

2016

Alzheimer's Disease: More Than Just Memory Loss: An Awareness of the Disease and an Active Plan of Coping Strategies and Caregiving

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Alzheimer's Disease: More Than Just Memory Loss

An Awareness of the Disease and an Active Plan of Coping Strategies and Caregiving

An Honors Thesis
Presented to
The University Honors Program
Gardner-Webb University
11 November 2016

by

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Acknowledgements

I wish to thank my parents, Tony and Sherry Evans for supporting my education and giving me the opportunity to attend Gardner-Webb University.

I also wish to thank my Thesis mentor and advisor, Mr. Jay Zimmer for giving me his guidance through this process and throughout my academic journey.

I would also like to thank Dr. Tom Jones, Associate Dean of the Honors Program for providing me this opportunity to write a thesis and for making my love for this program grow. And thank you to the Honors Committee for the input and encouragement when writing my thesis.

I would lastly like to thank PruittHealth of Elkin. Without my employment there, I would not have the experience of working with Alzheimer's patients that sparked my idea of writing this thesis.

Abstract:

Alzheimer's Disease (AD) is a chronic neurodegenerative disease which leads to progressive mental deterioration that can occur in middle or old age. During the disease's progression, various biochemical functions of the brain cells go astray and eventually lead to memory loss. What a lot of people do not always realize is the fact this disease goes beyond just losing memory. From my own observation as well as research studies, it has been noted that AD patients can experience sleep disruption, sundowning, speech decline, apraxia, agnosia, and behavioral changes such as depression and combativeness. As more of these signs and symptoms become evident to me, I conducted a plan as to how people who have loved ones with Alzheimer's Disease can cope with them and those who experience the disease themselves can learn to improve everyday functions as the disease progresses. This thesis constitutes an awareness of all aspects of Alzheimer's and a compilation of the best method for treatment and prevention.

Outline:

- I. Introduction
 - A. What is Alzheimer's Disease?
 - B. The brain (Normal versus AD)
 - C. Memory loss does not define AD
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 - B. Apraxia (Loss of Physical Function)
 - C. Agnosia (Inability to Correctly Interpret Signals)
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I. INTRODUCTION

One of the most commonly feared diseases in the world today is Alzheimer's Disease (AD). Alzheimer's is the most common form of dementia, which is a general condition that affects memory ("What is Alzheimer's?" 2010). What makes dementia so devastating is the fact it is progressive. This means the symptoms will gradually worsen over time without any hope of improvement. But how quickly this progression occurs may vary with each person (Lipton and Marshall, 2013). One out of ten people will develop AD, and the majority of the people are ages 65 and older. Five percent of people with AD will have what is known as early onset Alzheimer's, which often affects them during their 50's or even 40's ("What is Alzheimer's?" 2010).

Symptoms become worse over time as Alzheimer's progresses and can become more evident at more advanced stages of the disease. The symptoms can be divided into two categories: cognitive and psychiatric ("About Alzheimer's Disease," 2016). A person with AD may live four to eight years after his or her diagnosis, but depending upon the person, some may even be able to live up to 20 years longer. The later the stage of the disease, the more severe the outcome ("Stages of Alzheimer's," 2014).

Alzheimer's Disease is a chronic condition that affects the tissue of the brain. The brain consists of billions of nerve cells called neurons as well as dozens of neurotransmitters that travel and carry signals to other cells. The movement of these signals provide the basis of memories, thoughts, and emotions ("Brain Tour," 2011). Over time, this disease leads to abnormal buildup of a protein known as beta-amyloid that eventually forms plaques in between neurons. This protein comes from

a precursor protein that is found in the lipid membrane that covers neurons. These plaques interrupt signals from one cell to another (Colbert, 2013). Signals from cells travel through synapses, which are the spaces between the cells, that pass on information. This information is what enables people to carry out daily functions in their lives. Along with plaques, the proteins of normal brain tissue can misshape into fibers which then become tangled. Thus, the transporting of cell nutrients fails (Colbert, 2013). Nerve cell death is then inevitable, which leads to tissue loss throughout the brain. The brain shrinks dramatically, and this causes it to lose most of its functions. Figure 1 exhibits the changes of nerve cells and Figure 2 shows an illustration of a brain affected with AD compared to a healthy one. This shows the fact that Alzheimer's is a disease of age. During the last stages, cell death can even occur in the part of the brain that regulates breathing as well as the heart. Therefore, Alzheimer's disease is characterized as a timely death ("Brain Tour," 2011).

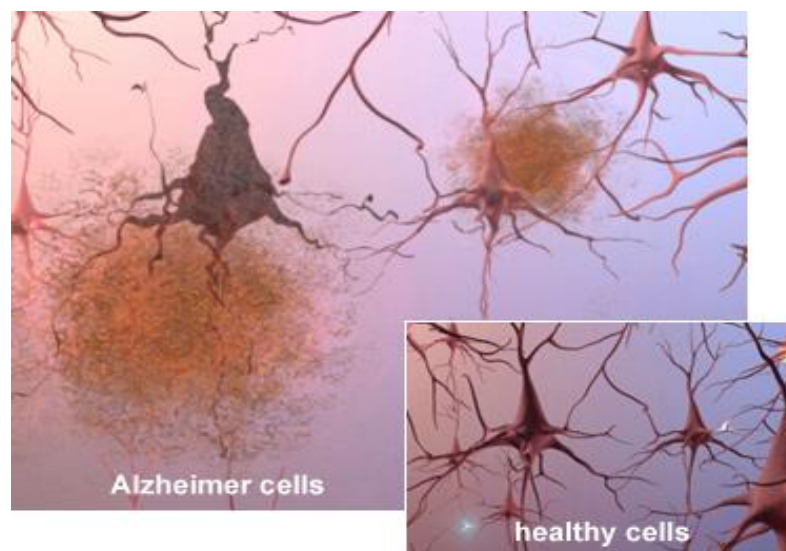


Figure 1: Comparison of Neurons Affected with AD versus Healthy Neurons. ("Brain Tour," 2011).

