

# History of Alzheimer's Disease

Hyun Duk Yang,<sup>1,2</sup> Do Han Kim,<sup>1</sup> Sang Bong Lee,<sup>3</sup> Linn Derg Young,<sup>2,4,5</sup>

<sup>1</sup>Harvard Neurology Clinic, Yongin, Korea

<sup>2</sup>Brainwise Co. Ltd., Yongin, Korea

<sup>3</sup>Barun Lab Inc., Yongin, Korea

<sup>4</sup>Department of Business Administration, Cheongju University, Cheongju, Korea

<sup>5</sup>Boston Research Institute for Medical Policy, Yongin, Korea

As modern society ages rapidly, the number of people with dementia is sharply increasing. Direct medical costs and indirect social costs for dementia patients are also increasing exponentially. However, the lack of social awareness about dementia results in difficulties to dementia patients and their families. So, understanding dementia is the first step to remove or reduce the stigma of dementia patients and promote the health of our community. Alzheimer's disease is the most common form of dementia. The term, 'Alzheimer's disease' has been used for over 100 years since first used in 1910. With the remarkable growth of science and medical technologies, the techniques for diagnosis and treatment of dementia have also improved. Although the effects of the current symptomatic therapy are still limited, dramatic improvement is expected in the future through the continued research on disease modifying strategies at the earlier stage of disease. It is important to look at the past to understand the present and obtain an insight into the future. In this article, we review the etymology and history of dementia and previous modes of recognizing dementia. We also review the historical developments leading to the terminology of Alzheimer's disease.

**Key Words** history, dementia, Alzheimer.

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**Correspondence:** Hyun Duk Yang, MD, PhD, Harvard Neurology Clinic, 294 Gwanggyojungang-ro, Suji-gu, Yongin 16943, Korea

**Tel:** +82-31-225-3080, **Fax:** +82-31-225-3081, **E-mail:** [hyundyang@gmail.com](mailto:hyundyang@gmail.com)

## INTRODUCTION

Korea is a rapidly aging society, which is currently unprecedented in the world. Degree of aging in society can be divided into an aging society (7%), aged society (14%) and super-aged society (21%) based on the proportion of people aged 65 years or older. Moreover, Korea is projected to enter a super-aged society in the next 10 years because this aging phenomenon was dramatically intensified, following the aging population already established in 2000 (Statistics Korea, Results of specific funeral population estimation, 2005. 1). Such a trend in Korea can be considered extraordinarily steep, as compared to 154 years in France, 97 years in UK, 94 years in USA, and 36 years

in Japan, which is close to our country. As our society is rapidly aging, the number of patients with dementia shows a significant increasing trend and the new dementia patients appear at a rate of five people per hour. The direct medical expense burden from the disease of dementia itself, and accompanying socioeconomic indirect burden are also exponentially increasing. To reduce direct and indirect expenses burden throughout society, as well as to improve an individual patient's quality of life, early diagnosis of dementia, effective treatment, and continuous follow-up management need to be addressed urgently. Delay in the onset of dementia by 2 years owing to appropriate treatment would diminish the prevalence of dementia by approximately 20%.<sup>1</sup>

Dementia could be likened to a philosophical death, as opposed to biological death. Forgetting personal life history and difficulty in retaining even fragmentary reminiscences of life, could result in a great deal of pain to those who share a collective memory of the past.

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Many people in modern society perceive dementia negatively. Owing to such social perceptions, dementia patients and their families find themselves in a more difficult situation. Thus, a good understanding of dementia is a first step to eliminate the widespread social stigma and promote public health. We are in the 106th year since the introduction of the term, 'Alzheimer's disease', which is the most common form of dementia. The recent developments in dementia study from the remarkable progress in science and medical technology, have led to outstanding advancements in epidemiological investigation of disease, determination of causes, and diagnosis and therapeutic techniques. Despite the limited effectiveness of medicines, innovative improvement through continued research is expected in the future.

Awareness of the past is required to understand the present status of dementia and obtain insights for the future.

In this paper, we review the etymology and history of dementia, perceptions on dementia in the past, and the historical developments leading to the terminology of Alzheimer's disease.

