



"Dedicated to improving the health, well-being and quality of life of patients and their families."

QUARTERLY

Memantine for severe stage Alzheimer's Disease? Examining the choices of two caregivers.

by Jason Karlawish, MD and Kara Krissel, MPH

Memantine: the choices of two caregivers

"...I look at her and she will say 'I love you.'
To me that is worth a million bucks"
- Mr. K: chose to use memantine

"What this drug does is to put a band-aid on a cut to prevent infection and raises the hope that someone will figure a way to make the cut disappear."
- Mr. E: chose not to use memantine

"*Namenda is indicated for the treatment of moderate to severe dementia of the Alzheimer type.*" As quoted from the label for memantine (Namenda).

The recent Food and Drug Administration approval of memantine for patients with moderate to severe stage Alzheimer's disease raises a question: when in the course of Alzheimer's disease is the benefit of treatment no longer valued? There are at least three reasons why this question is important, especially for the care of persons with severe stage Alzheimer's disease.

First, the patient cannot make the decision whether to take the drug. Most patients in the mild stage of dementia and many in the moderate stage are involved to one degree or another in decisions about

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"What is my risk of Alzheimer's disease?" National study seeks to answer this important and common question

The University of Pennsylvania's Alzheimer's Disease Center (ADC) has joined a nationwide Alzheimer's disease genetics study. This collaborative effort plans to find genes that play a role in late-onset Alzheimer's disease. The study is sponsored by the National Institute on Aging – a part of the National Institutes of Health, supported by the Alzheimer's Association, and conducted by the National Cell Repository for Alzheimer's Disease (NCRAD).

Why is this study important?

This study seeks to speed up the search for the discovery of genes that increase the risk of developing the most common form of Alzheimer's disease: late-onset Alzheimer's disease. About 90 percent of people with Alzheimer's disease have the late-onset variety, which strikes people age 65 and older. Identify-

ing the genes that determine who is at risk for this common form of the disease may be the first step in preventing the disease, and developing effective treatments.

Who can participate in the study?

This study recruits families. They must have 3 members who can donate blood including:

- 2 siblings (brothers or sisters) who developed Alzheimer's disease after age 60

AND

- Another family member over age 50 who may have memory loss OR a family member over age 60 who does not have any memory loss

For more information about this study contact study coordinators Jennifer Farmer or Beth Wood at 215-614-0937 or email at farmerj@uphs.upenn.edu or mccarty@mail.med.upenn.edu. Additional information is also available through the study website at www.ncrad.org.



A Grand Picture of The Glorious War Against Forgetting.

Book review by Jason Karlawish, MD

As part of a campaign to raise awareness of the experiences of caregiving and chronic illness, WHYY-TV12 recently broadcast a documentary, "The Forgetting: A Portrait of Alzheimer's", based on David Shenk's book The Forgetting. Alzheimer's: Portrait of an Epidemic. For more information about this documentary and details on other upcoming events visit the *WHYY Wider Horizons* website: www.widerhorizons.org. What follows is a review of the book.

I care for a clinic of persons who cannot recall the date or calculate the tip on a restaurant bill. Their family members – the people we call caregivers – tell us they can't put it all together like they used to and the sicker they get, the harder it is to care for them.

These people meet the diagnostic criteria for Alzheimer's disease. They have declines in at least two cognitive domains, such as short term memory and executive function, that is, the ability to plan and organize. When they try to draw the face of a clock, they try and try again, but just cannot get the hands and numbers in the right places. These cognitive impairments interfere with their ability to do their usual and everyday tasks. A careful inspection of a detailed image of their brain using a magnetic resonance image (MRI) may show atrophy of the regions of the brain beneath our temples. These are the usual cases. But the extremes unravel how confident I am in answer to the question: what is Alzheimer's disease?

Alzheimer's disease is the plaques and tangles in a brain. However, the pathologist may confidently label the brain of one person "Alzheimer's disease," whereas a psychologist who thoroughly tested that same person months before their death may label the person's cognition "normal". In some autopsy cohorts nearly 20% of the people who are labeled "cognitively normal" have pathologic Alzheimer's disease. What do we call these cases: asymptomatic Alzheimer's disease?

Is a person with a memory problem that interferes with their ability to do everyday tasks, such as remembering a list of groceries, demented? No. This is an isolated memory problem. They write the list down and they can still do the shopping. But actuarial data suggests that over time, this will likely progress to other problems that no amount of list making can solve, such as driving to

the grocery store and managing the change the cashier gives them. At some research centers, persons with this degree of mild cognitive impairment have Alzheimer's disease while at others they are labeled "mild cognitive impairment." The core issue here is when in the transition from "normal" to "abnormal" should we apply the label of "Alzheimer's disease?"