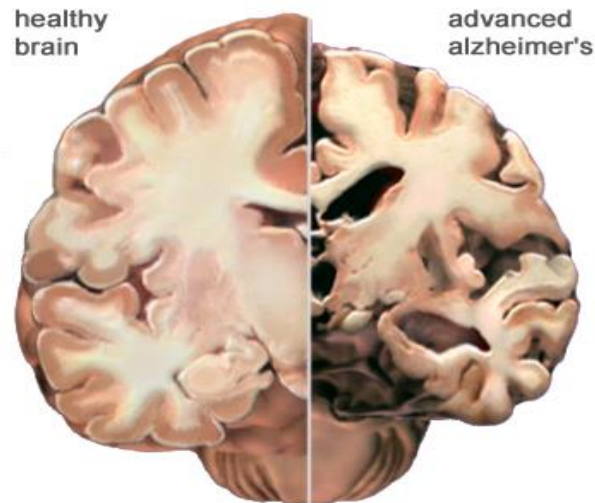


Figure 2: Comparison of a Healthy Brain versus One affected with Alzheimer's ("Brain Tour," 2011).

Studies have also shown defective autophagy is evident in the pathogenesis of Alzheimer's. Autophagy is the degradative pathway for organelles and proteins and is vital for the survival of neurons (Nixon and Yang, 2011). It is a normal physiological process in the body that deals with the protein degradation and destruction of cells. It is also a major contributor of cellular homeostasis and metabolism (Heath and Xavier, 2009). When cells become awry or they become affected by a disease, autophagy kills the cells by a process known as apoptosis; programmed cell death. This process can also give the cells enough energy to enable continuous survival (Gump and Thorburn, 2011). Therefore, the failure of autophagy to properly degrade beta-amyloid proteins may be a contributing cause of Alzheimer's Disease.

As mentioned before, there are numerous people who develop Alzheimer's Disease or at least know someone who does. This disease causes those to lose

memory to the point that they eventually forget major events or people in their lives. But what a lot of people do not realize is the fact that AD causes more than just memory loss. Dementia is a disease that affects memory, and although Alzheimer's is a form of dementia, it is not defined by memory loss. It is defined as a disease that can affect daily living and progresses with age. It is the common assumption that the disease only affects memory that bewilders people when they see their loved ones not being able to speak, walk, or even become a completely different individual. Understanding all the aspects of Alzheimer's and exactly what can happen to someone who develops this disease brings people one step closer to coping with it.

II. COGNITIVE/INTELLECTUAL EFFECTS

One of the cognitive effects of Alzheimer's Disease is a decline in speech and language, such as aphasia. Aphasia is defined as the inability to communicate effectively ("About Alzheimer's Disease," 2016). Aphasia often involves language production or comprehension which may include speech, reading, and writing (Graham, 2008). The declining ability to speak and write is known as expressive aphasia whereas the inability to understand written or spoken words is known as receptive aphasia. Some individuals may even pretend to comprehend what someone is saying and just nod in agreement. This is called cover-up aphasia ("About Alzheimer's Disease," 2016). When an Alzheimer's patient experiences any type of aphasia, this means their left part of the cerebrum, especially the temporal lobe, is most likely damaged by the disease. This part of the brain controls speech

and language (“Aphasia in Dementia,” 2007). The severity of aphasia in Alzheimer’s Disease patients is typically dependent upon the stage of the disease. During the early stages, one may have difficulty finding the right words to say with occasional semantic (meaning) substitutions (i.e., saying the word *aunt* instead of *sister*) but the speech may remain fluent as well as grammatically correct (Graham, 2008).

As the disease progresses to the later stages, speech becomes less fluent along with the use of incorrect words and poor comprehension (Graham, 2008). Table 1 provides a summary of language impairments in Alzheimer’s within stages. Aphasia causes difficulties speaking or “getting the words out,” trouble finding words, understanding what others say, or with word semantics and naming familiar objects (“Aphasia in Dementia,” 2007). Some people who know someone with Alzheimer’s who may confuse what they think is a “memory problem” with what is actually an aphasia problem due to the common preconception that AD is a disease of memory loss. For example, some patients may forget the name of a word or its meaning such as asking “what is asparagus?” This indicates a loss of linguistic or semantic knowledge rather than memory (Graham, 2008). Aphasia can also become so severe that the individual may jumble words together where it just sounds like mumbling and his or her oral communication is completely lost.

Table 1: Summary of Language Impairments in Alzheimer's Dementia

Medscape®		www.medscape.com	
Alzheimer's Dementia			
	Early Stage	Moderate-Severe	
Spontaneous speech	Fluent, grammatical	Nonfluent, echolalic, neologisms	
Paraphasic errors	Semantic	Semantic and phonemic	
Repetition	Intact	Impaired	
Naming	Impaired (mild)	Impaired	
Comprehension of words	Intact	Impaired	
Syntactic comprehension	Intact	Impaired	
Reading	± Intact	Impaired	
Writing	± Intact	Impaired	
Word and object knowledge (semantic knowledge)	Intact for more frequently used words and objects; impaired for less frequently used words and objects	Impaired	
Associated dementing syndromes			

(Graham, 2008).

Along with a language decline, AD may cause other cognitive effects such as loss of physical function known as apraxia. Generally speaking, apraxia is a difficult symptom to live with because there is a disconnection between the idea of doing a task and the action of actually doing that task (Heltemes, 2015). It is a motor disorder that is caused by damage to the brain tissue due to a loss of nerve cells. The part of the brain that is affected is the posterior parietal cortex which plays an important role in planning movements. Before a certain movement can be initiated, the nervous system must know the position of body parts and the position of an object to be interacted with before movement occurs. Therefore, someone who has

Alzheimer's Disease may have difficulty with the motor planning that is used to perform tasks or certain movements given that a command is understood as well as the willingness to perform the task ("Apraxia," 2005). In other words, one will have the intent of doing the task as well as the muscle strength to do so, but will not receive the right brain messages to make it happen.

An example of apraxia is a person who has strong fingers and can feel the buttons on his or her coat, but cannot figure out how to move his or her fingers in such a way to be able to button the coat. It is neither the finger sensation nor even the strength of their fingers that is the problem (Heltemes, 2015). Apraxia can also make a person do certain things out sequence or use an object incorrectly. For instance, they may use a toothbrush to comb their hair. They are using their arm in the motion to 'comb' but is using the wrong object to do so ("Apraxia," 2005). Apraxia may also cause someone to not move his or her lips and tongue to the right place in order to say the correct sounds. Even though the muscles may not be weak, the messages from the brain to the mouth become disrupted. The amount of damage to the brain determines the severity of the apraxia. This is not to be confused with aphasia which is the inability to comprehend language ("Apraxia," 2005).

