

# Alzheimer's Disease Research Center

at the

## Taub Institute

# pathways



COLUMBIA UNIVERSITY  
MEDICAL CENTER

WINTER 2008/2009

## Diabetes and Dementia

We are facing a double epidemic in our aging population: 1) diabetes and its related conditions, and 2) dementia, including Alzheimer's disease. Almost half of the United States population over the age of 60 has diabetes or pre-diabetes, and two thirds of the US adult population is either overweight or obese.

Overweight and obesity lead to high insulin levels, high blood pressure, high cholesterol, and eventually, to pre-diabetes and diabetes. As the number of people who are overweight or obese increases, so does the number of people with diabetes and pre-diabetes.

The number of people with dementia is also increasing. As many as half of the persons aged 85 years or older

may get dementia, and, due to advances in longevity, more and more people reach this age. Most importantly, we do not know any cures for or ways to prevent dementia. We are therefore conducting research to identify risk factors for dementia that can be modified, treated or prevented.

Our research in Northern New York City has demonstrated that high insulin levels and diabetes seem to be important risk factors for dementia, including Alzheimer's disease. Other studies have shown that obesity is also a risk factor for dementia.

Taub researcher Dr. Jose A. Luchsinger, Assistant Professor of Medicine, focuses

most of his research in this important area, and is conducting several studies in order to further understand connections between these risk factors and dementia. In one of his studies, Dr. Luchsinger is exploring the role of obesity, high insulin levels, and diabetes in dementia in Northern New York City. This study uses brain scans and cognitive memory tests to further understand these connections. A second study measures memory impairment in persons with diabetes, and seeks to explore how better memory control affects the risk of memory impairment and dementia.

Dr. Luchsinger is also conducting a clinical trial of metformin among persons with memory problems. Metformin is a medication used for diabetes which also can be used for weight loss and diabetes prevention. The objective of this study is to see if metformin can reduce the risk of memory decline by lowering insulin levels and preventing diabetes. Dr. Luchsinger is currently recruiting interested participants with memory problems who do not take diabetes medications and who are 55 years or older. More information can be obtained at (212) 305-4730.

Dr. Luchsinger is now beginning two additional important efforts. The first is a memory study in the Finnish Diabetes Prevention Study, a study that compares the risk of diabetes between persons who engage in weight loss through diet and exercise and persons who are sedentary. This study found that diabetes can

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Jose Luchsinger, MD, MPH

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## The “Art” of Coping with Early Stage Cognitive Impairment

By Jill Goldman, MS, MPhil, CGC

“I am in a passage and haven’t figured out where I’m going,” said a support group member recently diagnosed with Alzheimer’s disease. The early stage of cognitive impairment is perhaps the hardest for the patient. For many people, the diagnosis of mild cognitive impairment, early Alzheimer’s disease, primary progressive aphasia or other such conditions is terrifying. It can feel like wearing a scarlet A on one’s chest. For some, the diagnosis comes after difficulty doing one’s job leads to forced or voluntary retirement. For others, problems with orientation or visuospatial functioning lead to limitations on driving or navigating by oneself. Awareness of the cognitive deficits can cause anger, frustration,

isolation, and depression for both the patient and the primary caregiver. This is a time of adaptation when it becomes necessary to move on from “life before diagnosis” to a time of reduced capabilities and an unknown future. Caregivers, who may still be working and out of the house, search for ways to keep their loved one busy and active. The patient no longer works, may be less motivated or unable to engage in hobbies, and may have fewer interactions with friends, but is still not ready for adult day care. Yet such individuals are still very capable of interacting, sharing experiences and expertise, and being creative. While they deserve to have some activity to look forward to, few programs exist for them.

*Met Escapes offers tours and studio work for families dealing with dementia.*

In the fall of 2008, the director of the Metropolitan Museum of Art Outreach Education Program approached Taub co-Director Richard Mayeux for help designing a program for families living with dementia. Recognizing the great need for expanded services for patients and families dealing with Alzheimer’s disease and other dementias, Dr. Mayeux asked Dr. Karen Bell and me to consult with the program leaders. We helped them design the Met Escapes program and educated the educators about dementia and caregiving.

Met Escapes, which offers special tours and studio work at the museum for families dealing with mild to moderate dementia, has now been running successfully for just under a year.

