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The articles in this booklet will be open access at Neurology.org through the month of April 2011.
Dear Friends:

We cordially invite you – our readers – to join us in celebrating Neurology’s six decades of advancing science and beyond.

This 60th anniversary booklet marks an impressive milestone, but more importantly it reinforces Neurology’s goal to remain relevant to our readers. While our leadership, design, frequency of publication, and methods of delivering Neurology have evolved, Neurology’s mission “to provide clinical neurologists with outstanding peer-reviewed articles, invited editorials and reviews to enhance patient care, education, clinical research and professionalism” has remained constant.

To commemorate Neurology’s 60th anniversary, the journal will feature special offerings throughout the year. Editorials authored by four former Editors-in-Chief will offer the leadership’s view of each era. Abstracts of landmark articles will be re-published with accompanying commentary from our Associate Editors that will highlight the developments in neurology each decade. Podcasts will feature interviews with editors about historical articles published in the journal and a 60th anniversary page accessible from the Neurology home page will contain historical articles and videos featuring editors and staff.

In concert with 60 years of providing high-priority and cutting edge research in neurology, this compendium aspires to present a snapshot of the value Neurology offers that is “beyond the science” and to highlight topics of increasing importance to Neurology and its readers.

Neurology launched the Patient Page in July 2002 in an effort to provide a high-quality resource to patients and their families. The Patient Page provides invaluable insight into articles published in Neurology by offering up-to-date, clear, and accurate information about neurologic illnesses that is available to all. This feature adds to the wealth of patient-focused resources provided by the American Academy of Neurology (AAN), among them http://patients.aan.com/ and Neurology Now.

Residents and fellows are readers worthy of special consideration, as they represent the future of our field. Neurology features articles and editorials focusing on training and professionalism and provides a forum for residents and fellows to showcase their research, leadership, and writing talents. The recently launched Resident & Fellow Section sub-site offers resources specifically tailored to these tech-savvy neurologists-in-training.

Neurology's Podcast initiative, launched in September 2007, has also been tremendously well-received. Podcasts allow listeners to hear discussions on topics of interest and import to neurologists on demand, when and where it is convenient. Listeners may download a single podcast or subscribe to an RSS feed. In addition, podcasts, like selected journal articles, offer the opportunity to earn CME credit.

Similar to our podcasts, social media opportunities have revolutionized Neurology’s efforts to disseminate information rapidly and accurately. In addition to the outstanding public relations outreach by the AAN, we are now able to send Tweets to our followers and status updates to our Facebook fans regarding noteworthy articles and new initiatives. We are continually expanding our vision of how to best connect with our readers.

Neurology welcomes debate. In addition to featuring pro/con editorials on select articles, we publish timely correspondence from our readers. In light of technological advances and the increasing desire to promote lively discourse, we are working to launch a new rapid correspondence initiative moderated by former Editor-in-Chief Robert C. Griggs.

Images and videos, too, inform our knowledge of neurology. Graphics are expertly edited for optimal and uniform presentation in the journal. NeuroImages, where the image is the story, prove informative and eye-catching. In contrast to the instructive images published in the NeuroImages section, our newly launched Visions section provides a venue for medically or scientifically related artistic contributions by neurologists.

Creativity and humanity undoubtedly inform neurology. The seeming flipside of data and documentation, our humanities contributions provide a sturdy foundation. These “Reflections” offer insight into the experiences of both the neurologist and the patient and remind us all why we do what we do.

We are fortunate to have inherited this legacy and are honored to continue producing Neurology. And finally, a word of thanks: to our authors, reviewers and editors; to our superb staff and publishing teams (special thanks to Sharon Quimby, Morgan Sorenson, and Cindy Abair whose imagination and hard work culminated in this celebratory volume); and of course to our readers, for support and feedback.

Warm regards,

Robert A. Gross, MD, PhD, FAAN Editor-in-Chief, Neurology®

Robert A. Gross, MD, PhD, FAAN Editor-in-Chief, Neurology®
It seems fitting to assume that for the most effective expression of our aims and accomplishments, we, as neurologists, should have autonomy in publications as well as in teaching, administration, and practice. With this in view, the first number of Neurology issued under the auspices of the Board of Trustees of the American Academy of Neurology.

—Russell DeJong, 1951
Bridging the Divide
Are your patients getting the information they need? The Patient Page
Janet Jankowiak, MD and Robin L. Brey, MD
November 25, 2003 (Neurology 2003;61:1326-1327)

In an era when physician–patient contact time is limited, but there are abundant information resources, physicians often assume that their patients are amply informed. The Internet is recognized as an important vehicle for obtaining medical information, although limitations regarding misinformation are well known. However, patients may not be using the Internet for health information as much as we think. Only 40% of respondents with Internet access used the Internet to look for information about health or health care in 2001.¹ Thus, our patients often need to be guided to high-quality, credible online resources.

Since July 2002, the Patient Page has been an online feature of Neurology. The Pages provide critical reviews of clinically important discoveries in neurologic research that are clearly written for patients and their families. Each page includes a section that provides up-to-date patient information about many neurologic diseases. In addition, links to other information resources are provided for neurologic patients, such as the American Academy of Neurology (AAN) Web site, www.thebrainmatters.com, and disease-focused foundations.

The Neurology Patient Page was developed in response to the Needs Assessment Survey of AAN members asking for good patient education material. The Patient Page focuses on important neurologic topics accompanying current articles published in Neurology.

Between July 2002 and February 2003, the Neurology Patient Page received the most Web site hits of all features in Neurology. To make all neurologists aware of this feature, we are providing the Neurology Patient Page in this print issue of Neurology. All neurologists can now see what their patients are using and alert other patients to the Patient Page.

Articles are selected for the Neurology Patient Page because they have the potential to impact a large number of people or generate particular interest. Topics have ranged from stroke as a medical emergency (“brain attack”) to neurologic complications after stem cell transplantation in children (table). The Patient Page is written specifically for patients and their families to provide clear, accurate, up-to-date information about the diagnosis, management, and treatment of neurologic illnesses.

The article featured in this edition of the Neurology Patient Page is about the consequences of having myasthenia gravis on pregnancy and delivery and for the newborn. It is written by Carlayne E. Jackson, MD, and reviews in lay language “Myasthenia gravis has consequences for pregnancy, delivery, and the newborn” by Hoff et al. in this issue of Neurology.²

Users can access the Patient Pages in several ways. By clicking on the Patient Page icon and link on the home page of the Journal (www.neurology.org), users are led to an index of all published Patient Pages. In addition, there is a Patient Page section listed in the Table of Contents in the second issue of every month (print and online) with an “E” (electronic) page number. Print readers are made aware of the availability of the online-only page and Internet users can access it online within the Current Issue or Search links.

All Neurology Patient Page articles can be easily downloaded and printed, and may be reproduced to distribute for educational purposes. Make copies of the Neurology Patient Page available in your office or send your patients to www.neurology.org. The Neurology Patient Pages are only a click away.

For a complete list of references for this article please visit us online at neurology.org.
Memory loss commonly occurs as a result of the loss of nerve cells in the brain. When memory loss is so severe that it interferes with normal daily functioning, it is called dementia. People with dementia may have difficulty learning new things or remembering names of people they just met. They may get lost in places that were previously very familiar or have trouble finding words. The term “mild cognitive impairment” is used for a common condition in elderly people in which the memory problem is usually mild and does not interfere with normal daily activities. Most people with mild cognitive impairment do not develop a severe memory problem or end up developing dementia. There are many things that can cause dementia. One of these is Alzheimer disease (AD), the most common cause of dementia in the elderly. Another is called vascular dementia, caused by brain damage due to strokes. More information about causes of dementia can be found on the next page.

In this issue of Neurology, O’Brien and colleagues report the results of a study in elderly people evaluating the risk of developing dementia after a person has had a stroke (Gamaldo A, Moghekar A, Kilada S, Resnick SM, Zonderman AB, O’Brien R. Effect of a clinical stroke on the risk of dementia in a prospective cohort. Neurology 2006;67:1363–1369). The study included 335 elderly subjects who were on average 75 years of age when they entered the study. None of them had a memory problem, stroke, or major brain disease in the past. Subjects were evaluated on a yearly basis for memory problems and for whether they had a stroke. Overall, subjects were followed in the study for an average of 10 years.

During the follow-up period, roughly half of the study subjects developed mild cognitive impairment. There were 36 subjects who had stroke. Of the group of subjects who developed a stroke, about two-thirds of them also developed dementia in the first year after the stroke. The majority of patients with dementia after stroke had mild cognitive impairment prior to the occurrence of the stroke. Most of the subjects with mild cognitive impairment who did not have a stroke ever developed severe memory problems over the course of the study and some even showed signs of improvement.

There were 157 patients who died during the follow-up period. Autopsies were performed in 22 patients who had had a stroke and 108 who had not. Of the 108 subjects who had not had a stroke during follow-up, 26 of them were found to have brain damage caused by a stroke that did not cause any symptoms during life. These autopsy studies of the brain showed that people with strokes found only at autopsy were more likely to have mild cognitive impairment than subjects who did not have these abnormalities. The researchers also found brain abnormalities that are also seen in patients with AD in half of the subjects who died. These AD changes seemed to be a risk factor for cognitive impairment in these elderly subjects.

What did we learn from this study?
It seems clear that mild cognitive impairment is a common problem in elderly people. In most people, the memory problems do not progress and may even improve with time. However, in people with mild cognitive impairment who also have a stroke, there is a much greater chance for developing dementia. The fact that almost half of the subjects who died had brain abnormalities also seen in people with AD suggests that these abnormalities may be a cause of mild cognitive impairment in the elderly.

Why is this important for me?
While mild cognitive impairment was very common in this very elderly population, as long as subjects did not also have a stroke, their memory problems remained mild. This suggests that it is very important for elderly people to lower their risk factors for stroke as much as possible to help prevent dementia. This includes controlling high blood pressure, diabetes, and high cholesterol levels, remaining physically active, and not smoking cigarettes.
Stroke is a “brain attack” commonly caused either by a sudden loss of blood flow to the brain or by a bleeding inside the head. Eighty percent of all strokes are called ischemic due to loss of blood flow. About 20% of strokes are called hemorrhagic due to bleeding.

Large ischemic strokes are usually caused by narrowing of the large arteries in the neck and brain due to atherosclerosis. If the clot forms in the neck vessels, pieces can break off and block the brain vessels. Clots may also arise from the heart and travel to the brain vessels where they become lodged. Large ischemic strokes usually give symptoms such as muscle weakness, loss of feeling, speech and vision problems, double vision, headache, unsteadiness, sleepiness, and sometimes death. People with uncontrolled high blood pressure and diabetes often have small ischemic strokes that involve very small arteries in the brain. Small ischemic strokes may not cause any symptoms. It is not unusual to find these asymptomatic, or “silent” strokes on brain scans that are done for other reasons.

It is estimated that approximately one third of stroke victims will develop memory problems and serious difficulties in other aspects of performing daily activities. The memory problems can be so severe that they interfere with normal functioning and are then called dementia. This is more common as people get older. When dementia occurs after a stroke and no other cause can be found it is called vascular dementia.

Both large strokes strategically located in certain areas of the brain or multiple small strokes can result in vascular dementia. Certain features like old age, prior memory problems, a history of several strokes, or a stroke located in the left side of the brain all seem to increase the likelihood of dementia in the first year after stroke.

The symptoms of vascular dementia in addition to the memory loss include slow movement, slow thinking, lack of attention, and lack of an ability to do simple tasks. These symptoms are sometimes hard to differentiate from those produced by AD, the most common cause of dementia in the elderly. Symptoms of dementia after stroke can also be hidden by other more obvious stroke manifestations like paralysis, blindness, or lack of awareness. Another problem in recognizing the symptoms of dementia after stroke is that these symptoms can be confused with depression, which is quite common after stroke.

Can we prevent memory loss after stroke?  
The best way to prevent dementia after stroke is to avoid having a stroke. Just controlling high blood pressure can markedly reduce the risk of having a stroke. Having regular check-ups, exercising, eating healthily, keeping a normal cholesterol and blood sugar level, and quitting smoking can dramatically reduce the risk of stroke as well.

How do we treat memory loss that occurs after a stroke?  
There is no specific medical treatment to help reverse the memory loss that occurs after a stroke. Neurologists sometimes prescribe medications approved for AD for people with vascular dementia, but we do not yet have studies to address the usefulness of these medications in patients with vascular dementia.

For more information  
American Academy of Neurology  
www.aan.com  
American Stroke Association, a division of the American Heart Association  
www.strokeassociation.org
Effect of a clinical stroke on the risk of dementia in a prospective cohort
A. Gamaldo, BA, A. Moghekar, MD, S. Kilada, BA; S.M. Resnick, PhD; A.B. Zonderman, PhD; and R. O’Brien, MD

October 24, 2006 (Neurology 2006;67:1363-1369)

Abstract—Objective: To examine the risk and determinants of dementia following a clinically overt stroke in a prospectively followed cohort of elderly subjects. Methods: We examined the effect of a clinically detectable stroke on the risk of dementia using prospective data from 335 subjects in the Baltimore Longitudinal Study of Aging, all of whom were cognitively and neurologically normal at entry into the study (mean age at entry 75.1 ± 4.2 years). Results: Clinically overt strokes are common in our cohort (cumulative risk by age 90, 15.4%; 95% CI: 10 to 22%) and confer an increased risk of dementia compared to subjects without stroke (odds ratio [OR] 5.55; 95% CI: 2.76 to 11.4). The majority of patients who became demented after a stroke had evidence of mild cognitive impairment preceding the stroke (14 of 19). Moreover, a clinically symptomatic stroke was a major risk factor for the conversion of mild cognitive impairment to dementia (OR 12.4; 95% CI: 1.5 to 99). When cognitive impairment did not precede the stroke, there was no increase in the risk of subsequent dementia. Pathologic data indicate that both vascular and Alzheimer pathology leads to the prestroke impairment. Conclusion: Dementia after stroke may be determined by cognitive impairments that exist prior to the stroke.
Mentoring the Next Generation
ABSTRACT
Educators of the next generation of neurologists will face several challenges, including changes in academic medical centers and hospitals, changes in the scope and practice of neurology itself, and changes in trainees, related to both access to information technology and professional goals. This article, which originated as a lecture given at the A.B. Baker Education Symposium at the 69th annual meeting of the American Academy of Neurology in April 2008, arose out of an attempt to enumerate these challenges and to suggest ways to address them. First, approaches to overcoming challenges will likely require reinvigorating the commitment to teaching in fundamental and concrete ways, including, for example, establishing communities of educators and taking seriously the teaching role provided by clinicians. Second, it is expected that changes in the scope of educational content will be needed. Learning the role of the neurologist in a broader societal context will become an increasingly important part of training. It should be emphasized, as well, that trainees should play an important role in the redesign of neurology training and practice; in fact, their participation in this hidden curriculum constitutes an important part of their education. Third, new information technologies, such as Google, Wikipedias, and podcasting, will likely play an increasingly important role in neurology education. Finally, generational differences in familiarity with these new technologies, and differences in professional and personal goals, may lead to different career opportunities and plans for future neurologists than have been considered the norm in the past.

Neurology 2009;72:657-663

GLOSSARY
AAN = American Academy of Neurology; ACGME = Accreditation Council on Graduate Medical Education; UCNS = United Council for Neurologic Subspecialties.

CHALLENGES IN EDUCATING THE NEXT GENERATION OF NEUROLOGISTS
Graduate medical education, including neurology residency, has undergone tremendous change in recent years (table 1). Easy enough to enumerate, these changes pose both challenges and opportunities for educators and administrators.

CHANGES IN THE ENTERPRISE OF ACADEMIC MEDICINE
Academic medical centers face increasing pressures today, with potential corrosive effects on physician education. Research, commercial development, and practice all challenge education as a major focus of the academic mission. Many physicians do not receive compensation or recognition for their teaching efforts. Development of optimal methods for teaching the next generation, therefore, will occur in an environment of reduced financial support and, in many cases, reduced morale.

While commercial development of research offers possible alternative funding sources, it incurs risks, as well. In particular, physicians may be exposed to biased information or feel pressured to behave in ways that are not in patients’ best interests. Most physicians underestimate the effect of exposure to industry representatives on their own decisions, though they believe others are influenced. This problem is especially acute for trainees, who may be less able to distinguish between unbiased and biased data, and who may be more vulnerable to explicit or subtle influence. These concerns have led to stricter rules regarding interactions between trainees and pharmaceutical representatives, but such interactions cannot be fully eliminated. Efforts to simply block trainees from encountering salespeople, moreover, may be shortsighted, not unlike sex education campaigns that teach abstinence rather than contraception. After all, trainees eventually become independent physicians.

From the Department of Neurology, College of Physicians and Surgeons, Columbia University, and the Columbia-Presbyterian Medical Center of New York Presbyterian Hospital, New York.
Disclosure: The author reports no disclosures.
Table 1  Challenges in educating the next generation of neurologists

| Changes in the enterprise of academic medicine | Education competes with research and practice for attention |
|                                              | Decline in faculty time/reward for teaching |
|                                              | Decreased funding |
|                                              | Relationships between commercial sponsors and education |
|                                              | Inflexible regulatory requirements |
| Changes in neurology                        | Rapid pace of growth in scientific knowledge |
|                                              | Increased subspecialization |
|                                              | Role of inpatient vs outpatient care |
| Changes in trainees                         | Generational differences |
|                                              | Demographic differences |
|                                              | General comfort with virtual reality and the information superhighway |
|                                              | Changing interpretation of professionalism |

Educational programs are also increasingly subject to regulatory oversight. For example, the Accreditation Council on Graduate Medical Education (ACGME) introduced the core competencies, requiring educators to redefine the educational mission according to six specific areas of core knowledge and ability. These core competencies as they apply to neurology have been thoroughly reviewed, and suggestions for how to incorporate them into training have been published. The ACGME has also introduced duty hour restrictions. Of note, these changes occurred in the setting of shrinking reimbursements and increased administrative burdens, compounding difficulties for program directors. Many program directors have become experts in documentation, but have little time left for teaching their trainees. Changes in educational approaches will thus need to account for these regulatory requirements and unfunded mandates.

CHANGES IN NEUROLOGY Changes specific to neurology are also occurring. While growth in basic and clinical neuroscience is welcomed, it poses educational challenges. First, one can reasonably argue that there is more neurology to learn, due to the successes of neuroscientists and clinical researchers. Hardly a day goes by without report of a new gene or a new syndrome. Neurologists in training must now incorporate into practice new medications, clinical trials, and guidelines on an ever-expanding basis. Educators are therefore struggling to teach more neurology in the same time.

