



# Intranasal Spray of Oxytocin Might Improve Working Memory Performance in Alzheimer, Tracking with Diffusion Tensor Imaging



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## Abstract

Alzheimer's disease, neurodegenerative process, manifests as episodic memory loss and working memory impairment. Oxytocin affects dopamine and GABA releasing- modifier transmitters in working memory in prefrontal cortex, the center of working memory. Diffusion Tensor Imaging (DTI) is an MRI analyze method which can be used for tractography. We suggest that intranasal Oxytocin administration might improve working memory function which can be determined by tractography with DTI in these patients.

## Short Communication

Alzheimer's disease (AD) is a neurodegenerative process; manifests as episodic memory loss and working memory impairment [1]. Prefrontal cortex plays a key role in working memory which depends on modulating transmitters, dopamine and gamma-aminobutyric acid (GABA) [2,3]. The neurohypophysial hormone, oxytocin acts on lactation, parturition, modulating stress responses, pain perception, learning and different aspects of social behavior. Investigators suggest that oxytocin has potential therapeutic effects on depressive disorders because it induces hippocampal neurogenesis- a process altered in depression [4]. In this regard intranasal oxytocin administration found to be the most effective way to access to the central nervous system [5]. Dopamine concentrations in Alzheimer patients decreased (about 18-27%) in temporal and hippocampal cortices [6]. In addition to dopamine, significant reduction in GABA level has been identified in AD [7]. A recent study suggested that administration of single oxytocin dose has improved "executive component" of working memory (component contributing in information maintenance plus manipulation) in schizophrenic patients [8]. One of the oxytocin analogues induces GABAergic transmission [9]. Prefrontal cortex dopamine amounts might multiply upon oxytocinergic stimulation [10]. This can be resulted from pre-existing oxytocin receptor in prefrontal cortex [8]. Diffusion-weighted magnetic resonance imaging (DWI or DW-MRI) is an imaging method that uses the diffusion of water molecules to generate contrast in MR images [11,12]. A special kind of DWI, diffusion tensor imaging

(DTI), has been used extensively to map white matter tractography (a 3D modeling technique used to visually represent neural tracts) in the brain [13]. Structural connectivity can be explored using diffusion tensor imaging (DTI), which noninvasively assesses the integrity of white matter [11]. Based on abovementioned points, we hypothesize that a trial of intranasal spray of oxytocin would help improving working memory, and to evaluate the effect of treatment we suggest using tractography around hippocampus region.

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