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## THE MODERN VIEW ON ALZHEIMER'S DISEASE SWPS: UNIVERSITY OF SOCIAL SCIENCES AND HUMANITIES, WARSAW, POLAND

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Many elderly people do not struggle with cognitive disorders or diseases. But unfortunately, more and more people over 60 have cognitive impairments. For example, in the United States during last 15 years the cases of dementia and other diseases which are related to it grew significantly (more than 50,000 Americans die each year from Alzheimer's disease), and now it is one of the sixth leading causes of human death. Scientists believe that it is due to changes in diet, medical care, environment, daily activity, etc.

The first evidences about the Alzheimer's disease were in the ancient Greece and Rome, when the philosophers and physicians mentioned that there was a tendency of developing of dementia with getting older [7]. In 1901 German psychiatrist Alois Alzheimer described the case of his patient with Alzheimer's disease. It was a fifty-year-old woman whose name was Auguste D. After her death in 1906 he first reported about her history publicly. During the next several years new similar cases were reported using the term Alzheimer's disease. However, the first description of it like a distinctive disease was made by Emil Kraepelin. In his work there were two types of features: clinical (delusion and hallucinations) and pathological (arteriosclerotic changes). During the 20th century, Alzheimer's disease was connected with the age between 45 and 65, and it was like a part of dementia (it was not a single diagnose), but everything changed after conference in 1977 when it was concluded that Alzheimer's disease is independent from dementia, and also they proposed that these diagnoses have different causes. And finally the term Alzheimer's disease was included in medical and psychological nomenclature as an independent diagnosis, because it has got some specific disease cause, common symptoms, neuropathology, and so on.

*The aim of this article* was to review modern articles, researches and studies connected with Alzheimer's disease. All these studies and other materials are dedicated to show all possible answers what is the main cause of this disease, how we can diagnose it easily and fast, and suggest alternative ways of treatment, which are well-known nowadays.

*The material of research* was in 10 native and foreign resources which are connected with the topic of article.

*Results and discussion.* The basic symptom of Alzheimer's disease is the loss of memory. For example, a patient can leave the task unfinished and forget about it, or even start to forget things or names and surnames. As we can see, with the progress of disease patients have more problems with cognitive functions, like language, thinking, planning and problem solving, disorientation, and so on. They become irritated, anxious, and aggressive. Their behavior and judgments are inadequate.

One of the common causes of Alzheimer's disease is beta-amyloid plaques and neurofibrillary tangles. Alzheimer's disease can be diagnosed using PET scan (for evidence of beta-amyloid plaques and tangles) and puncture from cerebrospinal fluid (evidence of tangles). Unfortunately, scientists can only suggest treatment which is focused on elimination of symptoms. And the biggest advice from them is to stay active (physically and intellectually), follow healthy lifestyle. We should never forget about the support of our relatives and friends, because social activity is important as well.

**Keywords:** Alzheimer's disease, dementia, memory, physical activity, proper nutrition, therapy, amyloid plaques.

**Introduction.** At the moment Alzheimer's disease is one of the most common causes of dementia [10, 11]. Under the word "dementia" scientists illustrate the set of symptoms which show the decrease of memory possibilities, difficulties with thinking, problem solving process and language possibilities.

Despite the fact that all these symptoms can be noticed as a single symptom, scientists believe that obviously these symptoms characterize damage of different brain areas and wide range of diseases and illnesses, including Alzheimer's disease. In this article we would like to present the common symptoms of this disease, how it can be diagnosed, and describe the modern ways of treatment which is currently available.

*Material and methods.* Based on the review of different books and Internet resources we would like to represent modern view and understanding of Alzheimer's disease, and provide new ways of treatment. To write this article we had to analyze more than 10 native and foreign resources, and made our conclusions which we would present in the end of this article.

*Results and discussion.* First of all, we would like to present the way this disease developed. Mostly Alzheimer's disease can be noticed after the age of 60. However, researchers reported that nowadays there are more and more cases when the Alzheimer's disease can develop under this age [1, 8]. There are many factors which in combination with influence on human brain. Below we present common factors which are linked to the development of Alzheimer's disease:

– age

The older person is the more risk of Alzheimer's disease development is. It means that this disease mainly affects people over 60, but at the same time over 80 one in six people can have this illness;

– gender

According to modern studies, women suffer from this disease more than men. Unfortunately, scientists have not found a right explanation yet. Probably, this is due to the fact that over 60 women have lack of the oestrogen after menopause, and this can be one of possible factor to cause Alzheimer's disease;