## ETYMOLOGY OF DEMENTIA

The word 'dementia' appeared first in the record of mankind in around 600 A.D. Saint Isidore (560–636 A.D.), the archbishop of Seville, used the term 'dementia' for the first time in his book, 'Etymologies'.<sup>2</sup> The term has its origin in Latin, and is formed from the prefix 'de', which means a deprivation or loss; root 'ment', which means mind; and suffix 'ia', which indicates a state. In short, dementia refers to 'a state out of mind'.

## HISTORY OF DEMENTIA

Dementia has occurred in human history long before it was named. In about 2000 B.C., the ancient Egyptians were already aware that memory declines as people age.<sup>3</sup>

Pythagoras (570–495 B.C.), a doctor and mathematician in Greece, classified a lifetime of human into six stages; infancy (age 0–6), adolescence (age 7–21), adulthood (age 22–49), middle age (age 50–62), senescence (age 63–79), and old age (age 80 or older). Of these stages, senescence and old age were regarded as a declining phase of mind and body, and some people who survive to this time, were expected to degenerate in mind to a level of suckling baby and finally become stupid. Hippocrates (460–370 B.C.), a doctor in Greece, believed that brain injury results in cognitive disorder, and Plato (428–347 B.C.), a philosopher in Greece, mentioned that the principal cause of dementia is old age itself because the mental performance is destined to inevitably degrade. On the contrary, Marcus Tullius Cicero (106–43 B.C.), a philosopher, politician

and jurist in Rome, pointed out that ageing does not always cause the decline of mental performance, except in people with weak will. In brief, he indicated that dementia is not an inevitable consequence of ageing.<sup>4</sup>

Around the 2nd century A.D., Aretheus, a doctor in Turkey, described dementia by grouping it respectively into delirium, a reversible acute disorder of cognitive function and dementia, an irreversible chronic disorder.<sup>5</sup>

The medical and scientific study on dementia suffered a setback with the decline of the Roman Empire in the 5th century and reduction in financial aid. Subsequently, theocracy dominated the Middle Ages, as the spirit of the age; hence, there was a tendency to regard quite senility (dementia) as a fruit (punishment) of man's original sin as with other abnormal symptoms.<sup>6</sup>

William Shakespeare (1564–1616), a playwright in Britain, portrayed the symptom of dementia symbolically through King Lear (published in 1608), which became one of the four great tragedies in English literature.

Thomas Willis (1621–1675) a doctor, originally coined 'neurology' as a term and also treatment department. He first described vascular dementia academically in his book, 'De Anima Brutorum'.<sup>7</sup>

In the Modern Age, dementia as a diagnosis was initially accepted as a medical term in 1797 by Philippe Pinel (1745–1826), a doctor in France.<sup>8</sup> And Jean Etienne Dominique Esquirol (1772–1840), a disciple of Pinel, described dementia as follows: "Dementia is that disabilities are shown in discernment, intellectual ability and will due to brain diseases, and is to lose joyfulness enjoyed and is that the rich become poor."<sup>9</sup>

Otto Ludwig Binswanger (1852–1929) of Swiss decent conducted the study on neurosyphilis, which is one of causes of dementia, with Alois Alzheimer (1864–1915). He reported several forms of vascular dementia in academia in 1894. In this report, the term, 'presenile dementia', made its first appearance. This type of dementia was to be called Binswanger's disease by Alzheimer in the future.

Emil Kraepelin (1856–1926), a doctor in Germany, classified dementia into senile dementia and presenile dementia in 1910. He was the first to name the disease as 'Alzheimer's disease', after Alois Alzheimer (1864–1915), who discovered pathological features of presenile dementia while his student.<sup>10</sup>

## DISHONOR OR FALSE CHARGE OF DEMENTIA (FALSE PERCEPTIONS OF PAST AND PRESENT FOR DEMENTIA)

### Hammer of the witches

In the Middle Ages, mental illnesses such as depression or

dementia were regarded as a kind of punishment necessarily imposed by God for sins committed. As the reason for dementia was not elucidated rationally in this period, it was considered that abnormal activities and mental symptoms generated in the dementia patients were due to demon-possession, and thus naturally subject to hatred. Patients with dementia were representative victims of a witch hunt that was widespread over the 14th to 15th centuries.

