

Staying Sharp
Suffolk County
THE DANA ALLIANCE FOR BRAIN INITIATIVES

Will Stoner (WS): All right, good morning. My name is Will Stoner. I'm the Associate State Director for Outreach and Livable Communities for AARP. I am a Long Island resident and thank you for coming today. AARP has 600,000 members just on Long Island, between Nassau and Suffolk County, so thank you for being a member. We have 2.5 million members in New York, 37 million members in the country. And I'll tell you, I am thrilled today to be part of this collaboration between the Dana Alliance and AARP. The Dana Alliance helps us by bringing these fabulous events all across the country with our state offices. And the reason it's so important to me is because our membership, when we asked them what are they looking for. What are they concerned about? And what would they like AARP to help them with, if they can? The five top concerns are: staying mentally sharp, staying physically fit, eating right, staying socially active, and staying fiscally sound. This program today covers four out of the five of those top concerns. So the value of this program, by the end, you

will see, speaks for itself.

I want to thank you again for coming out today. This is a fabulous event. I'm glad you could come and I want to also thank Drew Scott for moderating today. Everyone knows Drew Scott, right? (Applause) thank you. And Laura will come up and she'll do the other introductions but really, thanks a lot and I want to thank the Dana Alliance for the opportunity for this partnership. It's really been great across the country. So thanks a lot, enjoy the event.

Laura Reynolds (LR): Good morning and welcome everyone. I'll be brief. My name is Laura Reynolds and I am a Senior Project Manager at the Dana Alliance for Brain Initiatives. This year we are celebrating our 20th anniversary. In honor of that anniversary I'd just like to read you this statement.

In April 1993 a press conference was held in Washington, DC to announce the launch of the Dana Alliance for Brain Initiatives. The founding members of the Dana Alliance pledged their commitment to advancing the public awareness and education about the progress and promise of brain research, and to disseminating information on the brain in an understandable and

accessible manner. I share this quote by David Mahoney, former Chairman of the Dana Foundation who two decades ago said, “We all have a stake in neuroscience. At some time in our lives, every last one of us will experience a brain-related disease, disorder or brain injury. Neuroscience research is lifting the burden of brain diseases and disorders. It is unleashing our potential as individuals, and it is revolutionizing our attack on the social and economic problems that face our nation as we enter the 21st Century. All that we are and all that we hope to be is centered in the human brain, and that’s why neuroscience is truly the human science.”

Twenty years later we celebrate the achievements of the Dana Alliance and applaud the ongoing commitment by its members to share their knowledge with the public for the betterment of all. So I thank you for coming this morning, and I hand you over to Drew Scott, our moderator. Thank you. (Applause)

Drew Scott (DS): Thank you very much Laura. Hi everybody. I see so many smiles. We’re in a good, upbeat mood. Did anybody float away last night during the rain storm? Good.

Were any of you thinking about building a boat and putting some animals on it? Yes. Well, we're glad so many of you are here today after that terrible weather last night. My name is Drew Scott. I am the senior correspondent and weekend anchor at News 12 Long Island. I've been in the broadcasting business for 43 years. I'm a member, proudly, of AARP, and I guess they figured since they have a senior correspondent they would ask me to moderate this today, so that's why I'm here.

I'm proud to introduce to you our two special guests today. To my left is Dr. Patricia Coyle. She is a Professor and Vice Chair of Clinical Affairs, the Department of Neurology at Stonybrook University School of Medicine, welcome Dr. Coyle. (Applause) And Dr. Dennis Choi, on our third chair there, is the Professor and Chair of Neurology and Director of Neuroscience Institute at Stonybrook University School of Medicine. So we're very happy to have you too. (Applause) So there's so much knowledge about the brain sitting to my left I'm feeling intimidated already, and I know you have questions. So we were going to have roving mics. During the time that we're speaking today, if you have a question, and I'll call for questions throughout our

discussion, please feel free to stand up, raise your hand and we'll get a microphone over to you so you can ask a question.

So let's drive right in and what we like to do is get started by talking about the brain and let's ask Dr. Choi to give us a very brief primer on brain function to kick off our discussion.

Dennis Choi (DC): It's a privilege to be here. I'd like to add that I'm a proud member of the Dana Alliance for Brain Research, and also a proud member of AARP. So, the brain. The brain is up here, in case you're wondering. It's about three pounds of tissue in the average adult, but it's an especially important three pounds of tissue because it's responsible for basically doing everything that we are aware of, all our thoughts, all our plans, all our memories, all our hopes, all our feelings, all our ability to feel or to move emanates from those three pounds. Another way of recognizing how very important those three pounds of tissue are, and of course the brain is connected via a structure called the brain stem to an extension of the nervous system down the back called the spinal cord and the spinal cord is the conduit through which signals go out to the rest of our body, to all our arms and legs, heart and the like. One way of recognizing how very important

these three pounds of tissue are, I mean think of your bodyweight, which in most cases more than 100 pounds, and then you've got three pounds of brain tissue. Well that three pounds of brain tissue takes about 20, sometimes even 25 percent of your heart, of your blood flow and your metabolic capability. So the brain is hogging blood supply and metabolic fuel because it's really working hard all the time.

DS: Dr. Coyle, tell us about the normal changes in the brain as we get older. I'm not going to say old, older. That's okay with you, right? Good way to say it.

Patricia Coyle (PC): I too am delighted to be here as a proud member of the Dana Alliance to speak to you. As the brain ages it does shrink somewhat. And we know that very well. It's actually shrinking from the time we pass adolescence. However, there's good news. Years ago we thought that the brain cells existed, and when they died they could not be replaced, that there was no growth or renewal or generation of new cells within the brain. It turns out that's not true at all, that there is ongoing development of new cells and our brain, which is really, I think of it as the master organ of the body that really controls everything, the

most important organ that controls our intelligence, our personality, our soul, can really learn from experience and you can actually see changes in brain circuitry. And we can actually, I think, positively try to build up brain reserve by certain activities that we're going to hear about. So, although there is some loss and shrinkage of tissue with aging, I think aging well can really maximize, maximize reserves of our brain.

DS: Dr. Choi, let's talk about Alzheimer's disease, stroke, some of the diseases that affect the brain directly. Can you discuss a couple of them for us?

DC: Unfortunately there are an awful lot of diseases that affect the brain. The ones you mentioned, in particular Alzheimer's disease and stroke are quite common, unfortunately. And their prevalence does increase with age, so they become more and more common as people get old.

PC: Well I think some of the major challenges as a society that we face involve major neurologic diseases, and we've heard about two of them. Alzheimer's, which is a major disease as we face, as we age, with increasing numbers. But we're learning more and more about Alzheimer's. We're

understanding the pathology and what goes wrong, and that is helping us to determine new therapeutic approaches that are very exciting, that are in a number of clinical trials. We're also learning associations of what makes development of Alzheimer's disease more likely and that is pointing out ways to preventative therapy. We're also looking at identifying brain diseases such as Alzheimer's and Parkinson's disease at very, very early stages, early stages where there may be minimum to no objective neurological abnormalities. And that's going to, I think, be critically important because if we're going to put into place therapeutic strategies, we want to do it at the earliest possible stage of the disease, before there's been a lot of injury.

DC: Maybe I could add something that to emphasize the great relevance of those two diseases, in particular, to all of us as we get older. Just a couple of statistics: stroke is the third leading cause of death in the United States, the second leading cause of death in the world, and it usually doesn't kill. Alzheimer's disease basically is a disease that gets more common with aging. It really gets a lot more common as individuals age. I'll give you a number. If you reach the age of 85 the likelihood of

developing Alzheimer's disease approaches 50-50. It's that common. One view of neurologists and neuroscientists in the field is that to some extent you really could take the position that all of us, every single last one of us, is at risk for Alzheimer's disease, in a sense, we'll get Alzheimer's disease, the only question is whether you die of something else first. So if you're lucky your age of onset of Alzheimer's disease is 120 and something else gets you before then. If you're not so lucky, your age of onset of Alzheimer's disease is let's say 82, and in fact you make it to 82 and you manifest Alzheimer's disease. So, in fact, Alzheimer's disease is not someone else's disease, it's really something that all of us have to think about.

DS: Let's discuss another component of the aging brain, and that is depression. Could you give us a little description of how that could affect us?

PC: Well I think we recognize that depression is extremely common, and depression is a brain disease. What depression really relates to are chemical abnormalities, neurotransmitter abnormalities within the brain. I like to think about depression as a poisonous symptom. It's very important to

recognize, but often individuals will deny it or not be aware of it and it may be family members and significant others. Depression is sadness, it's a feeling of hopelessness, it's a feeling that no matter what you do, things won't work out, so why bother trying. It can be related to disturbances in sleep, either sleeping more or sleeping less. It can be related to changes in eating, either eating more with weight gain or eating less with loss of weight. It's really feeling that no matter what you do, it's not going to make any difference, so why try? Why even get out of bed in the morning? That's completely treatable. That's a brain disorder. That's not in some ... well, it is in your mind, but it's not imagined. It's a chemical imbalance. And it's so insidious because it stops you from doing anything. It's not only ruining your daily pleasure in day-to-day activities, but it stops you from doing health-promoting activities. It's a critical, critical disorder to recognize and to get appropriate treatment for.