These extremes betray the ambiguity in the answer to the question what is Alzheimer's disease. To borrow a phrase from our rambunctious secretary of defense, Alzheimer's disease continues to present us with significant "known unknowns" – that is, the things we know we do not know. Our answer to the question "what is Alzheimer's disease?" is good enough to get us through the day.

All diseases have a history. But it is not simply a linear story of discovery, conquer and cure. We are not just the people who discover the

disease. We are also the people who get it and whose actions change the way we know the disease. Unlike a voyage of discovery, we cannot separate the explorer from the territory the explorer visits. What is Alzheimer's disease? The answer to this question is as much an answer about the entity as it is an answer about who we are. Both the clinical criteria and the pathologic criteria are subject to our judgments of what we say is normal.

David Shenk's The Forgetting understands this essential point. The result is a book that exceeds the usual expectations of "stories of disease." Typically, such tales collapse under the weight of their panegyrics of tragedy and suffering, and effusive praise for the heroic scientists who bravely battle arm-in-arm late into the night. It is aptly subtitled "Alzheimer's: Portrait of an Epidemic." Shenk's palate of colors and images is intense and diverse: the psychology of memory, the pathologic changes, the stages of dementia, and the

The Forgetting. Alzheimer's: Portrait of an Epidemic. by David Shenk. 2001. Doubleday. 292pp.

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Book Review...

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warring camps of scientists.

The result is neither an abstract collage nor the single image of a distinguished leader seated before a monochrome background. His portrait is a grand depiction of high drama. Think of full figured fighters arched in dramatic muscular poses, draped in flowing wind swept garments before a sweeping battlefield vista. Emil Kraepelin pushes the frail Alois Alzheimer as his devoted colonel in his fight to the death with Sigmund Freud over the biological basis of mental illness. Allen Roses fires broadside after broadside at academic medicine. A careful Ivan Lieberburg dances between corporate secrecy and academic openness. Ralph Waldo Emerson slowly demented as his dutiful daughter stewards his failing career. Jonathan Swift goes berserk in a carriage. Virginia Lee gracefully takes on the amyloid camp at a meeting of scientific leaders in the high mountains of New Mexico. This is good stuff. The portrait is the Reuben's that fills an entire wall, David's images of Napoleon at Jenna, a lantern jawed Washington crossing the Delaware ¹.

What is Alzheimer's disease? Shenk's portrait of the epidemic is an honest depiction. It includes in the battlefield's background the mess that is the product of a battle of ideas, egos, cultures and money. Allen Roses bluntly proclaims that "universities do not make drugs...pharmaceutical companies make drugs." But that is not entirely correct. An academic researcher can patent discoveries made using research supported by the U.S. tax payers. The model format for the university *curriculum vitea* includes a new header to join "peer reviewed publications" and "invited national talks" — "patents." The drive for big money adds performance enhancing adrenalin to the co-educational race for a cure, but monetary enhancement of academic performance has a cost. The rise of corporate-academic concubinage has muted the free and open exchange of ideas. Such silent science threatens the philosophic foundation of trust that is essential for scientific progress. Alzheimer's disease is not simply understood in the marketplace of ideas but in the marketplace of commerce ².

Some characters are glaringly missing from these battlefield images. Perhaps the most striking gap is the character of the cholinergic hypothesis of Alzheimer's disease. As far back as the 1970's, researchers such

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News Briefs from PENN's ADC

Penn receives a \$6 million Alzheimers research gift

The University of Pennsylvania has established the Marian S. Ware Alzheimer Program to advance drug discovery, clinical research and patient care related to Alzheimer's disease. The program is created through a \$6 million gift from Marian S. Ware, a supporter of the University. Visit our website for more details www.uphs.upenn.edu/ADC.

Farewell to staff...

We bid a fond farewell to Kris Gravanda, Clinical Research Coordinator. Kris has accepted a position with Myers Research Center at Menorah Park Center for the Aging in Cleveland, Ohio. Kris would like to thank all the patients and families who made our research projects possible. She will miss you all.

...Welcome to new staff members

A warm welcome to Jennifer Chase and Gerri Anselmo. Jennifer has joined our team as the new Clinical Research Coordinator. She received her BA from Harvard University. After leaving on a short break, Gerri has returned to our team as a Clinical Research Coordinator. She received her BS in Counseling and Rehabilitation Services from Pennsylvania State University.