In 1486, *Malleus Maleficarum* (Hammer of the Witches) was published by Heinrich Kramer and Jacob Sprenger who were priests of the Dominican order in the Roman Catholic Church. This book contained the criteria to identify witches, instructions and methods for trial and execution of a sentence, as a textbook of a witch hunt approved by Pope Innocent VIII. It was revised dozens of times and spread throughout the world in various languages. Hundreds of thousands have been burned dreadfully at the stake since the book was published.

People designated as witches according to the criteria defined in the 'Hammer of the Witches', were mainly mental patients, and most of them were women with symptoms such as paranoia, mania, schizophrenia, epilepsy and senile dementia. For no other reason than their mental instability, they became victims of a witch hunt and a great number of people across Europe were burned to ashes on the rack.

Maltreatment of dementia patients (witch hunt) is still prevalent in some parts of the world. In Ghana, Africa in November 2010, an old woman aged 72 years with dementia such as amnesia was burned at the stake for being a so called 'witch'. In accordance with the survey conducted in this country in 2012, most people still associate the dementia symptom with witchcraft. Such an incident resulted from error or absence of understanding of dementia.

### **Dementia and social stigma**

With the medical development in the Modern Age, dementia is considered as a brain disease like other mental symptoms, but negative perceptions of dementia persist in our society. Even today, dementia is considered as a supernatural or spiritual phenomenon. In fear for social stigma or hate responses of neighbors and relatives, dementia patients hide themselves and distance themselves from their family and society even now.

'The Scarlet Letter' was published by Nathaniel Hawthorne (1804–1864) in 1850. This is a novel set in Boston, Massachusetts in the United States of the 17th century. Hester Prynne, a heroine, was on trial for adultery. The final judgement was that she should spend the rest of her life with the letter 'A' (Adulteress) imprinted on the bodice of her clothes. 'The Scarlet Letter' has become synonymous with social stigma from such a back-

ground.

Erving Goffman (1963) defined the stigma as 'one that means properties, behaviors and reputations to be discredited, and thus that is mentally unwillingly rejected and quite distinct from other people.'<sup>11</sup>

According to the regulations of the World Health Organization (2002), the stigma is one that is achieved through the process that individuals or groups come to feel shame without justification, and whereby they are excluded and discriminated.

The survey conducted in the Alzheimer's Disease International for dementia patients in 2012 showed that 24% of respondents hide their history of diagnosis with dementia mainly due to social stigma. They experienced denigration and rejection of their ideas and opinions when their illness became known, and expressed concern about the future. Forty percent of respondents answered that they have experienced discrimination due to dementia; 23% replied that friendships were broken because of diagnosis of dementia alone; and 76% of total respondents were aware of a social stigma for dementia (Alzheimer's Disease International, World Alzheimer Report 2012: overcoming the stigma of dementia, 2012). Results of domestic research were identical. In accordance with the 2014 survey results on perception level of dementia, 70% of the public experienced a negative perception toward dementia (Gyeonggi Province Metropolitan Center for Dementia, in Results of the survey on the perceptions of dementia involving 5000 people in Gyeonggi Province, 2014. 5).

Based on the 2015 report of Alzheimer's Association in the United States only 45% of patients diagnosed with dementia and their family recognized dementia as an illness. Compared to cancer or cardiovascular disease, which are recognized by 90%, the understanding of dementia is significantly poor. In addition, only half of the people diagnosed with dementia among those with Alzheimer's disease were reported (Alzheimer's Association, 2015 Alzheimer's Disease Facts and Figures, 2015).

Owing to poor understanding of dementia, the social stigma is marked, and the patients who fear the stigma cannot aggressively seek treatment, leading to delay in diagnosis and treatment. Therefore, preventing the social stigma is a good starting point to overcome dementia, and the first step to improve the quality of life of the patients and their family. Awareness of the phenomenon of dementia is a key requirement to eliminate the social stigma.