DS: I often think of Mike Wallace, wonderful television news correspondent who was a colleague of mine for many, many years. You may remember Mike Wallace. In the later years of his life he was terribly debilitated by depression. Why is

that? Is that a function of worry for an older person, Dr. Choi?

DC: Dr. Coyle, I think, has outlined the impact of depression very well, and it also is true that depression, there is a peak of depression that is associated with aging. It's, of course, not exclusively a disorder of older folks. It can affect people across the life spectrum. And it's increasingly recognized, actually, in the young, in children. But yes, it is ... the incidence does rise with aging. And it then can confound and very likely actually biologically accelerate some of the damage that's done to the brain via a disorder like Alzheimer's disease, so the two are not even independent, there's some connectivity. And they unfortunately synergize.

DS: I think in the news recently we've heard about Paris Jackson, the daughter of Michael Jackson, affected by depression. She attempted suicide the other day. And she's a young person. She's an adolescent at this point, 12, 13 years old. So yes, depression can affect everybody, not just the older person.

Here's a subject I'd like to get into. This is one of my favorite questions. Are there differences in the way that men and women age in their brain? Who would like to go with that

one first?

PC: We'll I'll just comment that men and women are different, of course, and even if you look at the brain there are brain differences with regard to weight of the brain being greater in men, but density of neurons being greater ...

DS: That bears repeating.

PC: No, no, no, but the density of neurons is greater in women so that makes up. And there can be actually differences in certain neurons in various areas of the brain. Obviously, these differences are not confined to the brain. For example, the immune system is stronger in women than in men, and that's been suggested as at least one explanation for why so-called autoimmune disorders are more common in women. So there are some intrinsic differences.

DS: Is it accurate to say men are from Mars, women are from Venus, Dr. Choi?

DC: Not technically. It wouldn't be completely technically accurate. But it is true, as Dr. Coyle says, that neuroscience is recognizing more and more that there are definable differences in the structure and the way the brains of

men and women, on average work. Now, the differences are, you could say, small relative to the difference between, of course, a human brain and another kind of brain. But they're real and they produce differences in the way men and women, on average, use their brains; on average in strengths and weaknesses. Probably taken together, most people in this room would agree that women, on average, are smarter than men. But basically there are differences. Men are better at a few things. (Laughter) Maybe recognizing aircraft would be something very important that I think men are better at, but there's something out there.

Actually, and these differences do extend to the way Alzheimer's disease affects the brain. It is true that more women than men have Alzheimer's disease, although a large part of that is related to the fact that women have longer life spans, so an age-related process like Alzheimer's disease is going to be more prevalent.

More recently, I think some studies have started to recognize that men are at greater risk for a state called mild cognitive impairment, so that's more typically seen, statistically, in men than in women. And there are some

differences in the way Alzheimer's disease, if you really get down into the science, appears to progress in men and women.

DS: Here's what we're going to do. We're going to get into the next ... the next subject is learning and memory. But before we do that, I know you have questions that have come up, so we're going to take a few questions right now. We have the hand microphone right there. I'd like you to stand up, give me your first name – Dennis? Okay. What is your question.

M: What about heredity. My mother had it and died and I'm the first born. Scares me.

DS: What about heredity? In relation to Alzheimer's or a stroke? Okay.

PC: A small percentage of Alzheimer's disease will be genetic, typically autosomal dominant. And they are identifying genes called the amyloid precursor gene, presenilin 1 and presenilin 2. The vast majority of Alzheimer's disease are not familial, but a small, very small proportion, less than five percent are. And so there is risk when there's a positive family history, certainly. But there are positive things that you can do. And I think what's very important for all the major neurologic diseases that

we're talking about here, for the small proportion that may be familial, that's a wonderful research to look at because you analyze the genes, you figure out what that gene does, and it gives you critical insight into the disease, even though that's not directly applicable to the whole disease. And so it really gives you great insight and you begin to understand the disease and hopefully be able to develop treatment strategies.

DS: Dr. Choi, would it be accurate to say that Dennis faces a possibility, but not inevitable doom of Alzheimer's?

DC: Yes that's certainly accurate. We all face Alzheimer's disease as I outlined. I think if you run the numbers, assuming that there is not a specific familial form of Alzheimer's disease running in the family, if we're talking about the sporadic Alzheimer's disease, which is here and there is yet to be linked to a powerful single gene mutation. Still, I think on average having family members express Alzheimer's disease is a risk factor, so it bumps up one's risk a bit. But basically it's a relatively small bump and so it certainly wouldn't mean inevitability.

DS: So Dennis, you're at risk but you're not doomed, okay. So take heart. Another question over here please.

Give us your name?

W: I'm Jean.

DS: Hi Jean.

W: My children would very much like to know how ... their father died of Parkinson's, there's been no one else in his family who had Parkinson's, they would very much like to know what their risk for Parkinson's is as his children?

DS: Who would like to go with that first? Dr. Choi?

DC: Well, similar to the situation with Alzheimer's disease there are some rare familial forms of Parkinson's disease. So if that were to be in the family then that would convey a definable and significant risk. If that isn't the case, it's somewhat the same situation. In other words, having close relatives express Parkinson's disease is a risk factor, but it doesn't mean inevitably that all relatives will get Parkinson's disease. What tends to increase the risk in both Parkinson's and Alzheimer's disease, if we're outside of the zone of a familial genetically determined, typically dominant form of the disease, it would be greater risk with an earlier onset. So if one has relatives that express earlier onset

... if one has family members that come down with Alzheimer's disease or Parkinson's disease at a younger age, that is a higher risk factor than if they come down with those disorders in, let's say, their 80s or 90s.

W: (Inaudible comments)

DC: It's a continuum. So 70 is younger than 80, 60 is younger than 70, and the younger you get, the stronger the risk. But it still stays relatively modest as an impact factor. But if you talked about somebody who gets, say Alzheimer's disease or Parkinson's disease in their 40s, that would typically point to a familial form and a potentially very significant risk.

DS: Let me take one more question, this young lady right here, in the second row. And I'd like to caution you. When you ask a question, don't give us a personal example, keep it a little nonspecific. That protects your privacy and makes it a little easier for us to answer.

W: My name is Susan.

DS: Hi Susan.

W: And I'd like to know if there's a test that you could take to see if maybe you'll get Alzheimer's disease or

Parkinson's disease? Like I'm 60 so my children would like to know. (Laughter)

DS: Keep it nonspecific.

W: But I'm afraid to find out.

DS: Is there a test? Good question.

PC: That's a very good question. So the short answer is no. There's no test to be done. Now, there's very interesting work being done in both disorders. So when we think about Alzheimer's disease now, you can think about perhaps three stages. There's the Alzheimer's changes that are occurring in the brain, but there's no clinical features of it. This is a pre-symptomatic stage. Then there's the mild cognitive impairment, where there's a little bit of cognitive issues, but it's not interfering. And then a proportion of those go onto actually show Alzheimer's disease. There are very interesting studies looking for biomarkers that are being done with neuroimaging tests such as PET scan, and spinal fluid analysis that are possibly going to be able to identify Alzheimer's disease in the presymptomatic silent stage, where it has the pathology but there's absolutely no sign yet. And I think that will be wonderful, because when we get treatments,

that's where you'd like to introduce it. Same thing for Parkinson's. There's very interesting studies suggesting that gastrointestinal problems, constipation, loss of smell, disorders of sleep and sometimes mood disorders, may precede development of the clinical features of Parkinson's. And again, there are big studies that are ongoing to try to establish that. So this is kind of the excitement of the future and what we're learning, but the short answer is no, there's no test to be done right now that's going to tell you.

DS: What we're going to do is move on to another topic. I know a lot of you have questions, so we're going to take them. We'll get to you, don't worry, not to worry. We're going to talk now about memory and learning. And Nobel Laureate Eric Kandel says there's no memory without learning, but there is learning with out memory. So let's talk. What is learning and memory? And how does it relate to brain aging? Dr. Choi?

DC: Memory is our ability to change our nervous system through experience. And so usually, as the term is used, it means ... it refers to things that one can consciously retreat, so information that you remember. Learning is typically used in a

broader fashion, I think that's where the Kandel quote is going, to refer not only to memory, which of course by definition is a form of learning; somebody tells you a fact, you remember it and you've learned that fact. But you also can learn things that you can't really express verbally in a conscious fashion. For example, you can learn motor skills, or you can learn habits.

PC: Again, I come back to this concept – obviously, it's not accurate, but the brain is like a master computer. And we're actually encoding and storing our memories there. And old time memories, things that happened many years ago, that's the hardest thing to lose from the brain because they've been encoded and put down. There's a process of that encoding, putting memories in. There's short-term memory, and then there's long-term memory. And you can actually see things that interfere with the ability to lay down short term memory, and you actually can't get it encoded in the master computer part of the brain. Obviously this is a very important topic to learn more and more about because we do know with aging that our memory is not quite as good. My memory is not as good as it was 20 years ago. That sort of thing happens as a part of aging. But certainly there's a lot

of research and studies going on that are trying to discover how we learn and then how we make memories and how we can boost that or enhance that.

