Alzheimer’s disease (AD) is the most common cause of dementia [1]. The scientific literature offers a good description of the tissue changes in the brain resulting from Alzheimer’s disease. The prevalence of certain substances, biomarkers, in the cerebrospinal fluid reflects these changes. Alzheimer’s disease can be diagnosed by testing cerebrospinal fluid obtained by lumbar puncture (spinal tap). However, a blood test would be an easier way to diagnose the disease.

Four potential biomarkers that can be measured in plasma and serum have been studied for Alzheimer’s disease: plasma or serum levels of amyloid β (Aβ), autoantibodies against Aβ, platelet amyloid precursor protein (platelet APP), and α1 antichymotrypsin (ACT).

Summary and Conclusions

Conclusions

- Currently, no biomarkers in blood can be used to diagnose Alzheimer’s disease.
- Of the four biomarkers studied, only platelet APP has shown differences between sick and healthy individuals. For the other biomarkers, the difference between sick and healthy people is insignificant.
- Large, independent studies are needed to determine whether platelet APP in blood tests could serve as a diagnostic tool.
- Studies using refined, highly sensitive measurement methods are needed to identify more biomarkers that could serve as diagnostic tools.

Method and target group

Alzheimer’s disease mainly affects the elderly, but the early-onset AD can debut before 65 years of age [1]. Most cases of AD are sporadic, while genetically inherited forms comprise less than 0.1% of cases. Inheritance is autosomal dominant. Today, patients with mild memory loss often seek care. At this early stage of the disease, diagnostic biomarkers that reveal the underlying disease process would be valuable. Such biomarkers are found in the cerebrospinal fluid (total tau, phosphorylated tau, and the 42-amino-acid-long isoform of amyloid β [Aβ42]). The biomarkers can be used to diagnose Alzheimer’s disease with a sensitivity and specificity of 80% to 95%, 5 to 10 years before the patient meets the criteria for dementia [2]. Nevertheless, it would be desirable to have markers in blood that could be used diagnostically to avoid spinal tap, which is a more difficult and time consuming procedure than blood testing.

This report covers the literature on biomarkers in blood for diagnosis of Alzheimer’s disease. We have included case-control studies and longitudinal studies of patients with mild cognitive disorders that later develop into Alzheimer’s disease (prodromal Alzheimer’s) [3].
used the clinical NINCDS-ADRDA criteria from 1984 as a standard reference [4]. Some studies also used DSM or ICD criteria.

Most of the studies found no, or clinically insignificant, differences between Alzheimer’s patients and controls for the biomarkers studied. The studies on Aβ, autoantibodies against Aβ, and ACT were excluded at this stage (39 studies) since they did not show any diagnostically relevant differences.

Six studies addressing platelet APP ratios show potentially useful diagnostic differences between clinically relevant comparison groups. Four of the six studies were excluded since they did not report on diagnostic accuracy. The two remaining studies were found to have medium quality, but were produced by the same research group. Hence, large and independent studies are needed.

**Ethical aspects**

If, in the future, a clinically useful blood test becomes available to diagnose the disease – in the absence of effective treatment – ethical considerations would be necessary. The possibility for early diagnosis, but not treatment, of Alzheimer’s disease would cause distress for patients and families. In the worst case, a diagnosis could stigmatise people in a very early stage of Alzheimer’s disease, even though they might never develop a serious case of the disease.

A clinically useful blood test could have several positive effects. For instance, early diagnosis could help explain altered and perhaps unusual behaviour. An early diagnosis could also increase opportunities to take steps in preparing for the later phase of disease.

**Economic aspects**

Costs and cost effectiveness were not analysed since accurate and diagnostically useful methods have yet to be identified.

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### References


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Blood Test for Early Diagnosis of Alzheimer’s Disease

The SBU Alert reports are produced in collaboration with experts from the respective subject areas, the National Board of Health and Welfare, the Medical Products Agency, the Swedish Association of Local Authorities and Regions, and a special advisory panel (the Alert Advisory Board).

This assessment was published in 2012. Findings based on strong scientific evidence usually continue to apply well into the future. However, findings based on insufficient, limited, or contradictory evidence might have already been replaced by more recent findings.

The complete report is available in Swedish.


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