## **ALZHEIMER'S DISEASE: THE PROGRESS OF NAMING**

Alzheimer's Disease is named after the widely known doctor

who focused on the study of neurosyphilis and vascular dementia. He reported the first case to the academic world. As Alzheimer's disease is common in contemporary medicine, the origin and progress of naming, 'Alzheimer's Disease', are described in detail.<sup>12-19</sup>

### **Auguste Deter (1850–1906)**

'Auguste' was born into a working-class family of Kassel, Germany on May 16th 1850. Her father of four children was dead when Auguste was very young. Although the family was very poor, she was relatively well educated. At the age of 14, Auguste began work as a seamstress assistant.

In 1873, at the age of 23, she married to Karl Deter and moved to Frankfurt. Karl, her husband, worked in a railway company. Their daughter, Thekla, was born and for a time, they led an ordinary family life.

In March 1901, 28 years following the marriage, Auguste showed uncontrollable behavior. She abruptly accused her husband of adultery. Delusion had begun; and subsequently, her memory decreased rapidly. She was careless with the housework, hid items intentionally, and incomprehensively lost her ability to cook properly. She experienced problems in writing and serious alteration was detected in usual conversation. Insomnia manifested, her sense of direction was lost. She dragged a bed sheet outside, wandered around wildly, and she cried for hours at midnight. Her condition deteriorated rapidly, and she became restlessly boisterous, threatened neighbors with a horrible shriek, and started to doubt every movement of complete strangers for no reason.

Karl took Auguste to a hospital, and a doctor decided that she could not work anymore due to symptoms such as memory impairment, mania, insomnia, and agitation and recommended admission into a mental hospital.

Auguste entered the Frankfurt mental hospital on November 25th 1901. She was 51-year-old at the time.

In the hospital, Alzheimer oversaw her care, and obtained her detailed clinical history. Despite her ability to speak her own name, she answered to her husband's name. She could not write her own name upon a request. She could recognize and name objects such as pencil, key and cigarette. However, when she was questioned about what kind of food she ate during a meal, she replied that she was eating 'spinach', although eating pork and cauliflower. She was unable to fully remember the objects she had looked at. When it was difficult for her to answer Alzheimer's questions, she repeatedly stated, "So to speak, I lost myself." In the evening, symptoms became more intensified.

Alzheimer diagnosed the case as 'presenile dementia'.

Throughout her hospitalization in the mental hospital, de-

spite loud crying offensive behaviors to others, once in a great while, she would behave politely and kindly to people around her. By day, she had to stay in the bath filled with water to calm her down, and by night, to protect her, she had to stay in an isolated room that was securely locked. On one occasion, she left the room, and started running away while shouting puzzling words; "I don't stab myself. I will not stab myself."

For continuous observation, Alzheimer made Auguste stay in the hospital. However, the medical expenses were too much for Karl. He visited his wife as often as possible, while struggling to cover the cost. He often demanded moving her to a more affordable facility. Alzheimer intervened in the situation, and allowed Auguste to be continuously treated in the Frankfurt mental hospital, but in exchange, requested possession of all her medical records and her brain on her death. Karl gave his signed consent.

In 1903, Alzheimer moved to the mental hospital affiliated with Munich medical school via Heidelberg at the invitation of Emil Kraepelin (1856–1926).

Following his departure, in 1905, Auguste deteriorated in condition. She mumbled repeatedly to herself, was unable to get out of her bed alone, and she was unable to conduct any regular daily activities on her own including eating.

Alzheimer summarized in detail the process and aspects of the memory decline in her medical records. He described her symptoms as progressive cognitive disorder, local neurological symptom, hallucination, delusion, and psychological social disability.

Finally, she lost all cognitive ability, and succumbed to septicemia and pneumonia on April 8th 1906. She was 55 years old at the time. The brain of the patient was sent from Frankfurt to Munich together with the medical records. Alzheimer set to conduct a biopsy of her brain immediately.