DS: I'll give you a good example of that. I can remember lyrics from songs from the '60s but I can't remember the story that I covered yesterday. So there you go. But that's normal, right? And Susan asked is there a test, whether you might be susceptible to Alzheimer's and the answer is yes. It's if you continually lose at Words with Friends. (Laughter) No, I'm just kidding. Only Alec Baldwin does that, on airplanes. Let's talk about the hemisphere of the brain. Let's talk about left brain, right brain. How is that defined, Dr. Choi? Am I in my left brain right now?

DC: Yes you are. Most likely. Are you right handed?

DS: I am right handed.

DC: Okay, then I'll say you are. So the reason why I knew that is because we do know that the brain actually specializes, so it's not just two equal halves doing all the same things at all times. In most individuals, in virtually all right handed

individuals, and actually a majority of left-handed individuals, the left brain is the part of the brain that specializes in language. So your ability to understand what somebody is saying or understand what you read, and conversely your ability to communicate verbally or in writing, is mediated by circuits in the left part of the brain. That's a particularly striking example of hemispheric specialization. The right hemisphere, likewise, specializes in certain things, for example one's ability to find, to basically position in space and find one's way somewhere you want to go, you want to go to the living room, you have a map of your house in your brain. You know exactly to turn left, turn right. The right brain takes dominance there and basically takes charge. So those would be examples of hemisphere specialization.

DS: And learning and memory, is that left brain, right brain or somewhere else?

PC: Learning and memory is actually, to a certain extent, on both parts of the brain, but particularly in special areas that are called the temporal lobe, the anterior temporal lobe, the hippocampal, some of the older areas of the brain, bilaterally, actually, involved.

DS: Can we continue to learn throughout life? Is that a fair question to ask? And can you give us some specific examples?

DC: I sincerely hope so. There is no question, of course. At this instant you're continuing to lay down memory tracks. You just heard the moderator's question and could repeat it back, most likely, if you needed to. So fortunately, our ability to remember and to learn persists lifelong and we ... these abilities are essential for our ability to function. They remain very strong. There are things that we can do to keep them as strong as possible, and that might be a topic that we get to in a little bit. And unfortunately these are processes that are deeply impacted in conditions like Alzheimer's disease.

DS: What is mindfulness, a term that's come up from time to time, what is that?

PC: Well, my thinking of mindfulness is really awareness, and using your brain and trying to maximize use of your brain. And I think really an awareness of brain health, I think that's really critical. It's a use-it-or-lose-it phenomenon. I think it's very, very important to try to maximize use of our brain because I

think that promotes sprouting, it promotes development of circuitry or reinforcement of brain circuits. There are brain circuits that if you never do something you don't use that. If you force yourself to do it you use it. My concept of mindfulness is really somebody who has awareness of trying to maximize use of their brain, their mental functions.

DS: Again, that's Words with Friends on your iPhone or your ... I think one of the things that has really hurt me is autodialing. You see someone's name or phone number you just hit that and you ... previously, before all these gadgets came into vogue, you had to remember somebody's phone number and it was good for you, right? Now, let's go back to questions on learning and memory. Who has some questions on learning and memory? This gentleman over here has had his hand up for a while and ...

M: I was wondering, I have ADD, how does that affect (Inaudible) I don't stay focused.

DS: How old are you?"

M: I'm 75. I've had this since I'm a child. It affected me with my schoolwork. I'm a dreamer. And I was

wondering what that affect has on ... ?

DS: Your name again is?

M: Bob.

DS: Who would like to answer Bob's question?

PC: You know, if you have ADD, as we know it's an attention deficit disorder, it says nothing about your intelligence. That doesn't affect your intelligence. Very smart people have ADD. But the impact is to recognize that and appreciate it in schooling so that the special criteria are made to allow a person with ADD to learn well, and not have them go through school and not do well because they weren't appropriately accommodated and feel that they're not doing well in school because they're stupid. And that's not true at all. So, ADD does interact and affect how you pay attention. And there are ways around that. There are tricks. There are cognitive tricks that can be learned through therapy. There's also sometimes medication that can help and people with ADD should be able to do just as well as somebody without ADD once they realize what they have and if it's significant enough, then they can accommodate through therapy and techniques learned, and sometimes use medication. But you

should be able to be very, very successful in life.

DS: My wife says that I have ADD because I use the channel surfer, you know, the remote like this, I'm always going like this but always wind up on News 12, Channel 12. Another question, yes please?

W: Hi. My name is Judy.

DS: Hi Judy.

W: When does the forgetfulness that we all experience, forgetting our car keys, when does that require intervention? When do you start worrying about things that you've forgotten?

DS: Dr. Choi?

DC: That's a very good question. So against this background which a neurologist called benign senescence, meaning that all of us lose progressively some of our ability to remember with the years, Alzheimer's disease, of course typically does affect memory functions very prominently. But the way to think about it is, if one thinks of benign senescence as a very, very gradual slope, and as I ... the older I get the more I like to think that, as I lose memory capabilities, I more than compensate for

that by, through experience and other things that I progressively learn as I get older. This is a gentle slope. Alzheimer's disease is not a gentle slope. So that's what you basically need to know. Things progress much, much more rapidly and before long, unfortunately, the affects on memory reach the point where routine daily activities become progressively difficult – balancing a checkbook, getting from place to place, recognizing members of the family. At that point, that is not benign senescence.

DS: Want to add to that, Dr. Coyle?

PC: There are so many things that can affect memory – you didn't get a good night's sleep, you have a lot on your mind, you're stressed out, some of the medications that we may be given for various reasons can affect memory. We're all going to experience that. The more stressed out, the busier you are, the less sleep you've gotten, the poorer your memory is temporarily going to be. I totally agree with what Dr. Choi said. I think when other people begin to comment that you're having problems with memory, then that may be a feature. But things like forgetting your keys, that can be affected by so many things. We're not going to have perfect memory all of the time. It's very

vulnerable to all of these situational type issues.

DS: There you go Judy. I forget where I park my car all the time so I just hit the panic button. That's great for memory. Let's see. Okay, you got the mic. You win by default.

W: Hi, my name is Ann and there seems to be like some overlap between memory loss, dementia, and then I need to distinguish between dementia and Alzheimer's. My mom is almost 91 ...

DS: Keep it more nonspecific.

W: Could you just address distinguishing characteristics between memory loss and what is considered dementia and how that's different from Alzheimer's. Thank you.

DS: Dr. Choi?

DC: Well, memory loss is a symptom. It's very specific. It means your memory is being impaired and it can be a symptom of a variety of conditions besides Alzheimer's disease. It can happen transiently, as Dr. Coyle says, due to events like poor sleep at the moment. But in terms of a more chronic memory loss there are a number of diseases which can produce that, including stroke, can selectively, and certain kinds of stroke, can impair

memory. So it's just a symptom. Alzheimer's disease is, I'll call it a specific disease but science now recognizes that what we call Alzheimer's disease is a cluster of diseases, but anyway it's a group of related diseases, so that's Alzheimer's disease.

Dementia is a broad classification. Alzheimer's disease is a dementia, but there are other kinds of dementia. Parkinson's disease actually itself can produce a dementia. Another kind of dementia that's been in the news recently has been dementia pugilistica. Athletes, in particular, who sustain multiple head injuries or, unfortunately, some of our soldiers coming back from the war, who've had head trauma, that can, over time, produce a dementia. It's got nothing directly to do with Alzheimer's disease, at least at the beginning. But it produces an impairment of multiple cognitive domains that's chronic and persistent, which basically is a dementia.

PC: One way to think about it is dementia has to involve multiple cognitive issues. Dementia is never going to be simply a memory problem, got to have more than that. So even though memory is what we can focus on so much, if you have an isolated memory problem, but attention, concentration, abstract

reasoning, being able to make a smart judgment, you have to have multiple areas involved for a dementia syndrome, not just memory.

DS: We're going to move on now. Again, if you have questions, we'll get to them, eventually. Many of us worry about our memory and we want to talk more about that. But for the moment let's talk about some good news about the aging brain, some news that may help us worry a little bit less. Brain plasticity, interesting phrase, define it, Dr. Choi first.

DC: Well, maybe I should defer to Dr. Coyle because you introduced the topic earlier.

PC: This is the concept that we can change brain function by our learning interactions, by what we actually do. I spoke about circuits of the brain. Well, you can actually show through exercise, through cognitive tasks, et cetera, that you can change circuitry within the brain. We now know, as I said, that cells can regenerate. You can actually perhaps cause new cells to be laid down, new connections to be made. There are positive things that we can do to help our brain health. And this concept of plasticity is the fact that the brain changes based on learning experiences, and what happens with the brain. I think this really

emphasizes brain health and that we can take positive steps with regard to our daily activities and what we do to promote brain health, to combat the development of aging-related stroke, dementia, Alzheimer's, even Parkinson's, I would come back to multiple sclerosis. We can do things to help to prevent that by promoting our brain health.