As a result of this boom in knowledge and therapeutic possibilities, subspecialization is also increasing. The ACGME and the United Council for Neurologic Subspecialties (UCNS) have expanded the number of subspecialties with formal certifica-
for education, such as the ACGME and Residency Review Committee, cannot easily master these technologies and fit them into their long-term educational strategies. Educators, however, need to recognize both the potential benefits and limitations of these new developments if they are to best incorporate them into the educational mission. The challenges of these technological innovations are being felt across the cultural spectrum, but their effects are likely to be as great in medical education as anywhere else.

**RESTRUCTURING THE APPROACH AND COMMITMENT TO TEACHING** Neurologists, perhaps more than many others in academic medical centers, have always prided themselves on being among the best teachers. In the setting of limited salary support for teaching, and the growing pressure to be more productive in research and practice, however, neurologists’ teaching role is at risk of being shortchanged. Two of the major recommendations of the recently released American Medical Association Initiative to Transform Medical Education, in fact, focus on the need for institutional commitments to faculty development and ensuring that funding and time commitments are made conducive to faculty teaching. Educational planning, delivery, and research should explicitly be considered in promotion and tenure decisions. Many institutions have responded to this challenge creatively by creating academies within medical centers that focus on education. These academies provide ways for clinician-educators to share ideas across departments, join forces in promoting the crucial role of the educational mission in their institutions, and argue for greater respect and funding of education.

Another potential advantage of the increased consolidation of education within medical centers is the possibility for educational research. Education research is currently underrepresented in neurology compared to other medical and surgical specialties. The American Academy of Neurology (AAN) has recognized the importance of education research by initiating grants for education research proposals, and Neurology is committed to publication of education research papers. It is anticipated that with the improved quality of education research there will be more career possibilities along clinician-educator promotion tracks. In our endeavor to practice current, scientifically based medicine, it is also intuitively appealing that our approach to education should be equally scientific. Evidence-based medicine should be taught through evidence-based education. A major aspect of the ACGME use of core competencies, for example, is its Outcomes Project, which seeks to determine what works and what does not in training physicians and improving patient outcomes. Recommended ways to measure and achieve improved outcomes in graduate medical education are available on the ACGME Web site, but research is needed to prove their efficacy. It remains to be determined, for example, whether neurology training based on teaching and evaluation of the six core competencies can be accomplished without any sacrifice in mastery of fund of knowledge, arguably the cornerstone of residency training. Equally important, when specific educational methods are proven effective, will be ensuring that they are put into practice, just as we emphasize implementation of clinical guidelines.

**CHANGES IN THE SCOPE OF EDUCATIONAL CONTENT** The hidden curriculum. In a fragmented health care system, neurologists, like other physicians, increasingly require an appreciation of the context within which health care is delivered. Neurologists need to navigate the system, play an important role in helping patients to navigate it, and, ideally, work to help fix it, as well. David Leach, past director of the ACGME, has written about efforts to transform training to incorporate knowledge of the context in which health care is provided, and to involve trainees in efforts to improve the health care system. In fact, he argues, residents are in many ways better positioned to fix or improve the system because of their unique place in the trenches. Residents’ specific, local knowledge of how medicine is practiced is part of a hidden curriculum. These issues
are equally important for neurologists as they are for family practitioners. For example, issues related to practice and hospital systems frequently arise within residency programs, such as medical record completion, hospital initiatives to improve documentation, hospital certification, and optimal ways to structure rotations to maximize efficiency and work hour compliance. These issues provide opportunities for practical resident education. For example, at our institution residents are involved on committees tasked with redesigning the curriculum, rotation structure, and lecture content. Active participation in this process provides an opportunity for residents to demonstrate competence in practice-based learning and improvement, professionalism, and systems-based practice. Neurology residents at the University of Pennsylvania, together with medical students, organized a program to teach neuroscience to high school students, and they are assessing the effects of this program on career choices of these high school students. Others have studied methods of improving the teaching skills of residents, though it remains unclear how best to do this, and few reports include neurology residents. An example of a more formal approach to this process of involving residents in systems improvement is the combined residency program in preventive medicine at Dartmouth-Hitchcock in Hanover, NH, in which residents in any of several subspecialties do additional training in preventive medicine.

Balancing the art and science of neurology. With greater therapeutic potential comes greater responsibility, and a requirement to balance the art and science of neurology. The role of individual discretion has changed in the era of evidence-based neurology. Residents will thus need to learn to practice in a system that expects and rewards an understanding of evidence-based and, sometimes, protocol-driven neurology. In many cases, evidence-based neurology requires an appreciation of the availability of guidelines, like those produced by the AAN, and strict adherence to protocols. This is probably most evident in vascular neurology, in which timely delivery of treatments is a crucial factor. The American Heart Association Get with the Guidelines program, for example, emphasizes treating patients in standardized fashion, although many neurologists may object to this regimentation. Joint Commission on the Accreditation of Healthcare Organizations has mandated standards for hospitals that wish to consider themselves primary stroke centers, and there are plans to create similar criteria for comprehensive stroke centers. Failure to adhere to standards could lead to loss of certification. Residents are explicitly invited to participate in writing guidelines for the AAN, and their involvement arguably goes a long way toward demonstrating core competencies in practice-based learning and improvement, and professionalism.

The end of rotations? The limitations of traditional rotations are also becoming increasingly evident. An emphasis on competence, rather than time-locked rotation experiences, suggests that some trainees can achieve competence in less time than others. Similarly, the same length of time training at one institution may afford a different breadth of clinical experiences than training elsewhere. Fixed duration experiences for everyone, therefore, do not appear to account for the fact that competence may be achieved in different ways and on different schedules by trainees.

Inpatient hospital-based rotations, moreover, may not provide optimal training for the type of neurology that most residents will ultimately practice. Since the 1970s neurologists have reported a disconnection between the types of illnesses encountered in training and those encountered in practice, and there have been calls to increase the proportion of time spent in outpatient training. Residents are now required to have longitudinal continuity clinic at least one day weekly throughout residency, and at least 6 months of outpatient training. Even with these increases in outpatient training, however, neurology still falls short of outpatient training requirements in other similar medical specialties. Internal medicine, for example, requires a full third of residency be spent in the ambulatory setting. Pediatrics requires outpatient continuity clinics one half to one full day weekly and a separate and formal nonclinical community experience to “prepare residents for the role of advocate for the health of children within the community.” Longitudinal clinical training experiences, emphasizing outpatient training, may be optimally suited for teaching a specialty like neurology. Doing so effectively, however, would require restructuring responsibility for the costs of graduate medical education to include payors other than Medicare, as well as the use of other nonpatient health care providers, including physician assistants, nurse practitioners, or hospitalists.

Some educational experiences other than direct clinical care, moreover, are best suited to longitudinal training. Learning about systems-based issues of care—such as problems in health care delivery or development of clinical guidelines—may benefit from longitudinal educational approaches. Involvement in research also requires a similar long-term commitment. One month research electives often do not offer more than a break from the wards. There is some evidence that recognition of the needs of different
types of trainees is leading to changes in the structure of training. The Neurology RRC, for example, has approved a proposal to allow a flexible curriculum for developing physician-scientists.15

NEW TECHNOLOGICAL ADVANCES AND THEIR POTENTIAL ROLE IN NEUROLOGY EDUCATION There may be a divide between those trained before and after the advent of advanced neuroimaging and genetics.16 It is possible, however, that these distinctions will be overshadowed by qualitative changes occurring with the current information revolution, and thus between the Millennial generation and preceding generations. As an example, several physicians have described the power of Google in providing possible medical diagnoses. One resident impressed her attending by diagnosing an extremely rare disorder on rounds using Google.17 A different group of residents found that Google provided medical diagnoses over 50% of the time when faced with challenging New England Journal of Medicine clinicopathologic case conferences.18 These examples demonstrate that the ready availability of a virtually limitless database of information is potentially transformative not only of trainees' knowledge, but also of their relationship with patients and supervising attendings.

There is no doubt that modern technology and the Internet make possible finding the proverbial needle in a haystack in medicine. The broader possibilities represented by this capability are encapsulated by the concept of Web 2.0, a vast, distributed network of individuals openly sharing information and technology.19 Whereas the initial phase of the Internet included many static pages created by individuals or private interests, Web 2.0 represents an interactive, collaborative, constantly evolving network of information reflecting communication among many different people. The benefits derive from open access and sharing of information. The specific ways in which Web 2.0 manifests itself are growing, and they include blogs, medically oriented Wikipedias, podcasts,20 and others. Neurology21 began offering podcasts in 2007.22 The next generation of Web technology, also referred to as the semantic Web, may provide a still more efficient way of retrieving information.23

An outstanding question is how electronic media leads to changes in communication among physicians, and between physicians and patients. Electronic mail, for example, provides wonderful opportunities for rapid, inexpensive, virtually unlimited communication among users. The writing contained in e-mail is less formal than traditional writing, however, and in many ways closer to oral rather than written communication. Physicians may need to consider this when using e-mail among themselves or with patients. Consider the curbside consult, in which one physician informally asks advice of another, but no note appears in the chart. The consulting physician generally has not examined the patient or reviewed the records fully, if at all. Typically, the opinion is provided verbally to the requesting physician, with the often tacit understanding that the opinion is based on a superficial knowledge of the case. If the opinion is provided through e-mail, however, it may take on a greater degree of formality and potential liability. For better or worse, then, we will need to educate residents—and ourselves—in the context of the availability of these technologies.

GEN Y AND THE NEW PROFESSIONALISM Intergenerational differences. The current generation of trainees may differ from previous generations in ways that are relevant to education and practice. First, having been brought up in a world of rapid technological innovation and change, they are accustomed to access to a virtually effortless and limitless information network. They are thus skeptical of traditional top-down educational methods, such as lectures, and they are capable of organizing their own educational experiences. They are also comfortable communicating and forming relationships with others whom they know only virtually, that is, with people whom they have never met. Thus, using distributed networks of people, they may be able to organize themselves across geographic space to solve difficult problems.

Second, the demographics of younger generations of neurologists differ from those of previous generations. One of the most notable changes has been the increase in the proportion of women in medicine in younger generations. Over the past 20 years the proportion of medical students who are women has increased from less than 10% to 50%.24 The proportion of neurologists who are women is increasing comparably.25

Third, while studies are limited and methodologically limited, there is evidence that the Baby Boomer generation perceives younger generations as being more concerned with lifestyle and work-life balance, less committed to medicine, and working fewer hours.25 Both men and women in Gen X express similar feelings about the balance of work and personal life.26 As of yet, there is little data about Gen Y physician work attitudes.27

Fourth, other demographic and societal trends influence career choices of medical school graduates today. As alternative career opportunities expand, younger physicians may be less likely to pursue traditional full-time clinical practice careers. From 1997 to 2004, the proportion of medical school graduates
planning on full-time practice has decreased. More physicians may also choose sequential career changes, rather than committing to a single career pathway for life.

**The democratization of knowledge.** Additionally, traditional hierarchies may have less significance to today’s trainees due to the democratization of knowledge. With availability of information to all on a handheld device, medical students, residents, and even patients have as much data available on rounds as highly experienced clinicians. Rather than information flowing only downhill from attending to resident to medical student to patient, information may flow up the chain of command, as well. Everybody will need to adjust to the new possibilities this entails, but it is likely that the greatest challenge, as in most revolutions, will be for those who are accustomed to being at the top of the hierarchy. There is already evidence that competence declines with time after training; studies have provided evidence that there is an inverse relationship between time in practice and quality of care delivered, though some have questioned these findings. This decline with time could accelerate as the pace of scientific and technological change increases, further augmenting the differences between the generations. In the future, it is possible that each generation will offer complementary skills in educating the others to provide optimal care.

**The evolution of professionalism.** Several medical organizations have sought to redefine professionalism in the setting of a changing healthcare environment, and they have affirmed three major principles as guiding the profession: primacy of patient welfare, including altruism; patient autonomy; and social justice. It remains unclear, however, how new generational, demographic, and technological trends will influence educational philosophy and evolving views of medical professionalism. Given what are thought to be Gen Y’s defining characteristics, this next generation may not be satisfied being told by others what professionalism is. Principles and abstract commitments may not be accepted without question, and Gen Y may prefer to redefine professionalism for themselves. In particular, the importance of balancing professional and personal life may become increasingly important. While altruism and social justice are likely to remain important principles among most physicians, self-actualization, attention to family, and flexibility in work schedules may emerge as alternative values, in degree if not in kind. Consistent with these evolving notions of professionalism, younger physicians may view their career paths as including different activities at various stages.

They may not see themselves as committing to a lifelong practice of a particular specialty. How these potentially competing values will be balanced in the professional lives of the next generation, and how these issues will be addressed by professional organizations and certifying bodies, remains unknown.

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Right Brain: Reading, writing, and reflecting
Making a case for narrative medicine in neurology
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A narrative, at its simplest, is a story. Doctors listen to and tell stories every day. At morning report, on rounds, at case conferences, while taking a patient’s history in clinic and when signing out in the evenings, stories are told, revised, and retold. These narratives are the foundations of clinical practice and the currency of patient-physician and physician-physician relationships.

Neurologists are the custodians of speech and language within the medical community. We study, examine, and characterize speech and language and can diagnose pathology based on their aberrations. Not only do details and subtle nuances frequently make the diagnosis, but how the patient tells a story, including word choice, sentence structure, and prosody, takes on clinical significance. Neurology is one of the few specialties in which the patient’s history has retained its value despite increasingly sophisticated diagnostic technology.

More can be gained from a patient’s story than dry facts placed in a sequential pattern. Absorbing, interpreting, and responding to a patient’s narrative require a special skill set. These skills, called “narrative competence” by narrative scholars, include those that are practical, such as recognizing a story’s structure and appreciating metaphors and illusions, those that are creative, such as envisioning multiple endings, and those that are emotional, such as feeling empathy and recognizing a story’s mood. By developing narrative competence, physicians can better understand a patient’s experience and thereby be better equipped to help him or her.

WHAT IS NARRATIVE MEDICINE? Narrative medicine, rather than a specialty, is a framework for clinical practice based on developing and utilizing this skill set. It is a way of approaching the clinical encounter that focuses on appreciating and reflecting on the patient’s experience and the patient-physician relationship in order to improve both by building trust, developing empathy, and fostering a sense of shared responsibility in a patient’s health.

Narrative competence rarely is taught as part of traditional medical school courses or on hospital wards. Specific programs in narrative medicine, however, have been implemented in many medical schools and residency programs throughout the world. Curricula in narrative medicine typically include two parts: reading of literary texts related to health and illness to gain practice in hearing and interpreting the stories of others and reflective writing about the patient’s and the professional’s individual and shared experience.

LITERATURE IN MEDICINE

...You can’t understand. You’re using the language of reason, not of the heart; you live in a world of abstractions.
—Albert Camus, The Plague

Literature and medicine have amicably coexisted since Apollo was recognized as the Greek god of both medicine and poetry. The novel, the case report, and the autopsy were even developed at roughly the same time. Many of the great literary texts, such as Middlemarch by George Eliot, The Plague by Albert Camus, and The Magic Mountain by Thomas Mann, are centered on illness and its victims. Neurologic illnesses are well-represented in literature with works including those as diverse as The Idiot by Fyodor Dostoevsky, Awakenings by Oliver Sacks, and The Dying Bell and the Butterfly by Jean-Dominique Bauby. The large number of physician-writers, including Sir Arthur Conan Doyle, Anton Chekhov, and William Carlos Williams, underscores the shared interests and methods of the two disciplines.

The study of literature has been part of medical school curricula since the early 1970s, introduced at a time when medicine was especially focused on nurturing patient-centered practice. An informal survey conducted by the Society for

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Health and Human Values in 1994 found that approximately 30% of US medical schools taught literature as part of its curriculum. By 1998, the most recent statistics available, 74% of those medical schools taught courses in literature and medicine and in 39% of them, it was a required course. Literature and medicine as a subdiscipline currently has its own scholarly journals, professional societies, graduate programs, and sources of research funding.

The study of literary texts offers many advantages to students and develops skills that may not be obtainable in any other way. Through literature, a reader enters into another person’s experience, often historically, culturally, and physically different than his or her own. The situations, actions, emotions, and effects on the character are laid bare in a way that would be impossible in reality. Expert writers present readers with whole, complex characters, meaningful scenarios, and a purposeful plot structure allowing them to make sense of the story and come to their own conclusions. The partially or wholly fictitious nature of most of these works is an advantage as it strips the situation of the uninteresting and confusing elements that complicate real life.

By reading an author’s rendition of sickness, suffering, and death, the physician can better understand his or her own patient’s experience with illness. For example, Bauby, in his *The Diving Bell and the Butterfly*, describes the helplessness and frustration he feels by being trapped inside his locked-in body while his mind remains active:

> Reflected in the glass I saw the head of a man who seemed to have emerged from a vat of formaldehyde. His mouth was twisted, his nose damaged, his hair tousled, his gaze full of fear. One eye was sewn shut, the other goggled like the doomed eye of Cain. For a moment I stared at that dilated pupil, before I realized it was only mine... Whereupon a strange euphoria came over me. Not only was I exiled, paralyzed, mute, half deaf, deprived of all pleasures, and reduced to the existence of a jellyfish, but I was also horrible to behold.\(^{1}\)

The book itself, each individual letter of which the author communicated via eye movements, is a monument to the irrepressibility of the creative spirit, even in the face of catastrophic obstacles. Through great texts, such as this one, physicians become more familiar with the experience of pain and illness in a way that is more personal than could be safely ascertained with a real patient.

The act of reading itself is also beneficial. Reading literature builds interpretive, communicative, and empathic skills.\(^{2}\) Physicians can put the skills developed in reading literary texts to use while reading other complicated narratives such as medical charts, case studies, and even medical texts.\(^{3}\)

**PERSONAL REFLECTION**

But whatever else poems do, or do not do, at the very least they profoundly alter the man or woman who wrote them.

—Daniel Abe\(^{4}\)

Reflective writing is another method for developing narrative competence. Reflections take the form of clinical journal writing or critical incident reports where the writer is free to choose a patient or case significant to them or else to write centered around a predetermined theme (e.g., death or breaking bad news) or event (e.g., the illness of a relative). Participants experiment with different perspectives, voices, styles, and literary formats (e.g., plays, poems, prose). The only fixed rules are that reflections be stories or impressions of experiences rather than case reports, that medical language be avoided, and that the reflections be written. Writers frequently share their reflections in a small group environment.