*For more information about Met Escapes, call (212) 879-5500 ext. 3561.*

## Taub Institute Staff Book Pick

**A review of Debra Dean’s *The Madonnas of Leningrad*, by Director of Development Robin Roy**

This carefully researched and written novel follows two parallel stories: The first, as middle-aged, divorcee Helen realizes and has to deal with the onset of Alzheimer’s disease in her Russian-born mother, Marina; the second, as Marina’s reality moves from the present to the past and she relives her experiences in the winter of 1941 in besieged Leningrad. As a member of the staff of the Hermitage Museum, she has helped to pack up and evacuate its 1.1 million artworks. Then as the bombardment and isolation of the city proceed, she joins the rest of the staff and their families, numbering some 2000 people, struggling to survive cold and hunger in the museum basement.

Ms. Dean traces her inspiration for the tale to her own grandparents’ experience with Alzheimer’s disease, and to an apparently true story of the siege, which lasted almost 900 days and during which over one million people died of starvation. Dean relates,

When the staff of the Hermitage museum packed up all the treasures in the museum, they left the empty frames hanging on the walls...This was either a pledge that the art would return or it was a practical move to speed up re-hanging later. Though there was nothing left to see, visitors continued to show up at the museum throughout the war, and one of the curators occasionally gave tours, leading ragged groups of starving Leningraders through the deserted halls and describing the paintings that had once hung inside the frames. It was said he described the missing paintings so well that his listeners swore that they could see the images.

The book is highly readable and generously detailed both in its descriptions of monumental beauty and suffering in the war torn Soviet Union, and in Helen and her family’s struggle to come to grips with Marina’s condition.

## Taub Research Highlights

### Mitochondria and Alzheimer's Disease

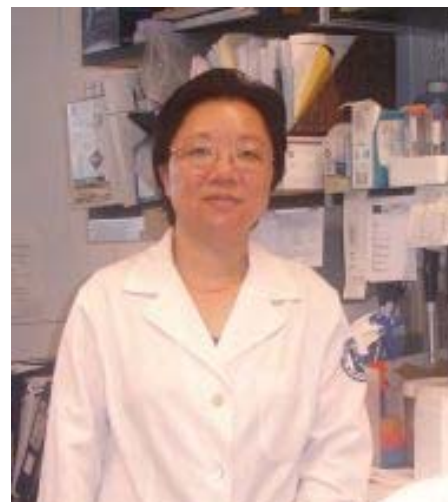
Taub researcher Shi Du Yan, MD led a multi-center research study which found that mitochondria could be an important target for the development of new drugs for Alzheimer's disease (AD) prevention and treatment.

Mitochondria, the microscopic parts found outside the nucleus of the cell that produce a cell's energy, play an essential role in mediating the neuronal stress involved in the development of neurodegenerative diseases such as AD. Mitochondrial dysfunction, or a problem with the cellular exchange of energy, is an early event observed in AD.

The neurodegenerative changes in AD are caused by the accumulation of amyloid beta (A $\beta$ ) plaques in the brain. These plaques damage neurons, and recent studies have shown that mitochondria are direct

targets for A $\beta$  damage. A $\beta$  progressively accumulates in the cortical mitochondria of AD patients, suggesting that mitochondrial A $\beta$  may be involved in the development of the disease.

Dr. Yan and colleagues offer new insights into how A $\beta$  and mitochondria interact with the molecule Cyclophilin D (CypD), which is linked to learning and memory. The research demonstrates that CypD interacts with A $\beta$  within the mitochondria of AD patients and a mouse model of AD. In the mouse model, cortical mitochondria lacking CypD are resistant to damage caused by A $\beta$ . Deficiency of CypD greatly improved the learning and memory of an AD mouse model.



Shi Du Yan, MD

**Read more** about Dr. Yan's research on our website, [www.TaubInstitute.org](http://www.TaubInstitute.org).

**Full article:**  
"Cyclophilin D deficiency attenuates mitochondrial and neuronal perturbation and ameliorates learning and memory in Alzheimer's disease", *Nature Medicine* online (21 Sep 2008)

## Possible Link Between Stroke and Alzheimer's Disease



Karen Duff, PhD

This work was supported by the NIH and the Alzheimer's Association.  
**Full article:** *Neuron* 57(5): 680-690.

A newly discovered pathway in the brain may help explain why stroke nearly doubles the risk of developing Alzheimer's disease (AD). AD is believed to be caused by toxic amyloid beta (A $\beta$ ) peptides that accumulate in the brain. A $\beta$  levels are known to increase after a stroke, but it is not known why, says Karen Duff, PhD, professor of pathology in psychiatry and the Taub Institute for Research on Alzheimer's Disease and the Aging Brain.