### **Alois Alzheimer (1864–1915)**

Alois Alzheimer was born in Marktbreit, a small Bavarian city in southern Germany on June 14th 1864. His father worked in a notary office, his first wife died of puerperal fever 2 years before the birth of Alzheimer, leaving only one son. After a while, he remarried an aunt of the son; they had 6 sons and daughters, and Alzheimer was the oldest child. When Alzheimer was young, the parents moved to a place where educational conditions were better for their children. Especially, Alzheimer showed a remarkable talent in science, and was trained in medical schools of Berlin, Tübingen, and Würzburg University. He showed enthusiasm for observation of micro-tissues through a microscope and anatomy. In 1887, he graduated with honors from Würzburg medical school.

Interestingly, Alzheimer was not interested in psychiatry. In

1888, while taking care of a woman patient with mental illness in a rich family, he returned to Germany for 5 months, where he started to work in the Frankfurt mental hospital as an intern. There, he studied psychiatry as well as neuropathology.

A year later, Franz Nissl (1860–1919), a doctor and neuropathologist joined Alzheimer's research group. He showed great talent for staining neurons. His staining method is still utilized today. They continued to study together while being friends for years. Nissl's staining method contributed greatly to Alzheimer's neuronal research. Alzheimer later acknowledged that he could not have conducted his own studies without Nissl's help. In 1895, Nissl moved to Heidelberg to work with his teacher, Emil Kraepelin. In 1904, the teacher moved to Munich, and Nissl took on his position. Meanwhile, Alzheimer missed studying with his friend Nissl.

Alzheimer was married to Ceacilia Geisenheimer, a widow of rich banker, and they had three children. Because of his family wealth, he could devote himself to study without economic difficulties. However, 7 years later, his wife passed away suddenly following her delivery of their youngest child. Elizabeth, Alzheimer's younger sister, moved to Frankfurt to raise the children. Alzheimer immersed himself in treatment of patients and research to forget the grief of bereavement. Although he managed all new patients voluntarily, his clinical opinion was highly developed.

Meanwhile, Alzheimer was first presented with Auguste Deter, a female patient aged 51 years, in the Frankfurt mental hospital on November 25th 1901. The patient was a student of Johann Alzheimer, his grandfather, when he taught in Kassel. She showed several abnormal behaviors such as short-term amnesic disorder, disorientation and dysphrasia. Alzheimer studied her symptoms thoroughly for years.

In the summer of 1902, a year after his wife's death, Kraepelin (who taught Nissl while in Heidelberg) invited Alzheimer to join him in collaborative research. Alzheimer accepted the invitation and moved to Heidelberg immediately. Despite having the opportunity to meet Nissl again, a year later, in 1903, he moved his practice to the hospital affiliated with Munich medical school along with Kraepelin.

The patient died 4 years after Alzheimer left Heidelberg. As agreed, Alzheimer obtained the patients' brain and medical records. She became the first patient with Alzheimer's disease.

First, he conducted a biopsy of brain to investigate the correlation between the medical records and the patient's symptoms. He found that the cerebral cortex was generally thinned. The region that controlled memory, language, judgement, and thinking was severely impaired. Senile plaques were formed in neurons, and tangles were found in nerve fibers. At the time, the consensus among medical doctors was that senile plaque

could be found in 70-year-old patients, while occurrence of neurofibrillary tangles was a new observation. Considering her age, both findings were exceptional.

Currently, this case would be diagnosed as early-onset Alzheimer's dementia. As Alzheimer's dementia is not likely to develop before 65-years of age, it is difficult for such early-onset Alzheimer's dementia to account for >10% of total early-onset Alzheimer's disease.

On Kraepelin's encouragement, on November 3rd 1906, Alzheimer made an important announcement that earned him his place in medical history. He publicly announced that the strange abnormal symptoms were generated in cerebral cortex. He reported the results of symptoms and brain biopsy of Auguste D, the 51-year-old woman, in the 37th psychiatry conference of southwestern Germany held in Tübingen. Patient's symptoms included a progressive cognitive disorder, local neurological symptom, hallucination, delusion and psychological social disability condition. In the brain biopsy, senile plaque, neurofibrillary tangle, and atherosclerotic alteration were observed at the same time. However, this announcement was poorly received by academia from the beginning.

He strengthened the contents of the report, and a year later, published it as a research paper. The symptom was called Alzheimer disease in a book published by Kraepelin in 1910.