Reflective writing often centers on a patient’s experience, frequently from the patient’s perspective. The physician is allowed time and space to ruminate on how it feels to be the patient, and how the patient is reacting to what he or she is experiencing. Writing about a patient in this way reduces the emotional distance between doctor and patient that traditional clinical practice imposes and increases a physician’s ability to empathize.\(^{5}\) Unrecognized attitudes and feelings emerge which can then be dealt with rather than left to linger, making a doctor more available and useful to his or her patient. In addition, reflecting on one’s own actions in a clinical encounter allows the doctor’s voice, typically absent, to be brought back into the patient’s story.

Learning is a cycle of action, reflection, interpretation, and reaction. Reflective writers study their own decision-making, feelings, behaviors, interactions, and gaps in knowledge and skill. Reflecting on one’s own practice coincides with the development of insight into one’s own educational needs and the ability to better practice well autonomously.\(^{6}\) Reflections draw out professional and ethical issues that the writer can then think about seriously on his or her own and subsequently gather the viewpoints and judgments of his or her colleagues.

**RESEARCH INTO NARRATIVE MEDICINE** The desired outcomes of narrative medicine, such as empathy, personal satisfaction, and relationship-building, are inherently difficult to study, not
lending themselves easily to quantification and measurement. The research that has been done into narrative medicine courses, however, has shown them to be effective in developing the specialized skills associated with narrative competence and in improving the overall well-being of physicians and students. Outcome studies of literature and medicine courses, relying on post-course student evaluations, questionnaires, and faculty member assessments, reveal that such programs improve students’ understanding of patients’ experiences, their relationships with patients, and their functioning in clinical situations.\textsuperscript{15-14} Within the more general scientific literature, writing about challenging or traumatic experiences has been shown to have health and psychological benefits in multiple studies including those in new mothers, victims of crime, and college freshmen.\textsuperscript{15} Writing about prior trauma boosted immune response to hepatitis B vaccinations in a subgroup of medical students.\textsuperscript{16} Another study found improved PEV\textsubscript{4} measurements in people with asthma and a decrease in disease severity scores in people with rheumatoid arthritis in those who wrote about stressful experiences compared to a control group who wrote on neutral topics.\textsuperscript{17}

The effects of narrative medicine on patients themselves, however, are still unclear, as little research has been done on the subject. Recent studies in the psychiatric literature are using new validated tools to measure patient-perceived physician empathy via skin conductance.\textsuperscript{18} Researchers into narrative medicine could follow suit by measuring patient-perceived physician empathy before and after the physician undergoes narrative medicine training and then correlating those results with patient satisfaction. Other possible lines of research include investigating practical measurements of the patient–physician relationship such as time to diagnosis, number of follow-up phone calls, likelihood of being lost to follow-up, and long-term survival.

NARRATIVE MEDICINE IN NEUROLOGY

We have five senses in which we glory and which we recognize and celebrate, senses that constitute the sensible world for us. But there are other senses—secret senses, sixth senses, if you will—equally vital, but unrecognized, and unlauded.

—Oliver Sacks

Neurologic illnesses are unique in how they affect a patient’s personhood and ability to function. They dehumanize in a way that heart disease and renal failure do not. A stroke may rob someone of the ability to speak, walk, or feel in a second whereas multiple sclerosis may gradually erode a patient’s functioning, leaving him or her struggling to adapt to unexpected obstacles every day. The uniqueness of these illnesses and their impact on people is part of what makes neurology both fascinating and challenging.

This uniqueness can also make it difficult for a neurologist to relate to his or her patients. Few can imagine what it is like to be hemiparetic or aphasic because it is so far removed from healthy life. These patients, however, stand most in need of being listened to and understood. While most neurologists will never know how it feels to have amyotrophic lateral sclerosis or to be locked-in, they can better understand alienation, frustration, and hopelessness through literature and reflective writing and therefore be better equipped to help patients through their own journeys.

The nature of neurologic illness often makes for long and rewarding relationships with patients and their families. The cognitive decline and debilitation of a long-term patient, as well as the effect of the illness on caregivers and families, however, can be hard for a neurologist to process. Self-reflection and discussion with peers can make coping with these issues easier, improving the physician’s quality of life and ability to care for patients.

In addition to asking what narrative medicine can do for neurology, however, the reverse should also be asked. The field of neurology, with its historic interest in speech, language, emotion, and cognition and its new fMRI technology that can look at brain function and adaptation in real-time, is poised to take narrative medicine research in a new direction. Does reading literature or writing actually change what parts of the brain are activated during encounters with patients? What areas in the patient’s brain are activated in response to perceived empathy? If one of the criticisms of narrative medicine is that its effects are too difficult to measure, the field of neurology has the opportunity and resources to change that perception.

HOW TO TEACH NARRATIVE MEDICINE

It is far more important to know what person the disease has than what disease the person has.

—Hippocrates

Narrative medicine programs are both cost-effective and minimally time-consuming. Although many medical schools across the country have incorporated narrative medicine programs into their curriculum, few residency programs have followed suit. Given most residents’ highly structured and overly scheduled personal and
professional lives, any attempt at integrating narrative medicine into their day must be made to fit within the existing confines, without adding too much extra time for the resident or jeopardizing patient care. Possibilities include substituting narrative medicine content for morning reports or noon conferences once or twice a month or asking senior residents to carry junior resident pagers for the occasional 2 hours in the afternoon and vice versa. Sessions held at night or on weekends may be practical in some programs or among more senior residents with less call responsibility.

Sessions can take many forms. Residents can be asked to read a selected text in advance of a seminar and come ready for a discussion on a predetermined theme, illness, or clinical situation. Another example would be that rather than a typical clinical case presentation, residents could give a narrative presentation of a patient’s case including a discussion of the social, psychological, and personal issues involved in the case, the patient-physician interaction, and any ethical or professional issues that come to light.

Reflective exercises may also be incorporated into available time. Residents may be asked to write freely for as few as 3 or 4 minutes on a theme or event, which they afterward share within a small group. Another exercise is to ask residents to interview each other about a time when they were ill or felt vulnerable. Afterwards both write about the experience, the interviewer about how it felt to listen to the other’s story and the interviewee about how it felt to share the experience. A facilitator helps to focus the discussion on the content and structure of the writing and the themes and conflicts that emerge. One particular residency program has had success by incorporating these reflective exercises into their program as little as once or twice a year.

CONCLUSION Neurology training is miraculous in the amount of knowledge and skill it instills in a short period of time. The trade-off to the intensity of the residency, however, is the physician’s gradual distancing from patients and colleagues. In addition, due to increasing sub-specialization, technologization, and managed care restrictions, neurology as a field has taken a giant step back from patients in recent years. Connecting with patients and one another, finding fulfillment in caring for people, rather than curing, managing, or triaging, is no longer discussed. It simply is deemed unimportant.

Narrative medicine is not a substitute for current clinical practice, but a way to complement it by re-establishing the centrality of the patient’s story in the clinical encounter. Within a neurology residency program, narrative medicine could be a valuable tool in developing empathy, professionalism, and communication skills. Finally, narrative medicine is a way to reconnect with patients, each other, and ourselves. Doctors listen to and tell stories every day. Now is the time to hear them.

For a complete list of references for this article please visit us online at neurology.org.
EDITORIAL

Playing doctor well
Alice W. Flaherty, MD, PhD

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FEELING Most neurologists will say they are all for good bedside manners. In practice, though, the word “manners” makes many of us uncomfortable. Manners sound tricky and artificial, like the rules about which fork to use, or how to be polite to people you dislike. One solution has been to talk instead of empathy. For the practitioner, empathy feels more real than playing doctor. Empathy seems a solid motive force for compassionate and nuanced communication with patients.

In this issue of Neurology®, Alcauskas and Charon present an approach to fostering such communication that uses literary techniques when thinking and writing about patients. They argue that narrative competence in medicine, the ability to interpret and tell stories about and to patients, is particularly important for neurologists. In neurology, patients’ histories are often the key to diagnosing and understanding their illnesses, and yet these histories are often hindered by impaired ability to speak.

Charon has founded the successful and prominent Program in Narrative Medicine at Columbia University. It offers workshops for physicians, as well as courses for medical students. But the two groups’ needs are different. Students often have a natural empathy that is overwhelming, but lack the skills—the bedside manner—to enact it. For students, courses that intensify empathy may counterproductively amplify its pain, encouraging students to block it out. Trained doctors’ thicker skins muffle their empathic pain—as recent fMRI research quantitates.

A literary approach to encouraging empathy has an advantage both for tender students and for hardened doctors. By aestheticizing rather than anesthetizing the distress of others, literary empathy provides a safe, perhaps even pleasant, perspective from which to witness suffering. Literary empathy, though, is different from the real-world kind. Writing about patients is a different skill from talking to them. We can safely mourn Ivan Ilyich’s fictive death because our sorrow will never drive us to spend 2 extra hours in family meetings.

Practicing the mental state of empathy, therefore, does not give us practice in the energetic expenditures of visibly sympathetic action. There is little evidence that introspective experience of empathy translates to real-world altruistic action. In fact, a study of WWII Christians who altruistically rescued Jews showed no difference in their ability to feel others’ emotional states compared to non-rescuers.

ACTING Should we then abandon this attractive narrative approach, which puts the art back into medicine? We might instead remember that the art of medicine is drama, too. Doctors who cannot act concerned well, however nuanced their empathy, cannot reassure their patients. A hand placed on a shoulder is something patients, not just doctors, feel. Thus TV medical shows like Gray’s Anatomy, though false, are also real in ways that writing cannot be. They demonstrate behaviors that patients hope for from us, and can directly shape health behavior.

Theater’s status as a public or “low” art can embarrass academic doctors in a way that reading Dostoyevsky does not—but most doctors are not academics. Indeed, stage-based or “performative” analyses of cultural phenomena are increasingly common in the humanities. Especially in action-oriented fields like surgery, a performance-based approach to bedside manners may be more practical than contemplative writing is. Of course, the latter does have the attraction that it does not require collaboration—it can be done in the comfort of your own bed.

Nonetheless, medical simulations can have such real-world benefits that schools and even hospitals increasingly use actor-patients and videotaped clinical encounters. Communication

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skills developed in this way allow the fruits of doctors’ private reflection to reach patients. Ultimately, medicine, with its operating theaters, its costumes (the scrubs, the johnnies), and its use of ritualized lines and gestures can give doctor–patient contact an emotional meaning that transcends the notion of cure.

**EXPERTISE** The explosion of social neuroscience research is now giving the dramatic art of medicine its own science. Studying the neurology of human interaction provides a bottom-up approach that complements art’s top-down one. The mirror neuron system, for example, is a cortical network that makes it easier for us to do what we witness others do. It is important for imitative play and learning. It helps in the many physician skills that are best learnt by imitation, not by trial and error—skills like putting in central lines.

Mirror neurons are vital for normal language and communication. They also underlie empathic action. They make us wince when we see another person do so. That incites our brains to feel the other’s pain more vividly. Thus, doctors with impassive faces, which don’t reflect patients’ sorrows, hinder not only the doctors’ ability to communicate but even their ability to feel their patients’ needs. By contrast, doctors whose behavior fosters mirroring encourage patients to imitate their own healthy behaviors. This may improve patients’ adherence to a treatment plan.

Intense direct exposure to good role models of empathic action is not always easy to find on the wards. Another development in social neuroscience, though, is spurring multimodal simulations of human interactions and treatments, as in Asperger syndrome. While these simulations lack the depth of literature, the empathic errors that we doctors make are often shallow ones of haste and habit: lack of eye contact, rapid monotones, not asking patients how they feel. As we learn to heal people with congenital problems of knowing how to feel and act, we should consider how we might, then, heal ourselves.

For a complete list of references for this article please visit us online at neurology.org.
“I wish I could be a neurologist,” a crayon painting by Lillian Rosenfield, is Lillian’s response to her kindergarten teacher’s request (December 2005; Shlenker School, Houston) for students to create a painting describing their primary wish. Lillian’s father, David B. Rosenfield, MD, a neurologist at The Methodist Hospital Neurological Institute and professor at Weill Medical College of Cornell University, was surprised that his 5-year-old daughter aspired to his profession. A picture of the artist and an interview conducted by her older brother, Dylan, are available online.

Figure. “I wish I could be a neurologist,” a crayon painting by Lillian Rosenfield. A picture of the artist and an interview conducted by her older brother, Dylan, are available online at www.neurology.org.
Doctoring faces many challenges in 2009, all potentially imperiling our professional soul or ethos of life as doctors. The field of medicine in the United States has never been more fulfilling, yet our dreams and those of our patients are clouded by a sense of unfulfilled promise and our practices are mired in policy restraints. I believe it is possible both to restore meaning to our debate with policymakers and optimism to our profession. To do so, we must rescue medical professionalism from what is becoming an entrepreneurial occupation in which we are asked to deliver a commodity. We must return our principal attention to humanity to ensure that ill humans will always be more than integers on an economic chart.

In this review, I discuss economic, medical, and social planning philosophies which contribute to our current dilemmas yet also provide insights and opportunities for their resolution. I discuss medicine’s past and current responses to its challenges and outline a new method of dialogue to accomplish our objectives of better quality and more cost-effective education, research, and clinical care for all.

As the escalating cost of health care in the United States exceeds that of any nation on earth, economic planning is essential. Much present-day health care delivery dysfunction is the consequence of economic manipulation of physician behavior in the absence of consideration of our ethos. I am neither against social planning with economic ends nor economic planning with social ends, but I am against both when doctrinaire, and not part of a larger humanistic whole.

Elements of recent neuroscientific discoveries serve as the foundation of my thoughts and conclusions. Our human capability and drive toward economic and social functioning confirms a biologic basis for the need for concurrent economic and humanistic planning of health care delivery. Both Glimcher5 and Platt and Glimcher6 have revealed our ability on a preconceptual cellular level to recognize value, utility, and novelty through lateral intracortical parietal neuron firing frequency and Rizzolattis7 description of the mirror neuron has revealed our ability on a cellular level to recognize intentions, expectations, and motivation. We know that these abilities are influenced by our intrinsic capacity for both selfish and altruistic behavior.8e10 Kandel11 described the molecular basis of long-term memory formation by the synthesis of new mRNA and protein. Si, Lindquist, and Kandel12 have explained its epigenetic impact on our genome.12e13 Our understanding of epigenesis13 itself, reflecting in part the consequences and the causes of our social evolution, confirms our inescapable duty and responsibility to our genetic future, vastly different from eugenics. Therefore our planning of health care delivery must be informed by a broader philosophical outlook than merely serving an immediate economic outcome, if only because the consequences of such planning will be both short- and long-term behavior modification and its impact will extend beyond the field of endeavor for which it is intended.

**OUR CHALLENGE** In Death of the Guilds: Professions, States and the Advance of Capitalism, 1930 to the Present,14 Kause writes that in Western capitalist democracies, when endeavors are sufficiently costly to affect negatively the agendas of business and governing, they are incorporated into business to further the ends of the state. Rather than the medical profession dying, he believes that medical guild power will be replaced gradually by the power of business. Unlike our predecessors, tomorrow’s physicians will serve their employers’ goals, and become like other technicians whose sense of purpose has been expropriated. Pellegrino15 argues that health care, rather than being a commodity, is human activity responding to the needs of ill humans, whose
overwhelming fear is abandonment to their fate by their fellow human beings. Further, converting the ends of medicine to the purposes of economic, political, or professional prerogative transforms medicine into economic, political, or professional preference, and not the health care process for which we all became doctors.

I am concerned by our acceptance of the seeming inevitability of these changes, initiated by the theft of our identities as caregivers, in changing our names from doctors to "providers"; in referring to patients as "lives" or "customers"; and by characterizing the patient–physician relationship as one of numerous "encounters." I refuse to discard the clothing of "The Doctor," which carries with it my unavoidable responsibility to behave and function as the administering high priest of humans, when, as stated by Pelagrine, our patients are in vulnerable states, and have to be confident enough to reveal to us the most personal and intimate recesses of their lives. Similarly, I refuse to abandon my stewardship of the physician–patient relationship and of our patient's autonomy.

The Austrian–American economist Friedrich Hayek wrote that economic planning was social planning, whether done by right- or left-wing governments, and that at its roots, all planning was potentially hazardous to liberty. He believed the waning of workplace autonomy initiated by economic planning altered the character of people, who, in becoming accustomed to loss of control in their workplace, become less concerned when their political liberties are infringed.

Both the opportunity for physicians to work in the manner we believe most appropriate and our confidence in our standing in the political forum are threatened. After identifying problems with the directions proposed by health care planners, we work to salvage as much as we can, and thus tacitly consent to the proposed changes. Rather, those of us in organized medicine, such as Universities and Professional Associations, bear the responsibility for arguing for the specific agendas of the medical profession, because we know that health care planning will fail unless it is organized around the ultimate and limiting pathway of health care delivery, namely, the patient–physician relationship.

The time has come to invigorate our purposes, strengthen our commitment, and collectively manage our political challenges, as we work to reclaim the initiative. As our society is complex, it will take more than this one brief article, or one method of dialogue, to compel discussion of these issues; yet this discussion is fundamentally necessary as we physicians start to heal ourselves and our work.

ECONOMIC THEORY AND HAPPINESS ECONOMICS

Economics is a fiscal and social science. The gross national product metric developed in the 1930s to facilitate understanding and management of society's output has been used in our consumer-oriented society to reflect consumer contentment. However, in the late 19th century, English economists believed that economics was purely about happiness or contentment.

Contentment theory was first described by the ancient Greeks as eudaimonism. I find this philosophy appealing as it is similar to a physician's way of thinking. "Eudaimonism is translated loosely as "happiness or contentment" but is far broader. It is the building block for "human flourishing." Though first discussed by Socrates, Aristotle later defined a hierarchy of human purpose with eudaimonia as the highest—and only—goal toward which it is worth striving. This is not constituted by honor, wealth, or power, but by rational activity in a "complete life," which I understand to be a meaningful life, manifested by virtues of character, such as honesty, integrity, personal responsibility, intellect, and rational judgment. Many consider this search for contentment inherently human after satisfying our basic survival drives. The validity of incorporating the themes of contentment theory in today's economic planning has been confirmed by economists, philosophers, psychologists, and more recently biologists, whose concepts of choice, rational and non-rational economic decision-making have prompted development of the fields of behavioral economics and neuroeconomics.

For example, Adam Smith, a philosopher before an economist, though lauding the invisible hand of capitalistic progress and the market, championed the need for an "impartial spectator" to provide moral guidance to economic decision-making. More recently, Princeton psychologist Daniel Kahneman was the 2002 Nobel Economic Laureate for integrating psychological research into economic science; in England, economist Richard Layard, Director of the Centre for Economic Performance at the London School of Economics, authored an economic book, Happiness, and Richard Thaler, Professor of Behavioral Science and Economics at the University of Chicago, is part of President Obama's economic team.