In the later stages of Alzheimer's Disease, the motor skills that developed during childhood become affected. These skills include chewing, swallowing, and even walking (Heltemes, 2015). Apraxia is a type of disorder where one cannot execute voluntary movement despite the fact he or she may have adequate mobility, strength, sensation, coordination, and comprehension ("Apraxia," 2005). There are several types of apraxia. Ideomotor apraxia is the deficiency in planning motor

actions that rely on semantic memory. Patients may be able to explain how to perform an action but are not able to act out the movement. Ideational or conceptual apraxia is the inability to conceptualize a task and the impaired ability to complete actions that require multiple steps. For example, these patients might put on shoes before they put on their socks. Buccofacial apraxia is the difficulty of carrying out movements of the face such as the inability to whistle or even smile to express emotions. Limb-kinetic apraxia is the inability to make precise movements of either the arm or leg ("Apraxia," 2005).

What surprises people when it comes to their loved ones affected with Alzheimer's, is the fact that one day, they have the ability to move around without any problems to not being able to use their lower limbs to walk the next. Gait apraxia is a common explanation for some of the walking difficulties shown in patients who have AD. In a study from the *Journal of Neurology*, 60 patients with Alzheimer's Disease who were free from other potential causes of walking deficits were selected. They were assessed with a new test evaluating the aspects of walking and related movements. Forty percent of the groups with Alzheimer's performed below the cut off score, and half of them performed poorly (Sala, Spinnler, and Venneri, 2004). Performance in the Alzheimer's group in the walking skills test positively correlated with the scores in a test that assessed gait apraxia with dementia severity. Therefore, this walking deficit is an independent and recognizable form of apraxia. Although there were several tests performed for this study, some of the walking movements that were tested for each patient include walking forward, walking backwards, walking while crossing legs over, and walking over an imaginary

obstacle. This study had shown that patients with AD have an increased risk of losing their balance and falling compared to those who do not have AD. This study also suggests that gait apraxia is a possible cause of bedridden patients not being able to turn over in their own bed (Sala, Spinnler, and Venneri, 2004). Therefore, they need to be turned by their caregivers every two hours.

During the later stages of Alzheimer's Disease, some may experience what is known as agnosia. This is the loss of the brain's ability to interpret your senses accurately. In other words, it is the impairment of the ability to be able to receive or correctly understand information from the senses such as hearing, smell, taste, vision, and touch (Heerema, 2016).

When it comes to vision, our eyes act like cameras as they transmit information for our brain to interpret. When someone has AD, the process of this interpretation becomes altered and the brain will no longer process the information in the same way even though the information that is being transmitted is the same in the eyes (Kelly, 2016). This impairment of visual input can result in the loss of the ability to recognize certain objects. Alzheimer's does not cause any disorder in the eye, but it does cause severe damage in the areas of the brain that organize this visual information. Specifically, it causes damage to the occipital and temporal lobes which send and receive messages in the brain and the eyes ("About Dementia," 2006). There is a miscommunication between what the patient's eyes see and how their brain interprets this image. Although they are able to see and describe the object, they are not able to tell someone what the object exactly is. The link between

a past experience with the object and the sight of the object has been lost (“About Dementia,” 2006).

As the disease progresses, they also are unable to recognize loved ones. For example, they can see the face of a person but they cannot recognize the fact that it belongs to their spouse. They also may confuse their grandchildren as their children and may also not recognize their home, car, or even a beloved pet (Kelly, 2016). It is quite dangerous to believe that a person with Alzheimer’s who does not usually recognize family or friends, will somehow realize that they should not cross a certain path. It is also not a good idea to let people with AD who experience agnosia to drive. When they drive, they often drive the wrong way on a street, misread street signs, drive onto a highway using an exit ramp, inappropriately use the brake, or just drive abnormally (Kelly, 2016).

The sense of smell can also be affected in Alzheimer’s patients. Some studies have shown this is due to the presence of beta-amyloid protein in the frontal lobe where the olfactory bulb is located. It consists of nerves that helps us detect and perceive odors. Research has also shown this is the area where the accumulation of the protein occurs first (Hereema, 2016). There was a study that reviewed the results of 130 autopsies with AD and found that there also was tau pathology. Tau proteins are the proteins that stabilize microtubules. They become twisted fibers which then start to accumulate in the brain cells. As Alzheimer’s Disease progresses, the ability to smell often decreases (Hereema, 2016).

Agnosia can also affect the ability to understand the feeling of a full bladder (Hereema, 2016). This leads to incontinence. Therefore, most of the time, patients

are unable to recognize the need to use the restroom. Some other causes that lead to incontinence include forgetting where the restroom is located, not being able to walk, medications, and even stress (“Incontinence,” 2016). Not being able to sense the need to use the restroom causes someone with Alzheimer’s to lose control of his or her bladder and bowels. AD influenced incontinence can lead to other medical problems such as a urinary tract infection and bacterial infections of the digestive tract (“Incontinence,” 2016). Sometimes there are obstacles that may get in the way of the path to the restroom and clothing that is difficult to remove that can cause incontinence even when they can sense the need to go to the restroom.

III. BEHAVIORAL/PSYCHOLOGICAL CHANGES

People who develop Alzheimer’s Disease can experience changes other than cognitive and intellectual changes. Many tend to have behavioral as well as psychological problems. Most of the time, an individual with AD becomes somebody completely different than they were before by developing a change in personality.

Research has shown that sleep disruption due to this disease may cause a change in behavior in patients. A research study from the journal *Neurobiology of Aging* explores a connection between sleep impairment and neurodegeneration. This conclusion was based on evidence that sleep disruption usually occurs before the onset of cognitive impairment (Kelly and Nadon, 2006). Scientists do not completely understand why this occurs in diseases such as dementia, but they do believe that these sleep changes result from the impact of Alzheimer’s Disease on

the brain. There are a number of factors that could possibly contribute to sleep disturbances in Alzheimer's. Examples include an agitation in the "internal body clock," located in the hypothalamus, which then causes a biological mix-up between night and day and a falsely perceived less need for sleep (Bitwise, 1994).

