Alzheimer's vaccine clears plaque but has little effect on learning and memory impairment

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A promising vaccine being tested for Alzheimer's disease does what it is designed to do -- clear beta-amyloid plaques from the brain -- but it does not seem to help restore lost learning and memory abilities, according to a University of California, Irvine study.

The findings suggest that treating the predominant pathology of Alzheimer's disease -- beta-amyloid plaques -- by itself may have only limited clinical benefit if started after there is significant plaque growth. However, a combination of vaccination with therapies that also target related neuron damage and cognitive decline may provide the best treatment opportunity for people with this neurodegenerative disease. Study results appear in the April 2 issue of the *Journal of Neuroscience*.

"We've found that reducing plaques is only part of the puzzle to treat Alzheimer disease," said study leader, UC Irvine neurobiologist Elizabeth Head. "Vaccines such as this one are a good first step for effective Alzheimer's treatment, but complimentary treatments must be developed to address the complexity of the disease."

Head and colleagues studied for a two-year period in aging canines the effect of a vaccine that is currently under clinical development for treating patients with Alzheimer's disease. The vaccine contains the beta-amyloid 1-42 protein and stimulates the immune system to produce antibodies against this same protein that is in the brain plaques. Dogs are

used for such studies because beta-amyloid plaques grow naturally in their brains and they exhibit cognitive declines similar to those seen in humans.

After the aged dogs with beta-amyloid-plaque growth were immunized (which is similar to starting a treatment in patients with Alzheimer's disease), the researchers found, in comparison with non-treated aged dogs, little difference in the results of behavioral tests that measure cognitive loss. Later, brain autopsies showed that although plaques had been cleared from multiple brain regions -- including the entorhinal cortex, a region of the brain involved with learning and memory and primarily affected by Alzheimer's -- damaged neurons remained.

Head said this discovery helps explain why there was little difference in the behavioral test results between immunized and nonimmunized dogs. In addition, she added, it implies that after clearing beta-amyloid plaques from the brain, the next step is to repair these neurons. This approach will be critical for treating and reversing the effects of the Alzheimer's disease.

Currently, Head and her colleagues are developing approaches to repair these damaged neurons and hope to test them clinically.

Source: University of California - Irvine