Developing an Animal Model of Alzheimer's Disease: Multiple Hippocampal Injections of Beta-Amyloid (1-42) and the Effects on Spatial Learning and Memory in the Male Rat

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DEVELOPING AN ANIMAL MODEL OF ALZHEIMER'S DISEASE:
MULTIPLE HIPPOCAMPAL INJECTIONS OF BETA-AMYLOID (1-42)
AND THE EFFECTS ON SPATIAL LEARNING AND MEMORY IN
THE MALE RAT.

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Alzheimer's Disease (AD) is a neurodegenerative disorder which affects
approximately four million people in the United States alone. A diagnosis of
AD can be made only by performing a postmortem examination of the brain
and confirming the presence of high numbers of neuritic plaques and
neurofibrillary tangles, the pathological hallmarks of the disease. The
neuritic plaque is composed primarily of the 39- to 43- amino acid protein β-
Amyloid (βA), and is found in large quantities in structures such as the
hippocampus, which is intimately involved with learning and memory. βA
has been hypothesized to play a role in the onset of AD, but studies which
attempt to model the disease using single injections of the peptide fail to
produce consistent behavioral impairments. A number of recent studies have
suggested that chronic administration of βA or one of its fragments may be
more pathologically relevant to AD than single injections, and may also
produce more consistent impairments of spatial learning and memory. In
addition, our lab has demonstrated that multiple injections of the neurotoxic
fragment βA (25-35) into the septum, which projects to the hippocampus,
produce a marginal impairment on a spatial task. A marginal depletion of
cholinergic markers in the hippocampus was also produced. Since the βA
fragment has different chemical properties than the full length peptide, it is
conceivable that more profound behavioral and neurochemical impairments
may result from the use of βA (1-42). It is also possible that injections into
the hippocampus instead of the septum would produce a greater impairment
on learning and memory. Therefore, this study examines the effects of
multiple hippocampal injections of the full length βA (1-42) peptide on spatial
learning and memory in the rat.