The research study investigated rapid eye movement sleep disruption and sleep fragmentation associated with cognitive impairment due to Alzheimer's Disease. The aim of this study was to explore the dysregulation of the orexin system in AD pathology and how it relates to sleep deterioration in patients (Kelly and Nadon, 2006). Orexin-A is a neuropeptide produced by the hypothalamus. It regulates the sleep-wake cycle by increasing arousal levels and maintaining wakefulness. The purpose of this study was to measure cerebral spinal fluid (CSF)-orexin levels in patients with AD based on the presence or absence of subjective sleep complaints compared to controls (no AD and no sleep problems). CSF samples were taken from each patient and then analyzed (Kelly and Nadon, 2006). The results showed significantly higher levels of CSF-orexin were detected in patients with Alzheimer's Disease who have disruptions in their sleep-wake cycle compared to the controls. This study showed that the orexin system is affected early in AD progression. The patients with subjective sleep problems had higher CSF-orexin levels compared to patients who did not have sleep problems and to controls who had similar sleep complaints. This suggests that the dysregulation of the orexin system may contribute to sleep impairment from AD pathology. This mainly affects REM sleep, as shown in figure 3, which can result in insomnia, prolonged sleep latency, and nocturnal awakenings (Kelly and Nadon, 2006).

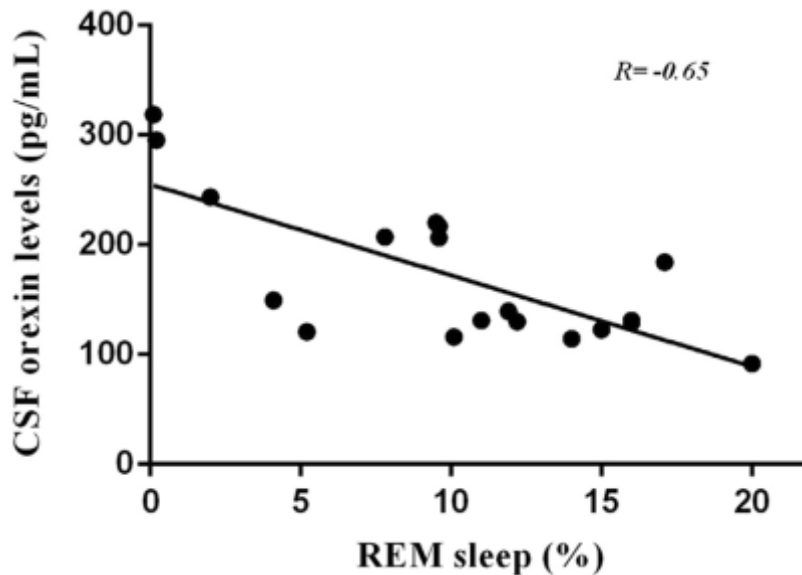


Figure 3: Negative correlation between CSF-orexin levels and REM sleep amount. Also shown is the linear regression fit across all patients (Kelly & Nadon).

Some people with Alzheimer’s Disease have an increase in behavioral problems, such as agitation or confusion, in the late afternoon or early evening that can last throughout the night when the person is awake. This condition is known as “sundowning” (“About Dementia,” 2006). Some factors that may contribute to sundowning are end-of-day exhaustion—mentally and physically—and reduced amount of lighting, which can lead to seeing shadows causing patients with AD to misinterpret what they see and be confused and frightened. Other factors can include reactions to nonverbal cues of frustration, and disorientation caused by the inability to separate dreams from reality (Bitwise, 1994).

Some of the symptoms that may appear in someone who experiences sundowning include repetitive speech, pacing, restlessness, wandering, disorientation of reality including time and place, agitation, and aggression toward

others (“About Dementia,” 2006). Sundowning affects about 25 percent of patients who are diagnosed with Alzheimer’s Disease. Sundowning is also called “sundowning syndrome” or “nocturnal delirium.” This term came about due to increased confusion, delusions, and paranoia. These symptoms typically appear when the sun goes down, but certain behaviors may also be experienced in the mid-afternoon or early evening (Sharer, 2008).

The phenomena of sundowning is a behavior that occurs spontaneously in AD patients. Some researchers say this sudden change in behavior could be due to environmental influences such as a change in shift of caregivers such as in a nursing home or things that simply agitate the patients. One research study has defined sundowning as “the appearance or exacerbation of behavioral disturbances associated with the afternoon and/or evening hours” (Volicer, Harper, Manning, Goldstein, & Satlin, 2001).

Sundowning is associated with an increase in motor activities such as pacing, wandering, resistance to redirection, and an increased amount of verbal activity, especially yelling and name calling. The cause of sundowning is still unknown, but there are several theories that suggest influences that may explain this particular symptom of Alzheimer’s Disease (Sharer, 2008). One theory points to damage in the pineal gland that produces melatonin. Melatonin helps regulate our sleep/wake cycles, and reducing melatonin levels can cause irregular sleep patterns. Other theories include sleep apnea, hallucinations, delirium, fatigue, over-stimulation, and sensory deprivation. Another theory focuses on the energy levels of a person with AD. A person is most likely to get tired at the end of the day. This could make them

feel more anxious or stressed because this is the time of day when they are the busiest because they are coming home from work, cooking, cleaning, then going to bed. Since they are not able to do these things, it makes them feel even more agitated (“About Dementia,” 2006). One of the most popular theories suggest that an abnormality in the circadian rhythm will increase the likelihood of a patient to experience sundowning (Sharer, 2008).

The circadian rhythm is influenced by the light and dark cycle (day and night) in the 24-hour period. A dysfunction in the circadian rhythm can result in an increase in behaviors such as sundowning. This could be due to the naturally produced melatonin declining due to increasing age or an abnormal regulation of core body temperature (Sharer, 2008). The research study, “Sundowning and Circadian Rhythms in Alzheimer’s Disease,” investigates the relationship between sundowning and characteristics of circadian rhythms in a group of patients with AD. Alzheimer’s Disease leads to pathological changes in the suprachiasmatic nucleus (SN) which causes a disruption in the circadian rhythms (Volicer, Harper, Manning, Goldstein, & Satlin, 2001). The study showed that 14 of the patients with AD sundowned never or rarely. Eight patients sometimes experienced it, and three patients usually did. Figure 4 shows that some of the patients who exhibited sundowning had increased locomotor activity in the evening but others had similar activity throughout the day. Patient one who usually has sundowning, had increased motor activity during the evening. Patient two who usually has sundowning, had the same motor activity throughout the day and therefore, this patient’s sleep schedule is irregular. Patient

three who never has sundowning compared to patient one, had less motor activity in the evening (Volicer, Harper, Manning, Goldstein, & Satlin, 2001).