– genetic inheritance

People have fear which is connected with if Alzheimer's disease can be inherited or not. On the one hand, scientists conducted that on different families in which Alzheimer's disease occurs over 60, chances of inheritance of this illness are extremely rare. On the other hand, there were cases when inheritance means a lot for Alzheimer's patients, but it does not prove that namely inheritance influences the most and if a person follows healthy lifestyle, it can reduce chance to have Alzheimer's disease. But as to twin study which was conducted by Gatz in 2006 it was reported that the heritability of Alzheimer's disease is 79%. According to GWAS research, there was identified a set of 10 specific genes which could explain approximately 20% of occurrence of Alzheimer's disease. In addition the genetic polymorphism of chromosome 19 is noticed during Alzheimer's disease (it is called apolipoprotein-4 or ApoE-4 allele). For example, if a person has one allele, his chance of getting this disease is near 20%, but if he or she has got two alleles, their chance increases. Now scientists and researchers understand that ApoE-4 influence badly on clearing excess of beta-amyloid peptide from the brain. And those who have two alleles have overproduction of beta-amyloid plaques, so loss of neurons and connections between them in hippocampus and low level of glucose metabolism in different areas of the brain can developed. By the way, immune system and high level of cholesterol are also

linked to Alzheimer's disease, because they cause inflammation, so person has got greater chances to get the Alzheimer's disease. The same is with people who have got type II diabetes. As to other genetic factor, those people who suffer from Down's syndrome have more risk of developing Alzheimer's disease. This is based on difference in their genetic makeup;

– health and healthy lifestyle

There are health problems which are links to developing of Alzheimer's disease: diabetes, stroke, heart problems, high blood pressure, high cholesterol, obesity and so on. In addition, psychological factors such as stress and depression can be like a factor of developing dementia and so on. Active lifestyle, regular physical activity, having a balance healthy diet, not smoking and drinking only during special occasions can prevent you from Alzheimer's disease.

Unfortunately, scientists still have doubts about the real cause of Alzheimer's disease. Some of them believe that all factors which are described above can influence on occurrence of this disease. Others think that the first changes in the brain are occurred decades before the first symptoms of cognitive changes appear. Here toxic changes take place while patients cannot see symptoms (symptom-free preclinical stage). Abnormal deposits of proteins form beta-amyloid plaques (which may damage and destroy brain cells and influence badly on cell-to-cell communication), and tau tangles (which influence badly on internal support and transport system inside the cell) throughout the brain [6]. After that healthy neurons stop to function appropriately, connections are lost and died. Some people produce excessive amounts of amyloid, while others have got problem with mechanism of clearing beta-amyloids from the brain. According to Klunk and his study the biggest density of beta-amyloids is presented in frontal cortex, and interestingly, they can be visible for 10-20 years before the first symptoms occur. They can be diagnosed using PET scan. On the other hand, tangles are usually measured in cerebrospinal fluid and using PET scan as well. During the later stages tangles and plaques spread through the brain.

As to immune system, plaques case immune responses which lead to inflammation, and then changes in brain structures are visible. At the beginning the loss of synapses for acetylcholinergic and glutamatergic neurons is noticed. It leads to death of neurons, connections, entorhinal cortex, and then hippocampus and other regions. It is interesting that the cerebellum, spinal cord, and motor and sensory areas of cortex are not so affected, and based on this we can see that patients with Alzheimer's disease do not have wrong movements until later stages.

Depending on the cause of dementia, there are different types which are based on the specific brain region in which changes are occurred [12]. For example,

Lewy body dementia, frontotemporal disorder, and vascular dementia (caused by blood problems which supply to the brain). In addition, patients with one type of dementia can have at the same time another one, and from that moment it is called mixed dementia. For instance, Alzheimer's disease patients can have at the same time vascular dementia. In this situation all symptoms are mixed. Moreover, during early stage of Alzheimer's disease some patients do not have memory loss, and this condition is called atypical Alzheimer's disease by scientists. It is commonly diagnosed in patients who are under 60 years old.

Furthermore, scientists reported that according to different patients' history there are causes when Alzheimer's disease has atypical symptoms, and there are specific characteristics which are connected them:

- Posterior cortical atrophy which occurs when areas at the back and upper-rear of the brain are damaged. Here there are problems with perception of visual information.
- Logopenic aphasia which is connected with damages of left side of the brain which is responsible for language and speech possibility.
- Frontal variant of Alzheimer's disease which is connected with damages of frontal lobes. Symptoms are linked to problems with planning and decision making.