Happiness is considered by many to be an objectively measurable and repeatable dimension of human experience, demonstrated by single cell recording, functional imaging, and preference assessments, such as life satisfaction surveys. But money has a complex relationship to happiness: contentment rapidly increases across countries with increas-
ing wealth beyond subsistence, but does not continue to grow with increasing wealth, reaching a peak in many countries with lesser economic standing than ours.\(^{28}\) For individuals\(^{29}\) (figure), the growth of contentment in the United States since 1965 has not paralleled our increasing wealth, and similar curves have been defined in other countries. Social contentment is also revealed by studies of society’s discontent; in the United States\(^ {29}\) 9 years ago, the percentage of adults who thought that most people could be trusted was half of what it was in the 1950s.

Though contentment studies do not tell the whole story, it is equally clear that financial well-being and its metric, the GDP, have shortcomings when used as the sole arbiters of societal well-being. Wealth alone is insufficient for contentment and both wealth itself and the striving for wealth may in some ways be deleterious to contentment. For these reasons, market metrics such as wages and output are now considered suboptimal when used alone. Metrics of internal contentment reflecting, for example, self-esteem and workplace fulfillment, provide additional understanding of the quality of a society and are used by several countries around the world.

Concurrent economic and humanitarian planning requires that we define noneconomic factors based on contentment theory that affect physician and patient flourishing. Commitments to both must be incorporated in our discourse with payors and legislators, to invigorate negotiations for rebuilding the House of Medicine.

**CURRENT UNITED STATES AND WESTERN HEALTH CARE MANAGEMENT** In the United States, we have developed various medical reimbursement systems before and since enactment of the Medicare legislation in 1965. More recently, these have focused on the supply side by managed competition, and the demand side by cost sharing, such as copays and deductibles. Neither has been sufficiently successful and both have produced significant problems of their own. The pendulum is now swinging back to quality, and planners are attempting to achieve this through pay-for-performance (P4P).

Both P4P and evaluation and management (E&M) coding are examples of the vulnerability of medical care quality to isolated economic planning, and both provide opportunities for application of the concepts of physician and patient flourishing.

P4P is now used in many countries including Canada, Germany, and England, where these objectives account for 23% of the pay of primary care practitioners.\(^ {31}\) P4P incentivizes performance by increasing or decreasing pay to physicians or institutions for patient–physician or patient–hospital encounters that achieve quality objectives, as determined by a third party. For example, the denial of payment to hospitals for prolonged hospitalization caused by hospital-acquired urinary tract infections in catheterized inpatients has been successful in reducing its occurrence.\(^ {32,33}\)

While I acknowledge the simple strength of this economic carrot-and-stick incentive on institutions, I am concerned that economic success with P4P for individual physicians may come at the cost of physician internal satisfaction and drive, and may be detrimental rather than additive to quality. Physician motivation by payment alone can never equal the inspiration we derive from a sense of personal responsibility. Physician work motivation includes our focus on patients’ needs first; our opportunity for
creativity and workplace autonomy in application of science and our experience; and our drive to achieve our peer group’s respect. When we are paid specifically for accomplishing some components of work we assume to be either routine or unimportant, these other more significant drivers of our motivation may fade. Like so many other workers, we may shed our belief that good work is anticipated. The character values encouraged by our inner drive for growth, competence, and self-actualization, so necessary when competing for medical school entry and completion, may be squandered.

E&M’s failure to codify quality is a contradiction as we introduce P4P, and as we speak of our need to practice evidence-based medicine (EBM). In the late 1980s, William Hsiao, Professor of Economics at the Harvard School of Public Health, defined the resource-based relative value scale (RBRVS) E&M coding, developed in response by the American Medical Association (AMA), provides a measurable comparison of the work product during the patient–physician interaction primarily for reimbursement purposes. Most renditions of the electronic health record, soon to be mandated for us, are similarly focused.

Incorporation of E&M into our daily work has required us to shift or add to our focus many details that are relevant for payment but do not speak to the work of doctoring as a whole. The code most commonly used by neurologists for the initial evaluation of a complex patient requires completion of a document with 48 bulleted points, of which 4 relate to the history of the present illness. All physicians, not only those in cognitive fields, recognize that acquiring this history—and especially the manner in which it is obtained—is the major determinant of the quality of the patient–physician relationship and of the value of initial and subsequent care.

The American Board of Psychiatry and Neurology, in attempting to define a method for adjudication of resident competence, has considered applying American Academy of Neurology evidence-based practice parameters to the history of the main complaint. We need to ask: When finalized, could this fully fleshed-out concept become part of E&M bulleted extra value? In conferring heuristic, testing, and some clinical parameters, the practice parameter is a good start in the effort to restore value to E&M coding, but it is not enough. It lacks differential diagnostic questions and its inclusion risks further dilution of workplace autonomy. Moreover, it poses a barrier, in taking too focused a history, to listening for what is not said and to hearing the innuendo of what is said. It does not address the missing yet essential communication and relationship-building components of the patient–physician encounter.

I have expanded on these from The Effective Clinical Neurologist by Caplan and Hollander: the physician must gain an understanding of the patient’s strengths and weaknesses and the confidence, respect, and cooperation of the patient. Armed with this information, the physician can help the patient understand and come to terms with the condition; select, plan, and coordinate investigation and treatment; and thereafter, communicate with the patient and others about the illness, its ramifications, and its management.

As we know, the defining physician–patient relationship is neither explicitly encouraged nor reimbursed. It must be our mission to bring to the attention of policy-makers and payors the absence of attention to this relationship, the sine qua non of our professional interactions.

During the 17 years we have used E&M codes, which are no more likely to ensure appropriate compensation, I have not spoken to a single physician who believes they contribute to clinical quality. Disingenuous use and teaching of these codes undoubtedly sends the wrong message to medical students and residents. Rather, reintroducing to the debate the idea that we should seek improvement of E&M coding based simply on what is humanly right would reverberate through our ranks.

The consequences of the methods used to define reimbursement by E&M coding raise additional concerns. The AMA appointed the Relative Value Reimbursement Update Commission (RUC) to evaluate and then recommend E&M code reimbursement to the Center for Medicare and Medicaid services (CMS), to enable the government to define how allotted funds, otherwise known as the Medicare sustainable growth rate, are disbursed. RUC/CMS decisions have repeatedly favored procedures, thereby contributing to the altered face and cost of American medicine. Over the past 5 years, for example, laboratory tests increased 530% and MRIs 94%, while office visits of established patients increased only 12%. Not surprisingly, during this time entry into primary care has fallen significantly and patients complain that doctors do not listen or talk to them and only seem to want to order tests. This is precisely the change in doctoring one would anticipate given the incentives created by the RUC-recommended decisions by the CMS.

In ethical terms, a moral community binds its members together and is constituted by the collective will of individuals espousing a set of commonly held moral commitments, other than self interest. We physicians constitute just such a moral community.
and some of the RUC/CMS work product appears discordant with these principles.

We face numerous challenges in managing our work because face-to-face physician–patient time is threatened. The complexity of evolving science cries for its expansion yet the crowding of our workplace escalates. It is increasingly inhabited by technologic advances, posing deceptively as health care, while in reality they are only the tools of doctoring. Our patient interactions are overflowing with accumulating obligations such as E&M coding, complicated by current renditions of the electronic health record and e-prescribing, P4P documentation, and the need to satisfy the demands of insurers more often driven by economics than by quality of care. We acknowledge the potential value of EBM data and perhaps Maintenance of Certification requirements. Our future includes Comparative Effectiveness studies, and while we accept their potential value we cannot but view with trepidation the role physicians will be called on to play, as quality of life year cost analyses are applied to them. Each of these concepts has evolved alone yet none exists in isolation. Collectively, they carve out accumulating quantities of patient-focused time.

Humanistic medical care requires the combination of a cognitive component for diagnosis and management, and an affective component, in which experience and the context of the patient’s life, personality, and illness variables are considered. David Leach, former executive director of the Accrediting College for Graduate Medical Education, states that context-based (physician) behavior demands the application of practical wisdom and prudence, and the need, at times, to break rules to accommodate life’s realities. Humanism is lacking, ethically and practically, if either aspect of care is ignored. These requirements risk converting some or, over time, most, of the patient–physician interaction to a cookbook process; yet they cannot quite so simply (to borrow from William Osler) manage doctoring’s fusion of humanity, diagnostic uncertainty, and scientific probability. In short, we have developed and are applying methods of care before studying their intended and unintended consequences. We need to ask: by conforming, are we hastening the death of our guild, and, if so, what can we do differently?

THE CHARTER ON MEDICAL PROFESSIONALISM

So, what have we done about this? Our Charter on Medical Professionalism was published in 2002, by a consortium led by the American Board of Internal Medicine Foundation, American College of Physicians–American Society of Internal Medicine Foundation, and the European Federation of Internal Medicine, and has been endorsed by more than 100 professional associations. This Charter characterizes professionalism as the basis of medicine’s contract with society, defined by 3 fundamental principles: patient welfare, patient autonomy, and social justice. Physician commitments include professional competence, patient respect, definition of education and standard setting processes, improved access to care, working collaboratively, and engagement in and collaboration with scrutiny.

The Charter speaks meaningfully about physician conduct but does not speak to our souls, embedded with our medical ethos, the principal influence on our behavior. This single most important component of our professionalism resides at Medicine’s junction with society and is influenced, intentionally or not, by socioeconomic planning.

THE ETHOS OF DOCTRING AND THE WAY FORWARD

The physician’s ethos needs tending now more than ever, given that we in medicine, like no other enterprise that hopes to survive in a capitalistic democracy, have been asked and have consented to produce a mis-incentivized and suboptimal health care delivery product. We have done so to satisfy our country’s economic planning, despite the fact that these same economists ignore the cost side of our equation: US physicians, accounting for 20% of the health care dollar, are called upon to squander about half our earnings on administrative costs, more than double spent in other countries.

History reveals that we have often stumbled in the application of our ethos. A century before Hippocrates, Hammurabi’s medical code defined differing payment and punishment for doctors in caring for the wealthy and the poor. Recent examples are the yielding of the ethos of doctoring in the 1900s in Germany during National Socialism, and during my life in South Africa under Apartheid.

I propose we begin by convening a global summit of physician stakeholders and thought leaders to develop and define an understanding of the ethos of the physician, based in part on contentment theory, culminating in a Charter on Professional Flourishing, as a parallel document to The Physicians Charter on Professionalism. Though the ethos of doctoring is universal, crossing all times and cultural divides, its application is not, changing from country to country, responding to local circumstances. Two documents are therefore necessary.

First: We must define our ethos: It is not an abstraction, but a set of behavioral principles, which determine how we respond to the sick. It is our character, behavioral characteristics, internal motivators, physician–patient relationship requirements,
the ethics of our professionalism, and our guardianship of appropriate autonomy for ourselves and our patients. Our ethos has not been, nor will it be, forever impenetrable, and therefore our definition must incorporate integrity to counter human weaknesses such as envy, greed, and power; and it must incorporate, preeminently, personal responsibility, because if we do not accept responsibility, we will surrender our responsibility to others.

Second: We must identify the dynamics necessary for application of our ethos, specific to each society and country. The physician workplace should be built to encourage those values, necessary for physician and patient flourishing, while discouraging distractions. For example, we may consider the misconceived incentives, defensiveness, and irrelevancies in our workplace, while for others, workforce issues may dominate.

Once fully characterized, the philosophical backdrop to doctoring should be defined and taught. Premedical and medical school requirements should include medical and behavioral ethics courses to foster the spirit of altruism in young students. We must develop methods of assessing how students and physicians integrate this behavior and monitor its use in the political forum.

CONCLUSION Our philosophy and our personal responsibility are the ultimate sources of our motivation. They are more steadfast than those traits encouraged for employees working principally for financial advancement, as exemplified by unthinking and non-nuanced application of E&M and P4P, and will outlast regulations. Both must be used to inform our intersection with our medical environment for the present and foreseeable future and strengthen our involvement in the debate on the best methods to encourage professionalism, and our adherence to the external behaviors of the Physicians Charter. Our stance will confirm our commitment to our history, to the nature of doctoring and of suffering, and to the future of doctoring.

Guided by our Charter on Physician Professional Flourishing, and based on the Charter on Medical Professionalism, Medicine must fulfill its obligation to society by taking its seat at the health planning table, not as another shepherd of policy or bean counter, and not primarily to advance social, political, or fiscal policy, but to call for conformity with the philosophy of medical care delivery. We must draw attention to the merits and demerits of isolated economic behavioral management on all aspects of doctoring, and affirm our belief in our calling: that personal responsibility and the values defining our ethos, more effectively than any others, can lead to better quality research, education, and health care delivery, and in all likelihood, in the most cost-effective manner.

By embracing our challenges, exercising our judgment, and entering the health care debate armed with these data, we can return to the authentic nature of doctoring and restore our sense of purpose and confidence in Medicine’s future.

DISCLOSURE
Dr. Segal is Immediate Past President of the American Academy of Neurology; served on an advisory board for Merck Serono; serves on an External Review Group for the NIH; holds stock options in Amarin Corporation; has provided expert opinion in non-malpractice-related proceedings; and is a partner in Asonis Clinical Research of Florida, for whom the following have sponsored clinical trials: Genzyme Corporation, Genentech, Inc., Myriad Genetics, Inc., Neurochem Inc., GlaxoSmithKline, Merck Pharmaceuticals Corp., XeroPort, Inc., Bayer Schering Pharma (Berlin), Merck Serono, Novartis, Pfizer Inc., Eli Lilly Corporation, Sanofi-Aventis, Teva Pharmaceutical Industries Ltd., Takeda Pharmaceutical Company Ltd., Vernalis Plc, Boehringer Ingelheim, Endo Pharmaceuticals, Hamilton Pharmaceuticals, Inc., Biogen Idec, AstraZeneca, Otsuka Pharmaceutical Co. Ltd., Eisai Inc., Genomics Collaborative, Inc., and Eli Lilly and Company.

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1950s
1960s
1970s
1980s
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2010s
Catch the Wave
The forecast for podcasts: Sunny skies but not necessarily with clear visibility

Ted M. Burns, MD


It seems like the report of an important advance in neurology is a weekly occurrence. For many of us, the potential and rapid progress of neurology was one of the major attractions for choosing this career. But for residents and fellows, already busy with personal lives and the fundamentals of neurology training, it’s challenging to also stay current with exciting advances. This task is particularly daunting when one considers that there are well over 100 neuroscience journals. The challenge of staying up to date does not disappear after residency and fellowship because lives and work remain busy. For the neurologist, any failure to stay current can have negative consequences on patient care. In response to this challenge, there are a few fee-based services that provide reviews, usually in print, of recent neurology literature, but downsides of these services include cost and the difficulty in finding time even to read these publications.

With these issues in mind, about a year ago I was struck by the immense potential for podcasting to provide timely, free neurology literature updates. Podcasting has many advantages over traditional communication media: 1) Podcasts allow listeners to hear recordings on demand, i.e., when and where the listener wants. 2) Podcast production is relatively inexpensive, which obviates any need for costs to be shifted to the listener (thus almost all podcast “subscriptions” are free). 3) Podcasts are digital and thus available online to anyone in the world with online access. 4) Podcasts are very user-friendly; one reason being that there are many podcast “aggregators,” i.e., directories such as iTunes, that manage a listener’s podcasts, searching and downloading the most recent podcasts to the listener’s MP3 player, iPod, or desktop.

Podcasting has become exponentially more popular over the past year, with the most popular podcasts now enjoying approximately 2 million downloads per month. But much more growth is predicted, and it still should be considered an underutilized medium. For example, the percentage of Web users who downloaded a podcast in the month of June 2006 was only 6% of US adult Web users (approximately 9 million users), according to Nielsen Analytics. Perhaps this is because people do not realize that podcasts can be accessed directly from a desktop computer or still think of iPods as being only for music, and because so many of us (me included) are not tech-savvy and easily feel overwhelmed by the informational technology revolution. Regardless, there is no viable reason why free, on-demand digital audio will not become mainstream within the next few years.

Can we expect nothing but sunny skies for podcasting as a tool for medical education? Probably not, in large part because podcasts—more so than journals—are vulnerable to clouding of the distinction between commercial and unbiased content. This is because medical audio (or video) podcasts work best when they discuss results or practice styles in general terms; the “fine print” of methodology and statistical analysis—p values and the like—will almost certainly be left sitting on the sidelines (can you imagine listening to a table of data?). This will prevent critical analysis by the listener and shift even more responsibility on the podcast producers to provide content that is accurate and objective. Industry-influenced podcasts will likely not be transparent or even discernible as advertisement. One way to combat this would be for organizations, such as the American Association of Neuromuscular and Electrodagnostic Medicine (AANEM) and the American Academy of Neurology, to participate in podcasting. Their imprimatur would allow for easy identification of objective podcasts. Furthermore, neurology podcasters should adopt the following rules: 1) each should have an editorial board that chooses articles only from peer-reviewed publications; 2) the podcast equiv-
alent of journal supplements (which generally are not peer reviewed) should not be standard practice; 3) all editorial board members, discussants, interviewers, and interviewees should disclose potential conflicts of interest; 4) any advertisements or sponsorships should be clearly marked and not allowed to influence podcast content.

In the spring of 2006, I began working with the AANEM on the development of a bimonthly neuromuscular update podcast. We settled on an editorial board comprised of neuromuscular experts and agreed that we would interview only authors of peer-reviewed articles that the AANEM podcast editorial board deemed to be instructive, informative, and/or interesting. We decided early on that rather than provide reviews of the published articles, we would instead use a format of interviewing authors. We thought this format (a discussion between two interviewers and one interviewee) would provide for a more interesting podcast than a podcast comprised simply of spoken reviews. The AANEM has supported this endeavor because of their commitment to medical education. We posted our first podcast, “AANEM Presents Nerve and Muscle Junction” (http://www.aanem.org/education/podcast/index.cfm), in late August 2006. I urge residents and fellows to tell colleagues and mentors of the educational potential of podcasting but also to discuss the vulnerability of podcasting to be abused in order to market a product. The potential for podcasting for medical education will only be reached if physicians participate in the development and surveillance of this exciting new medium.

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Self-treatment of benign paroxysmal positional vertigo: Semont maneuver vs Epley procedure

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Abstract—The authors compared the efficacy of a self-applied modified Semont maneuver (MSM) with self-treatment with a modified Epley procedure (MEP) in 70 patients with posterior canal benign paroxysmal positional vertigo. The response rate after 1 week, defined as absence of positional vertigo and torsional/upbeating nystagmus on positional testing, was 95% in the MEP group (n = 37) vs 68% in the MSM group (n = 33; p < 0.001). Treatment failure was related to incorrect performance of the maneuver in the MSM group, whereas treatment-related side effects did not differ significantly between the groups.

