

# Could early identification of Changes in Olfactory Function be an Indicator of Preclinical Neurodegenerative Disease? A Systematic Review



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## Abstract

**Introduction:** Alzheimer's disease (AD) is a debilitating neurodegenerative disease that currently affects 850,000 individuals in the UK with estimates continuing to rise. Diagnosis is only available in the presence of significant neuronal pathology and apparent cognitive decline, meaning that treatment avenues are often limited and carry little to no effect on prognosis. Olfactory function has been shown to have a direct correlation with cognitive function and therefore may serve as a potential diagnostic tool for the detection of preclinical disease. Despite this, olfactory testing is not a clinical tool used routinely, which may represent a missed opportunity. The aim of this review is to critically appraise relevant literature to establish whether olfactory testing provides a suitably accurate preclinical biomarker of Alzheimer's Disease for clinical use, and if so, to make recommendations for future research to increase its accuracy.

**Methods:** A systematic review was performed using the search terms and Boolean operators 'Dementia OR Alzheimer's AND olfaction AND cognitive impairment' yielding 111 results. Articles were assessed via the inclusion/exclusion criteria alongside a PICO strategy.

**Results:** Despite different study designs, all studies included in this review found a correlation between OI and cognitive decline. This aligns with previous evidence. However, this review highlights novel limitations that may strengthen future work and result in the ability to use olfactory testing with greater accuracy in the future.

**Discussion:** The findings of this review align with current literature in demonstrating the correlation between olfactory and cognitive function. However, the strength of this review lies in the highlighting of multiple limitations that, if addressed in future work, may increase the accuracy of olfactory testing, and therefore its utilisation in clinical practise.

**Conclusion:** This systematic review aligns with the current literature; there is a connection between olfaction and cognition. However, the strength of this paper is in identifying limitations that may be preventing increasingly accurate conclusions to be found, which may facilitate regular clinical use, and the possibility of designing new therapeutic targets.

## Author Statements

### Conflicts of interest statement

No conflicts of interest have been declared by any authors.

## Authorship statement

All authors fulfill ICMJE authorship criteria, which can be accessed at <http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html>. All authors have read and approved

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