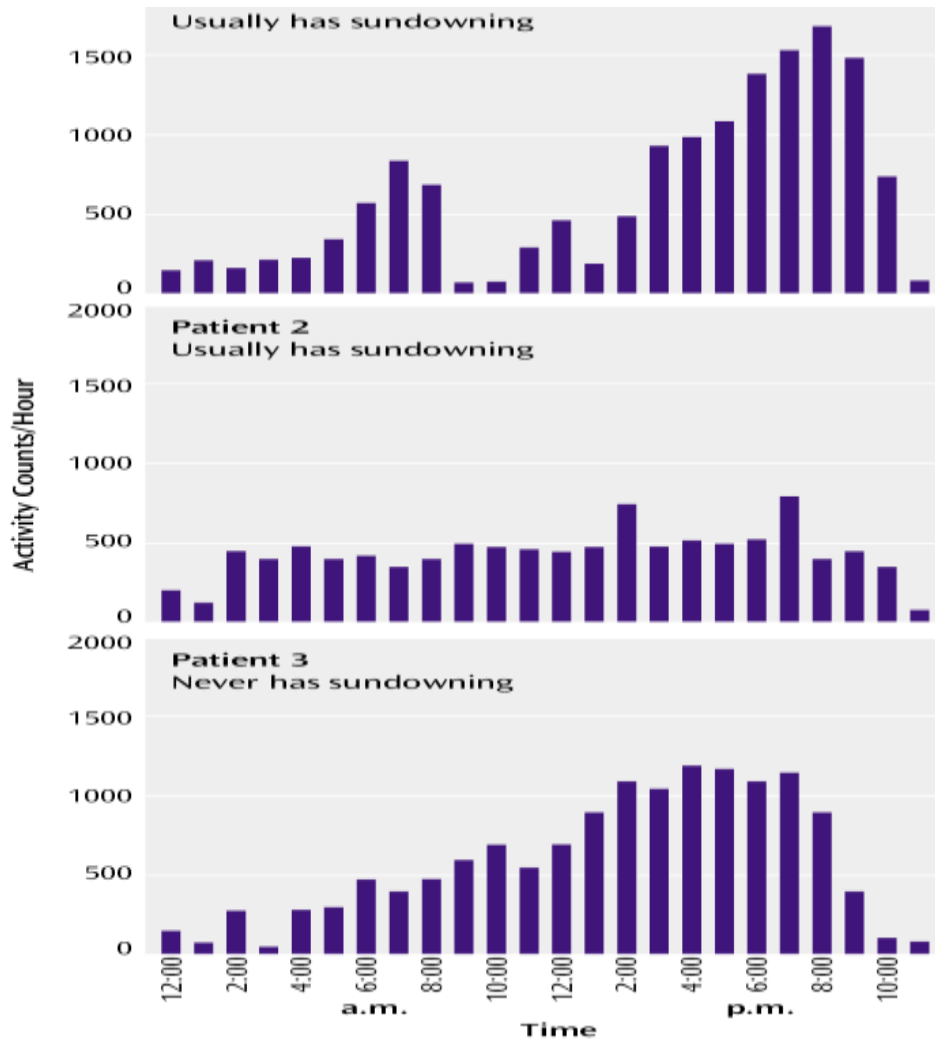


Figure 4: Distribution of Motor Activity During the Day and Night in Three Alzheimer's Disease Patients With or Without Sundowning (Volicer, Harper, Manning, et. al).

According to the results of the study, those with a sundowning status were significantly related to several circadian characteristics. The measurements of core

body temperature show that the patients with AD had a higher temperature and a greater acrophase (peak in the circadian cycle) than the comparison group who did not have AD. Figure 5 shows that the acrophase of motor activity occurred later in the patients who exhibited sundowning than in both the patients who did not exhibit sundowning and the comparison group. It also shows the acrophase of core body temperature occurred later in those who experience sundowning compared to those who experience sundowning less often (Volicer, Harper, Manning, Goldstein, & Satlin, 2001).

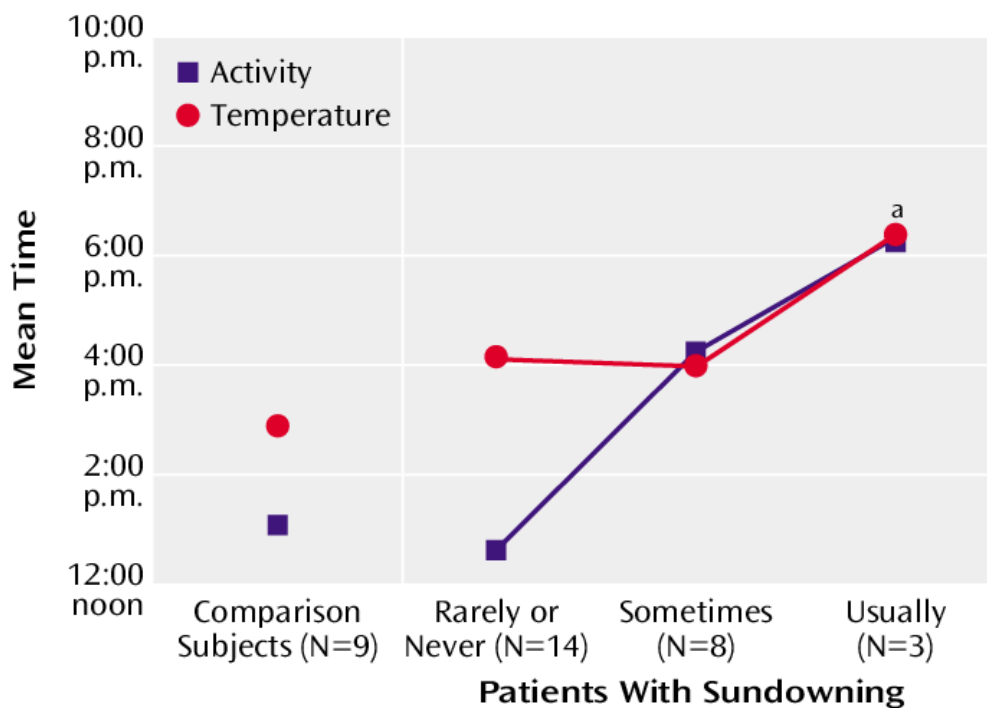


Figure 5: Time of the Acrophases of Temperature and Motor Activity in Healthy Comparison Subjects and in Alzheimer's Disease Patients With Sundowning Rarely/Never, Sometimes, or Usually (Volicer, Harper, Manning, et. al).