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Posterior canal benign paroxysmal positional vertigo (PC-BPPV) is caused by dislodged otoconia that move within the PC whenever head position is changed. The resulting endolymph flow activates hair cell receptors, causing short-lasting vertigo and a mixed torsional/upbeating nystagmus. This “canalolithiasis” hypothesis has been corroborated by the success of therapist-guided positioning maneuvers that aim to clear the PC of trapped particles. In controlled trials, single applications of the Epley procedure1 or the Semont maneuver2 relieved 70 to 90% of patients.3,4 However, this indicates that some patients require repeated treatment until positional vertigo resolves completely. Therefore, complementary self-treatment is a desirable option to abort BPPV. We recently showed that self-treatment with a modified Epley procedure (MEP) relieved 64% of 28 patients within 1 week, whereas the Semont maneuver has not yet been evaluated for self-treatment.5 Therefore, we compared the efficacy of self-treatment with a modified Semont maneuver (MSM) and the MEP.

Patients and methods. Forty-one outpatients with unilateral PC-BPPV from a dizziness clinic and 29 patients from a neurologist’s practice were included according to the following criteria:

1. History of short-lasting (<1 minute) rotational vertigo precipitated by changes of head position;
2. A mixed torsional/upbeating nystagmus beating toward the underrmost ear elicited by positional testing in the lateral or head-hanging position for <60 seconds as observed with Frenzel glasses; and
3. Reversal of torsional nystagmus on sitting up.

Patients who had received any positioning maneuver during the acute episode of BPPV, patients with bilateral or horizontal canal BPPV, and patients who could not reliably perform self-treatment because of language problems or lack of mobility were excluded.

Seventy-nine patients were eligible. After giving informed consent according to the local ethics committee, patients were randomly assigned to apply MEP (n = 42) or MSM (n = 37). Five patients in the MEP group and four in the MSM group were lost to follow-up. Seven of these nine patients did not return for positional testing, and two did not complete the exercise because of concurrent cardiac arrhythmia or a sore hip. Therefore, statistical analysis was performed on 70 patients (10 men, 60 women; age, 35 to 80 years [mean, 60 ± 12 years]). The median duration of acute BPPV was 8 weeks. BPPV was idiopathic in 55 patients or occurred after head trauma (n = 4) or vestibular disease (n = 11). Age, sex, and mean duration of the acute episode did not differ significantly between the two groups.

All patients received an illustrated instruction with their specific exercise for the affected ear (figure 1). The sequence of head and body movements was explained. Patients then performed the maneuver once under supervision of the instructing physician. Patients performed the exercise three times daily until positional vertigo had ceased for at least 24 hours. They indicated in a diary whether positional vertigo occurred during each treatment session to determine the number of sessions needed for subjective relief of vertigo and documented treatment-related side effects (e.g., nausea, gait imbalance, and dizziness). Successful treatment after 1 week was defined as absence of positional vertigo and absence of nystagmus on positional testing. Patients were asked to perform the maneuver again on their second visit to assess accuracy of treatment execution.

Statistical analysis. Statistical analysis included chi-square test for dichotomous variables and Student’s t-test for continuous variables for comparison between treatment groups. Kaplan–Meier analysis, including log-rank test, was performed to test for differences in number of treatment sessions completed until positional...
Results. At follow-up evaluation after 1 week, 35 of 37 patients (95%; CI, 81 to 99%) in the MEP group were asymptomatic and showed a negative positional test, whereas in the MSM group, only 19 of 33 patients (58%; CI, 39 to 75%) were cured (relative risk, 1.64; CI, 1.21 to 2.22). Figure 2 shows the number of treatment sessions patients performed until they felt relieved from positional vertigo. The two groups did not differ significantly with respect to treatment-related side effects. Seven of 37 patients (19%; CI, 8 to 35%) in the MEP group and 12 of 33 patients (36%; CI, 20 to 55%) in the MSM group performed the maneuver incorrectly ($p > 0.05$). However, although incorrect performance had no effect on treatment outcome in the MEP group ($p > 0.05$), there were significantly more treatment failures in the MSM group among patients who performed the maneuver incorrectly compared with those...
who made no mistakes ($p < 0.05$). The most frequent mistake was a too slow head and body movement in the MSM group ($n = 9$) and an incorrect head rotation in any of the head positions in the MEP group ($n = 7$). Age, sex, and duration of the acute episode of BPPV were not associated with treatment outcome. Similarly, a logistic regression including age, sex, positioning maneuver, duration of the acute episode, and accuracy of treatment performance showed that only inaccurate performance and positioning maneuver were significantly associated with outcome.

**Discussion.** Our study shows that self-treatment with MEP is more effective to abolish PC-BPPV within 1 week compared with self-treatment with MSM. Whereas BPPV resolved in 95% of patients who applied MEP, MSM cured only 58% of patients. The response rate in both groups was higher than would have been expected from spontaneous remissions within 1 to 2 weeks reported in previous studies, ranging from 0 to 50%.

The efficacy of MEP is comparable with the Epley procedure and the Semont maneuver, with success rates ranging from 70% after single application to nearly 100% after repeated application. In a comparative study, the Epley procedure and the Semont maneuver were found to be equally effective with response rates of 90 to 95% after one or two applications. In view of these results, we considered an untreated control group unjustified from an ethical point of view. The rapid resolution of positional vertigo within a few days in most of our patients after a median duration of 8 weeks argues for a treatment effect and against a spontaneous remission. In a previous, nonrandomized study, we reported a lower success rate of 64% for self-treatment with MEP ($n = 28$), which was, however, superior to treatment with Brandt–Daroff exercises (23% response rate after 1 week; $n = 26$). The Semont maneuver as self-treatment was evaluated for the first time in this study. Although less effective than MEP, MSM successfully relieved half of patients from BPPV. Failure of MSM was related to incorrect maneuver execution. The most frequent mistake was a too slow head and body movement. During the Semont maneuver, the particles sink to the lowermost point when the patient lies down on the affected side. When the patient then moves in one swift movement toward the contralateral side, the particles, because of inertia, do not immediately fall back toward the ampullary end of the PC but may pass its vertex and fall out through its upper open end. If the movement is not performed sufficiently swiftly, the particles, instead of passing the vertex, fall back toward the cupula. Conversely, incorrect performance of MEP did not adversely affect treatment outcome, indicating that the step-wise propagation of particles through the PC induced by the MEP is more robust with respect to minor deviations from treatment instructions. Our results confirm that self-treatment may provide rapid relief from PC-BPPV and should be considered as complementary treatment especially for patients who fail to respond to single therapist-guided positioning maneuvers. It may also be a viable tool for patients with frequent recurrences rendering them independent from costly and time-consuming medical care. Because, according to our data, MEP is more effective than MSM in relieving BPPV, we recommend MEP as first-line self-treatment approach.

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Scan this code with your smartphone or go to http://tinyurl.com/vertigovideo to view the videos. Download a free QR Reader from your phone’s App Store, launch the application, and then scan the code.

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Three days of fog had finally disappeared, and the morning sun was shining brightly. It lifted the spirits of Holmes and me, who had sulked in our sitting rooms. It also put an end to the nosome chemical experiments that Holmes always turned to when unoccupied with a case. Holmes suggested we go out to lunch when Mrs. Hudson knocked on our door and informed us that we had an unexpected visitor. Holmes ascertained to see the visitor, and Mrs. Hudson ushered in a stately woman in her middle years. She introduced herself as Mrs. Agatha Fletcher from Braxton. She explained that Braxton was a small fishing and boating port east of London on the North Sea.

Holmes made the necessary introduction of himself and me, and immediately inquired about the purpose of her visit.

She was somewhat distraught, but explained her troubles in a concise manner. “It is my husband Alfred, who is known locally as the Squire, as his family owned most of the land north of the village and Fletchers have lived in the manse for over 200 years. Two days ago, a local young man, Aubrey Pound, was assaulted and received a heavy blow to the head, and he is now in hospital. He is recovering and can give only a sketchy description of his assailant. My husband was close to the place of the assault. It was in a part of the village that he never visits, and he cannot give a good reason why he walked there. He knows the area, for as a young man, he surveyed the whole region and knows it like the back of his hand. Because of his confusion and the nature of the crime, he is temporarily at the local constabulary and is held there until they can get more evidence.”

“Thank you, Mrs. Fletcher, that is a good summation. Now, a few questions: First, you know your husband well. Is he capable of such behavior?” asked Holmes.

She replied, “Indeed, he is a man of fiesty disposition, and I cannot say that he has not made some enemies in the village. However, he is a kind and generous man and has no history of violent behavior.”

Holmes continued, “Did your husband have any prior acquaintance with the victim, who you indicated was a local man?”

She continued, “That is part of the problem. Pound is a clerk in a boat chandlery. He has been courting our daughter Mary, and my husband is very much opposed to the match. He is a fine man, and, in spite of her father’s opposition, I think and personally hope that they do marry.”

Holmes tented his fingers together and asked one final question. “Was a weapon used, such as a club or a heavy stick?”

“That is another problem. No weapon was found, but my husband had a slight stroke of apoplexy 3 months ago. Fortunately, he had a swift recovery, but now uses a heavy walking stick in his right hand. Our constable believes he capable of rendering a severe blow.” She pulled out a handkerchief to wipe some tears, and finished with an entreaty. “Please, Mr. Holmes, we need your help.”

Holmes consented to come, there was a brief discussion about the village and about local accommodations, and she left.

Holmes turned to me and asked if I could take the morning express and spend a few days at Braxton taking the salt air. He also added, “The account of the event is not convincing that the Squire is innocent.”

I said I was pleased to accompany him. Holmes ascertained himself with an excuse that he had a few errands.

It was a pleasant train ride the next morning and we then settled in a delightful inn. The village was situated on the western side of an inlet protected from the North Sea by a promontory north of the village, which then faced west and provided a quiet cove. On the promontory was the Fletcher manse. It was surrounded by extensive fields with an occasional crofter’s cottage. Holmes and I took a walk to examine the surroundings. From the manse there was a lane that divided into a road, on the right called the Harbour Road and on the left named the Town Road. On the Harbour Road were fishmongers, shipping offices, and the boat chandlery at the end of the road. The Town Road was the main road with the usual shops and the Braxton Inn where we lodged.

We finished our outing with a visit to the constabulary, where the Squire was held. Constable Duncan was a large, jovial man who was willing to share information with us. Holmes, always attuned
to the situation, shared pleasantries with him before gathering information.

When questioning began, the constable lost his joviality, and said, “I have known the Squire for 30–some years, and, although our stations in life are much different, he and I were grand friends, joking and sharing many a pint together. It is not a good time for me.”

Holmes commiserated, but pursued his questioning.

“What did the young clerk Pound give in evidence?”

“He was out for a few hours after the blow, but then gave me what he remembered. At the close of the day in the chandlery, he takes the money up the street to one of the shipping offices where they have a safe. It is a well-known fact in the village. However, the junior clerk had already taken the money up to the safe. As Pound was coming out of the chandlery door, he was partly blinded by the setting sun and only remembers a large man in a gray coat, and then the blow fell. The other clerk heard the commotion, ran out of the door, saw Pound on the pavement, and then saw the Squire in a gray coat and carrying a heavy cane walking down Harbour Road. I summoned and asked the Squire what he was doing there, as I never saw him in this area. He was confused and could not give me a straight answer. He and his Missus often walk from the manse down Town Road and eat at the inn. That evening, she had done some shopping and he was to meet her there.”

Holmes said, “Surely, you do not suspect the Squire of common thievery?”

The constable quickly answered, “Oh, no, but you know there was bad blood between the two?”

Holmes nodded, and said, “Yes, Mrs. Fletcher told me of the romantic liaison. Could I have a few minutes with the Squire?”

The constable was most accommodating, and left them alone for several minutes.

Holmes emerged from the small cell, and spoke briefly to the constable. “I know that the Squire is innocent, but we must find the culprit. I have a plan, but I will need you to help.” Again, he and the constable spoke a few minutes, and then Holmes and I went back to the Braxton Inn.

Back at the inn, Holmes turned to me, and said, “Watson, the constable and I have planned a scheme to trap the culprit and clear the Squire. Unfortunately, we need some bait and that is where you are involved. You are perfectly free to refuse me when you hear of our plans.”

I quickly interrupted, “Holmes, you can be assured of my help, for I know you would not risk my safety.”

He went on to explain, “Again, I am indebted to you. Here is a 5-pound note. Go into the King’s Arms on Harbour Road and buy drinks all around. A few remarks about your own financial good fortune would not go amiss. Then promptly at 7 o’clock, when the street is deserted, walk slowly down away from the pub. We hope to root out the criminal. The constable and I will be secreted on the street and will instantly intervene. Again, will you do it?”

The scheme worked well, and, after only a minute or two, I was accosted by a large man in a gray coat who demanded my wallet. The shrill whistle of the constable immediately frightened him off, and he was soon captured. It turned out that he was well-known for his criminal activities in the fen country, and he admitted to the assault on the clerk.

On our train ride back to London, I inquired of Holmes, “You sorted out a most distressing affair. Most of it is quite straightforward, but how were you so convinced of the Squire’s innocence?”

Holmes chuckled. “I would like to say it was elementary, but it was not. Perhaps you remember one of my earlier mysteries, which you fancifully entitled ‘The Case of the Reed in the Breeze.’ You will also remember that at that time I dined with my brother Mycroft and with Doctors Gowers and Jackson. Our conversation was most widespread and animated, or as animated as one can be in the Diogenes Club. I recalled some remarks by Jackson, which provided me guidance. Jackson talked about the duality of the brain. My errand prior to coming here was a visit to a medical library. There I found my information. You will recall that Mrs. Fletcher said that her husband had suffered a slight stroke a few months ago, and now he used a cane in his hand. It is my observation that the cane is carried in the arm opposite to a lamed leg to provide support. Thus, if my elementary knowledge is correct, this would mean that the right side of the brain must have suffered the damage. This led me to my peregrinations through the medical literature fortified by Dr. Jackson’s remarks.”

Holmes took a folded piece of paper, and explained he copied it from a case report by Jackson. Holmes said, “Watson, let me preface my reading by pointing out that Jackson, at our dinner, had put forth the idea that the right side of the brain played a special role in visualizing space, in contrast to the left side, which had a special role in language, as noted by the French surgeon Broca in 1864. He explained his reasoning on the basis of his observation of patients with right hemisphere damage as suffered by the unfortunate Squire. Jackson called this peculiar condition with change to the right side of the brain as imperception. Now, let me read one of the cases reported by Jackson in the Royal London Ophthalmic Hospital reports of 1876:8/434–444. This was in a 57-year-old woman who had a tumor of the right hemisphere of the brain. ‘Patient had been a healthy woman up to the time of her present illness. Has never had rheumatic fever. For 2 months before this illness set in she had pain in the head and “nervalgia,” but never did anything odd until about Christmas time. She was going from her own house to Victoria Park, a short distance and over roads that she knows quite well, as she had lived in the same house for 30 years, and has had frequent occasion to go to the park; on this occasion, however, she could not find her way there, and after making several mistakes she had to ask her way, although the park gates were just in front of her. When she wished to return she was utterly unable to find her way, and had to be taken home by a country relation to whom she was showing the Park for the first time. When she got home she seemed as usual . . .’ Now, Watson, is this not reminiscent of the Squire’s problem?”

Holmes continued, “I confirmed my suspicions with my visit to the Squire. He seemed quite normal until I showed him a map of the local region, which he had surveyed in the past. He had great difficulty in tracing our routes to the local villages, which he had visited many times. It was not definite proof of his disability, but raised my suspicion enough to proceed with our little subterfuge.”

Holmes thought for a moment, and went on, “Watson, I must also admit an error. You will remember in your original account of meeting with me in ‘The Study in Scarlet,’ I noted that one must stock his brain, or brain attic, with useful information and not useless information as it would crowd out the other. I must revise that as you must select certain information to go in one side but not the other. But I digress. Mrs. Fletcher informs me that the Squire made his peace with Pound, and the Fletchers provided a rather munificent emolument for their services, which I will share with you for your gallant effort.”

I demurred, and chuckled, “Your admission that you will revise your thinking is reward enough, Holmes.”

Holmes laughed, and said, “Then, Watson, we will see if a fine white wine and a Dover sole Muniere can compare with a pint of ale and fish and chips that we had at our last lodging. Providing, of course, that we can find our way.”
We are initiating a new feature in *Neurology*®. Heretofore, the Reflections section has presented stories, essays, and poems. This image inaugurates the publishing of graphical offerings, occasional visual meditations on science and medicine. Please let us know what you think of this innovation.

This image was taken by John F. Collins (1888–1992), a photographer who freelanced and worked for Kodak, known for his mastery of light and shadow. This Kodachrome® was created in 1938, during the dawn of color photography, the vivid colors clearly illustrating the power of the newly introduced film. This particular image was obtained from a scan of a large format (8 × 10-inch) Kodachrome® transparency (scan by Michael Hager, Museum Photographics, Rochester, NY), from the collection of Marsha and Robert Gross. Reproduction of this article or of this image is prohibited by the owners.

—Robert A. Gross, MD, PhD, FAAN, Editor-in-Chief
Missing nail for 22 years
Dae Won Seo, MD, PhD; and Gregory Youngnam Chang, LTC, MC
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A 31-year-old man had a 2-year history of stereotyped seizures characterized by a sudden falling sensation followed by motionless stare or with a sudden loss of consciousness without an aura, occurring once weekly. When he was 9, he misfired a homemade wooden nail gun. Upon regaining consciousness minutes later, his right cheek was sore and swollen and there was a trace of blood. He and his older brother were perplexed because they could not find the nail.

He denied any neurologic symptoms and examination disclosed no focal abnormality. An EEG revealed right temporal slowing. Without a proper screening, a brain MRI was attempted and was quickly terminated due to onset of a severe headache. A skull film revealed the cause (figure). After removal of the nail via the maxillary sinus, he had a flurry of seizures. Seizure frequency improved to one seizure every 3 months on Tegretol.

Note: The opinions or assertions contained herein are the private views of the author (G.Y.C.) and are not to be construed as representing the views of the Department of Defense, or the Department of the Army.

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What’s inside the art? The influence of frontotemporal dementia in art production
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Abstract—We evaluated the productions of an artist with frontotemporal lobar degeneration from before dementia onset until she was fully symptomatic. We noted an improvement of technique that might be related to sparing and disinhibition of the right posterior neocortex. There was a reduction of closure (completeness of the painting), possibly induced by impersistence and a decrease in evocative impact that might be explained by frontal and anterotemporal-limbic dysfunction.