DS: Can you give me an example, Dr. Choi, of working on our brain plasticity? Would it be a good thing for older persons to take on a new task or learning a new task of some kind? Maybe, if you've never worked with a computer, would it be good to learn computer technology, or some part of the process of working a computer?

DC: Very much. I think we've touched on this topic several times already in our conversation, but the brain, as our most important organ, will benefit from some attention to its health, just like any other organ, like our heart. The ability of the brain to be plastic, which at this ... I'll put it at a cellular level in case you find that interesting. Just in terms of numbers we have about 100 billion neurons in our brains. Each neuron is forming, typically, thousands of connections with its peers. And these

connections are always being moved around, basically strengthening, weakening, adjusting. That's the way our brain, our computer, basically, learns new things and processes, analyzes that information, expresses our feelings, et cetera. All of that's happening at the cellular level through these changing connections of these hundreds of billion neurons and some non-neuronal cells as well. So all of that's going on, we can in fact aid and abet the process. If somebody said, "How can I keep my heart healthy?" everybody in this room would I'm sure know that there would be things you could do to strengthen your heart and make it more resistant to age-related disease. That's absolutely true of the brain as well. And coming back to the question, specifically taking on new intellectual challenges is clearly one of the things that one can do to kind of keep that plasticity cranking, keep our brains vigorous and healthy. Someone mentioned to me the other day, I don't know if there's anyone here of Swiss ancestry, but somebody told me that actually in Swiss culture, that it's common, it's believed, it's encouraged that one, in later life, should learn a new language. I think that's a wonderful idea, and that's exactly along the lines that you were actually talking about learning a computer language.

That's one of my own personal ambitions is basically, a bit later when I have a few less responsibilities at work, I would love to learn a new language and I think that that would be both fun and sort of rewarding, and would touch on a couple of the AARP goals, which we all endorse. It would be intellectually stimulating and probably would be socially enabling to learn a new language.

DS: Our brains get better with age in certain skills.

PC: I guess it's how you define it, but I would be positive in agreeing with that statement. I think an older brain brings the whole wealth of their experience and that's something that can only come with age. I think, again, it really comes down to a use it or lose it, very important to promote brain health by keeping active in reading, in new experiences, in taking courses, in learning new skills, in challenging your brain, challenging your thinking you are physically, anatomically, at a cellular level, helping it. Use it or lose it. Very, very key.

DS: My wife hates to fly and I coaxed her to get on a plane to go to San Diego a few years ago and the cockpit door was still open and she saw the pilot and he had a full head of gray hair and she said, "Oh, I feel so much better." With age

comes experience and level headedness. Teenage brains take terrible chances. And we hear so many tragic stories of teenagers getting themselves into tragic situations. But that shows you the difference in the brain as it ages. Am I correct?

DC: You're absolutely right. Here's a fun fact. I mean there are different peaks for abilities. There's sort of a general, unfortunately, downward trend in raw processing power in the brain with time. Your hearing actually peaks, it's one of the first thing that peaks is your hearing ability, which actually hits a peak somewhere around age 12. How many of us would like to be in an airplane piloted by a 12 year old because of his or her perfect hearing?

DS: I'm going to open it up to a couple of questions. I'm going to ask you to give us a specific example of a new skill that you're taking on to help your brain. Anybody taking on new skills, tell us about it. Yes, please, right here. Stand up. What's your name? Hi Diane.

W: I went to Stonybrook and I took the Project Management course and I'm studying for a PMP certificate.

DS: How has it affected you? How do you feel?

W: I feel much better. I know that I'm going to be able to do it. And it reinforces the things that I've learned all these years. I never knew that there was a certificate that you could get and it'll help me get a new and better job.

DS: Is it helping your memory or your brain?

W: Yes.

DS: In what ways?

W: Well, now there's also aspects to that particular certificate, mathematical equations that I have to learn and I was like, oh my god, I have to remember math all over again. It's taking me back to what my daughter was learning in algebra. So it's reinforcing all those aspects.

DS: Wonderful example. Another example of a skill that you're taking on?

DC: And Diane is a new AARP volunteer too, so ...

DS: There's another hand back there, Will. Just a specific skill ... also there's a hand over here too.

W: I'm learning to play bridge and trying to learn to juggle.

DS: Jumble is the word game.

W: Juggle.

DS: Three balls or four? I've only been able to master two so far. Wonderful. Good. Another hand over here.

W: I'm learning Spanish. I'm taking a Spanish class. I took Spanish in college and I didn't remember a thing. And so now at least I could count up to 20, I remember a few of the words and I could speak just a *poco*, just a little.

DS: Have you found it helps your brain?

W: Whenever the instructor says she's going to give us a test, then suddenly I study a little more and then I could be tested because I would understand and know a few things.

DS: Excellent. Very good to hear that. *Mucho gusto*. Another hand right over here, young lady over here.

W: (Inaudible) ... and it's ... I teach older adults at a church situation and I see how it has helped them tremendously with their learning ability and their ability to retain a lot of words and things like that. And it's funny how a lot of language students, when they learn a lot of language, for example, I started out learning Spanish and the I also had French but I didn't

have anyone to speak with when I was speaking French so I lost a lot of the French. So now what I'm doing is that I'm bringing back the French and that is helping me tremendously to remember things. So it's so important for all of you to take another language, really, it really is. It'll help you tremendously.

DS: Wonderful, okay. New skills, that's very important. Let's move onto another topic now. We've touched on this quite a bit. The normal changes that come with memory and age now, is it normal for us to forget names of dear friends that we knew a number of years ago? And why does that happen? Who wants to do that first? Dr. Coyle?

PC: As we get older it is very common for us to have a memory that's not working as well. There are many things that can impact on memory, as I mentioned. There are specific tricks that you can do to improve that. You're going to be able to remember if you're not distracted. So if you have a lot going on, there's a lot of noise in the background, like we're hearing next door; if you don't get a enough sleep, sleep is very important. You really, ideally, want to get a replenished sleep because that helps the brain to work. If you're under a lot of stress the brain and

memory is going to be affected. If there is depression that's a critical ... as I say, I consider it a poisonous symptom, critical to treat. So there are tricks of the trade that you can learn to help memory as you get older. And that is something that's not going to be quite as good. But again, health promotion, making sure that you take care of brain health, but also body health, body health in general. The more physically fit you are the better your brain is going to work, the better your memory will be.

DS: Are there certain brain foods that will enhance our memory? Dr. Choi?

DC: I'm not sure this has been totally pinned down, but the answer is probably yes. It's certainly yes at the level of a healthy diet. So we say is it health promoting? Is it brain health promoting specifically to eat right? No question. Are there specific foods that through their almost pharmaceutical abilities, would be brain health promoting? Less clear, but I'll throw out a couple of clues, not that I feel everybody should rush out and eat A or B, but just to give you some idea of the kinds of thoughts that are going on now in the field, people know that, in general, for example, fruits and vegetables are health promoting. You know

that that's a basis for a healthy diet. Scientists have begun to see if they can isolate certain elements and there have been experiments, for example, where laboratory rats are, instead of rat chow are given blueberries. They think they've died and gone to heaven. And then those rats that get the enhanced diet actually can out perform on mental tasks, the rats that are eating the plain old rat chow which contains all the standards ingredients that science believes are necessary for health. So that would be one example. A human example that I could site is one epidemiological fact that interests everybody is the fact that Alzheimer's disease incidence in India is relatively lower than in some other parts of the world, including the United States. And people have begun to wonder if there was something in the Indian diet that might contribute to that, and of course the obvious lead candidate would be curry. So there's been some experiments to take curry and work on it experimentally. And there actually is evidence that some elements in curry might be beneficial at a biochemical level in helping to stave off some of the changes of Alzheimer's disease. So I think this is a 'stay tuned' would be the general answer to your question. This is where science is very

much interested in this question, but meanwhile, no question about it, that focusing on eating a healthy diet, that has bountiful fruits and vegetables, for example, is something that we all should be doing.

DS: We even talked about the Mediterranean diet as being very positive, correct?

DC: Yes. And so there science has taken it one step further. The Mediterranean diet has now been pretty well validated through larger study as being health promoting, longevity promoting. Science believes that one can identify specifically olive oil and nuts and perhaps also red wine as pillars of that diet's success. So that's, again, moving from the general to the specific.

DS: We're going to move onto our part two now of our discussion, that's brain disease and disorders. And we've touched on this, but let's define it some more, talking about dementia and Alzheimer's, memory loss versus Alzheimer's disease. Specifically, what would be a first indicator of someone developing Alzheimer's disease?

PC: Well, I really think if you have other individuals that are noticing an issue, by definition, at the stage of

Alzheimer's there has to be interference with daily activities. So the cognitive issues, and memory would certainly be affected in Alzheimer's, in any dementia syndrome, but it has to be more than that. It's impacting sufficiently in daily activities that other people – family members, friends at work – are going to notice issues. So you could have fall off of work performance. You could have somebody who begins to be forgetful that's beyond the norm. For example, driving to a spot and forgetting in the middle of driving, where they're going; where they begin to not recognize family members; daily activities that they can't ... they could keep a checkbook and now they're screwing up the checkbook, the finances, on a regular basis. Other people are going to notice there's an issue. It's very hard to keep that hidden, and it's clearly going to be more than just memory. And it's going to be interfering with day-to-day life.