Higher amplitude of the circadian cycle of body temperature is possibly related to hypothalamic dysfunction, which is the area in the brain that controls the sleep/wake cycle. In this particular study, sundowning was present in 11 out of 25 patients. It is reported that 13 percent of patients who experience sundowning is in a general nursing home population and 66 percent of patients with AD who live at home also experience this same symptom (Volicer, Harper, Manning, Goldstein, & Satlin, 2001).

Depression is a very common behavioral change in someone who develops Alzheimer's Disease especially during the early and middle stages. Some symptoms of depression in someone who has AD include apathy, loss of interest in activities, social withdrawing, isolation, trouble concentrating, and impaired thinking ("Depression and Alzheimer's," 2016). Some will even say that depression, to a certain point, could also be a risk factor of developing Alzheimer's Disease. Most researchers believe depression plays a role as an early symptom in the neurodegenerative process of AD. Data also show neuropathological lesions in AD brains that correlate with the development of depressive behavior. These pathologies include reduced gray matter in the frontal and temporal lobes. These lesions found in the diseased brain are always accompanied by neuroinflammation (Lehman, 2011).

Scientists have known for a long time that depression and dementia are linked. It was often the case that depression had to be ruled-out, including using a trial of antidepressants, before dementia could even be diagnosed. But now they say that depression can exist together with Alzheimer's ("About Dementia," 2006). The

cognitive impairment that people with AD experience often makes it difficult for them to articulate their sadness, hopelessness, guilt other types of feelings that are associated with depression. This is why depression in Alzheimer's does not always look like depression in people without the disease. Depression in AD is usually less severe, may not last as long and the symptoms may come and go, and the person may be less likely to talk about or attempt suicide ("Depression and Alzheimer's," 2016).

There seem to be two ways depression and Alzheimer's Disease are linked together. One way is the fact that for some people, the diagnosis of this disease is enough to trigger the depression, and the other way is the fact that the disease appears to affect the chemicals released by neurons in the brain that give signals. Even just damage to brain tissue can cause depression ("About Dementia," 2006). For patients to be diagnosed with depression in Alzheimer's, they must have either a depressed mood, or a decreased pleasure of usual activities along with social isolation, loss of appetite that is not from some other medical cause, disruption in sleep, slowed behavior, irritability, loss of energy, feelings of worthlessness, or recurrent thoughts of death ("Depression and Alzheimer's," 2016).

Another type of behavioral change that could possibly be associated with Alzheimer's Disease is anger and aggressive behavior; verbally and physically. This aggressive behavior can either occur suddenly with no apparent reason, or can occur from a frustrating situation ("Aggression and Anger," 2016). This neuropsychiatric symptom (NPS) is strongly associated with caregiver distress which can lower the patient's quality of life. If the caregiver does not give them the

adequate care they need, this can affect the patients and their aggressive behavior. This also increases the likelihood of being institutionalized in an Alzheimer's unit or a nursing home. Many patients are aggressive toward others, including their caregivers, and can pose a threat of danger to themselves, and this behavior can increase over time with this disease. In a small study of patients with AD, aggressive behavior occurred in 42 percent of patients and had increased to 75 percent of patients in a 24-month observation. Although some of these behaviors are situational and can be managed, about half are unpredictable (Dennehy, Kahle-Wroblewski, Sarsour, & Milton, 2013).

Physical and verbal aggression can be caused by many factors including physical discomfort, environmental factors (overstimulation of loud noises), and poor communication ("Aggression and Anger," 2016). One of the major concerns of Alzheimer's Disease is combativeness. This aggression has nothing to do with his or her personality, rather it is just a common symptom of this disease. As the illness progresses, a patient develops less and less tolerance for frustration, and the disease usually affects the part of the brain that controls inhibition. When this happens, there is no barrier between thoughts and action. Therefore, thoughts become alive without the benefit of the brain to tell the patients when they do something wrong. There could be consequences or they could hurt someone ("Understanding Combative Behavior," 2016). Combative behavior can be stimulated by different reasons such as boredom, medications with negative side effects, depression, too much activity, physical pain, fatigue, other medical problems (ex. urinary tract infection), unkindness, and protection from intrusion (ex. bathing).

Although it is hard to cope with, being aware of why such behavioral issues occur in patients with Alzheimer's Disease and understanding why they cannot help the things they do, can actually help those who are facing it.

IV. MEDICAL TREATMENTS

There is no cure for Alzheimer's Disease, but there are ways in which it can be treated. There have been several clinical trials to discover types of drugs that will slow the progression of the disease in some people or temporarily alleviate the symptoms that accompany it.

An example of a type of medication used for this disease is a group of the same chemical called cholinesterase inhibitors, short for acetylcholinesterase. One example is donepezil. In a brain of a person who has AD, there are lower levels of acetylcholine which is a chemical that helps to send messages between nerve cells. When one has Alzheimer's, there is also a loss of nerve cells that use this acetylcholine. These declining levels of acetylcholine and the progressive loss of nerve cells are linked to the worsening of AD symptoms (Kelly, Harvey, & Cayton, 1997). Donepezil alleviates effects on cognition (memory and concentration) and neuropsychiatric symptoms as well as with daily living activities (ex. personal care and dressing) because it prevents the enzyme acetylcholinesterase from breaking down acetylcholine in the brain. This increase of acetylcholine leads to an increase amount of communication between nerve cells which helps stabilize the symptoms in Alzheimer's Disease (Conti et. al, 2016).

Donepezil is mainly offered to those who have mild to moderate Alzheimer's, but there is also strong evidence that it helps those in the severe stage of the disease. It is shown that 40 to 70 percent of people benefit from taking medication involving a cholinesterase inhibitor. Symptoms would improve temporarily, such as in between six and twelve months, and then gradually worsen over the following months (Kelly, Harvey, & Cayton, 1997).