Patients with primary progressive aphasia and semantic dementia subtypes of frontotemporal lobar degeneration (FTLD) often have focal atrophy of the left frontal and temporal lobes. Patients with FTLD have developed new visual artistic skills during their illness.1,2 Because most patients with FTLD who subsequently became visual artists did not paint or draw prior to symptom onset, it is difficult to be certain whether these degenerative diseases released or enhanced nascent creative and artistic talents or whether the disease itself engendered artistic expression in previously inartistic people. For the same reason, it is also difficult to assess how the different components to creative visual artistic expressions are influenced by this illness.

We studied a patient with FTLD, a semantic dementia subtype, who was an artist prior to symptom onset. To learn what qualities of her artistic production improved, declined, or remain unaltered during the course of her disease, we systematically evaluated a collection of her paintings from before symptom onset until 8 years after the diagnosis.

Methods. Case report. The patient was a 65-year-old, right-handed woman who reported progressive memory loss and increasing problems with speech that started 8 years prior. Before symptom onset, she was mild mannered; with her illness, she became more impulsive and belligerent. The patient and her significant others reported that since the beginning of her illness, her paintings improved in quality. When we evaluated her in August 2005, the patient was alert and behaviorally appropriate. When assessed for motor impersistance, by asking her to keep her eyes closed for 15 seconds, she was able to accomplish this task, but repeatedly asked for assistance (e.g., “Can I open my eyes now? Should I still keep my eyes closed?”). She experienced difficulty with repeating complex sentences and had some difficulty understanding complicated verbal and reading instructions. Conversational speech was normal in terms of fluency, grammar, articulation, and pace (see table E-1 on the Neurology Web site at www.neurology.org). Her visual spatial copying (intersecting pentagons on the Mini-Mental State Examination) was normal, although after 20 minutes, she failed in reproducing the figure from memory. MRI indicated bilateral anterior temporal lobe atrophy (figures 1 and 2).

Procedure. After obtaining informed consent, we collected 40 paintings done by the patient between 1987 and 2005 (figure 3 provide samples). Eighteen painting were collected from the period around 1990 when the patient did not exhibit any symptoms (time 1: presymptomatic period), six collected from the period around 2000 when the patient symptoms were just beginning (time 2: presymptomatic period), and 16 collected from the 2005 collection (time 3: fully symptomatic period).

We asked 18 judges (10 men and eight women) with an age range of 19 to 50 years (mean 21.9, SD = 9.59) and a mean of 13.2 years of education (SD = 2.19) to examine the paintings. The judges were blind to the patient’s clinical diagnosis and when the paintings were produced. The judges were briefly trained to evaluate the paintings on six different artistic qualities (table E-2) by providing them with a definition and examples of each quality to be judged. They were subsequently asked to rate each painting, using all six artistic qualities, on a continuum from 0 (lowest) to 100 (highest) by bisecting a line that was 100 mm in length.

Results. We performed a two-way repeated-measures analysis of variance, with the independent variable of quality having six levels (esthetics, representation, technique, closure, evocative impact, and novelty) and the independent variable of time period having three levels (time 1, time 2, and time 3). The results indicated an interaction between quality and time, F(10,170) = 5.92, p < 0.001. Main effects were also found for quality, F(5,85) = 4.68, p = 0.001 and time, F(2,34) = 3.77, p = 0.033. Multiple comparisons, with the criterion of significance set at p < 0.01, indicated that closure, evocative impact, and technique changed as a function of time (table E-2).

Discussion. Consistent with previous studies, our patient showed an increase of some visual artistic skills over time. The posterior parietal and temporal cortices are affected to a lesser degree in FTLD. Additionally, these areas mediate the visuospatial and visuoconstructive skills important in copying.
drawing, and painting pictures. It has been suggested that these enhanced artistic skills in the patients with anterior temporal and orbital frontal degeneration might be related to a loss of inhibitory activity over the posterior temporal and parietal regions involved in visuospatial and visuococonstructive processes. Thus, the patients with FTLD have a paradoxical functional facilitation that may contribute to the emergence of talents or an increase in technical skills.

Our patient showed a decline in closure and evocative impact from time 1 (presymptomatic) to time 3 (fully symptomatic) and from time 2 (perisymptomatic) to time 3. In contrast, her technique was judged to have improved from time 1 to time 3.

The improvement in technique is not surprising, given that one would expect continued improvement in technique as artists practice their trade. The more interesting finding is the decline of the curve across the three time periods for closure and evocative impact, suggesting progressive impairment in these artistic qualities, particularly starting from the time the patient became symptomatic, and then subsequent decline.

The reason why closure decreased with progression of this patient’s illness is not known, but patients with frontal lobe dysfunction have been reported to have cognitive impersistence; on the eye closure task, our patient showed some evidence of impersistence. Regarding her decrease in evocative impact, patients with FTLD often have behavioral disorders that suggest abnormalities of emotional

Figure 1. Axial T1-weighted images. Left to right, top to bottom: images are inferior to superior. Note the symmetric anterior temporal lobe and parietal lobe atrophy.

Figure 2. Coronal fluid-attenuated inversion recovery images. Left to right, top to bottom: images are anterior to posterior. Note the symmetric temporal and parietal lobe atrophy.
processing. Whereas the medial Papez circuit appears to be important in forming declarative memories, the basal lateral circuit of Yakovlev\textsuperscript{6} appears to be important in the mediation of emotions. It is possible that this limbic network influences artistic production and plays a critical role in allowing artists to use their technical skills to develop images that represent or can elicit emotions. On postmortem examination, patients with FTLD often show degeneration of portions of this basal lateral-limbic circuit, such as the amygdala,\textsuperscript{7} and on MRI, our patient showed anterotemporal atrophy. We were not able to conduct a quantitative assessment of atrophy with this patient. Future research would benefit from such an analysis.

A potential limitation of our study is that we chose individuals not formally trained in art, rather than professional artists as judges. Research has indicated differences in functional hemispheric specialization between artists and nonartists.\textsuperscript{10} Thus, the possibility exists that different results would be found using a panel of professional artists. Further studies are needed to control for this potential limitation and to better understand the role of different brain regions in mediating the qualities and skills important in artistic productions as well as a better understanding of how neurologic diseases affect these systems.

Acknowledgment
The authors thank the artist and her family.

Figure 3. Examples of paintings made at time 1 (A, B), time 2 (C, D), and time 3 (E through G).
Abstract—Advances in cognitive neuroscience and neuropharmacology are yielding exciting treatments for neurologic diseases. Many of these treatments are also likely to have uses for people without disease. Here, I review the ways in which medicine might make bodies and brains function better by modulating motor, cognitive, and affective systems. These potential “quality of life” interventions raise ethical concerns, some related to the individual and others related to society. Despite these concerns, I argue that major restraints on the development of cosmetic neurology are not likely. Neurologists and other clinicians are likely to encounter patient-consumers who view physicians as gatekeepers in their own pursuit of happiness.

Are better brains better? Advances in basic neuroscience and neuropharmacology are beginning to yield therapies for cognitive disorders. While we eagerly anticipate treatments for dementing illnesses, stroke, traumatic brain injury, and developmental abnormalities, these very treatments raise uncomfortable questions. If we can improve cognitive systems in disease, can we also do so in health? Should we?

The possibility of “better brains” has captured the attention of the press, policy pundits, and ethicists. With few exceptions, neurologists have not contributed to these discussions, despite the fact that clinicians would be centrally involved as this drama unfolds. In this paper, I review the landscape of cosmetic neurology and offer preliminary speculations about its future. While cosmetic neurology certainly includes the use of botulinum toxin to brush away wrinkles, the focus here runs deeper. I start by considering the purpose of medicine to frame the ethical dilemmas of cosmetic neurology. Then, I review three ways in which bodies and brains might be made better. This is followed by an outline of four main ethical concerns raised and my opinion on why these concerns are unlikely to serve as a restraint. The goal is not to evaluate the correctness of cosmetic neurology. Rather, the goal is to alert neurologists to the shape that cosmetic neurology might take and to consider our possible role.

Framing the issue: The purpose of medicine. The strength of allopathic medicine is its focus on mechanisms of disease. Understanding the biologic basis for malfunction provides insight into how to fix that malfunction. Despite the successes of this approach, it has limits. Most notably, patients’ impressions of the quality of their lives do not always correspond directly to bio-markers and symptoms of disease. The cardinal symptoms of Parkinson disease (PD) most responsive to dopamine agonists are not necessarily those that bother patients most. Measures of disease activity may not be the best indicator of the impact of multiple sclerosis (MS) on patients. Recognizing the limits of clinical and pathologic indices, quality of life assessments of patients have become a standard practice in therapeutic trials. Such assessments seem eminently reasonable, if one believes that the point of treating a disease is to improve patients' quality of life. However, if improving quality of life is an explicit goal for physicians, and quality of life does not always correspond directly with clinical-pathologic indices, then why not consider biologic interventions for the quality of individuals' lives whether or not they have a disease?

This distinction between treating disease and improving quality of life is echoed in discussions of therapy vs enhancement. Therapy is treating disease, whereas enhancement is improving normal...
abilities. Most people would probably agree that therapy is desirable. By contrast, enhancing normal abilities gives pause to many. Fukayama opines that “the original purpose of medicine is to heal the sick, not turn healthy people into gods.” He suggests that public policy should restrict research for enhancement.

On scrutiny, the distinction between therapy and enhancement can be vague particularly when the notion of “disease” lacks clear boundaries. For example, if individuals of short stature can be “treated” with growth hormone, does it matter if they are short because of a growth hormone deficiency or because of other reasons? Additionally, the idea of promoting research for therapy and restricting it for enhancement misses the point that research in one often applies to the other. Distinguishing between therapy and enhancement may avoid tackling what is perhaps a more difficult question. If one purpose of medicine is to improve the quality of life of individuals who happen to be sick, then should medical knowledge be applied to those who happen to be healthy?

Better bodies and brains. The prospects for better bodies and brains fall into three general categories: improvement of motor systems, attention, learning and memory, and mood and affect. With the current and future impact of aging in our society, these prospects are particularly germane. Some interventions like alcohol, tobacco, and caffeine have been available for a long time. Many others are on the horizon. For novel medications, the effects in clinical populations are often not known and their efficacy and safety in healthy individuals are now unexplored. However, for purposes of this discussion, we can anticipate that such interventions will eventually be available, relatively efficacious, and safe.

Movement. Medicine can make people stronger, swifter, and more enduring. While some of these interventions might not be considered “neurologic” as narrowly conceived, I mention them because neurologists treat muscle disorders, and innovative interventions for these diseases may generalize to the normal state.

Professional athletes use anabolic steroids to improve their strength and quickness. Beyond steroids, new ways of improving motor performances are being developed. Insulin-like growth factor (IGF) produced by the liver may improve the quality of life of people without disease. IGF given to men over the age of 60 for 6 months increased their muscle mass, decreased body fat, and improved skin elasticity. In mice, injection of recombinant viruses containing the IFG-1 gene directly into muscle also increased muscle mass and strength and prevented declines observed in untreated old mice.

Maximizing blood oxygenation optimizes muscle activity and enhances athletic performance. In the 1970s and 1980s, athletes trained at high altitudes and used autologous blood transfusions to increase their oxygen carrying capacities. Since the 1980s, human erythropoietin (EPO) has been produced to treat anemia. EPO has become a new form of athletic “doping.” Similarly, new transfusion methods, motivated by blood supply shortages and contaminants, may have implications for performance when endurance is critical.

Finally, the acquisition of motor skills may be improved by medications developed to enhance neural plasticity. For example, amphetamines in small doses promote plasticity and accelerate motor learning. Their effects are most pronounced when paired with training as seen in patients with weakness following stroke. Could amphetamines also be used in normal subjects at the time of skilled motor learning, such as learning to swim, ski, or play the piano?

Mentation. We now have unprecedented therapeutic options for degenerative and developmental cognitive disorders, with more on the way. Currently available treatments most often modulate catecholamine and cholinergic systems.

The effects of amphetamines on plasticity in motor systems may generalize to cognitive systems. Amphetamines improve the effects of speech therapy in aphasic patients. Might similar effects occur in normal subjects? Modafinil improves arousal and ameliorates deficits of sustained attention associated with sleep deprivation. Methylphenidate is used widely to improve attention, concentration, spatial working memory, and planning. Students commonly use amphetamines despite the fact that it may also impair previously established performance. Newer non-addictive drugs such as atomoxetine are likely to increase off-label use of such medications.

Cholinesterase inhibitors also improve attention and memory. These medications are used widely in AD, and their use in older individuals is on the rise. The reticence for enhancement and enthusiasm for therapy is reflected in the recasting of diagnostic designations of “age-associated memory impairment” to “mild cognitive impairment.” The effects of cholinesterase inhibitors on normal subjects are not well studied. However, one intriguing report suggests an effect in the setting of highly skilled performance. Yesavage et al. reported that commercial pilots taking 5 mg of donepezil for 1 month performed better than pilots on placebo on demanding Cessna 172 flight simulation tasks, particularly when responding to emergencies.

Two new classes of drugs for memory, ampakines and cyclic AMP response element binding protein (CREB) modulators, are on the horizon. These drugs capitalize on recent advances in understanding of the intracellular events that contribute to structural neural changes associated with the acquisition of long-term memory.

Facilitation of glutamatergic transmission pro-
motes long-term potentiation, presumed to foster synaptic plasticity and memory formation. Ampakines augment AMPA-type glutamate receptors by depolarizing postsynaptic membranes in response to glutamate. Because NMDA receptors crucial to induction of long-term potentiation are sensitive to this depolarization, ampakines are thought to facilitate the acquisition and consolidation of new memories (see for review). Early studies show that ampakines improve memory in rats and normal humans. The NMDA receptors themselves may ultimately be a target of genetic modification. Mice genetically altered to overexpress NMDA receptors have superior learning and memory abilities. Neurogenetic studies suggest that CREB is a critical molecular “switch” in forming long-term memories. Gene expression is promoted by activation of CREB, which itself is dependent on NMDA receptor activation. Specific protein kinases activate CREB. CREB then sets off a transcription cascade, which produces specific structural changes at the synapse. Drosophila genetically altered to overexpress CREB demonstrate long-term conditioning to odor-shock pairings after only one exposure, a conditioning that normally takes 10 trials. Similar effects are seen in mammals. Mice given rolipram, a phosphodiesterase inhibitor, which enhances CREB, form long-term memories in fewer than half the trials needed by untreated mice.

Besides pharmacological interventions, other interventions, such as repetitive transcranial magnetic stimulation (rTMS), can have a therapeutic effect on depression. Some patients respond to frontal rTMS that are otherwise unresponsive to medications. Would TMS improve mood in normal people that are not clinically depressed, but simply have off days? Pharmacologic agents can also modulate the way emotional events are remembered. In animals, consolidation of emotional memories are strengthened by epinephrine and dampered by beta blockers injected within the amygdala. Similar effects occur in normal people. Subjects given propranolol recall emotionally arousing stories as if they were emotionally neutral. Propranolol also enhances the memory of events surrounding emotionally charged events that are otherwise suppressed. In one pilot study, patients in an emergency room given propanolol after a traumatic event suffered fewer post-traumatic stress disorder symptoms when assessed 1 month later. Intriguingly, CREB inhibitors may have selective effects on negatively charged memories. Most would agree with treating post-traumatic stress disorder to help individuals that are paralyzed by their disturbing memories. However, these studies suggest that less disturbing memories might also be clipped, if we so desired.

**Ethical dilemmas.** Cosmetic neurology raises deep ethical dilemmas. These dilemmas coalesce around four concerns, two focused on the individual and two on society. While the present context for these concerns is novel, the ethical issues themselves are not without precedent. Our responses to these concerns in other settings may predict how we will deal with cosmetic cognitive neurology.

**Safety.** Virtually all medications have potential side effects that range from minor inconveniences to severe disability or death. In disease states one weighs risks against potential benefits. Thus a patient with glioblastoma multi-forme might be willing to endure toxic chemotherapies because the alternative is so grim. In healthy states any risk seems harder to accept because the alternative is normal health. For some interventions the risks are known or suspected. EPO improves endurance but increases the risk of stroke. Modafinil enhances alertness on some tasks but may compromise performance on others. Genetically modified mice may have terrific memories but are more sensitive to pain.

While safety concerns are undoubtedly real, they are unlikely to have much of a practical impact. The incentives to develop new treatments with minimal side effects are in place. This is not to say that unexpected effects might not be encountered. But, in general, newer medications will continue to be safer, and the safer the medication, the less relevant this concern.

In a culture with strong libertarian undercurrents, many believe that if individuals are given ad-
equate information about potential side effects, they should be free to make their own decisions. Thus, we place warning labels on cigarette packs and beer bottles. To complicate matters further, it is not obvious that individuals make consistent use of this kind of information in making decisions.\textsuperscript{56} Financial investment practices suggest that many Americans are willing to tolerate considerable risk to the point of “irrational exuberance,” in hopes of improving their (monetary) quality of life.

**Character and individuality.** This concern takes two general forms, one about eroding character and the other about altering the individual. The erosion of character concern is wrapped around a “no pain, no gain” belief. Struggling with pain builds character, and eliminating that pain undermines good character. Similarly, getting a boost without doing the work is cheating, and such cheating cheapens us.\textsuperscript{57}

While these concerns about character run deep, they are mitigated by several factors. Which pains are worth the hypothetical gains they might bring? We live in homes with central heat and air, eat food prepared by others, travel vast distances in short times, take Tylenol for headaches and H2 blockers for heartburn. Perhaps these conveniences have eroded our collective character and cheapened us. But few choose to turn back.

A fundamental concern is that chemically changing the brain threatens our notion of personhood. The central issue may be that such interventions threaten essential characteristics of what it means to be human.\textsuperscript{3} For example, would selectively dampening the impact of our painful memories change who we are, if we are in some sense the sum of our experiences? This is a difficult issue to grapple with, and consensus on the essence of human nature may be elusive.\textsuperscript{11,12,16} Some changes in personhood, such as sudden transformational changes in the form of religious epiphanies are not always viewed negatively. Americans often take pride in “reinventing” themselves. Is medically doing so different? For some, medicine paves the way of revealing an identity that is otherwise hidden by circumstance. People claim to “find themselves” through steroids, anti-depressants, mind-altering drugs, and amphetamines.\textsuperscript{6} Invasive surgical procedures such as sex-change operations are used to express one’s individuality. Elliott,\textsuperscript{4} in reviewing such practices, suggests that “in America, technology has become a way for some people to build or reinforce their identity (and their sense of dignity) while standing in front of the social mirror.”