DS: Dr. Choi, am I correct – there is no definitive diagnosis of Alzheimer's until an autopsy is performed . Is that right?

DC: That's correct, and Dr. Coyle, I think, already spoke to that. There's certainly work in the field, as she outlined,

moving towards a pre-death diagnostic capability. But as we stand today, the diagnosis of Alzheimer's disease is still a clinical diagnosis. To add a couple of bullet items to the list that Dr. Coyle outlined, just to give people a broader sense of the domains of cognitive function, intellectual function that can be affected by Alzheimer's disease besides the ones that she mentioned, which are the biggies, I might also add to the list language difficulties. So people with Alzheimer's disease not infrequently will have some progressive difficulties with, in particular, spoken language, expressing themselves. Sometimes people will start to talk around the point because they can't come up with the right words, word finding difficulties. There can be some atypical, meaning for the individual, difficulties with emotion, so people can become irritable and sort of emotionally labile. And you know that's not them, that they've gone through decades and decades and that's never been the way they've reacted before and now they're somewhat hard to deal with because they've become somewhat emotionally labile. And getting lost, which I think was very much on Dr. Coyle's list is also, unfortunately, a common symptom of early Alzheimer's disease.

DS: Thank goodness I have a teleprompter where I work. I don't have to memorize anything. Tell us about medications. Are there vaccines, medicines that will treat or cure Alzheimer's at this point?

PC: Well we don't have a cure for Alzheimer's. Obviously, I think anybody that got that would win a Nobel Prize. There are several treatments that manipulate chemicals, neurotransmitters, that have shown benefit in temporarily improving memory. These are focused particularly around acetylcholine. There's a fourth medication that really has a slightly different chemical action. These are reasonable medications. They're not really game changers as far as I'm concerned. They're not really game changers. We now know the associated abnormal brain pathology that we think is integral to development of Alzheimer's, and it really involves abnormal protein being deposited in the brain. And we know the cascade of how that abnormal protein really ... we know fairly well the cascade of how those abnormal proteins develop. We're trying to develop them as biomarkers, early identification of the disease. There are very clever, very smart strategies, and this is where they tried an initial

vaccine that didn't work, unfortunately. It had some negative effects. But they've developed others. There are very exciting new, potential treatments for Alzheimer's that have begun testing in clinical trials. I think the future is very bright in the next couple of years that we're going to have a step up in our treatment for Alzheimer's beyond the current manipulation of neurotransmitters. That's okay, but not really a game changer, in my mind.

DS: I know in a number ... in a case that I was familiar with, the person became very defensive to the point of when they were being diagnosed for Alzheimer's one of the questions, and maybe you could talk about this Dr. Choi, in diagnosing Alzheimer's, the questions were asked, "Who is the President of the United States? Who was the last president before him? And who was the president before him, going back chronologically?" And what she said was, "Oh, you know who the President is," became a little defensive like that. Is that common?

DC: Yes, it is. I think it's fully understandable at a human level. If one is affected one has a reflex to try to work around it and that's an effort to work around it, and one can fully understand why an affected individual might become a bit

defensive. So both of those elements sort of work around, you try to get by and talk around or work around a difficulty that you're having remembering or doing something. And also the bit of emotional overlay, there's a bit of anger. That's a fully understandable human response to this kind of difficulty.

DS: It's a brilliant part of the brain that's trying to hide what's going on inside the other part of the brain, I would imagine. Isn't it?

DC: Absolutely right?

DS: It's fascinating. How late should someone continue to drive an automobile or function on their own? Do you have any recommendations on that? Who wants to play with that one? I think they've turned hostile on us already.

PC: I'm a big believer ... well, if somebody starts to have accidents, that's a huge red flag, let's face it. There has to be a very significant discussion. But I'm a big believer if there's any question at all, basically get recertified. Go through the driving test, be checked out again, and pass it, to make sure that there are no issues. So those would be kind of the two things that I would highlight on this kind of controversial area.

DS: Dr. Choi?

DC: Well, you know, Drew, the existence of what is it, the Amber Alert tells us that every once in a while someone gets in their car who shouldn't get in their car, so that's a fairly extreme but unfortunately not all that uncommon situation where somebody with most likely a dementia and, therefore, statistically most likely Alzheimer's disease is driving, who really shouldn't be driving, and truly gets lost and an alert has to be put out to try to have everybody look for that person.

DS: It's so difficult to judge because I have a dear friend, 86 years old, and she drives herself twice a year to Virginia on her own, and does a wonderful job, but she keeps busy working in an office, so it's a case by case basis.

DC: Age is just a number. When I was at Washington University I remember (Inaudible) was very distinguished, famous scientist and he, at age 90 was asked to re-Chair the Department of Pharmacology and applied for a federal grant, one of the most difficult, competitive grants to get, and he got it and his priority score was the absolute best in the entire country, age 90.

DS: I'll be he's on the Mediterranean diet. Before we start talking some more about stroke, let's open it up to questions about learning and memory and Alzheimer's. Again, keep your questions non-specific. Yes, please? Give us your name? What's your name? Hi Juanita.

W: (Inaudible) ... technology impact brain, the individual who have the need to stay connected all the time, having dinner, traveling, never giving the brain time to rest. It's just continuous connecting. How does that impact, if it does, do you think it has some impact ...

DS: As opposed to isolating and being alone?

W: As opposed to the next generation that have never been without this technology.

DS: Good question.

DS: Obviously, socialization, getting out and interacting with other individuals, I think is a health promoting measure, and that probably really helps brain health, and that's a very important thing to do. I'm not a big fan of people sitting in front of a TV or on their iPad all day, not having human contact. I think conversation, human contact, et cetera, is very important. So

that's to be encouraged. That helps the brain. That promotes brain health. The time for restoration is really to have good sleep. And that's another basic health issue. You want to have good sleep, and if there's an issue there, you want to see how you can fix that up, because that's the time when the brain can really be resting.

DS: How many hours would you recommend?

DC: That's going to be different for individuals.

There's a wide array – I can give you an average figure of eight hours. There are some people who can do with less. There are some people who can do with more. The bottom line is, are you refreshed during the day and able to focus, et cetera. Sleep is very important, very, very important for our general health and our brain health.

DS: Do naps help? Or is it bad?

PC: I'm not going to say that naps are bad necessarily. It really depends. Now if a nap is going to stop you from sleeping at night, then there's a potential issue. But if the nap is really helping to replenish you, giving you greater energy and you're able to do it, then that may be fine.

DC: Can I come back to the (Inaudible), because there was a little bit of an edge on your question and I wanted to address that edge. I sense from the way you asked the question that you have a concern that, in particular, I'll say the younger generation's affinity for technology and sort of continuously texting, et cetera, might have a downside. And I do share that concern. In a sense we're conducting a large social experiment because we have a whole generation of people that multitask to a greater extent than any of their progenitors, and also depend on technology more than any of their competitors. So the multitasking, I'm just not sure. You can sort of see there could be a plus side in keeping that brain always agile and on its toes, but there could be a downside. You never really, or less commonly going deep and taking something a little bit further. In terms of depending on that little pocket device all the time, I think that there is a downside. You've spoken to that a couple of times as well in the conversation, so I wanted to highlight that.

I'm very aware of it. People say, "How's your memory?" I say, "It's about 32 gigs, it's not bad, actually."

(Laughter) But there really is a downside and I've become more

and more aware of that. Because we, basically anything we need to know we can carry around with us so conveniently, we don't work our brains as much as people used to. I really became aware of that when I read a book recently – no conflict of interest, I just bought the book and read it. It's a fun book which I can recommend, it's called *Moonwalking with Einstein* and it's written by a journalist by the name of Jonathan (sic) Foer. I don't know if you've read it, but it's a very cool book. He got very interested in sort of memory gymnastics and all and he did some reading of history. And he learned that basically in previous times, in many cultures memory was highly prized and in fact, for example, the ancient Romans had very well developed techniques which they used and taught widely to learn. There were fewer books. There certainly weren't any pocket devices. So if you wanted to know something you had to store it. So they exercised their brains and they learned techniques for storing it. And progressively, and especially now in a stepwise fashion with the available pocket phone, we don't do that anymore. And I think that could be a downside. So I share your edge.

DS: Some of these kids think they're so smart

texting, but sometimes they drive themselves into telephone poles. You don't want to do that either. Yes, please.

W: My name is Linda and my question is about sleep. I know it pertains to a lot of people in here. You fall asleep for a couple of hours, you wake up for a couple of hours and then you go back to sleep again, does that count towards your eight hours of sleep, like say a two hour intermission of wakefulness?