In a research study from *European Journal of Clinical Pharmacology*, it is hypothesized that donepezil could be linked to a neuroprotective effect that leads to a reduction in toxic beta amyloid fibrils which is a real anti-pathogenic effect. It has also shown to regulate the immune system response. In this case, the inflammatory phenomenon involved with the pathogenesis of AD (Conti et. al, 2016).

Memantine is another cholinesterase inhibitor, but it has a different pathway than donepezil. It protects brain cells by blocking the effects of glutamate, which is another chemical that helps send messages between nerve cells. Glutamate is released in an excessive amount when brain cells are damaged by Alzheimer's Disease, and the release of this chemical causes the brain cells to be damaged even further (Kelly, Harvey, & Cayton, 1997). Memantine has been approved to treat patients with AD at the moderate to severe stages of the disease. This type of drug is known as a noncompetitive glutamatergic NMDA receptor antagonist. To go in further about its treatment pathway, it attenuates phosphorylation of tau through a decrease in glycogen synthase kinase-3beta activity (Wang, Blanchard, Grundke-Iqbal, & Iqbal, 2015). It has shown to slow down the progression of symptoms including disorientation and the difficulties of carrying out daily living activities. There

is also some evidence that it can help with delusions, aggression, as well as agitation (Kelly, Harvey, & Cayton, 1997).

Although drug treatments for those who have Alzheimer's Disease are very important when it comes to the biological aspects of the disease, it only delays the symptoms rather than gets rid of the disease altogether. This type of treatment should be only one part of the patient's overall care. There are other ways to treat these people that are just as important when it comes to helping someone live well with Alzheimer's.

V. A PLAN TO CARE

Alzheimer's Disease is not only known in the United States. This disease is common throughout the world. But this does not mean AD is treated the same in every country. Some countries, such as India, view people with Alzheimer's as mentally insane or just simply inhuman. Rather than treating them, they are locked away in one place without any interaction with anyone and without proper care. They lose their respect and dignity this way.

From research and my own experience, the best treatment for someone with Alzheimer's Disease is to care for them. Caring for them shows compassion and does not just make them a scientific experiment. It is important to make people realize that they are still people and that they had a life before the disease took it away. It is our job as caregivers or family members who know someone with this disease to care for them and improve their quality of life. We treat the person rather

than the disease, and this is the best medicine we can give them. Holistic treatment is more effective than medicine. Caring and providing for AD patients treats them from the inside and as a whole, whereas medicine just delays the symptoms. The symptoms will come and go with medical treatment, but helping them live their life will give them a chance to keep their humanity. Therefore, we need a plan. A plan to care.

Starting with Cognitive symptoms that a lot of AD patients develop, there is a lot we can do to help. I have come around those who have expressive aphasia to the point where I could not understand them and those who just cannot understand what I am telling them. It is important to assume that they are always listening and check their understanding with yes/no questions. Using sentences that are short and to the point can help them understand things a lot better as well as keeping the noise volume to a minimum. Standing where they can fully see you is also a way to keep their focus and understanding what they are being told. It is always important to remember that the patient is an adult and we need to let them make their own decisions and keep them in the conversation. Even though it's hard for them to do so, they still have a right to not let people make decisions for them. A caregiver or a family member should be patient with their aphasia and to give them the time they need to try to speak and get their point across for it respects their dignity ("Aphasia in Dementia," 2007). It would make it harder for a patient to participate in conversation if one is becoming frustrated and agitated toward them. Understanding their difficulty in conversation and speech is the first step to helping them.

People can also help someone with AD who experiences apraxia, like mentioned earlier, this is a disconnection between messages sent from the brain and movements with objects or in general. Here are some ways in which someone can care for those who have this problem with this disease. Using modeling to help the patient get through a task or guiding your hands over theirs can make them more aware and understand what they need to do to get the job done. For example, if they are having trouble buttoning their shirt, you can show them how to button it, and then have him or her try to do it themselves. Or if they cannot position themselves in a chair correctly, you can put your arms around them and guide their body to align to a chair. Even demonstrating how to chew can help them be able to chew in the later stages (“Apraxia,” 2005). Caregiving for those who cannot walk because of AD can be harder to cope with them, but just being patient with them and helping them get to locations they desire to be is just enough to care for them for they are not able to do a lot on their own. Since people with Alzheimer’s can easily confuse objects with other objects. Putting similar looking items hidden away from commonly used places like the bathroom or kitchen can even keep them from dangerous situations. For example, one can hide things that might look like a tube of toothpaste that might be used by accident such as ointments or denture adhesives. One can also set out the ‘correct’ item for a task to make things much easier such as setting out only a spoon when they are about to eat a bowl of soup. One can also set out items in the proper sequence for those who are more likely to do something in an improper way. For instance, setting out clothes to dress in, one can stack them with the underclothing on top, shirt and pants in the middle, and socks at the bottom (“Apraxia,” 2005). With

a better understanding of what happens to an AD patient with apraxia, caregivers can better prepare for it, manage it, and eliminate frustrations that it might cause for both the patient and the caregiver.

It is important to be supportive of someone who has Alzheimer's Disease, especially if they are unable to understand their senses because of the damage that occurs there which keeps them from being able to see well, hear, or even use the bathroom. You can reassure the patient in order to reduce feelings of uselessness or embarrassment. You can say that everything is just fine instead of pointing out their mistakes. Do not scold the person if they do make a mistake or make them feel guilty. It is also very important to respect their need for privacy. Otherwise, we are just dehumanizing them and not maintaining their dignity. Doing things for their incontinence can also help them, for they cannot control it if they do not feel the need to go to the bathroom anymore. You can make it easier for them to find the bathroom. But withholding fluids can cause dehydration and lead to a urinary tract infection and increased agitated behavior ("Incontinence," 2016).

