ISSN: 2472-3703 DOI: 10.6911/WSRJ.202011_6(11).0011

The Effect of AICD on the Development of Alzheimer Disease

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Abstract

The cause of Alzheimer is a topic researched for decades. Recent research showed that Aβ, which was thought to be responsible for the disease, is proved not to be the cause. The fragment called AICD, which is cut from the same large protein as Aβ, is possible to be the cause for Alzheimer. Experiments illustrated by this essay are designed to test the above possibility.

Keywords

Alzheimer, Aβ, AICD.

1. INTRODUCTION

Alzheimer is a disease among old people, and this disease will cause a series of problems, such as tremor and slowness of movement [1]. Latest research proved that Aβ is not the fragment responsible for Alzheimer disease. After taking the drugs, the symptoms of the patients were not relieved [2, 3].

Aβ is a piece cut by proteases from a larger protein, called Amyloid Precursor Protein (APP). When APP is cut up into pieces, one part is called AICD. AICD stays inside the cell and can go from the cytoplasm into the nucleus, where it binds to DNA and controls the expression of genes [1,4].

My hypothesis is that there is a correlation between the presence of AICD and the development of Alzheimer disease. To test the hypothesis, the following experiments are designed.

2. EXPERIMENT

2.1. Preparation of AICD Antibody

(1) Use enzymes to cut AICD from APP protein [5]. Then use flow cytometer to purify the target protein.

(2) Prepare 60 mice with same species, size, age and gender. Inject the purified AICD into 10 healthy mice and wait for three hours.

(3) Use monoclonal antibody to obtain a large amount of antibodies for the following steps. After three hours, extract the B cell of mice, which can produce antibodies.

(4) Combine B cell with myloma cells to produce hybridoma. Select the target cell groups and culture the cells into mice's abdomen. After six hours, take the ascite from the abdomen of mice.

(5) Ensure the force applied on mice is gentle to avoid pain on mice.

2.2. Preparation of Alzheimer Mice

The traits of Alzheimer disease is cognitive disorder and accumulation of amyloid protein blocks in brain. However, this process cannot occur in mice's brain naturally [1]. So genetic

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engineering is needed to raise level of production of amyloid protein artificially. Before the genetic modification, every mouse needs to be trained to go through the maze. Whether they can go through the maze after the modification and antibodies injection is needed to be tested. The mice that could not go through the maze successfully can be regarded as having Alzheimer disease.

2.3. Injecting Antibody and Breeding the Mice

(1) Divide the mice into groups. There are 4 groups in total and there are 10 mice in each group. The groups are named Group 1, 2, 3 and 4.

(2) Inject antibodies into mice in each group. The antibody injection periods for Group 1, 2 and 3 are 1, 2 and 3 weeks respectively. Inject placebo for mice in Group 4 as control.

(3) Breed each group under the same condition (e.g. same kind and amount of food and water). Monitor the health condition of the mice regularly.

2.4. Measure and Quantify the Results

(1) Let the mice from each group go through the maze after the injection period. Use a stopwatch to measure the time they take. Calculate the mean time, standard deviations for each group, and the percentage of mice which can go through the maze.

(2) Measure the fEPSP of each mouse [6].

(3) Use functional Magnetic Resonance Imaging (fMRI) to show the activities of every mouse.

(4) Compare the result of each group.

3. CONCLUSIONS

AICD can be proved to be related to the development of Alzheimer disease, if

(1) there is a positive correlation between the percentage of mice which can go through the maze and the length of antibody injection

(2) there is a negative correlation between the time taken to go through the maze and the length of antibody injection

(3) the longer antibody injection period, the bigger difference of fEPSP and fMRI results between control Group and the antibody-injection Group

There are some weaknesses of the experiments above and the following improvements can be done.

(1) The period of time used to produce antibodies from mice may be short. Culture time for the monoclonal antibody should be tested before the experiments to determine the best culture time.

(2) Biochemistry tests should be conducted to confirm the results.

(3) Sample size is relatively small. A larger sample size is needed for more valid and reliable result.

(4) Whether the genetic modified mice have or do not have Alzheimer should be tested and verified before the conduction of the experiments. The time to run through a maze by mice can be determined by many factors (such as if the mice have trained recently or they are not fed well so they are lack of energy to run through etc.)

(5) Experiment time length may be short and experiment should last for a longer period, such as 6 months.

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