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Alzheimer Patients and Navigation: Is Magnetoreception and Magnetite Involved in the Process?

Fredrik C Stormer*

Norwegian Institute of Public Health, Oslo Norway

Abstract

Since both memory and spatial navigation are affected in early stages of Alzheimer's disease, magnetite must be the key compound involved in these processes.

Keywords: Alzheimer; Navigation; Magnetite; Magnetoreception

Introduction

Negligible memory loss is a mild decline of Alzheimer's (AD) but easily be distinguished from the normal age-related memory loss.

Another early stage of the symptoms of AD is also in the use of both way finding and route learning strategies and it could be linked to a possible damaged magnetoreception mechanism in the brain. The aspects of spatial navigation may be particularly sensitive at detecting the earliest cognitive deficits of AD [1].

Magnetoreception allows an organism to detect natural magnetic fields. It is used by a range of animals for orientation and navigation and also to make regional maps. Recently it has been demonstrated good evidences for the presence of magnetoreception in human brain [2]. They report a strong specific human brain response to the Earth magnetic fields, and ferromagnetism remains a viable biophysical mechanism for sensory transduction. If so, magnetite must be involved since there is not reported any other magnetic substance in the human brain.

The Connection between Magnetite and AD

Magnetite is an iron oxide (Fe_3O_4) which is widely distributed among organisms without being involved in any biochemical reactions. The compound is present in the brain and is associated with neurogenerative diseases like AD [3]. There are strong indications that magnetite play an important role in the storage of memory in the human brain [4]. There is a link between AD and magnetite [5,6]. High levels of magnetite are found in patients with AD [7].

The grid cells are involved in a GPS like a navigation system and they could also in one way or another participate in the storage of memory. In rats is this ability present in these cells present in hippocampus and connected to AD [8,9]. It could be a connection between released magnetite from the damaged neurons and a possible magnetoreception system in the human brain. The grid cells are damaged in the early stage of AD due to the accumulation of tau protein which reduces the grid cell ability to fire [9]. Without sufficient signal strength, the neurons will not work properly and they will be disrupted. This may partly explain the problems with route learning and way finding in the early stages of Alzheimer's patients.

Conclusion

Magnetite is involved in several brain functions and it is not surprising that something can go wrong like disturbance of memory functions and navigation leading to diseases like AD.

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***Corresponding author:** Fredrik C Stormer, Norwegian Institute of Public Health, Oslo Norway, Tel: +4792268576; E-mail: fredrik.c.stormer@gmail.com

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