International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

2734 17 Avenue SW,
Calgary, Alberta, T3E0A7,
Canada
+15878858911
editorial-office@sciformat.ca

ARTICLE TITLE	PLASMA p-tau217 AS A MINIMALLY INVASIVE BIOMARKER FOR ALZHEIMER'S DISEASE DIAGNOSIS: ANALYTICAL PLATFORMS, DIAGNOSTIC PERFORMANCE, AND CLINICAL IMPLEMENTATION CHALLENGES
DOI	https://doi.org/10.31435/ijitss.3(51).2026.6492
RECEIVED	20 May 2026
ACCEPTED	17 August 2026
PUBLISHED	21 August 2026
LICENSE	The article is licensed under a **Creative Commons Attribution 4.0 International License.**

PLASMA p-tau217 AS A MINIMALLY INVASIVE BIOMARKER FOR ALZHEIMER'S DISEASE DIAGNOSIS: ANALYTICAL PLATFORMS, DIAGNOSTIC PERFORMANCE, AND CLINICAL IMPLEMENTATION CHALLENGES

Oliwia Lenkiewicz *(Corresponding Author, Email: oliwialenkiewicz00@gmail.com)*
Nicolaus Copernicus Hospital, Copernicus PL Sp. z o.o., Gdańsk, Poland
ORCID ID: 0000-0002-4794-627X

Julia Lenkiewicz
Nicolaus Copernicus Hospital, Copernicus PL Sp. z o.o., Gdańsk, Poland
ORCID ID: 0000-0002-6976-6990

Zuzanna Chmielewska
University Clinical Centre, Gdańsk, Poland
ORCID ID: 0000-0003-1106-1119

Marcin Trzciński
Nicolaus Copernicus Hospital, Copernicus PL Sp. z o.o., Gdańsk, Poland
ORCID ID: 0000-0003-4817-7772

Agata Kotłowska
Nicolaus Copernicus Hospital, Copernicus PL Sp. z o.o., Gdańsk, Poland
ORCID ID: 0000-0001-9665-8533

Wiktoria Napiórkowska
Military Institute of Medicine – National Research Institute, Szaserów 128, 04-141 Warsaw, Poland
ORCID ID: 0009-0007-9546-3356

Aleksandra Izabela Masłowska
Military Institute of Medicine – National Research Institute, Szaserów 128, 04-141 Warsaw, Poland
ORCID ID: 0009-0006-7634-1006

Anna Gwóźdź-Broczkowska
Military Institute of Medicine – National Research Institute, Szaserów 128, 04-141 Warsaw, Poland
ORCID ID: 0009-0005-4839-5261

Gabriela Luba
National Medical Institute of the Ministry of the Interior and Administration, Warsaw, Poland
ORCID ID: 0009-0007-4262-2093

ABSTRACT

Background: Plasma phosphorylated tau at threonine 217 (p-tau217) has emerged as a promising minimally invasive biomarker for the biological detection of Alzheimer's disease. This review aimed to evaluate the analytical platforms used for plasma p-tau217 measurement, their diagnostic performance, and the principal challenges associated with its implementation in clinical practice.
Methods: A structured narrative review of publications issued between 2019 and 2026 was conducted using PubMed/MEDLINE, Scopus, and Web of Science, with Google Scholar and reference-list screening used as supplementary sources. Studies evaluating plasma p-tau217 assays, analytical validation, diagnostic accuracy, comparison with positron emission tomography or cerebrospinal fluid biomarkers, and clinical implementation were included. Owing to substantial methodological and analytical heterogeneity, findings were synthesised narratively.
Results: Plasma p-tau217 showed high diagnostic performance for identifying amyloid and tau pathology and generally outperformed other phosphorylated tau isoforms. Mass-spectrometry-based measurement, particularly percentage p-tau217, demonstrated the highest analytical selectivity and diagnostic accuracy. However, fully automated immunoassays showed greater potential for routine laboratory use because of their higher throughput and reduced technical complexity. Diagnostic performance varied according to the assay, cut-off values, clinical setting, disease prevalence, and patient characteristics. A two-cut-off strategy improved classification while retaining an intermediate group requiring confirmatory testing.
Conclusions: Plasma p-tau217 may substantially improve access to biological Alzheimer's disease diagnostics, but it should not be interpreted as a stand-alone test. Clinical implementation requires assay-specific validation, standardization, external quality control, and integration with clinical assessment and confirmatory diagnostic methods.