Virginia M.-Y. Lee, PhD, appointed to the National Advisory Council on Aging (NACA)

Virginia M.-Y. Lee, PhD, Co-Director of Penn's Center for Neurodegenerative Disease Research, was appointed to the National Advisory Council on Aging (NACA). The NACA advises the National Institute on Aging (NIA) on the conduct and support of biomedical, social, and behavioral research and training on the diseases and conditions associated with aging.

National conference on the past, present and future of drug development for Alzheimer's disease and other dementias

The University of Pennsylvania's ADC is jointly sponsoring a course on the treatment of Alzheimer's disease and other dementias. Johns Hopkins University School of Medicine in Baltimore, Maryland is hosting the course on March 26-27, 2004. The program will include speakers who are respected leaders and voices in their disciplines, and will feature topics surrounding historical and clinical perspectives of drug development for AD as well as updates on AD and other dementias. Continuing medical education credits will be available. For registration brochures and course information call 410-955-2959 or visit www.hopkinscme.org/cme.



Memantine: the choices of two caregivers...

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their medical care, but when patients transition to the severe stage of the disease this role in decision making changes markedly. Their cognitive impairments are severe enough that it is highly unlikely they understand the risks and benefits of the medicine or appreciate how these risks and benefits affect their daily lives. The usual ethic that guides the conduct of medicine cannot guide the decision to take the medicine. Others must decide for the patient.

Second, the cognitive and functional impairments have reached a point that the value of treating the disease can be difficult to justify. The spectrum of cognitive and physical impairments in a person with severe stage disease may represent losses that are too great. In other words, the dementia may be too far gone. Delaying the time to further decline may not extend a valued degree of cognitive and physical function.

Third, the decision about whether to use memantine is influenced by ambiguities in both the nature and the effect of the drug's benefits.

Memantine is indicated for the treatment of moderate to severe Alzheimer's disease. What then is this treatment? Is it a treatment that improves symptoms such that patients get better? Or is it a treatment that slows the emergence of new symptoms?

Memantine's benefits, like the benefits of the cholinesterase inhibitors Aricept, Exelon, Galantamine, and Tacrine, are expressed in a language that describes an ambiguous interspace between symptomatic improvement and disease modifying effects. The FDA label states that "There is no evidence that memantine prevents or slows neurodegeneration in patients with Alzheimer's disease." The data describing the magnitude of changes between patients on drug versus those on placebo control do not show whether, after 24

weeks of treatment, memantine causes a patient to experience meaningful overall improvement. Instead, the drug seems to benefit patients by diminishing the rate that new symptoms emerge. This effect may reduce the costs and time spent caring for patients with severe stage dementia, but while cost-benefit data helps policy

makers choose drugs for a formulary, it may not be relevant to the caregiver making a decision for their family member.

What is relevant to the caregiver? Science can help to frame the issues and inform the discussion, but it cannot answer this question. The answer is ultimately a personal choice. One useful way to inform that choice is dialogue between the professional community that calls a drug the standard of care and the people who face the decision about whether to use that drug: namely caregivers of persons with severe stage Alzheimer's disease. We have asked two family members to tell us how they thought through these issues and the decisions they reached.

Typical Features of Severe Stage AD

Function	<ul style="list-style-type: none"> • IADL – dependent in all IADLs • BADL -dependent in grooming, dressing, and toileting, generally able to walk and eat, though food may need to be cut up
Cognition	<ul style="list-style-type: none"> • Only fragments of memory remain • Severe language impairment • Inconsistent recognition of familiar people • Short attention span
Behavior	<ul style="list-style-type: none"> • Inability to focus on tasks • May appear too ill to attend functions outside of home
MMSE	<ul style="list-style-type: none"> • <12

IADL - instrumental activities of daily living (such as cooking, paying bills, using the telephone, driving)

BADL - basic activities of daily living (eating, grooming, dressing, transferring and toileting)

MMSE – mini mental state exam (scores range from low of 0 to high of 30)

More information on the stages of Alzheimer's disease can be found in the March 2002 issue (volume 1 number 4) of the Quarterly on our website www.uphs.upenn.edu/ADC

Below and continued on the next pages are the stories of Mr. K and Mr. E. Both men care for spouses who have severe to profound stage Alzheimer's disease (the text box above shows a standard description of a typical severe stage patient in terms of functional and cognitive impairments). Mr. K decided to use memantine, and Mr. E. decided not to use memantine. How did they make these decisions?