At the beginning all symptoms blurred, but they got worse and worse and started to interfere with everyday life.

The first symptom is losing memory [3, 13]. Patients said that for them it was very difficult to recall recent event and learn new information. A person started to lose things, had difficulties in finding in the right words for conversation or forgot names, recent conversation, or events, and so on. This is based on early damage of hippocampus, which has a specific role in memory. It is interesting that long term memory is unaffected in the early stage of the Alzheimer's disease. Scientists connect these memory problems with the condition which is called mild cognitive impairment (MCI). Patients with MCI have worse memory in comparison their peers, but at the same time this difficulty does not influence on their lives. In addition, problems with movements and smelling are related to MCI.

Then problems can develop with thinking, reasoning, perception, communication, planning, and concentration, etc. Sometimes scientists reported that patients had unstable mood, became anxious and depressed. Many people became withdrawn and lost interest in everyday life and their hobbies and interests.

During later stages all symptoms got worse and worse. Patients needed more and more support from those who look after them. Patients rarely said that they had delusions or hallucinations, and they had unusual behavior for them like agitation, calling out, repeating the same questions, and so on. Finally, patients had problems with eating or walking. Eventually,

patients needed help with each daily activity. On average, people lived with Alzheimer's disease for 8 to 10 years after the first symptoms occurred.

As to diagnostic part, there is no single test for Alzheimer's disease [4, 5]. At the beginning, therapists have to collect all symptoms which are noticeable, and especially the therapists have to pay more attention on how these symptoms developed and how they affect patients' lives. Then therapists have to know something about your previous conditions and illnesses (e.g. infections, vitamins or hormones deficiencies, depression and so on), and study carefully your medical history. At the same time the nurse must ask you to complete special mental tasks which can show your cognitive abilities. It is usually pen-and-paper tests which are based on the fact that Alzheimer's patients can often forget things and information very quickly, and they have difficulties in recall them. Moreover, as the part of diagnostic of memory, a procedure which is called lumbar puncture can be used. During this procedure a cerebrospinal fluid is collected and then analyzed [2].

The second stage of diagnosis is the brain scan which shows certain changes and damages in different regions. Computerized Tomography and Magnetic Resonance Imaging are common used for this purpose. During early stage of Alzheimer's disease a brain scan can show that the hippocampus and surrounding brain tissue have shrunk.

And finally we would like to mention that there is no specific treatment, but on the other hand there are many ways which can relieve patients' lives [14, 15]. According to modern studies, there are special drugs which can temporarily alleviate some symptoms and decrease the progression of disease. During mild or moderate stage doctors usually prescribe drugs which consist of donepezil, rivastigmine, or galantamine. The main purpose of this medicine is to improve memory problems, concentration, motivation, and helps with everyday activities. During moderate or more severe stages or during mixed dementia patients are described drugs with memantine and so on. If a patient has depression or anxious, cognitive behavioral therapy or drugs like antidepressants can be used. In addition, support from your family members and friends, keeping with activities which you like are beneficial for patients, because patients, especially during later stages, can easily be depressed. People who live with Alzheimer's patients must remember, that since the time has gone, patients become more aggressive and their conditions get worse and worse, so they should listen to doctor's advice or find appropriate for them strategy of coping with these difficulties and struggles.

By the way, it is highly recommended to use transcranial magnetic stimulation in combination with

specific medication [9]. For the last experiment, 130 people with mild were involved to moderate Alzheimer's at 10 sites. Four of five participants were already given a specific treatment. At the beginning they had to complete a 30-minute test, and then they were randomly assigned to receive the rTMS therapy or a sham treatment during six weeks (five days per one week, one hour each day). One week after the treatment and five weeks later, participants completed this test again to see if there were some improvements or not. As a results, more than 90% of all participants completed at least 90% of their visit. On the other hand, no significant differences were seen between active and sham groups at the seven-week point. The active group showed the 1.8 test score advantage over the sham group. In comparison to this method, drug treatment showed 2.5-3 improvement in six month using. Patients also did not have any improvements with more serious cases.

Doctors also recommend their Alzheimer's patients do not forget about physical and intellectual activities, because according to recent research those who have a healthy lifestyle, enough physical activity and their brain always "working", they have less chance of getting these illness.