PC: So obviously the hours of sleep are when you're sleeping. But that's interesting, so that's disrupted sleep to a certain extent, whether that's learned or not. And I think there are specific sleep hygiene, sleep promoting measures that you can think about. So it would be better not to have the disrupted sleep. You would rather have it straight through, and there are clues, for example, that you not take caffeine or alcohol in the hours before you're going to sleep; that when you go to bed you should be prepared to be sleeping within 20 minutes, and if you're not, you should get up and do something else; that you shouldn't be in bed eating or watching TV for any extended time. And then you would analyze why you might be getting up and what the reasons might be, and looking at your performance during the day. I think the

comment that I would make is that sleep hygiene is an important component of general body health, that is an important component of brain health. And so you don't want to neglect that. If you have a sleep issue it's hurting your brain. That's the way to think about it. You really need to get that fixed up.

DS: Another question back here please.

W: Is sleep induced by a sleeping pill the same as natural sleep?

PC: I'm not a big fan of sleeping pills, I'm really not. In theory, sleeping pills are supposed to be short term use. When there are issues, for example, you're traveling or there's been a specific event or circumstance to help you sleep, I'm really not a big fan of routine use of sleeping pills, which aren't supposed to work in the first place. So I would much rather an individual try to use natural techniques first. If there's a rationale I might use a sleep prescription short term only. I really don't like my patients to be on long term sleeping medication.

DC: And there are some differences. For example, most sleeping pills are in the so-called benzodiazepine class of drugs. While they induce sleep, the sleep is usually, has a

reduced fraction of slow wave sleep relative to natural sleep. And more and more research has pointed to slow wave sleep, deeper sleep, stage three or four sleep, as being especially important for its restorative properties. So there, in fact are some technical differences also to the type of sleep induced by current pharmaceutical agents, and natural sleep.

DS: We have examples in the news when people are taking Ambien and then getting up and going to work and driving in nearly a hypnotic state, they still haven't fully awakened.

DC: Ambien would be a benzodiazepine.

DS: Which would be very dangerous. So I recommend a warm glass of milk and count some sheep. That's my prescription. Yes?

W: My name is Fran and I'd like to thank you. You're giving us a lot of good information here today. And I'm just kind of thinking more proactively. You told us, Dr. Choi, of things, different foods and things that we could eat.

DS: Cut to the chase though, what's your question?

W: Supplements – fish oil, ginkgo biloba,

anything like that, that could help brain function?

DC: Nothing's been established. There are all these theories. One has to keep a certain distance from these theories. Scientists are humbled by a number of recent studies where things that were thought to be highly likely to be beneficial, like vitamin E, turned out not to be so in a rigorous clinical trial. So I would say stay tuned, but no, I wouldn't recommend ... I can't get behind any specific supplement at this time that comes in a pill.

DS: One more quick question. Yes?

M: (Inaudible) ... positive connection between yoga and meditation, and I mean anything positive, somebody into yoga or meditation, do you see any affect on the brain?

DS: Has the Department of Neurology studied yoga or meditation? I would imagine you have looked into that.

PC: I believe that there are some studies that have really suggested a benefit of things like meditation and certainly there's data for t'ai chi, which is somewhat similar to yoga. I think these are valuable techniques that can have a benefit. Now, I guess the bottom line is how rigorous are the clinical trials? And I don't think you can point to extremely rigorous clinical trials, but

there have been studies of meditation and a little bit of yoga that I think have suggested benefit.

DS: We're going to move onto the next topic now. Alzheimer's disease isn't the only cause of dementia. Stroke is also a cause. Can you tell us, doctors, more about what a stroke is, and what affects it can cause? Stroke or brain attack?

PC: Really, a stroke refers to blood flow being cut off, typically, to a part of the brain, ischemia, or a blood vessel abnormality. Sometimes you can have a rupture of blood vessel and you can have what we call a hemorrhagic stroke. Obviously, stroke is a major concern. There is an age relationship. After the age of 55, for each decade there is a greater than twofold risk of having a stroke. Stroke is recognized as a major cause of permanent disability in individuals. We know that there are identifiable risk factors that you can do things about to avoid a stroke. And when you think about what is a stroke doing, it's damaging brain tissue. When you have a stroke you can permanently injure, kill brain cells and permanently damage parts of the brain. And the second most common cause of a dementia syndrome is a vascular dementia where if you have sufficient

number of strokes, ischemia to the brain, you can damage sufficient brain tissue to actually cause a dementia syndrome, which shouldn't be surprising. To me the take home is, how can you prevent stroke? And there are a whole bunch of general health factors. Take care of your blood pressure. Hypertension is a key link to stroke. Smoking, smoking increases risk of stroke, bad thing. Hyperlipidemia, increasing cholesterol and lipids, poor diet. Obesity, particularly abdominal obesity, individuals that have a very protuberant abdomen, and that's where the major part of their weight is, are really suggesting a metabolic syndrome, and that's a marker for vascular risk factors. Things like physical activity – being physically inactive makes stroke more likely. So stroke is something that is very, very common. It increases with aging, and a proportion of it is completely preventable. You can lower your risk of stroke by really addressing these action items.

DS: Dr. Choi do you agree?

DC: Yes, absolutely.

DS: I've often heard that ... now TIA, can we talk about that a little bit?

DC: A TIA is a transient ischemic attack. What

that is, is the beginnings of a stroke that fortunately doesn't go onto damage brain tissue. That's basically the way it's defined. At onset it looks like a stroke, it produces a loss of function. What are the warning signs of a stroke? Everybody should recognize this. A stroke typically presents with numbness or weakness, sudden onset, typically involving half the body, are the cardinal signs. Another common early stroke sign might be an abrupt difficulty with language, or an abrupt difficulty with tension and confusion, or an abrupt difficulty with vision or an abrupt headache. But all of these stroke-like symptoms, at the very instant they begin you don't know whether it's going to go on to produce a full-fledged stroke and damage a chunk of brain, or whether it will spontaneously resolve before the damage occurs, in which case it's called a TIA. You might think of it in lay terms as a warning stroke. You just dodged the bullet, but that was a bullet, so you just didn't quite go through with the full stroke, but you essentially experienced most of it and would do well to seek medical attention immediately and look into what you can do to reduce your risk of having subsequent strokes, because you've just proven that you can have a stroke.

PC: Can I just give one little case scenario that

was in my training that I remember vividly. A 50-year-old dentist on the golf course had less than one minute of transient vision loss, painless vision loss in one eye and he ignored it. One month later he had a catastrophic hemispheric stroke on the left side of his brain, giving him loss of the ability to talk, paralysis on the right side, completely destroyed his career. That brief episode of loss of vision in one eye was his TIA that he ignored – a very healthy, 50-year-old guy otherwise, ignored unfortunately. He had a very significant stenosis that clotted off and then had a horrific stroke that he didn't come back from. That stands out.

DS: Warning signal to not ignore. I've forgotten the acronym now, but there's an acronym that describes certain symptoms of a stroke which would be a partial paralysis of the face, being unable to speak certain words. Can you elaborate on that a little bit? Are you remembering the acronym I'm thinking of?

DC: As a neurologist I don't use the acronym but I think we've outlined the major symptoms.

DS: One thing that we had in our outline that's kind of interesting, and that is the matter of type two diabetes. There's a tremendous surge in adult onset diabetes among our

older population. Is that a factor in stroke?

PC: Absolutely. Diabetes is one of the risk factors for stroke. Type two diabetes, in particular, has a relationship with obesity, but diet is also a factor. So it is one of the, like health maintenance, health promoting items that you would really want to pay attention to, it does increase risk of stroke.

DS: Now let's open up some questions now on stroke, specifically. Any questions on stroke? Yes please?

W: My name is Denise. I'm just wondering if anything is being done with stem cell research.

DC: There's a tremendous amount being done with stem cell research. It's in relative preliminary stages. It's part of what we might consider a CNS restorative or CNS repair approach to neurologic diseases. And it's even moved outside the realm of neurology. But this is very pertinent for stroke, for Alzheimer's, for Parkinson's, for ALS, for traumatic brain injury, for spinal cord injury. There are a lot of questions. What are the best sources of cells? What is the best way to deliver them? How would you do it? This is aimed more at a deficit that's already there to try to fix that deficit, have new cells, lay down new axons,

repair myelin loss, et cetera. And we're making real advances, so it's moved into actually treating individuals with diseases now, but it's still at a very preliminary stage, but very exciting as a future therapy to restore lost function in the central nervous system.

W: My name is Marilyn, and what do you recommend the first thing you do if you think you're having a stroke?

DS: Dr. Choi?

DC: That's easy. Either you or most likely, better would be someone else around you, should call 911 and you should get to the hospital ASAP. One of the most important treatments for stroke is tissue plasminogen activator, TPA, clot buster. So if one has a certain kind of common stroke, and one can get to medical attention very, very rapidly, tissue plasminogen activator can sometimes be used to open up a blood clot if it is the ischemic type of stroke, and in some cases convert what might turn out, what might otherwise turn out to be a devastating stroke into a small stroke or almost like a TIA. So, by all means once you get to the hospital – and minutes count. The term brain attack is something that you should be familiar with. The neurological,

neurosurgical community likes to use that term to remind people that an incipient stroke is every bit the emergency that everybody knows, an incipient heart attack. And to go back to the symptoms of stroke, to make it easy, because we talked about a number of details and it may be difficult to sort of keep all those in mind, if you walk out of this room saying, "The way I will recognize a stroke is a sudden onset of a major disability," – weakness, numbness, thinking, vision, language – doesn't matter, sudden onset of some major disability, especially if you see it affecting half the body, that's very likely an onset of a stroke or TIA.