When Alzheimer taught psychiatry and neuroanatomy in Ludwig Maximilian University in Munich, Wilhelm II, King of Prussia, invited him as a full professor of Friedrich-Wilhelm University in Breslau (presently Poland). Alzheimer caught an illness in the train proceeding to his new post. Three years after performing studies while in his newly appointed position, on December 19th 1915 at the age of 51, he died due to heart failure by endocarditis and kidney failure. He was buried beside his wife in Frankfurt.

Alzheimer was not well acknowledged in those days owing to his position of anatomist, but today, he is remembered for his remarkable legacies to the field of modern neuropathology. The most remarkable achievement was to investigate anatomical lesions associated with clinical symptoms, because cerebral phenomena were not typically approached from such a perspective and viewpoint at the time.

The handwritten medical records and the interviews with Auguste were not read since 1909. However, 87 years later, we are able to access these records.

### **Franz Nissl (1860–1919)**

Franz Nissl was born in Frankenthal, Germany. Theodor Nissl, his father, wanted him to be a priest, but he entered Ludwig Maximilian University of Munich and became a doctor, and then majored in psychiatry.

Because of his interest in neuropathology, Nissl developed various staining methods while conducting a study on the cerebral cortex. The biggest outcome of his work was the 'Nissl stain'.

Nissl carried out a study with Bernhard von Gudden his teacher in Munich that involved the care of Prince Otto who suffered from mental illness. Meanwhile, Gudden was found drowned with Ludwig II, King of Bavaria, who was Gudden's patient at the same time in 1886; hence, Nissl had to look for a new occupation. Prince Otto was the younger brother of King Ludwig II.

In 1889, Nissl moved to Frankfurt where he met Alois Alzheimer. He conducted a study with Alzheimer for 7 years. Despite being 4 years senior to Alzheimer, Nissl helped and encouraged him as a friend to perform both clinical treatment and basic research simultaneously. Nissl became a witness at his wedding. Alzheimer took Nissl's advice, and they made progress together with the study on cerebral arteriosclerosis, epilepsy, and dementia, etc.

In 1895, Nissl moved from Frankfurt to Heidelberg at the invitation of Kraepelin, where he was appointed as a full professor. After Kraepelin departed for Munich, Nissl replaced him. Nissl and Alzheimer regretted not being able to work in the same hospital. However, they continued their friendship and academic exchange throughout life.

In the summer of 1902, a year after Alzheimer's wife died, Kraepelin invited Alzheimer to join a laboratory of Heidelberg. This was a great honor to Alzheimer because Kraepelin was the most respected and influential psychiatrist in Germany in those days. Furthermore, Nissl had been working there for 7 years. Alzheimer knew that moving to Heidelberg had several merits. However, he applied for directorship of the hospital instead and was rejected.

Nissl who received this news, persuaded Kraepelin to re-suggest a collaborative research to Alzheimer. Kraepelin made the suggestion once more and Alzheimer accepted his suggestion and moved to Heidelberg at the end of 1902.

In 1918, Nissl went to Munich at the invitation of Kraepelin and joined the research of his teacher after Alzheimer moved to Breslau University in 1912. Nissl worked there for about 1 year and subsequently died of kidney disease.

### **Emil Kraepelin (1856–1926)**

Emil Kraepelin left a significant legacy in the medical world. He is acknowledged as the father of scientific psychiatry. He tried to classify mental diseases systemically based on their symptoms, and grouped diseases, traditionally referred to as a mental illness, into manic depression and schizophrenia designated as 'dementia praecox' in those days.

In 1902, Kraepelin, who was conducting a study with Franz Nissl in Heidelberg, invited Alzheimer to the laboratory in Heidelberg to join his own research group. Alzheimer had the opportunity to rejoin his friend Nissl once more.

In April 1903, a psychiatry professor of Munich medical school who had led new construction of the mental hospital building died suddenly. The university authorities offered the vacancy to Kraepelin. Kraepelin accepted the request and then moved his research team, including Alzheimer, to Munich. Alzheimer worked as a senior researcher without payment. However, because of his marriage to a wealthy woman, Alzheimer could devote himself to study without financial constraints.