Nevertheless, patients must not forget that healthy food is like a little doctor who lives in our kitchen. Recently scientists have published in the American Journal of Geriatric Psychiatry that Mediterranean diet is one of the most important factor which prevent the brain from developing the toxic plaques and tangles. This diet includes:

- fresh fruits and vegetables (especially green vegetables);
- olive oil;
- nuts and seeds;
- beans and legumes;
- herbs and spices;

- whole grains;
- seafood and fish;
- eggs, cheese, goat milk, yogurt;
- red meat from time to time;
- a big amount of water;
- a glass of red wine.

It is interesting that there are jobs which many scientists associate with jobs protecting against Alzheimer's disease. According to researchers from Wisconsin Alzheimer's Disease Research Center, those who work with people in complex work situations are more tolerate to brain damages than those who work usually alone. They emphasize the importance of social engagement in the work setting for building resilience to Alzheimer's disease.

**Conclusion.** Alzheimer's disease is one of the biggest problems in the modern society, and we have to pay more attention how we can help patients who have already been struggling for this disease, and eliminate new occurred cases. But one of the most things which we must always remember is that for Alzheimer's patients support physical and emotional from their families and friends is one of the most important things for them. Becoming well-informed about the disease means preparing yourself and others for long-lasting process of treatment which we cannot imagine without any obstacles.

**Prospects for further research.** Despite that fact that there are many ways which help patient with Alzheimer's disease stay independent and cope with everyday tasks (e.g. drugs, therapy, support of others, and so on), scientist have to work more and more to find appropriate ways to treat and prevent Alzheimer's disease. Now scientists are working very hard to develop and test new possible interventions, like immunization and drug therapies, cognitive and physical training, and so on. Probably, one day we will remember about Alzheimer's disease like a nightmare.

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#### СУЧАСНИЙ ПОГЛЯД НА ХВОРОБУ АЛЬЦГЕЙМЕРА

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**Резюме.** У роботі представлений аналітичний огляд вітчизняної і зарубіжної літератури, присвячений дослідженням, пов'язаним з хворобою Альцгеймера. Актуальність проблеми визначається загальним збільшенням випадків захворювання, яке на сучасному етапі відносять до шести ведучих причин смерті людини. Кількість людей старше 60 років з когнітивними порушеннями з кожним роком збільшується. З розвитком хвороби у хворих прогресують порушення когнітивних функцій, аж до тотального розпаду інтелекту і психічної діяльності. У роботах останніх років висвітлені спроби цілеспрямованої дії на різні ланки патогенезу нейродегенеративного процесу, що лежить в основі хвороби Альцгеймера, які привели до розробки ряду напрямів терапевтичної дії на прояви цього захворювання.

Дослідженнями ряду авторів встановлено, що превентивні заходи (здоровий спосіб життя, розумова робота, соціальна активність, повноцінне харчування) не стільки дозволяють запобігти первинному ураженню мозку, скільки відсунути в часі початок самої фази хвороби Альцгеймера. Пошук шляхів профілактики, ефективного лікування хвороби Альцгеймера має конкретний економічний інтерес для суспільства.

**Ключові слова:** хвороба Альцгеймера, деменція, пам'ять, фізична активність, правильне харчування, терапія, амілоїдні бляшки.

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#### СОВРЕМЕННЫЙ ВЗГЛЯД НА БОЛЕЗНЬ АЛЬЦГЕЙМЕРА

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**Резюме.** В работе представлен аналитический обзор отечественной и зарубежной литературы, посвященный исследованиям, связанным с болезнью Альцгеймера. Актуальность проблемы определяется общим увеличением случаев заболевания, которое на современном этапе относят к шести ведущим причинам смерти человека. Количество людей старше 60 лет с когнитивными нарушениями с каждым годом увеличивается. С развитием болезни у больных прогрессируют нарушения когнитивных функций, вплоть до тотального распада интеллекта и психической деятельности. В работах последних лет освещены попытки целенаправленного воздействия на различные звенья патогенеза нейродегенеративного процесса, лежащего в основе болезни Альцгеймера, которые привели к разработке ряда направлений терапевтического воздействия на проявления данного заболевания. Исследования ряда авторов установили, что превентивные меры (здоровый образ жизни, умственная работа, социальная активность, полноценное питание) не столько позволяют предотвратить первичное поражение мозга, сколько отодвинуть во времени начало самой фазы болезни Альцгеймера. Поиск путей профилактики, эффективного лечения болезни Альцгеймера имеет конкретный экономический интерес для общества.

**Ключевые слова:** болезнь Альцгеймера, деменция, память, физическая активность, правильное питание, терапия, амилоидные бляшки.

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