Conversation with Jason Karlawish:

JHK: This past Spring, the New England Journal of Medicine (NEJM) reported the results of a study of a drug called memantine given to persons with moderate to severe stage Alzheimer's disease.

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Memantine: the choices of two caregivers...

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Conversation between Mr. K and Jason Karlawish
Mr. K chose to use memantine

JHK: After you heard about that study, what did you do to learn more about the drug?

Mr. K: I researched the subject on the internet, read an article about the study on the Alzheimer's Daily News website and then discussed it in more detail with you.

JHK: Based on what you learned about the drug, what did you decide to do?

Mr. K: I was very interested in having my wife try it. I found a source in London, England with whom I placed the initial order in late June, 2003.

JHK: Why did you decide that?

Mr. K: Two things I heard about the study impressed me. The first being that it was the first drug approved for an Alzheimer's disease patient in the advanced stages of the disease, and the second being that there was an indication that there could be some delaying of symptoms. My decision to start my wife on the drug was made primarily in the hope that any delay in the progression of the disease in my wife or even a slight enhancement or improvement would prolong the period of time that some form of communication between us, however basic, would be extended. I was well aware of the fact that there would not be any long-term improvement or cure.

JHK: What do you mean when you say improvement?

Mr. K: I guess what I mean is that anything that can keep the communication lines open. I am at the point now where communication is getting more and more difficult, but we still communicate, and to me that means everything. Hardly a day goes by when at some point my wife will look at me and say, "you know what?" and I look at her and she will start to laugh and won't finish the statement, or I look at her and she will say "I love you." And to me that is worth a million bucks. Since taking memantine, my wife recognizes me regularly, whereas before starting the treatment, she was getting to the point where she didn't recognize me completely each time. She laughs and she is very happy.

JHK: Did you get any sense from the study of memantine that it had an effect on improving a patient's ability to communicate and recognize family members?

Mr. K: Not really. The primary indications that I got were that there could possibly be some slight improvements in the patient's condition and that the progress of the disease in the patient could be slowed down for a period of time.

JHK: If there did come a point where your wife was not recognizing or communicating would that be a point where you would stop using memantine?

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Conversation between Mr. E and Jason Karlawish
Mr. E chose not to use memantine

JHK: After you heard about that study, what did you do to learn more about the drug?

Mr. E: I went on line and downloaded a copy of the original article so that I could read it, and better understand the results of the study.

JHK: Based on what you learned about the drug, what did you decide to do?

Mr. E: Nothing. When I read the article in the May 2003 issue of the *New England Journal of Medicine* my spouse was taking Aricept. At her most recent assessment from the Memory Disorders Clinic in August, 2002 she was in the moderate to severe stage. Her score on the MMSE test was 1. The results of the study were in persons with a range from 7 to 14. So, given that she had a 1, I thought the likelihood of improvement was close to 0.

JHK: What do you mean when you say improvement?

Mr. E: I mean slow the deterioration. I never thought the medicine would make people better. The changes between the baseline for persons who got the drug compared to persons who got a placebo were so small.

JHK: But what if the study did show effects on people at your wife's stage? In fact, other studies of the drug have included persons with MMSE scores as low as 0.

Mr. E: That's a very difficult question. I think it would depend on whether it was agreed that it does nothing but slow down the progress of the disease. If it did just that, then I am faced with a moral dilemma. Knowing the low functional level my wife has, do I want to prevent her from delaying the time from being functionally worse in hopes that during this time some one will discover a treatment to reverse the disease and return her to where she was? Or am I delaying the time to when she will die? She won't suffer more but everyone else suffers more. I may sound like some cruel judge of another person's life, but the life I am evaluating is not only hers but that of everyone who loves her, and the continuing traumatic effect on our feelings of seeing her in her present condition. What this drug does is to put a band-aid on a cut to prevent infection, and raises the hope that someone will figure a way to make the cut disappear.

JHK: The drug will be available in pharmacies this coming January. What do you think you will do?

Mr. E: Nothing. My wife had been taking Aricept for over three years. I decided in June to have her stop taking it, since it appeared that it was having no effect. She is no longer taking any medication. Why continue to take any drug if it is not alleviating or curing the sickness for which it

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Memantine: the choices of two caregivers...

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Conversation between Mr. K and Jason Karlawish
Mr. K chose to use memantine

Mr. K: I would say that after a short period of time and after consulting with you, that I probably would do so. In other words if I got to the point where I was completely convinced that it was non beneficial.