Caring for patients with Alzheimer's Disease who experience behavioral changes can make a difference to improve their life and cope with the disease. Not every patient with AD experiences sleep issues or sundowning, but there are ways in which one can deal with these symptoms as well. If a patient is awake or upset, approach them in a calm manner and find out if they are needing something. They should be gently reminded of what the time is and avoid arguing by reassuring them that everything is all right, especially if they are confused. Do not use physical restraint if they get up and start wondering off, it will only agitate them. Instead, allow

them to continue to pace under your supervision (Bitwise, 1994). If they are at home, make sure it is well lit in the evening which will reduce their dark surroundings. Make a comfortable and safe sleep environment as well such as keeping doors and windows locked and providing a comfortable temperature. It is also important to maintain a sleeping schedule to allow for a more restful sleep at night and avoid stimulants such as sweets and caffeine that can keep them up at night. Discouraging afternoon napping and planning more activities such as trips and bathing in the morning or early afternoon will make them less likely to be awake at night. Even limiting environmental distractions that occur during the evening can help them maintain a proper sleep schedule (Bitwise, 1994).

When a patient with Alzheimer's experiences depression, it can be hard for them to get back to where their life used to be, but getting the appropriate treatment for depression can significantly improve their quality of life. The best kind of treatment for depression in AD involves some medication, counseling, and a gradual reconnection to activities and people that have always brought them happiness. Telling them to "try harder" or to "cheer up" is not helping anything. Those with depression are hardly able to make themselves better without will. What makes them better is lots of support, reassurance, and professional help. Support groups can be very helpful, especially to those who are in the early stage for Alzheimer's so that they can become aware of their diagnosis and take on an active role of seeking help from others. Scheduling a routine, and making a list of activities that they fully enjoy can also help in overcoming their depression. Celebrated small successes and occasions such as their birthday can even improve their behavior and make them

feel very important. Family members can provide reassurance that the patient is loved, respected, and appreciated as part of the family, and not just to feel sorry for them for what limited things they can do now. They need to be reassured that they will not be abandoned (“Depression and Alzheimer’s,” 2016).

Coping with someone who has AD with aggression and anger can be one of the hardest things to do, and I have experienced this type of frustration. I have been hit and yelled at, but it is very important to understand that they cannot help what they do. It is hard for them in fact to think before doing something because of the way their brain has disconnections between signals. When a patient is becoming angry and aggressive, it is important to identify the immediate cause of the aggression, such as thinking about what happened right before the reaction that may have triggered this sudden behavior. Many caregivers may not realize that pain can actually cause a person with AD to act aggressively, so one must rule out pain as a source of stress. It is vital to focus on the patient’s emotions rather than the specific facts. In other words, look for the feelings behind the actions or words. Getting upset with a patient can make him or her even more aggressive so that is not the answer. Being positive and reassuring will help as well as speaking in a soft tone. Limiting distractions and trying a relaxing activity can help them become more calm. And as mentioned before, it is not good to use force and restraint unless the situation is very serious for they can become even more frustrated and even cause personal harm (“Aggression and Anger,” 2016).

VI. CONCLUSION

Alzheimer's Disease is a progressive and fatal disease that so many individuals develop in their later stages in life. One out of ten people are affected with this disease over the age of 65 ("What is Alzheimer's?" 2010). No one is immune to this disease because it comes gradually with the abnormal buildup of protein that later forms into plaques and tangles that kills brain cells. The disease starts with memory loss and worsens over time. It is the common assumption that Alzheimer's Disease is only about memory loss, but this disease in fact, is associated with a lot more; it takes over your life. We take for granted simple recollections that happened a few days ago or even years ago that we remember. Those with AD have more trouble remembering just what happened a few minutes ago ("Brain Tour," 2011).

Although memory is affected significantly by this disease, it is not the only consequence. After affecting memory, more plaques and tangles spread to different regions in the brain which kills even more cells and eliminates specific functions which is also known to be the different stages of Alzheimer's. These different parts of the brain being affected by this disease lead to speech decline and language incomprehension, physical dysfunction, senses to not be accurately perceived, a disruption in the sleep/wake cycle, depression, and losing control over emotions and feelings and turning towards aggression. It can even lead to affecting the part of the brain that regulates breathing and the heart which means Alzheimer's is a disease of a timely death.

There are risks when it comes to developing AD. Alzheimer's Disease is a disease of aging which is the strongest risk factor. The older a person gets, the more likely he or she is to develop it. Genetics can also be a factor. Those who have one or more family members with AD are more likely to develop it than those without a family history of it. Studies have discovered the fact that women are at greater risk for this disease than men (Braunstein, 2010). Strong evidence has also shown a link between brain health and heart health. The brain is nourished by a rich network of blood vessels. A heartbeat pumps about 25 percent of blood to the brain, and the brain cells use about 20 percent of the nutrients and oxygen that the blood carries. Therefore, an unhealthy heart could lead to an unhealthy brain. Evidence has pointed stress can be a contributor to AD as well whether it is mental stress, a certain lifestyle, or some sort of head trauma (Braunstein, 2010).

Despite these risk factors, there are ways in which people can prevent the development of Alzheimer's Disease and maintain the function of their brain. Maintaining good health starts with your brain. The brain requires a lot of care. It is the most vital organ in the human body. Without it, you cannot move, speak, or even breathe. It makes sense that whatever is good for the heart is good for the brain, so doing something everyday to prevent heart disease, high blood pressure, and even diabetes can help (Braunstein, 2010). Eating less fat in your diet and eating more foods that are rich in antioxidants can feed your brain and give it the proper nutrients it needs. Even keeping your brain active and engaged can increase its vitality and preserve brain cells and functions. Playing games, learning new things, and daily crossword puzzles can stimulate the brain. Physical exercise can also help prevent

AD as it regenerates blood cells. Studies has shown that regular exercise can improve memory and cognition (Braunstein, 2010).

The disease's progression takes place on average of eight to ten years ("Stages of Alzheimer's," 2006). What people need to realize is that the disease is relentless and for right now, is incurable. The brain is the most complex organ in the human body, and scientists are still unsure of the exact cause of Alzheimer's. Further research is suggested to evaluate what exactly happens when the brain goes awry and the effects of this disease. Further research could also discover how patients can become fully treated to improve their life when fighting this progressive disease.

Treating someone with AD requires an active plan that does not just mean medically. Alzheimer's is not defined as losing memory; it is defined as a disease that affects one's lifestyle and daily functions. There is a fine line between treating memory loss and other symptoms, and treating someone's ability to live. Helping people to understand Alzheimer's Disease will reduce the stigma of this disorder, improve care, and even help to find a cure. Doing your part, especially if having a family member or a loved one who has the disease, to care for them and get them the appropriate help they need is the first step in improving their life. This is the best treatment patients can receive in fighting Alzheimer's Disease.

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