Dr. Duff's new study found that in cells and transgenic mice, A $\beta$  levels rise when there is an increase in another protein, p25, which also has been previously linked to stroke. One component of the pathway that connects p25 and A $\beta$  may be a good target for treatments aimed at preventing post-stroke AD, the researchers also discovered. When the activity of this component (called cdk5) was restrained, toxic A $\beta$  levels dropped. Dr. Duff cautions, however, that it is still unclear if stroke actually triggers the p25/cdk5 pathway. Her lab is currently looking for signs of activation in stroke patients.

### More Research Highlights on Page 7:

- Taub Researchers Make Progress in Developing Blood Test to Determine AD Risk
- Taub Faculty News and Notables

## Diabetes and Dementia

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be prevented with diet and exercise, which lead to low insulin levels. Now Dr. Luchsinger will explore whether these persons also have better memory function.

The second study is a memory study in the United States-based Diabetes Prevention Program. This study found that lifestyle changes (diet and exercise) and metformin prevented diabetes compared to persons who did not utilize these interventions. Most of this benefit was explained through lowering of insulin levels. Dr. Luchsinger is collaborating with this study to add memory measures.

The Metformin study, the Finnish Diabetes Prevention study collaboration, and the Diabetes Prevention Program collaboration have the potential to answer whether dementia and memory problems can be prevented through the prevention of diabetes, weight loss, and the lowering of insulin levels. Dr. Luchsinger is also seeking funding to explore these questions in animal models, which can provide a unique understanding of the problem in a way that human studies cannot. Dr. Luchsinger's work is trying to clarify the link between two of the most important conditions in the aging population, diabetes and dementia, and has the potential of achieving important public health benefits.

### Selected Articles:

- Scarmeas N, Stern Y, Tang MX, Mayeux R, Luchsinger JA. Mediterranean diet and risk of Alzheimer's disease. *Ann Neurol* 2006; 59:912-921.
- Luchsinger JA, Reitz C, Patel B, Tang MX, Mayeux R. Relation of diabetes to mild cognitive impairment. *Arch Neurol* 2007;64:392-398.
- Luchsinger JA, Tang MX, Mayeux R. Glycemic load and risk of Alzheimer's disease. *J Nutr Health Aging* 2007; 11:238-241.
- Reitz C, Luchsinger JA. Hypertension, Cognitive Impairment and Dementia. An epidemiological perspective. *Current Hypertension Reviews* 2007;3:166-176.
- Reitz C, Tang MX, Manly JJ, Mayeux R, Luchsinger JA. Hypertension and risk of mild cognitive impairment. *Arch Neurol* (in press).

## Ask the Experts...

### About Diabetes and Dementia

#### Question:

I have diabetes. Does this mean that I will develop dementia or Alzheimer's disease?

#### Answer:

NO. Some studies suggest that the risk of dementia is increased in persons with Type II Diabetes, but this does not mean that all people with Type II Diabetes will develop dementia or AD.

#### Question:

What should I do if I am having problems with my memory?

#### Answer:

If you think you are experiencing memory problems, talk with your doctor. Changes in memory and thinking abilities can occur from a variety of conditions, not just Alzheimer's Disease. Testing is available to evaluate memory changes and thinking abilities.

If you are overweight or obese, are over the age of 55, and have memory complaints, consider the Metformin study, described below.

#### About Dr. Luchsinger:

Dr. Luchsinger is interested in clarifying the relationship between cardiovascular risk factors and Alzheimer's disease. In the last 5 years he has explored the relationships between diabetes, diet, hypertension and Alzheimer's disease.

#### Study of Metformin in Amnesic Mild Cognitive Impairment:

This study, funded by the Institute for the Study of Aging, is a clinical trial of metformin, a medication effective in the prevention and treatment of diabetes. To be eligible for this study, participants must be overweight or obese, be over the age of 55 years, and have memory complaints. The study will last 12 months. For further information, please contact Dr. Jose Luchsinger at (212) 305-4730 or jal94@columbia.edu

## Caregiver's Corner: Tips for the Holidays

For most families, holidays are filled with opportunities for togetherness, sharing, laughter and memories. But holidays can also be filled with stress, disappointment and sadness.