JHK: The study reports reductions in the hours spent caregiving. What do you think of that result?

Mr. K: I am not sure I fully understand the term because my wife is at a point where I can't imagine leaving her alone. However, if a treatment showed that the time spent doing these activities was reduced, I think that would be a valuable measure of the benefit of the drug.

JHK: Some people with patients very similar to your wife have chosen not to use the drug. What do you think about that decision?

Mr. K: Well, it is a personal decision. It depends on each individual. In my particular case my wife and I have always been very close, we have had an excellent relationship. I am just hopeful to keep her around as long as I can. We do have a degree of communication to the point that she recognizes me, and she replies to basic communications with head movements, smiles and some facial expressions and she is relatively happy.

JHK: Can you think of any new information about memantine that would change your mind?

Mr. K: Should it be determined at some future point that there are serious side effects, I would evaluate the benefits I have attributed to it against such side effects. I would also consider discontinuing the use of this drug should the beneficial effects that I have attributed to it no longer be manifested.

JHK: What do you think about the following statement: "people who have Alzheimer's disease who can no longer live at home should not be taking treatments for Alzheimer's disease?"

Mr. K: I believe that whether the patient lives at home or in a care facility should not of itself be the criteria that determines if a patient receives medication. I hope to be able to continue to take care of my wife at home as long as possible, recognizing that to do so will most probably require arranging for outside help at some point. The question of whether or not treatment should be given depends, in my mind, upon whether or not there would be any further perceived benefits to the patient. If the patient has reached the point where there is no recognition or communication possible, then I would agree that there should be no further treatment, regardless of where the patient is receiving care.

Conversation between Mr. E. and Jason Karlawish
Mr. E. chose not to use memantine

is intended?

JHK: Can you think of any new information about memantine that would change your mind?

Mr. E: If memantine or any other drug becomes available which can reverse the effects or cure Alzheimer's disease, I would jump at the opportunity to have my wife try it, but I do not know of any.

JHK: The study reports reductions in the hours spent caregiving. What did you think of that result?

Mr. E: It's a subjective concept. I don't know how you can accurately measure that. The study states that the number of hours spent caregiving was 45.8 fewer per month for those persons who took memantine. That is significant.

JHK: How could treatment be better for people like your wife?

Mr. E: Two things. First, there is the medical aspect. We need drugs that do not just treat the symptoms but the disease. It is necessary to know the cause or causes of the disease so that drugs can be developed to treat these causes. Second, the options that are available that enable someone to live in a comfortable environment with a reasonably good quality of life are to a great extent limited by the financial resources of a family. The choices I faced with her one year ago were, to have her at home with help, or at an assisted living facility. I feel fortunate that I was in a position to make that choice. There are many families who do not have the resources to make that choice, and so one family member assumes the task of the caregiver. If we want to improve the quality of life of everyone with Alzheimer's disease we must find a way to provide the financial resources to assist those families who are presently in need.

JHK: What do you think about the following statement: "people who have Alzheimer's disease who can no longer live at home should not be taking treatments for Alzheimer's disease?"

Mr. E: I absolutely and strongly disagree with that statement. Where a person with Alzheimer's disease lives is a choice, a very difficult one, which his/her caretaker makes, and may make it many times. One person may live at home. Another may live in an assisted living facility or a nursing home. The decision about where to live is totally separate from the decision about medication. Depending on the stage that any person is in, I believe that a "progress slowing drug" such as Aricept or memantine is appropriate. But I also feel that there is no reason to take a drug unless there is some probability that it will decrease the symptoms or cure the disease for which it is prescribed.



Book Review...

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as David Drachman demonstrated that deficits in acetylcholine produced an amnesic syndrome strikingly similar to the clinical picture of Alzheimer's disease. The data were as compelling as Elan Pharmaceuticals' mice responding to anti-amyloid vaccination. When the *New England Journal of Medicine* published William Summers small study of persons with Alzheimer's disease exhibiting dramatic responses to Tacrine – a drug that restored cholinergic neurotransmission – the fire was lit in the dry tinder of hope and desperation. Twenty years later, thousands of human subjects, millions of dollars, and countless prescriptions have been written for a class of drugs – Aricept, Reminyl, and Exelon — that no one quite understands what exactly is their benefit for patients, their families or society. The development of the cholinesterase inhibitors is a lesson in the price we pay when the corporate genie gets out of the scientific bottle ³.