**Distributive justice.** If we can make better bodies and brains, who gets them?\textsuperscript{29} These interventions are expensive and there is no reason to expect insurance companies or the state to pay for them. Perhaps third-party payments for enhancements should be prioritized below more conventional treatments. Then only those who can afford to pay privately would get enhancements. The rich, in addition to becoming richer, might also become stronger, smarter, and hopefully sweeter than the rest.

A familiar counter to the worry of widening inequities is that this is not a zero sum game. With widening disparities, even those at the bottom of the hierarchy receive some benefit and improve from their previous state in some absolute sense.\textsuperscript{9} This argument assumes that people’s sense of well-being is determined by an absolute level of quality, rather than a recognition of one’s relative place. However, beyond worries about basic subsistence, well-being seems mostly affected by expectations and relative positions in society (reviewed by Frank\textsuperscript{59}).

One might argue that the critical issue is access and not availability.\textsuperscript{60} If access to such enhancements were open to all, then differences might even be minimized. This argument may have logical merit, but in practice (in the United States) it skirts the issue. We tacitly accept wide disparities in modifiers of cognition, as demonstrated by the acceptance of inequities in education, nutrition, and shelter. Not only have we habituated to these disparities, we limit programs such as Head Start that might attenuate them. Sadly, it is hard to expect that our response to inequities in access to cognitive cosmetics will be different.

**Coercion.** The concern here is that matters of choice can evolve into forces of coercion. Such coercion can take two forms. One is the implicit coercion to maintain or better one’s position in some perceived social order. Such pressure increases in a “winner-take-all” environment in which more people compete for fewer and bigger prizes.\textsuperscript{61} Many professionals are familiar with Faustian trade-offs of working 60, 80, or more than 100 hours a week to the detriment of health and hearth. Athletes may feel compelled to take steroids to compete at the highest levels and children at high-end preparatory schools take methylphenidate in epidemic proportions.\textsuperscript{31} To not take advantage of cosmetic neurology might mean being left behind.

A second form of coercion, which has not received attention, is the explicit demand of superior performance by others. Such coercion could take regulatory forms. Yesavage et al.\textsuperscript{58} findings that pilots taking donepezil performed better in emergencies than those on placebo could have wide implications. If these results are reliable and significant, should pilots be expected to take such medications? Can airline executives require this of pilots? Would they offer financial incentives to pilots willing to take these medications? Will the public, fearful of flying, pay more for cholinergic copilots? Closer to home, should post-call residents take modafinil to attenuate deficits in sustained attention brought on by sleep deprivation? Will hospital administrators require this practice? Insurance companies? Patients?
Inevitability. The ethical concerns raised by cosmetic neurology are serious. However, in my view, hand-wringing of ethicists, journalists, and futurists is unlikely to have much of a restraining effect on its development. When faced with the analogous ethical concerns in other contexts, we collectively shrug our shoulders. Restraint by government regulation, journalistic consternation, and religious admonition are likely to be overwhelmed by a relatively unrestrained market and the military.

The market. Treatments to enhance normal abilities are likely to be paid for privately. Many psychiatrists in private practice only accept personal payments for conditions that fall well into the “disease” category. If social pressures encourage wide use of medications to improve quality of life, then pharmaceutical companies stand to make substantial profits and they are likely to encourage such pressures. According to Elliott,6 in 2001 GlaxoSmithKlein spent $91 million dollars in direct advertising to consumers for its medication Paxil, more than Nike spends on its top shoes. It does not take much imagination to see how advertisements for better brains would affect an insecure public. Gingko Biloba, despite its minimal affects on cognition,69 is a billion dollar industry. Pharmaceutical companies, undoubtedly encouraged by sales of Viagra, are not oblivious to the marketing possibilities of new “interventions” that could apply to the entire population.31,50 Furthermore, the Academy is unlikely to restrain industry. Scientific leaders who discover new therapeutic possibilities are quick to stake biotech claims.31 Prospecting for better brains may be the new gold rush.

Military. If we can make smart bombs, surely we can make smarter bombers. Imagine a soldier that is stronger, faster, more enduring, who learns more quickly, needs less sleep, and is not hampered by disturbing combat memories. The military has long investigated and used enhancements, dating back to “go-pills” (amphetamine) for World War II soldiers.29 At the Defense Advanced Research Projects Agency and other military institutions, considerable research is under way using pharmaceuticals and TMS to modulate cognition.31,50 For example, Fort Rucker investigators found that modafinil had its greatest effects in helicopter simulation performances at the combined nadir of sleep deprivation and circadian troughs.29 Only the tip of this research may surface in the public domain. However, relevant findings from the military may trickle down to civilians. Overflood Hummer vehicles now lumber down the narrow streets of Philadelphia. Perhaps Hummer bodies and brains are around the corner.

The role of neurologists? Americans believe that the pursuit of happiness is an unalienable right. This belief assumes we have the wisdom to know what constitutes happiness, an assumption that itself is suspect.64 Fame and fortune have been standard proxies for happiness in American culture. Better brains may very well join the list, either as a means to fame and fortune, or as a source of happiness itself.67 Since 1997, the FDA has permitted direct marketing to consumers. Physicians are likely to face “patients” insistent on pursuing this means to happiness.

The role of neurologists and psychiatrists is likely to evolve along with the cultural zeitgeist. Some psychologists now focus on normal rather than on psychologically distressed individuals. “Positive psychology” hopes to maximize normal abilities so that individuals can fulfill themselves.64 Therapists are now coaches in the pursuit of happiness. Can positive neurology be far behind?

Scientific, economic, marketing, and regulatory forces are likely to shape the role neurologists and psychiatrists will play in all this. The details are difficult to predict, but what is certain is the fact that clinicians will engage in cosmetic neurology. The practice of cosmetic neurology will be complicated by the fact that we cannot rely on the conventions of traditional practice or the convenience of disease markers as guides to care. As neurologists, we may have special understanding of the potential benefits and risks of quality of life therapies in so far as they work through the nervous system. But we have no special insight into the pursuit of happiness.

One plausible scenario is that neurologists will become quality of life consultants. Following the model of financial consultants, we could offer a menu of options, with the likely outcomes and the incumbent risks stated in generalities. The role would be to provide information while abrogating final responsibility for these decisions to patients. Abrogation of such responsibility makes easier by current practice norms. Financial incentives, driven by forms filled and diagnostic studies ordered, encourage less personal involvement with patients. The comfortable stance would be to let people decide for themselves. After all, isn’t autonomy what patients desire? However, the degree of autonomy desired by patients when sick is not so clear.63 Furthermore, the bewildering array of choices available to American consumers in almost every domain of life is a source of considerable anxiety.66 If the practice of cosmetic neurology encourages the role of patients as consumers, it is in danger of compounding these anxieties.

I am not advocating that neurologists become disengaged purveyors of quality of life elixirs. I am suggesting that this role is a distinct possibility given current trajectories of medical practice. Is this what we want? While I suggest that the advent of cosmetic neurology is inevitable, the specific shape it takes may be subject to modification. I hope this paper encourages discussion of what this shape should be. Such discussions will have to center on two issues, both of which I have tried to show are not straightforward. First, we need an explicit notion of what it means to be human. How else could we motivate our
choices in enhancing movement, mentation, and mood? Second, we need to have a clear sense of the evolving role of physicians. This sense will be especially important as we wander off the familiar moorings of treating disease.

**Conclusion.** In this paper, I have raised issues about cosmetic neurology that our profession will encounter. We may have our personal opinions on the correctness of such “treatments,” but do we have a stand as a profession? We can anticipate facing questions where separating principle from prejudice is not easy and for which there are no easy answers. To make these questions concrete, I invite readers to consider their own views on the following questions:

1. Would you take a medication with minimal side effects half an hour before Italian lessons if it meant that you would learn the language more quickly?
2. Would you give your child a medication with minimal side effects half an hour before piano lessons if it meant that they learned to play more expertly?
3. Would you pay more for flights whose pilots were taking a medication that made them react better in emergencies? How much more?
4. Would you want residents to take medications after nights on call that would make them less likely to make mistakes in caring for patients because of sleep deprivation?
5. Would you take a medicine that selectively dampened memories that are deeply disturbing? Slightly disturbing?

Such questions are not simply thought experiments. Patients and advocacy groups encouraged by direct advertising to consumers will raise them. How will you respond to these “patients” when they turn to you as the gatekeeper in their pursuit of happiness?

**Acknowledgment**
The author thanks Lisa Santer, Barry Schwartz, and H. Branch Coslett for comments on earlier drafts of this paper.
Drug therapies that are already available can help patients improve their muscle mass and endurance, attention and memory, ability to learn, and moods. Future research, Anjan Chatterjee argues in this issue of Neurology, will almost certainly produce relatively safe wonder drugs that will allow us to manipulate our strength, our memory, our ability to concentrate, and our capacity to learn. Once these drugs are available, he contends, the pressures of the marketplace and of potential military uses will compel us to embrace them to remain competitive. To some extent, this discussion has an air of unreality: for the foreseeable future, any drug powerful enough to enhance brain functions significantly is likely to have serious side effects, especially with prolonged use. But if we accept the premise that safe neurologic enhancement technologies will eventually become available, then we face two important moral questions: 1) What kind of doctors should neurologists be? 2) What kind of society should we become? The answer to the first obviously depends on the second. So the question of whether neurologists should become, as Chatterjee suggests, “lifestyle consultants” who dispense fixes for the mind the way plastic surgeons offer fixes for the body does not even arise unless the mere availability of these treatments implies that neurologists must prescribe them to whoever seeks them. Putting the point in this way, however, just forces us to ask the second question in a different form: Do we want to become a society in which neurologic enhancements are routine?

Chatterjee asserts that the question of whether neurologic enhancements will become routine is moot because the power of the marketplace and the insistence of the military will force their use upon all of us. But his argument seems plausible only insofar as he falls prey to what I would call the allure of the slippery slope: He starts by showing, correctly, that a line between two concepts, like that between treatment and enhancement, is hard to draw, and he then concludes that no meaningful line can be drawn between them. Although, for pragmatic reasons, we often draw sharper lines than the boundaries between two concepts warrant, the distinction is not thereby rendered null. Even if the exact placement of the boundary is arbitrary, the distinction may still be a useful tool for thinking about what doctors should do and how they should treat their patients. Chatterjee’s claims are filled with similar arguments: Because we take Tylenol for headaches and sit in air-conditioned offices, he implies that we have no reasons to worry about how eliminating discomfort will affect our character. Because we seek psychotherapy and antidepressants to change how we feel, he suggests that we have no reason to worry about how chemicals will alter us. Because we accept inequalities in education, he infers that we have to accept them in access to neurologic enhancements as well. (I would argue this fact shows that, for reasons of justice, we need to do better in addressing the gross inequalities in our society, not that we need to acquiesce to even more.)

Slippery-slope arguments are always fallacious, and they always hide an agenda. However they are used, they are meant to make us accept a conclusion that we would otherwise reject. In this case, Chatterjee wants us to think that we are already sliding down the slope, and we may as well enjoy the ride. But in fact, as hard as the lines are to draw, Chatterjee rushes past the real issues in each of these cases. The way I think and the way I feel are more closely connected to my sense of who I am, both as a member of the human race and as a unique individual. The more radically we alter that sense of self, the more seriously we must consider what the ethical limitations should be. Moreover, because our sense of identity is involved, we should never lightly dismiss
concerns about whether drugs are safe and whether people are being subtly coerced into taking them. It is no small matter to compel people to take drugs that can change their sense of themselves, merely because we find it economically or socially convenient. But the issue goes even deeper. A drug that would, for example, make us feel giddy all the time might be tempting, but it would divorce us from some essential life experiences. We want to feel good, but the most satisfying experiences cannot be produced by any drug. They come from engaging in activities that are truly valuable, whether they involve curing a disease, composing a poem, or loving a companion. To say exactly how and why drugs that affect our mental functions alter our view of these activities requires, of course, a rich philosophical account of identity, an account which not only includes a theory of autonomy and its limits but also respects the essential role that communities play in our lives. Although no such account is readily available, we should not conclude that constructing one is impossible any more than we should conclude that no safe versions of enhancement drugs are possible because none has yet been produced.

If we accept slippery-slope arguments like Chatterjee’s, we are left thinking that we have no recourse when the forces of the market and the power of the military combine to foist a change upon us. In doing so, we have simply surrendered ethics to power. Once we have done that, of course, we no longer have to worry about the future of the profession, since either the government or the invisible hand of the market will simply decide our fate for us. On such a view, there is no ethics, just acceptance. Yet such despair is unwarranted: not even Adam Smith thought that we should leave all decisions to the market, and the government that controls the military is still—ostensibly, at least—subject to democratic checks. Fighting the power of both government and Wall Street together is certainly a daunting task, but it is not an impossible one. The campaigns for work-safety rules and for the 40-hour work week demonstrate that we need not bow to the massive power of the market. So there is nothing inevitable about the course of our society or of neurology as a profession. As neurologists and as citizens, we can collectively control our own destinies, if we so choose and if we have the will to act. Because we can choose, we face deep moral questions that we must simply answer one by one.

Acknowledgment

The author thanks Jennifer Kwon, MD, for help with this editorial.

For a complete list of references for this article please visit us online at neurology.org.
The shape of things to come
Stephen L. Hauser, MD

September 28, 2004 (Neurology 2004;63:948-950)

Is it progress if a cannibal eats with a fork?
—Stanislas J. Lac

In the current issue of Neurology, Anjan Chatterjee makes a compelling argument that neurologists need to enter the debate about the proper uses of the fruits of the biomedical revolution. In so doing, he has performed an important service to the neurological community. Chatterjee reminds us that advances in neuroscience carry with them the likelihood, intended or otherwise, of medical applications that go well beyond the traditional goals to prevent, diagnose, and treat disease.

Chatterjee focuses our attention on biomedical advances that are likely to provide new ways to modify behavior, improve performance, extend lifespan, and generally give the user a competitive edge over his or her fellow humans. It addition to the traditional concept of relieving suffering, these advances will also improve the perceived quality of life, a concept that will have different interpretations depending on one’s point of view. One of my colleagues has noted, somewhat sarcastically, that in a free market economy the proximate goals of genetic engineering are as likely to focus on correcting male pattern baldness and increasing height as on curing disease. Individuals will go considerable distances to seek advantages, even trivial ones, both for themselves and their children. In the words of Bill McKibben, “people will do far-out things for less than pressing purposes.” The rampant use of cosmetic surgery, use of growth hormone for children within the range of normal height for age, and the apparently widespread use of performance-enhancing drugs by professional (and in some circles amateur) athletes, are but a few examples of this behavior.

Several authors have commented on the slippery slope encountered along the path from treating diseases to eliminating predispositions to actively enhancing functions. Depending upon one’s interpretation of our role as physicians and the goals of medical science, one could conceivably endorse all of these missions as appropriate. In the eloquent original charge by Congress to the newly formed NIH in 1952, the purpose of biomedical research was defined as follows:

To help provide the practicing physicians of this nation—and of the world—with better means for ameliorating physical suffering and emotional imbalance, for prolonging human life, and for making all the years of that span more useful both to the individual and to society.

This is a broad charge indeed that might be reasonably applied by proponents to support the widespread use of Prozac for malaise, Ritalin for rambunctious boys, performance-enhancing drugs for athletes, and also stem cell therapy for tissue replacement. Many of these interventions have strong arguments both for and against, arguments that will undoubtedly change over time, with shifting political winds, and with improved technologies. How does one define physical suffering? Does unhappiness due to lack of athletic prowess, unattractive features, or low-normal intelligence satisfy the criterion of “emotional imbalance” as defined by Congress? Should limits be placed on the goal of “prolonging human life” (assuming, of course, that we can even agree on the definition of human life)?

Emerging medical technologies. It is evident that a major expansion will soon occur in the repertoire of selective biologic manipulations available to physicians and that many of these new therapies will involve enhancements that fall within the purview of neurology. The changes that we can expect to happen over the short, medium, and long term are likely to be substantial, and it is as preposterous to think that these can be predicted accurately as it is to imagine that the knowledge base required to practice neurology today will be adequate 10 or 20 years from now. These uncertainties notwithstanding, it is likely that six major areas of science will profoundly impact neurology in the next generation.

1. Cosmetic pharmacology. The increasing use of designer drugs to improve such attributes as mood, focus, energy, as well as perhaps memory and motor performance is to be expected, fueled by the identification of “druggable targets” through human genetic
studies. As with such currently available drugs as Prozac and Ritalin, behavior-altering drugs are likely to be approved for rather narrow medical indications. Who would reasonably deny use of a motor performance enhancement drug for stroke patients, or a memory enhancer for Alzheimer disease? However, there will certainly be considerable pressure to employ such drugs for additional, off-label, indications. Should we permit use of a safe memory enhancement drug for physicians who need to keep current with new developments in the field? What about a single-use indication for our kids as they cram for SAT exams? If yes, should our neighbors’ kids have the same opportunity?

2. Human cloning. The capacity to clone whole organisms is obviously already with us, and the technical problems associated with current cloning methods—e.g., cloned animals tend to be unhealthy and less fit than their naturally born species mates—can undoubtedly be overcome in the near future. Although the widely publicized reports in 1999 that the Raelian cult had successfully cloned a baby named Eve (based upon a protocol obtained through UFO encounters) turned out to be a hoax, it is likely that successful human cloning will be carried out somewhere, notwithstanding proscriptive laws against such activity enacted by most nations.

3. Stem cell research. This technology promises the possibility of prolonging life and improving its quality through cell and tissue replacement (e.g., nigrostriatal neurons for Parkinson disease, oligodendrocytes for multiple sclerosis, etc.). Stem cell–based therapies will undoubtedly find their way into neurologic practice, perhaps not via cell-based therapies but with traditional drugs that stimulate differentiation of adult stem cells in the body.

4. Preimplantation genetic selection. With the availability of high throughput genetic sequencing and improved informatics, this technology will increasingly permit parents to select inherited attributes of their offspring without the need to do any genetic engineering whatsoever. As noted above, distinctions between disease, predispositions, and enhancements will differ among reasonable individuals. If one could predict that an embryo has a 30% chance of developing multiple sclerosis, is termination ethical? Even more difficult, what about embryos in which the inherited component of intelligence falls at the low end of the parents’ gene pool?

5. Genetic engineering. Here the genetic material is directly manipulated in an embryo or adult, either through the direct modification of selected genes or by insertion of a gene or genes that will improve some desired attribute. If the inserted genes are not incorporated into chromosomes and thus are not transmitted to offspring, do arguments against genetic engineering weaken? Are there ethical differences between delivery of gene therapy to correct muscular dystrophy due to dystrophin deficiency or to correct an inherited disadvantage in athletic prowess due to myostatin overexpression?