Because of the changes he or she has experienced, the person with Alzheimer's disease may feel a special sense of loss during the holidays. At the same time, caregivers may feel overwhelmed maintaining holiday traditions while caring for their loved one. In addition, caregivers may feel hesitant to invite family and friends over to share the holiday for fear they will be uncomfortable with behavior changes in the family member.

Here are some suggestions, adapted from the Alzheimer's Association, that may help to reduce stress and make holidays happy occasions.

### Adjust expectations

Be realistic about what you and your loved one can handle during the holidays. You may not be able to continue every holiday tradition.

Discuss holiday celebrations with family and friends to make sure that everyone understands your caregiving situation and has realistic expectations about what you can and cannot do.

*Build on past traditions while creating new ones.*

Give yourself permission to do only what you can reasonably manage. If you've always invited 15-20 people to your home, consider inviting five for a simple meal. Consider having a potluck dinner or asking others to host the holiday at their home.

### Involve the person with dementia

Involve your loved one in safe,

manageable holiday preparation activities. Begin slowly by asking him or her to help you prepare food, wrap packages, hand you decorations or set the table. (Avoid using candies, artificial fruits/vegetables or other edibles as decorations. Blinking lights may confuse or scare the person.)

Maintain your loved one's normal routine so that holiday preparations don't become disruptive or confusing. Taking on too many tasks can wear on both of you.

Build on past traditions and memories. Your loved one may find comfort in singing old holiday songs, for example. But also experiment with new holiday traditions, such as renting seasonal videos.

### Adapt gift giving

Encourage people to buy useful gifts for the person such as an identification bracelet (available through MedicAlert® + Alzheimer's Association Safe Return®); comfortable, easy-to-remove clothing; audiotapes of favorite music; videos; and photo albums.

Advise people not to give gifts such as dangerous tools or instruments, utensils, challenging board games, complicated electronic equipment or pets.

Depending on his or her abilities, involve your loved one in giving gifts. For example, someone who once enjoyed cooking may enjoy baking cookies and packing them in tins or boxes. Or, you may want to buy the gift and allow the person to wrap it.

If friends or family members ask what you want for a gift, suggest a gift certificate or something that will help you out as you care for your loved one, like a cleaning or household chore service.

### Try to be flexible

Consider celebrating over a lunch or



*Heleena VanRaan, LMSW  
Social Worker*

*Phone: (212) 305-3785*

*Email: hvanraan@neuro.columbia.edu*

brunch, rather than an evening meal, to work around the evening confusion or sundowning that sometimes affects people with Alzheimer's disease. Also consider serving nonalcoholic drinks and keeping the room bright.

Prepare for post-holiday letdown. Arrange for in-home care so you can enjoy a movie or lunch with a friend and reduce post-holiday stress.

Holidays are opportunities to share time with the people you love. Try to make these celebrations easy on yourself and your loved one so that you may concentrate on enjoying your time together.

### Resources

*MedicAlert + Safe Return* is a 24-hour nationwide emergency response service for individuals with Alzheimer's or related dementia who wander or who have a medical emergency.

*The Alzheimer's Association:* Contact your local Alzheimer's Association, call 1(888)572-8566 or register online at [www.alz.org](http://www.alz.org).

Contact our social worker, Heleena VanRaan, at (212) 305-3785, to talk about other available resources.

**Happy holidays!**

## Clinical Trials Update

The Taub Institute is actively involved in clinical trials which are essential to understanding and finding treatments for Alzheimer's disease, Huntington's and other brain diseases. For individuals with dementia and their caregivers, participation in clinical research can provide a sense of purpose and hope. Some of our studies are described below. Check our website, <http://www.TaubInstitute.org>, for more opportunities.

Today's research may lead to tomorrow's treatments and cures.