W: Another question I wanted to ask before is, you have not mentioned medical illnesses that cause dementia. People ... I know someone who had encephalitis as a child, and then it becomes a diagnosis years later of Parkinson's.

DS: Is that a question?

W: Yes, it is a question. You haven't talked about any of the medical conditions that can ... exposure to disease, that sort of thing, you haven't mentioned, and I think that plays a part.

DS: And there's a reason, because you didn't ask

it yet.

W: Well, I'm asking it now.

DS: Thank you for asking.

W: I tried to ask it before.

DS: Thank you.

PC: I would just make a general remark to that.

Dementia is a syndrome. Many things cause dementia. There are many treatable causes of dementia syndrome. Now the major cause is Alzheimer's followed by vascular dementia. But there's a whole host of things that can do it. Many reversible and certainly systemic diseases, if you have any sort of kidney, liver malfunction (sic), pulmonary malfunction, endocrinologic, thyroid disease, B-12 deficiency, nutritional deficiency – that's why it's so important that every patient in whom dementia is suspected goes to a physician, should be a neurologist, and gets a workup, because there may be absolutely preventable or treatable things. They need to be worked up, because we go through that whole list of the multiple things that can cause a dementia syndrome, including reversible or fixable causes. So that would be part of the differential diagnosis and the evaluation and workup of a newly diagnosed dementia

patient. That's a syndrome.

DS: Can trauma lead to Alzheimer's or dementia?

PC: Well trauma is certainly, potentially, is damage to the brain and there can be an association. And as Dr. Choi mentioned, you can have a dementia syndrome that's due to repeated trauma to the brain, the so-called dementia pugilistica that's very big in the NFL and discussions now. Trauma can also lead to things like clots on the brain, subdural, that's considered an eminently treatable or curable form of dementia.

DS: I'm thinking more like a tragic situation or emotional trauma.

PC: That's an interesting question, whether that can directly ...

DS: Still under study?

PC: That's a tough-y. There's a very interesting relationship between emotions, positive or negative outlook, and your brain function and your immune and endocrinological function. For example, in periods of stress people become more vulnerable to infections. If you have two individuals that have been married a long time and one dies, it is a common phenomenon that the other

spouse is at risk for dying sooner, and why could that be? And our emotions, our feelings, depression, et cetera, can have true impact on our immune system and endocrinological system, and ultimately the nervous system as well. But it's an area that's not too well understood.

DS: Another question?

W: Is there a role for estrogen therapy in dementia treatment?

DS: Dr. Coyle?

PC: The question is the role of estrogen treatment in dementia syndrome, and not that I'm aware of. The estrogen is a sex hormone and we know that the sex hormones – estrogen, progesterone, testosterone, are some of the major ones – are not just endocrinologic hormones that have activities on reproduction and masculinization and feminization, but they also have immune system effects and they have brain effects. They have neurotrophic effects. And, for example, something like progesterone has been looked at as a potential brain restorative type of strategy. So this is an interesting area. All of the sex hormones, not just estrogen, impact the brain and they impact the

immune system, as well as the endocrinologic system, and are being looked at for potential therapies for various brain disorders. But that too is at a very early stage.

DS: Let's move onto depression now. We've touched on it quite a bit in our discussion earlier, but characterized by changes in certain brain chemicals, neurotransmitters, discuss that a little bit for us and boil it down to English so we can understand it.

PC: I think the first emphasis is that, honestly, in my opinion, all the major psychiatric diseases are brain diseases. And the abnormalities in the brain for things like depression, you may not be able to see a big lesion when you look at the brain, when you slice the brain or when you do neuroimaging, our conventional neuroimaging. But the brain encompasses chemicals and electrical circuits, and you can find disturbances in the brain when you get down to that level. Now it's very interesting with depression. There are two major approaches to treating depression, and if you use both of them you get a better effect than using either alone but they're relatively equivalent in isolation. One is psychotherapy. So going and talking about your problems, and

this is part of the socialization, actually helps lift mood. As a matter of fact, exercise improve depression too. But secondly is medication. And the medications, the antidepressants that we have typically manipulate different neurotransmitters like serotonin, norepinephrine, sometimes dopamine. Right now I'm not aware – and I'd like to hear what Dr. Choi thinks – we don't have a way to look at somebody with depression and determine what's the chief neurotransmitter that's wrong in their depression. So we need to play around with the medications a little bit. But in the future it may be that we'll have a test or a biomarker that will say, "In your case, we need to affect serotonin plus norepinephrine," "In your case we need to boost dopamine." And it's to that level that we're beginning to advance to really treat brain diseases, including depression.

DS: Future markers, do you think?

DC: Yes. I would absolutely agree with what Dr. Coyle said. The only thing I could add to this conversation would be, I could mention that there is some early scientific evidence that chronic stress or depression might actually damage brain tissue, and this is coming from imaging studies, not conventional imaging

studies as Dr. Coyle mentioned, which are typically normal, but very refined imaging studies looking precisely at small structures of the brain. That kind of evidence is suggesting that chronic stress, chronic depression may, through some pathways that are becoming increasingly understood and are part of the hypothesis, actually produce frank tissue damage, visible on this kind of very sophisticated imaging. And in doing so might synergize with other degenerative processes like Alzheimer's disease. So not only is depression itself poisonous, to use Dr. Coyle's word. But there may also be some biological synergies between depression and other frank tissue damaging processes like stroke and Alzheimer's disease or Parkinson's disease.

DS: What causes Parkinson's, that we know of now?

PC: For the majority of Parkinson's patients we don't know what causes it. But we are getting a better and better picture. A small minority are genetic. There are genes, increasingly genes – this is only a small minority. It's very akin to Alzheimer's. But again, it's giving very important insight into Parkinson's disease. We do know that there's a chemical called

alpha-synuclein that is the major component of what we referred to as Lewy body, that is deposited. It is an abnormal protein structure being deposited in the brain of Parkinson's patients and that appears to lead to death of specific neurons in Parkinson's disease. But what's really interesting is that they're now tracing that you can see abnormalities outside of the central nervous system, the brain, in individuals that are destined to develop Parkinson's years before. I mentioned this earlier. One theory – not proven – is that this abnormal protein is being passed from neuron to neuron and is contributing to the disease. There may also be environmental factors. They are being studied also. The bottom line is we don't know what causes most of idiopathic Parkinson's disease, but we are understanding the genes that are linked in the small minority and they're going to give us insight. We do understand the pathology better and better, and maybe we are able to pick up the population who's truly at risk for Parkinson's earlier to try to intervene with meaningful therapy in the future.

DS: No cure at this point for Parkinson's disease,
Dr. Choi?

DC: No cure, but there are quite effective

therapies for most individuals, either pharmacological or in some cases surgical, involving brain stimulation and the like.

DS: How is that done?

DC: How is brain stimulation done?

DS: Yes.

DC: For somebody who has an appropriate form of Parkinson's disease, typically one that has gotten past early management with medications, which of course is easier, brain stimulation is a procedure that's performed, of course, by a neurosurgeon who typically with a whole team that makes careful measurements all along the way, an electrode is placed deep in the brain, some of the so-called nuclei that are right in the deep center of our brain, and they have to get that electrode, as you might guess, precisely in the right location. And then that electrode is attached to a wire and attached to a stimulator box, and if it's all been done properly and the patient has been appropriately selected, this procedure can be very, very helpful. And so people will report that when that stimulator is turned on, they get instantaneous lifting of some of their symptoms, and it can be very, very helpful in restoring function. However, keep in mind that

Parkinson's disease, like Alzheimer's disease is a progressive illness. So, unfortunately, even if the procedure works 90 percent on day one, inexorably, it will gradually fail. And that's why it's essential that we find the root cause of Parkinson's disease and develop what are called disease modifying, or neuroprotective therapies.

DS: I'd like to move onto the successful aging and can you tell us some of the factors that would help maintain cognitive function? What are some of the factors that will really help the brain?

PC: I think you can fall into major categories. The first is cognitive health by keeping your brain stimulated and active and demanding that your brain continues to learn, and that's actually promoting brain health. Secondly, physical activity. Very important to keep physically active. Exercise is part of a health maintenance, wellness program. Everyone should be exercising, particularly aerobic exercise. We're not talking about being out in the gym and lifting weights and stuff like that. Walking is exercise. Swimming is great therapy. But keeping physically exercised is critically important. Thirdly, socialization, interacting with others,

enjoying life, talking, getting the stimulation of being with people, and this is where it comes back to the concept that somebody who's sitting in front, that never talks to somebody is probably not a good thing at all. And then finally this concept of minimized vascular risk factors . Take care of hypertension, diabetes, obesity, smoking. Those kind of four prongs are really going to do the best to preserve and promote your brain health.