6. Artificial interfaces and nanotechnology. Although a major impact of this technology appears to be further away than the above approaches, its presence is already beginning to be felt in neurology. Cochlear implants are the sentinel example of mechanical interfaces providing sensory input to the human nervous system. Neural stimulators—for movement disorders and epilepsy—are other examples of technologies currently in (increasing) use. Some worry that these successes represent the beginnings of Cyborgs—individuals who are part human and part machine. For more than 50 years science fiction writers have imagined the potential of such human–robotic chimeras. Nanotechnology promises the potential of designing micromachines capable of dramatically advancing the potential of such interfaces.4

The unique role of neurologists, core competencies, and training. Neurologists, as principal physicians of the human nervous system, must assume a role in shaping the debate about what it means to be fully human, healthy and normal, and about how society might define the boundary between interventions used to promote or restore optimal health and those used for enhancement. Neurologists led the discussion of brain death in the last generation, and similarly we must now lead the discussion about how to define conscious life and how to arbitrate the very difficult questions of quality vs quantity of life.

The neurologist of the future will be competent only if fluent in the language of science. Compassionate care is a given, but it is merely the vehicle through which competence is expressed. The next 20 years is likely to witness changes in neurologic practice and new technologies that we cannot now imagine, and yet by many measures our profession (medicine in general and neurology in particular) appears to be poorly prepared. By some estimates, the number of physician–scientists on faculty in American medical schools has declined by 25% in the past generation, and the proportion of medical students who express a deep interest in science has also declined. Medicine remains a highly attractive career option for young people, and it has been argued that the decline in a passion for science exhibited by medical students may be due to a conscious (or unconscious) attempt by admissions committees to seek out applicants who are “well-rounded” or show evidence of humanistic values rather than a passion for science. As Faith Fitzgerald has argued, the best medical students appear to be defined not by their undergraduate areas of concentration but whether as people they are inherently curious and pursue their passions—whatever they may be—in depth.
To meet the challenges and opportunities ahead, neurology should:

1. Redesign our training programs to ensure that they are models for the incorporation of neuroscience into clinical medicine.
2. Emphasize the role of neurologists as teachers in all practice settings; our small numbers (approximately one-half of 1% of American physicians) requires that most neurologic care will be delivered by generalists, not neurologists. All medical students also need to receive adequate training in neurology, including a mandatory clerkship of at least 4 weeks.
3. Recognize that the margins between academia, industry, and practice are likely to blur further in the next generation. This reality is recognized by the federal government and is a component of the roadmap initiative elucidated by NIH Director Elias Zerhouni.\(^{10}\) We should work through our national organizations to create multidisciplinary consortia of neurologists in different practice and research settings, as has been done in oncology.
4. Include psychiatric disorders—especially the highly prevalent psychoses, affective, somatiform, and addiction disorders—as a key component of our larger mission as neurologists. It is critically important that the disciplines of neurology, psychiatry, and neuroscience ally themselves in new and meaningful ways.\(^{11}\)
5. Avoid conflicts of interest, both personally and in our national organizations. It has been estimated that 90% of medical experts have financial ties to the pharmaceutical industry. I am not suggesting that such ties should be avoided absolutely; in many cases they serve the interests of all. However, we must give the public no opportunity to question our independence. We must be absolutely honest brokers if we hope to be major players in the coming debates on the appropriate uses of bioscience.

Finally, we should convey a message of profound optimism to the young people who plan to enter our profession or are just beginning their careers:

_You could not have chosen a profession that, during the course of your careers, will be more important to humanity, nor one that is more fundamentally ethical. In the future, neurology will grow dramatically in importance if you live up to your responsibility and enter the debates on the life-altering technological advances, and threats, that will appear. One could not imagine a better time to begin your lives as neurologists._

*For a complete list of references for this article please visit us online at neurology.org.*
Cosmetic neurology: The controversy over enhancing movement, mentation, and mood

To the Editor: The healthy human has vast, untapped potential. Neurologists do not need to create new neural capability or alter individual essence. In the military, we would be remiss if we did not seek to improve performance in sleep-restricted environments. When American warriors cannot sleep, when their lives are at stake, and when battles may be won or lost based upon ability to sustain performance, it would be unethical for the military not to provide a rational and well-researched fatigue countermeasure. Countermeasures associated with the correct use of dexmethylamphetamine are safe, because they have seem no reports of adverse effects, of dependency with “operational” use, or of flight surgeon’s overprescribing them. We have to take their word for it because the data are not available outside the military—assuming that they are available within the military. We should never accept the reviewed testimony of any researcher, and we should be especially skeptical when the institution involved, be it the military or a pharmaceutical company, has strong reasons to make the rest of us accept a particular finding.

Second, the military is a coercive institution. I suspect that if the soldiers are not actually ordered to take these drugs, their superiors let it be known that they are expected to do so. At minimum, it is represented to them that their lives and those of the members of their unit are at stake if they fail to take these drugs. The soldiers from do not have a meaningful choice about whether they can take the drugs or not. Such coercion is perhaps justifiable, but only if an important ethical goal cannot be achieved in any other way. In addition, the drugs could easily be subject to “mission creep.” If situations in which these drugs are needed may sometimes be unavoidable in war, the availability of such drugs makes the assignment of sleep-depriving missions easier. With these drugs available, the military is likely to assign missions to fewer soldiers than in need for the sleep requirements that humans normally require. As a result, the use of these drugs will simply become a routine part of their job.

Third, the authors’ role in prescribing neuroenhancing drugs for soldiers under their care raises general questions about the doctor-patient relationship. The authors believe that, as military physicians, they have responsibilities to both the health of “our military members and of our nation.” These two responsibilities may conflict, especially if the desires of the military become equated in some people’s minds with the needs of the nation. In that spirit, some military doctors at Abu Ghraib and Guantanamo Bay thought it ethical to advise interrogators about their prisoners’ vulnerabilities. The authors, of course, claim a much more modest use of this principle: they only claim that “when battles may be won or lost,” that “it would be unethical not to provide” performance-enhancing drugs for the “warriors” in their care. Nevertheless, the doctors do not prescribe these drugs to better their patients’ health, but to enable the soldiers to perform their lethal jobs better and thereby to advance what they perceive to be the greater good. When doctors begin to act on their own perception of the greater good, they can begin to treat their patients not as the individuals that need care, but as cogs in a war machine. Even if the war in which they are participating is a just war—even if it is a war for survival—doctors violate the deepest duties of their profession when they lose sight of the individuals they are supposed to help. If physicians keep their focus squarely on their patients, they will be better off ethically, and the rest of us will be better off medically.

Acknowledgment: The author thanks Jonathan Mink, David Goldblatt, and Jennifer Kwon for comments on earlier drafts of this response.

Richard H. Dees, PhD, Rochester, NY

Reply from the Author: I appreciate Drs. Russe et al.’s comments about cosmetic neurology and their confirmation of my speculation that much research conducted on soldiers will not reach the public domain. I am also heartened that there are no reports of amphmphetamine dependency or abuse within any of the services, no reports of coercive prescribing practices among flight surgeons, and that military research shows that the benefits of modafinil outweigh the risks.

I do not consider what military practitioners do, or cosmetic neurology for that matter, to be shallow or superficial. While the term cosmetic has come to be associated with appearance rather than essence, it is rooted in the Greek word “kosmetikos,” which refers to skill in arranging. My point was to discuss ways in which cosmetic neurology involves skilled neurologic arrangements that penetrate our very notions of personhood, and the promise and predicaments that follow. The questions I pose are: Can you be more than you can be? Should you?

Anjan Chatterjee, MD, Philadelphia, PA
Reply from the Editorialist: Dr. Russo’s comments, and the reactions elicited by my colleagues, highlight again the need for active engagement by the neurologic community in the use of neurologic enhancement technologies. The problem here, as with many bioethical issues, is that reasonable people will often disagree. Our community has two obligations, I think. The first, as stated eloquently by Dr. Deos, must be to support the traditional view of the physician–patient relationship which required that the physician always act in the best interest of the individual patient. Even this mandate is not black and white, however. Consider the situation in which acting in the best interest of the patient may conflict with the goal of improving public health. We willingly vaccinate our patients against polio for the purpose of maintaining herd immunity (rather than providing individual protection), even though vaccination carries a risk—albeit miniscule—of neuroparalytic complications. From his military vantage point, Dr. Russo provides an interesting and important example in which the greater good is not that of public health but that of combat readiness, public welfare, and the national interest. Perhaps the military should distinguish between a personal physician and a combat physician whose role is to prepare troops for battle. In such a situation one would hope that the personal physician is given the final say over any therapeutic option suggested (or imposed) by the combat physician. By analogy, professional athletes have long been aware of the potential conflict of interest inherent in their relationship with team physicians. They usually seek opinions of independent experts before undergoing treatment for sports injuries. They recognize that team physicians may be subtly (or not so subtly) incentivized to return the player to the field as soon as possible. An egregious example of this type of potential conflict occurred several years ago in professional baseball; in this case the team physician was also a member of the ownership group.

Our second obligation, and the purpose of the editorial, was to suggest that we must as a profession provide expert and evidence-based data on the risks and benefits of interventions that enhance neurologic functions.

Stephen Hauser, MD, San Francisco, CA
Force of Narrative

1950s
1960s
1970s
1980s
1990s
2000s
2010s
Dr. David Goldblatt certainly started something, and we should all be grateful. The formal recognition of the human, creative aspect of neurology implied by the existence of this section in the journal is due to his energy and zeal. Neurology is a precise specialty. It is increasingly technical, whether we admit it to ourselves or not. The neurologic examination is overshadowed by diagnostic imaging. The reflex hammer gives way to molecular biology. Old beliefs crumble in the mirror of evidence-based medicine. Quite right, too!

But in neurology lies a conundrum. What attracts us to the specialty in the first place? It is, in essence, the brain. We yield to the fascination that has preoccupied philosophers and priests through the ages. The brain, the seat of the soul, the repository of self, the sine qua non of human existence. It is the mystery of thought, the recursive attempt to contemplate the brain with our own brain that draws us in at the beginning. It is all so—well—interesting! I suspect that there is a personality that goes along with that. Perhaps we include a higher proportion of dreamers in our midst, more artists for whom creation is internalized, not externalized. People who dare to contemplate the brain have to be a little bit out of kilter, a bit wacky, more than a bit creative, a bit closer to the frontiers of rational thought. Thank heavens we are all neurologists. It keeps a lot of bright but dangerous people off the streets.

No wonder that we have a rigorous training program. No wonder that we demand substantiated data, a proof for all our suppositions. It is the only way to control the Puck that lies beneath. Yet, in many of us, the timeless jester that first interested us in neurology, hidden away under the exoskeleton of science, still gives the occasional spasm. It is to that character that these pages are dedicated so that he can be let out once in a while and show the rest of us what life is really like on the inside.

We also have to thank the Editor, Dr. Griggs, and the Neurology Editorial Board, since these pages are really the opposite of what the journal itself is all about. Papers published in Neurology have the weight of authority. Every fact is documented. There is no room for invention or speculation. The section “Reflections” is the dark side of the moon. Fabrication and exaggeration are encouraged as long as they are well written. Documentation is useless; writing carries its own conviction. Neurology is the place for things that are. “Reflections” is for things that ought to be, might be, or may have been. In the other pages of Neurology there is no place for emotion. Neurologists on the other hand are often emotional people, intensely empathetic and distressed by the illness they encounter. “Reflections” is their crying towel.

Thank you, Dr. Goldblatt, I don’t know how you accomplished it, but I believe that you have established a forum that will become increasingly important. Finally, I have to apologize to you. We changed the name! It was called “Nisus,” a title as apt as it was erudite. The problem was that, in my ignorance, I was never sure I knew what it meant exactly. Someone suggested “Reflections” and that conjured up the boy by the water looking at his image. I am sure that Narcissus was a neurologist—and as for Echo—well, the less said the better!
I am a mother.
I used to be a wife.
I am not sure if my son
Remembers still.
Maybe that is better.

I have one child.
My son is thirty-four.
He lives with me.
He has no wife.
He decided long ago
Not to have children.

Huntington’s.
Used to be just a town in Long Island
Or a beach in California.
When his father
Was first diagnosed,
My son and I were both afraid
For ourselves.

How do we survive?
But we made do.
Then the genetic tests,
Those so-called
Blueprints of life,
Ha!
The blueprints said
My son would have
The disease too.

My son and I were both afraid.
Afraid.
In the name of the father
And of the son.

We see the small jerks,
The subtle funny motions,
That probably went
Unnoticed with my husband.
And my son would look up to me
With the same stare
He used when he was three,
About things he did not understand.

I raised a brave son.
A soldier
Who held his father’s hand
Through bedbound pneumonia
And even jokingly said

“Do not be afraid,
I will soon follow.”

But I know he is afraid.
He cried when he kept on falling.
Impulsive.
As the therapist described him.
It could not be farther.
My son has always
Always planned his life.

Living Will is done.
For a man—
A good man
Who told me,
”Mama, if I should
Kill myself,
Know that I put up
A hell of a fight,
For I know the grief
That it will bring to you.”

It will not be him
Who kills himself.
It will not be him.

His doctor
Sees him once a year.
There is nothing
They can do.

I see him every day,
And more and more,
I see less and less.

What plague is this?
What protein?
A protein?!?
In the name of the father
And of the son,
My God, my God …
I accepted widowhood.
I am a mother.
Do not let me be in vain.

But then my boy’s
Words come back to me,
”Mama, when the time comes,
I will tell God to take care of you.”
He will take care of me.
Let me now hold
His writhing hand
For as long as I can.
His wife helps him hobble into the examination room, heavily bent over and frail where once a tall and healthy young boxer juked and jived. He breaks his shuffle and torques to look up at me, eyes as unpained and piercingly blue as in his youth, nodding and grunting a little to communicate hello before his wife leads him lovingly to the chair. He sits there patient and reticent, both hands resting on his cane, while his wife, spry and wiry in her elderly years, communicates for him what seem to be his ailments, evolving problems, and the logistics of the numerous medicines he consumes daily. He looks around the room briefly at times before looking down again, sometimes glancing over at his wife, and when his intermittent gaze falls on me to make eye contact. I suddenly feel intimidated for those brief moments. I find it uncanny how you can tell when you are in the presence of a leader, of a dynamic individual by some subtle manifestation of presence, even if it is buried under layers of medical illnesses and advancing age. He is aware, focusing on his wife and me attentively, taking things in, but at a slant.

Among his wife-mediated complaints is a fluctuation over a matter of hours in his ability to perform some of his activities of daily living, a shying away from bathing, and intermittent unannounced incontinence being his wife’s most troublesome concern, selflessly because she is afraid it will shame him. He has never become aggressive despite his training as an amateur boxer, but fears spectral beings born from the television set with growing frequency. His gait is unsteady and falls are a growing concern. He responds dismally to low doses of his many medications, the side effects quickly becoming the ceiling of doing before efficacy can be reached. He looks over into his wife’s watering eyes as she speaks her concerns on his behalf and responds to some light internal thought, reaching over, patting her on the leg, smiling. “Katie, I love you.”

Her name is not Katie, but she smiles back at him, unfazed by this tip-of-the-iceberg expression of his declining memory. He has forgotten long ago all the important elements of their life together, and once a habitual talker, he has dropped slowly into long periods of silence. His is a mixed dementia, likely but nondefinitively a diffuse Lewy body dementia, a currently thickening dementia, and his wife, like so many others, is concerned with keeping him healthy and in her presence as long as possible. I can think of no better medicine available to give to her right now than more time with him. This is our first encounter. At last year’s visit, another resident’s note briefly acknowledges the obvious poor cognitive baseline, but not specifically, so I am not sure of the degree of domain-specific decline since that time. I start my examination. When I come to testing his cognition, I start teasing out the boundaries of memory, his capacity to remember short-term facts and recall his personal information as well as memories from the world at large, both in the short and lengthier intervals of time. He is silent to all questioning, but does not appear confused, and looks directly at me eye-to-eye and with his wife intermittently, the smirk of a leader’s gentle assurance on his face.

I start to see flashes of recognition when I ask about historical figures such as Abraham Lincoln, Susan B. Anthony, Winston Churchill, Socrates. To Martin Luther King, I receive, “Strong man,” JFK, “Shot in Dallas,” and Jesus of Nazareth, after a long pause, “Gave us our bread, our daily bread, and forgave us our trespasses.” We all smile at the obvious presence of himself in there somewhere. His wife rocks slightly, trying to contain her excitement at the flash of her husband coming through like a ray of light as the storm clouds start to break. She reaches over and strokes his hand, wanting to connect to him but conservatively so in my presence. I delve into his service history, into the yellowing pages of World War II and his time in Europe. I ask him who Hitler was, what’s significant about the Jewish people. His demeanor changes palpably and he looks down. Sensing the change, I am waiting for a response as I write a note or two on my paper. When he looks up again, tears are running down his cheeks, his lack of facial expression belying the deep flowing ocean underneath.

“It was their eyes. Only their eyes that moved.”

It is abrupt. Unexpected.

I feel goose bumps run up and down my arm in waves, then across my neck. I tilt my head unconsciously, and his wife is silent, the room suddenly set apart one thousand miles into deep space.

“The Man from Dachau.” (Long pause.) “I vomited.”

His wife looks at me and says softly and apologetically, “He liberated Dachau. He was in the forward front before being later turned back by the Russians.”

She is interrupted by a slow, aching, and suddenly open voice, “When we walked into Dachau, they were too weak to move. They were skeletons... Skeletons. All gray, gray... Dusted. Dachau. They were free and only their eyes were free to move... all following us along... All the bodies hanging and lying on the ground.” He is suddenly urgent after more pause and memory obviously rolling past his mind’s eye, and when he looks at me with furrowed brow, I shift in my seat, uncomfortable under the weight.

“All skeletons, dead, living gray skeletons. But their eyes. Their eyes followed us. Only their eyes.”

The room remains silent.

After an eternally long and somewhat shocked pause, his brows ever-so-slowly soften and he sinks back into his former state, less acutely aware of himself, layers of dementia piling back in and over the memory as I leave it alone and stop digging it out. His wife rubs his shoulder, consciously holding back her own emotions. He looks over and up at her; “I love you, Katie.”

I am surprised and ashamed by my encounter with this man with his Cimmerian blessing... burying his Cimmerian curse. It lingers with me. It is why I entered medicine, and yet, makes me feel guilty, as though I were clergy who brought up an explicit confession over dinner with a friend. Is it always better to remember, or sometimes to forget?
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