*Dr. Karen Bell and Dr. Lawrence Honig*

### CURRENT CLINICAL TRIALS (as of December 2008)

Study	Description	Eligibility Info	Contact
Receptor for Advanced Glycation Endproducts in Mild to Moderate AD	Phase II study of a drug that blocks the receptor for advanced glycation endproducts (RAGE) which damages nerve cells in the brain	Men and women, age 50+, with mild to moderate AD	Ruth Tejada (212) 305-7661
Effect of Gamma-Secretase Inhibition on the Progression of AD	Phase III study of the effect of LY450139, an oral compound, on the progression of Alzheimer's disease	Men and women, age 55+, with mild to moderate AD	Lynda Mules (212) 305-2077
Study of CAD106 in Mild AD	52-week Phase II study to evaluate the safety and tolerability of CAD106 administered by injection, which researchers hope may prevent the formation of plaques in the brain	Men and women, age 40-85, with mild AD	Lynda Mules (212) 305-2077
Study of Bapineuzumab in Mild to Moderate AD	Phase III study of bapineuzumab administered by IV infusion which researchers hope will attach to the amyloid protein in the brain and help the body to remove it	Men and women, age 50-88, with mild to moderated AD	Evelyn Dominguez (212) 305-2371
Metformin in Amnesic Mild Cognitive Impairment	Clinical trial of metformin, a medication effective in the prevention and treatment of diabetes, in persons with mild cognitive impairment	Men and women, age 55+, with memory complaints	Dr. Jose Luchsinger (212) 305-4730
Study of Memantine in Frontotemporal Dementia	Phase IV study to determine whether memantine is effective in slowing the rate of behavioral decline in frontotemporal dementia (FTD)	English-speaking men and women, age 40-80 with FTD or semantic dementia	Lynda Mules (212) 305-2077
Brain Imaging Study Measuring Changes in Cerebral Blood Flow and Cognition with Age	This study uses brain-imaging technology to assess cerebral blood flow pattern in elderly individuals using Magnetic Resonance Imaging (MRI).	Men and women, age 55-85, with no memory problems OR with memory complaints OR with AD	Brittany Holmes (212) 305-7846
Cooperative Huntington's Observational Research (COHORT) Study	Study to collect information to learn more about Huntington's disease for potential treatments and to plan for future research studies	Adults and children who have clinically diagnosed HD and adults who are a part of an HD family.	Ronda Clouse, RN (212) 305-2387
2CARE Study	Phase III study to evaluate the effectiveness and long term safety of high dose CoQ in slowing functional decline in Huntington's disease	16 years of age and older with early stage Huntington's disease	Ronda Clouse, RN (212) 305-2387

### OTHER RESEARCH OPPORTUNITIES

African American Genetics Study	Looks at genetic risk factors for Alzheimer's disease among African Americans	African American men and women over the age of 60	Raquel Cabo (212) 305-1893
Cognition Study among African American Women	Investigates issues of aging, cardiovascular health and cognition among mid-life African American Women	African American women age 40+	Raquel Cabo (212) 305-1893
Genetic Linkage Study	This study seeks to identify genes that may increase the risk for developing Alzheimer's disease (AD)	Families with at least two living siblings diagnosed with AD who are 60 years old or older	Vincent Santana (800) 243-5828 or Jennifer Williamson (212) 305-4655

## Taub News and Notables

### Taub Researchers Make Progress in Developing Blood Test to Determine AD Risk

Building on a study that started 20 years ago with an elderly population in Northern Manhattan at risk or in various stages of developing Alzheimer's disease, Taub researchers have yielded findings that suggest that by looking at the blood doctors may be able to detect a person's predisposition to developing AD.

Nicole Schupf, Ph.D., Dr.PH., Richard Mayeux, M.D., and their colleagues found that individuals with elevated levels of a certain peptide in the blood plasma, Amyloid Beta 42 (A $\beta$ 42), are at increased risk of developing Alzheimer's disease and that the decline of A $\beta$ 42 in the bloodstream may reflect the "traffic jam" of A $\beta$ 42 in the brain which occurs in people with Alzheimer's. Doctors have typically measured A $\beta$ 42 levels in the cerebrospinal fluid, which is more difficult to collect than blood.



*Nicole Schupf, Ph.D., Dr.PH.,  
lead author*

While the cognitive impairments of Alzheimer's can be monitored throughout the disease course, clinicians have had no reliable way to monitor the pathologic progression of the disease. Being able to reliably measure A $\beta$  levels in the blood could provide clinicians with a tool that forecasts the onset of Alzheimer's much earlier. Earlier detection would of course be an important step in combating the disease.

*This research is supported by a Program Project Grant by the National Institutes' of Health National Institute of Aging. Other authors on the paper from Columbia University Medical Center include Ming X. Tang, Ph.D., Jennifer Manly, Ph.D., and Howard Andrews, Ph.D. The Department of Immunology at the New York State Institute for Basic Research in Developmental Disabilities, Staten Island, New York, also contributed to this research. (Adapted from material provided by Columbia University Medical Center.)*