Auguste's brain tissue was sent from Frankfurt to Munich on April 8th 1906. Alzheimer found senile plaques and neurofibrillary tangles, and reported them to his colleagues in connection with clinical symptoms. Analysis of correlation between clinical symptoms and histological content was a new methodology. Kraepelin encouraged Alzheimer and recommended that he present the research findings at the 37th Psychiatry conference of southwestern Germany that was to be held soon in Tübingen.

Alzheimer presented the clinical records and results of neuro-biopsy of Auguste Deter in Tübingen on April 11th 1906. Alfred Erich Hoche (1865–1943) was a senior professor in University of Freiburg. Hoche was influential at that time, and opposed the concept of Kraepelin's classification of mental illness. Kraepelin was not present at Alzheimer's announcement, and professor Hoche did not permit a question and answer session, but immediately, passed the order to the next presenter whose subject was related to psychoanalysis. Hoche engaged aggressively in this subject and a very long active discussion ensued. Alzheimer was very disappointed because he did not receive the attention of eminent scholars. In addition, the press paid no attention to his announcement.

Alzheimer's disease was not named by Alzheimer but by his teacher, Kraepelin.

Kraepelin gave the name of Alzheimer's disease in acknowledgement of the importance of Alzheimer's discovery in the case of Auguste Deter; he reported in the conference to the revised edition of psychiatry textbook published in 1910, while preparing the revised edition of his book.

The name of the disease indicated 'presenile dementia' in those days, but, in the later generations, its meaning was expanded to include 'senile dementia', which is the relatively common type of dementia.

Several scholars, including Alzheimer, were surprised at the unexpected event. They were surprised that Kraepelin expeditiously defined the Auguste case as an evident disease and,

moreover, named it.

Some researchers had previously described the illness before Alzheimer's announcement. Naming Auguste's case as Alzheimer's disease raised various issues. It was considered a strategy to secure research funds by elevating the reputation of the laboratory through the expansion and exaggeration of new findings. By this view, Kraepelin's laboratory gained fame by discovering the neurofibrillary tangles through a biopsy in an early-onset dementia patient for the first time and announcing it publicly, which resulted in higher research funding for the laboratory.

Since his marriage to a widow of rich banker in 1894, Alzheimer devoted himself to studies and inevitably worked without payment. Kraepelin could not offer him a regular post and appreciated his service, since Alzheimer's financial ability provided stable support that allowed the laboratory research to proceed consistently.

Political issues were also raised. There were two competing schools investigating neuropathology in those days; one was the Munich school led by Kraepelin and the other was Prague school led by Arnold Pick (1851–1924). Alzheimer reported the pathological features including senile plaque and neurofibrillary tangle. However, senile plaque had already been mentioned several times by Oskar Fischer (1876–1942) of the Prague school in the case of a patient with senile dementia.

## CONCLUSION

In this review, we examined the etymology and history of dementia, false perceptions of past and present for dementia, and historical events related to the naming of Alzheimer's disease.

Perceptions on symptoms of dementia have long existed in human history. However, objective and scientific knowledge on the illness of dementia have accumulated relatively recently.

A great number of dementia patients have suffered and continue to suffer from the false conceptions of dementia. The witch hunt in the Middle Ages is only one such example. Currently, there are still many dementia patients who hide their illness and do not seek treatment owing to the social stigma.

Advances in science and medical technology have led to an increased understanding on the pathophysiology and causes of dementia; in addition, the diagnosis and treatment of dementia have also improved remarkably. However, since current treatment mainly focuses on symptom relief and is not based on the cause, its efficacy is limited. Strategies that alter the progress of disease in the early phase are actively investigated and expected to bring a remarkable change for improved

dementia treatment in future.

In summary, we need to create an environment that facilitates early diagnosis of dementia and promote active treatment by eliminating the social stigma through a proper education on dementia. This would relieve the financial burden and pain of dementia patients and their families, as well as reduce the indirect social expenses due to the exponentially increasing frequency of dementia. Overall, this approach would improve the health of our community.

## Conflicts of Interest

The authors have no financial conflicts of interest.

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