup>51</sup> Similar results were obtained in a study in Scotland, in which adults with late-onset dementia were found to have had lower childhood mental ability test scores than those in control groups.<sup>52</sup> An analysis of 396 persons who graduated from Cleveland Heights High School in the mid-1940s drew a link between higher IQ scores and activity levels in youth and reduced risk for cognitive impairment in old age.<sup>53</sup>

Though these retrospective studies must be taken with the usual pinch of salt (remember to think ecologically: Many factors in the “causal matrix” other than early education, such as diet or exercise, could have brought about the differences in brain aging), their findings do suggest that the number of years of education may be an important risk factor for brain aging that you can, in part, control, since continuing education—whether it takes place in or outside a classroom—may strengthen your cognitive reserve. Education can increase neuronal complexity and sow the seeds for a lifelong appreciation of learning that may inspire you to engage in reserve-building activities as you age. The longitudinal study of 678 Catholic Sisters of Notre Dame living in Mankato, Minnesota, the Nun Study, demonstrated that women who were college graduates had two to four times the chance of being functionally independent at advanced age than nuns with less education.<sup>54</sup>

When viewed ecologically, the aforementioned studies provide compelling evidence that the trajectory for cognitive decline later in life may be influenced by the amount of education available to children in their formative years. Although it goes without saying, we must all encourage our kids and grandkids to get as much education as they can. An educated brain is potentially a healthier one. Beyond that, the greater the complexity of our mind, the more valuable we may be to society.

#### LIFETIME LEARNER

At the age of ninety, Elizabeth Eichelbaum from the United States became the oldest person to receive a Ph.D. Her degree in education was awarded by the University of Tennessee on May 12, 2000.

I do want to stress that even if you didn't have a high school or college education in your youth, this does not mean that you are doomed to suffer from dementia earlier than others. Our brains are resilient, malleable organs that can be reorganized and rewired at various life stages. Even if you don't have multiple diplomas hanging on your wall, you can still challenge your mind by learning a new language, a new skill, new faces and names, and participating in activities that will build strong neural connections in your brain.

#### PROTECTING THE BRAINS OF OUR YOUNGER GENERATIONS

Given the effect of education on brain aging, we must all advocate for a more equal distribution of educational resources in the developed and developing world.

Attention must be given to ensuring safe homes for infants and children, since they learn best when they feel safe, protected, nurtured, and in a state of “attentive calm.”<sup>55</sup> Children growing up in abusive, neglectful, or war-torn households will have brains adapted to focus more on day-to-day survival rather than developing the neuronal pathways in the higher brain that will promote lifelong learning. Children exposed to abuse or an extreme lack of stimulation may develop cognitive wiring that puts them at a permanent intellectual disadvantage, weakening their cognitive reserve and disposing them to a greater dementia risk in the long term.<sup>56</sup> Again, it is up to our generation—the powerful, innovative, creative, value-oriented baby boomers—to advocate for these changes, to think ecologically and compassionately, and to leave the world a better place than the one we came into.

#### MAKING A PROFESSION OUT OF PREVENTION

Intellectual stimulation in your professional life and leisure activities can contribute to your cognitive reserve. Several studies have attempted to identify activities with the greatest protective value. Some of my Cleveland colleagues found that the frequent exchanging of ideas and participation in novel activities may result in increased neural activation and mental processing, adding to one's cognitive reserve.<sup>57</sup> Such activities include but certainly are not limited to:

- Learning a new language
- Learning to play an instrument