### Taub Faculty Notables

- Ottavio Arancio, PhD was the inaugural recipient of the Margaret Cahn Research Award from the Hudson Valley Chapter of the Alzheimer's Association at their Wine and Roses event on April 26, 2008.
- Karen Bell, MD was honored in June with the 2008 "Community Leadership Award" of the NYC Chapter of the Alzheimer's Association.
- Congratulations to Martin Chalfie, PhD, former member of the Institute, on winning this year's Nobel Prize in Chemistry, bringing to two the number of Nobel Prize winners affiliated with the Taub Institute.
- Gilbert DiPaolo, PhD was a 2008 recipient of the Irma T. Hirschl and Monique Weill-Caulier Award.
- Karen Marder, MD, MPH was the 24th Annual Emanuel and Nathalie Goldberg Family Lecture at the University of Rochester Department of Neurology on October 3, 2008.
- Richard Mayeux, MD, MSc, Gertrude Sergievsky Professor of Neurology, Psychiatry and Epidemiology and CO-Director of the Taub Institute received the New York Academy of Medicine's John Stearns Award for Lifetime Achievement in Medicine at the Academy's Meeting of the Fellows and Annual Discourse on November 18, 2008.
- Carol Troy, MD, PhD was an invited lecturer at the Hunter College Department of Biology Seminar Series; the Nathan Kline Institute Seminar Series; the CHI conference "Targeting Gene Therapy & Gene Transfer" and the 2008 Gordon Research Conference.
- Shi Du Yan, MD was named Associate editor of the Journal of Alzheimer's Disease.

## Giving to the Taub Institute for Research on Alzheimer's Disease and the Aging Brain

July 1, 2007 to June 30, 2008

Thank you to all our donors for your generous support during the 2008 academic year (July 1, 2007 to June 30, 2008.) Gifts to the Taub Institute support research initiatives in the broad array of disciplines we study. They provide funds for laboratories, equipment, up-to-date study and work environments, and help launch promising new initiatives in the fight against Alzheimer's and other neurodegenerative diseases. There are many ways to contribute including life-income and testamentary giving. For more information, please contact Robin J. Roy, Director of Development, at (212) 342-4126 or at rjr5@columbia.edu. Thank you again.

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The brain is an organ that many people do not think of when considering organ donation, yet brain donation is a priceless gift with the potential to benefit loved ones and future generations. Brain autopsy is an invaluable research tool, allowing scientists to understand disease processes and to develop drug treatments. By examining the postmortem brain, we are able to definitively diagnose Alzheimer's disease and other types of dementia. Brain autopsy also allows us to clarify risks to relatives of people with

Alzheimer's disease, which in some cases has been identified as a genetic disorder.

The postmortem examination of healthy brains is equally important to our research efforts. Cognitively healthy individuals who donate their brains to research are known as "controls." Scientists compare these healthy controls to the brains of individuals with dementia to further develop our understanding of the effects of disease on the brain. Many controls have been personally



touched by Alzheimer's and other dementias, having known a friend of loved one with the disease.

Brain donation truly is a gift of knowledge.

To learn more, contact:  
Arlene Lawton, R.N.  
(212) 305-9086  
ASL1@columbia.edu

## Hereditary Dementia Risk Assessment and Education Program

Certain dementias can be caused by inheriting an altered gene, and dementias vary in the degree to which they are carried in families. Some diseases, like Huntington's disease, are 100% inherited. Other diseases, like Alzheimer's disease, are less likely to be due to the inheritance of a gene. In some cases, a cluster in families may be due to the presence of susceptibility genes that increase risk to disease rather than cause the disease.

For some of these hereditary diseases, specific genes have been identified. Individuals with a dementia diagnosis and a family history of the disease in a close relative may choose to be tested for such genes. If a disease gene is found in the family, other individuals may want to explore their own risk status. Investigators are continuing to discover new genes that either cause these diseases or increase risk.

Having a potentially hereditary condition in one's family can lead to many questions. Learning more about the cause of the disease and the risk of inheritance can be helpful. In fact, people often feel that their hereditary risk is higher than it really is.

The Hereditary Dementia Risk Assessment and Education Program at Columbia is designed to help you understand your own family history, the genetics of the different dementias, and your personal risk of inheriting a gene that increases your chance of developing dementia. If clinical genetic testing is available and appropriate, we will discuss the benefits, risks, and limitations of genetic testing with you in a confidential setting. Genetic research may also be available and will be discussed when appropriate.

For more information, please contact one of our genetic counselors:

- Jill Goldman, MS, MPhil, CGC  
(212) 305-7382
- Jennifer Williamson, MS, CGC  
(212) 305-4655

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The Education Core is:

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