I agree with Shenk that corporate money and market place ethics have thoroughly entered the world of Alzheimer's disease drug discovery and that for now this is the best of all possible worlds. But why then is the character of the cholinesterase inhibitors missing from the portrait? Perhaps because the development of these drugs is the messy image that does not fit in Shenk's dramatic and coherent set of images. He had to lead up to something. I do not spoil the book by giving away its ending: the beginning of the clinical trials of the anti-amyloid vaccine. A cure is imminent. This book had to stop somewhere and this was an appropriate place to stop. Alzheimer's disease is plaques (and tangles too, and probably something else, that pesky known unknown); the amyloid mouse model of the disease is cured when vaccinated against amyloid. Messy as the science is, victory is ours. But the story did not end. The clinical trial was halted because of a lethal side effect of brain inflammation. The story carries on, the battle continues.

The book is not simply about drug discovery. Shenk admits a discomfoting question into his final analysis. How much are we to blame for this present state of affairs? At first, this question seems silly. Unless we fill deep cisterns of guilt for living longer and for our genes, the answer is that we are not to blame. Or are we? We don't memorize like we once did. Before Guttenberg, long before the Post-It Note, the ink pen and the task list, when recording information instead of memorizing it was not effortless, but an effortful task on

stone or clay, the culture embraced memory. Scholars devised elaborate skills to memorize vast quantities of information, entire epic poems, the records of trade from Sparta, the names of all the citizens of Rome. They read aloud to reinforce the learning. Like the song birds who turn over the bulk of their hippocampus each year to memorize the new songs, people really used their minds.

Now, we who memorize little know that the more years of education, employment and "effortful cognitive activities" a person has, the more likely he is to delay the onset of Alzheimer's disease. Test scores at age 6 predict the odds of being demented at age 70. Our minds may be suffering the same fate of our under exercised and over fed bodies. Perhaps the best case for well funded public education and pre-kindergarten is in the nursing homes of America.

I have one serious reservation with the book. Shenk suggests that the progressive brain failure leads to a cessation of all brain stem functions, such as breathing and eating. While I have cared for many patients who simply stop eating, the data do not support that Alzheimer's disease causes a person to stop breathing or circulating blood. Many clinicians have the eerie experience of caring for a mute, motionless and entirely unengaged patient who receives nutrition and hydration through a rubber tube inserted into the stomach. They have numerous complications, especially skin break down and urine infections, but they live.

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1. A more thorough history of Alzheimer's Disease is available in Whitehouse, P.J., Maurer, K., Ballenger, J.F. *Concepts of Alzheimer Disease: Biological, Clinical, and Cultural Perspectives*. Baltimore, MD: The Johns Hopkins University Press; 2000.
2. Shenk quotes Krinsky on the influence of corporate culture in academic research. Krinsky's book *Science in the Private Interest: Has the Lure of Profits Corrupted Biomedical Research?* (Lanham, Maryland: Rowman & Littlefield Publishers, Inc. 2003) is an excellent history and analysis of the topic.
3. Two histories of the development of the cholinergic drugs are Karlawish J.H.T.: *The search for a coherent language: The science and politics of drug testing and approval*. In: Kapp M.B., ed. *Ethics, Law and Aging Review*. New York, NY: Springer Publishing Company 8;2002:39-56 and Muriel Gillick's *Tangled Minds: Understanding Alzheimer's Disease and Other Dementias*. New York, NY: Penguin Putnam Inc;1998:118-143.



ADC QUARTERLY



"Dedicated to improving the health, well-being and quality of life of patients and their families."

Research Opportunities at Penn's Alzheimer's Disease Center:

To learn more about these research opportunities contact Jennifer Chase, clinical research coordinator at 215-349-5903 or email her at jchase@mail.med.upenn.edu

- A study to examine if a medication used for other conditions can slow down the progression of Alzheimer's disease and delay the emergence of problematic behaviors
- A study to compare the benefits of three medications currently approved for Alzheimer's disease
- A clinical trial of a new investigational drug for Alzheimer's disease
- A study to determine if taking Zocor (a cholesterol lowering drug) can slow the progression of Alzheimer's disease
- A study to determine if taking high doses of three specific vitamins can slow the progression of Alzheimer's disease
- The study of the relationship between a genetic risk factor for Alzheimer's disease - the gene APOE, and levels of cortisol in the blood, urine, and spinal fluid
- A study to determine if a measure of brain waves generated in response to sound can detect the presence of Alzheimer's disease
- A longitudinal study will search for the presence of specific proteins in the spinal fluid that mark the presence of Alzheimer's pathology at a time when the symptoms are too mild for the disease to be detected by clinical examination

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