DS: Want to add to that Dr. Choi?

DC: Only to underscore it because these are so important. One thing that I would underscore is the connection between physical exercise and brain health. And the reason for underscoring it is that it sort of sounds like a platitude. I mean who would be against maintaining your physical health and it's something that people have always advised. There's actually more and more powerful and specific evidence linking physical activity to brain health. This is not everybody should lead a good life, this is actually very specifically a way to promote brain health. Some of the newer studies have linked physical activity to neurogenesis. So the ability of the brain to make new cells and rebuild its circuits, even in late life, is linked to physical activity.

Second, this affect is so powerful that one can actually identify linkages between physical activity and improved cognitive performance, and even perhaps some imageable changes in brain volume. It's that big an effect. Don't walk out of here thinking, yeah, everybody should exercise. If you specifically want to maintain your brain's capabilities as you age, exercise is vital.

DS: Many in our audience here often hear about clinical trials that are being conducted at Stonybrook and other universities nearby. What do you recommend to patients? Would it be good to get involved in a clinical trial or study?

PC: Absolutely. I think clinical trials are wonderful. Clinical trials are very controlled circumstances, supervised by the National Institutes of Health and our Food and Drug Administration, FDA. They have inclusion, exclusion criteria, but number one, this is how we document and prove and develop our new treatments. So they're absolutely crucial. It's the only way to really have a new treatment get approved and become available to prove it in a very well controlled clinical trial, because you have to be very vigorous. So, as I think about it, not only are you probably promoting your brain health by participating in the

clinical trial, because it's going to mentally challenge you, it's going to physically challenge you, you're going to have the social interaction. It's going to keep you active. But you're helping to advance medicine, advance science for all of us. I think it's really a wonderful thing to get involved in clinical trials.

DS: Let's open it up to some more questions now. We would invite your question if you haven't had a chance to ask a question. Let's call a new hand right over here, I believe, this young lady. Your name?

W: My name is Paula. I wonder if you could speak a little bit about aneurisms – how they develop, how they're treated and their impact on the brain as they progress.

DC: An aneurism is a blow out of a blood vessel, so like a tire developing a bubble, part of your blood vessel, an artery in the brain begins to swell. So that causes two potential problems. One is by swelling it can press on adjacent brain and cause symptoms that way, because it causes pressure and dysfunction of the surrounding brain. The second, and worse, of course as Dr. Coyle has mentioned, it can rupture, just like a tire, and if an artery in your brain ruptures, that's a bad thing. That

causes a brain hemorrhage and a stroke.

DS: Are there symptoms that we should look out for in the case of an aneurism?

PC: One of the things is, anybody that has he quote, 'worst headache of their life,' that's something that needs to be evaluated because the worst headache of your life can represent an aneurism leak, a small leak. You can have a small leak before there is a catastrophic bleed, so that's one thing that you would think about. As an aneurism gets larger and begins to press on certain areas, for example you might present with problems with your eye drooping, of your lid, you could have what we call a third neuropalsy. That can be the signs of an aneurism. So were you to ever develop the worst headache of your life, you really don't want to ignore that. That needs to be evaluated. If you develop a new neurological issue that's not right, it's an abnormality on your exam, of course I think you should get that investigated. You don't just sit there and say, "Well, this is natural, this is old age." That's not. You would really pay attention to that and get it looked at.

DS: What do you use? Do you use CAT scan

with contrast to determine an aneurism? What do you use in the clinical diagnosis?

PC: You're going to image the brain. We have the capability of imaging the blood vessels, the arterial system, and probably non-invasively a CT angiogram is superior to an MR angiogram, and then the most definitive way would actually be to do an angiography study where they go through the femoral artery in the groin, thread it up and can actually image the dye that they've injected in the blood vessels of the brain. But a CT angiogram, non-invasively, looks at the blood vessels pretty well. Most people would probably do that as a first screen.

DS: And it's possible to get an aneurism in the heart as well.

PC: Absolutely.

DS: Another question?

M: (Inaudible)

DS: Hi there, Doug.

M: (Inaudible) ... fall down a side of stairs and I cracked my head (Inaudible), lost my sense of taste and smell. My sense of taste is very diminished at this time, my sense of smell

has never come back, and this is over three years ago.

DS: Is that just one incident of trauma?

M: I was hit three times on motorcycles. I had concussions but never had no lasting injuries.

DS: Was it diagnosed as a concussion?

M: I had bleeding on the brain initially from tests, but it went away and I have since not gained my sense of smell at all.

DS: What's your question though?

M: Is there any long-lasting effect on having a sense of smell, on the brain, and the trauma, what's the effect?

DS: I think you're going to have to make an appointment and pay a co-pay and get your Blue Cross card and your AARP card. Want to touch that ... it's a little personal. It's a little ... we're trying to keep them nonspecific here but ...

PC: As a general rule of thumb with a neurological issue, it's a general rule – nothing in life is 100 percent except death and taxes, right. If you've lost function, completely lost function for a year, then do not expect it to come back. That's what we say as a general rule. I think what you're pointing out is the

very significant issue of, basically, brain trauma – head trauma, brain trauma and concussions. I hear about three concussions, and then I heard about a fall sufficient that there was bleeding to the brain and loss of neurological function, luckily not more than that, but for you quite meaningful. I think to me this is stressing, and we're increasingly recognizing how important concussions are. Concussions are not trivial. And concussions, by the way, don't necessarily mean you have to lose consciousness. Concussion is head trauma, brain trauma that disrupts function. So you could be jarred or be out of it for a bit of time, et cetera. These are bad things, and cumulative concussions are bad things. And if you injure the brain it is perhaps increasing risk for later age-related brain diseases. So concussions are something that you want to avoid if you possibly can.

DS: Wear a helmet. Yes, over here.

M: (Inaudible)

DS: Who wants to talk about tumors in the brain?

Specifically, what about ...

PC: So brain tumors are a major neurologic issue.

Tumors can occur in the brain just like they can occur in any parts

of the body. As we approach a brain tumor, is it a primary brain tumor or is it a metastatic, secondary, spread from somewhere else? And I can tell you, in individuals that we see, people can have brain tumors and present in a fairly subtle way ... I can think of somebody who was just seen very, very recently because of a seizure that they had, they had a huge brain tumor, without much on examination, because there are quiet areas of the brain where you can have the brain tumor growing and you don't have an obvious hemiparesis or loss of vision, et cetera. But in speaking to them, there were vague issues of memory not being quite as good, just function not being quite as good that went back for some weeks. This is an example of there are areas of the brain where things can be happening without any overt changes. And again, to me is an emphasis for if you are really having a neurological issue that is new and persisting, you need to get it checked out. You need to get it checked out.

DS: Yes, over here?

W: My name is Pam. Is Stonybrook involved in research for the brain and memory? And if so, how would someone like us get involved in that?

DS: Dr. Choi?

DC: Very much. And the easiest way to find out what's going on would be to come through the Stonybrook website, look at the Neurosciences Institute specifically. Studies are always coming and going in various departments, so that would be one good way to find out what's going on. In a more general sense, I'll be less Stonybrook-centric, there's a public website called clinicaltrials.gov that allows you to look and see what clinical trials are going on nationally in any given area, and I strongly recommend it. That site is maintained by our National Institutes of Health.

DS: We've come to the end of our discussion today. But I reserved a little bit of time where both of you doctors would like to summarize what we've covered. So, how would you like to start first, Dr. Coyle?

PC: I'm going to say the following, and I've come to appreciate this more and more. Our brain is a very precious organ. It's simply the most important, brain. We can positively do things to promote our brain health, our brain flourishing. I'm seeing excellent aging individuals, people 90, 95 years of age, who are

sharp as a tack. And I think that that's a wonderful thing. But there's a responsibility that we all have. So to keep our brain working by embracing cognitive challenges, keep thinking, don't be isolated – critical. Physical activity and exercise, as Dr. Choi pointed out, it changes the brain. It helps the brain. So that's an important part of a neurological program. Think about keeping socially involved and interactive. And finally, think about your general body health, vascular risk factors, health wellness programs. We touched on it. The diet, the sleep, the issue of hypertension and diabetes and hyperlipidemia, no excessive or binge drinking of alcohol. Paying attention to that general body health will allow your brain to age in an optimal manner, and really, it's so critical to daily quality of life.

DS: Dr. Choi?

DC: I couldn't add to that outstanding summary.

As Dr. Coyle said, death and taxes are inevitable. But all of us have some ability to influence the way we approach our inevitable death. We can influence how well our brains function in our later years of life. It's hard to think of something that wouldn't be more important at an individual level. So I could only underscore the

points that she's already emphasized.

DS: Thank you so much Dr. Choi, Dr. Coyle.

(Applause) Thank you for your wonderful questions and we appreciate your support today and many thanks to AARP for this event and of course all of the folks involved, our volunteers. If you have questions, maybe we can answer a couple of them after the session is over. We'll try to help you out wherever we can. Make it brief. But thank you again for being with us today and we hope to do this again.

(END OF TAPE)