KEYWORDS

Alzheimer's Disease; Plasma p-tau217; Biomarkers; Analytical Platforms; Clinical Implementation

CITATION

Oliwia Lenkiewicz, Julia Lenkiewicz, Zuzanna Chmielewska, Marcin Trzciński, Agata Kotłowska, Wiktoria Napiórkowska, Aleksandra Izabela Masłowska, Anna Gwóźdź-Broczkowska, Gabriela Luba. (2026) Plasma p-tau217 as a Minimally Invasive Biomarker for Alzheimer's Disease Diagnosis: Analytical Platforms, Diagnostic Performance, and Clinical Implementation Challenges. *International Journal of Innovative Technologies in Social Science*. 3(51). doi: 10.31435/ijitss.3(51).2026.6492

Introduction and Aim

Alzheimer's disease (AD) is the most common cause of dementia and accounts for approximately 60%–80% of cases. Around 50 million people worldwide were estimated to be living with dementia, with substantial consequences not only for patients but also for their families and caregivers (Alzheimer's Association, 2021).

AD is a progressive neurodegenerative disorder characterized by worsening memory, disorientation, impairment of other cognitive functions, and, at more advanced stages, complete loss of independence. Global estimates indicate that the number of people living with dementia may increase from 57.4 million in 2019 to approximately 152.8 million by 2050, largely because of population growth and ageing. These projections emphasize the need for more accessible diagnostic methods and effective strategies to mitigate the consequences of the disease (GBD 2019 Dementia Forecasting Collaborators, 2022).

Historically, AD was diagnosed mainly on the basis of its clinical presentation; however, contemporary diagnostic frameworks increasingly emphasize its pathobiological basis. The principal neuropathological features include the deposition of amyloid-β in plaques within the brain parenchyma and cerebral vessels, together with abnormal tau metabolism and the formation of neurofibrillary tangles. These processes are accompanied by progressive synaptic dysfunction and loss. Although amyloid and tau are central to the biological definition of AD, the initiating causes and interactions among the pathogenic mechanisms remain incompletely understood (Long & Holtzman, 2019).

The diagnosis of AD remains challenging. One of the most promising contemporary blood biomarkers is tau phosphorylated at threonine 217 (p-tau217). Plasma p-tau217 may be useful not only in specialist neurological or memory clinics but also at earlier stages of the diagnostic pathway. In a prospective study of

1,213 patients undergoing evaluation for cognitive symptoms, p-tau217-based testing, used alone or in combination with the Aβ42/Aβ40 ratio, achieved an overall diagnostic accuracy of approximately 88%–92%. This performance exceeded the accuracy of routine clinical assessment performed without access to AD biomarker results (Palmqvist et al., 2024).

Plasma p-tau217 can be measured using several analytical technologies, including mass spectrometry and high-sensitivity immunoassays. Fully automated systems are now available, although individual assays differ in antibody design, analytical range, calibration, and diagnostic cut-offs. A fully automated Lumipulse p-tau217 immunoassay has demonstrated high accuracy for identifying AD pathology in both primary and secondary care settings (Palmqvist et al., 2025a).

Research published in 2026 suggests that the potential role of p-tau217 may extend beyond detecting the presence of AD pathology. Petersen and colleagues developed models based on longitudinal changes in plasma p-tau217 to estimate the timing of biomarker positivity and the age at the onset of symptomatic AD. These findings remain developmental and require further validation, but they illustrate the potential role of p-tau217 in biological staging, prognostication, and the selection of an appropriate time for treatment initiation (Petersen et al., 2026).

The development of blood-based biomarkers could simplify the diagnostic process and reduce reliance on expensive or invasive procedures. The aim of this review was to summarize current evidence on plasma p-tau217 as an innovative, minimally invasive biomarker supporting AD diagnosis; to compare the analytical technologies used for its measurement; to evaluate its diagnostic performance for amyloid and tau pathology; and to discuss its relationship with established diagnostic methods and the main limitations affecting clinical implementation.

Methodology

This study was conducted as a structured narrative review of the literature on plasma p-tau217 as a minimally invasive biomarker supporting the diagnosis of Alzheimer's disease. Publications issued between 2019 and 2026 were considered, with a focus on analytical platforms, diagnostic performance, and challenges related to implementation in clinical practice.

The literature was searched in PubMed/MEDLINE, Scopus, and Web of Science. Google Scholar and the reference lists of eligible articles were used as supplementary sources. The search used combinations of the terms "p-tau217," "phosphorylated tau 217," "plasma," "blood biomarker," "Alzheimer's disease," "immunoassay," "mass spectrometry," "diagnostic accuracy," and "clinical implementation."

Full-text studies involving adults were included when plasma p-tau217 was measured and the publication reported information on analytical technology, assay validation, or diagnostic performance. The review primarily considered cohort, cross-sectional, case-control, validation, and head-to-head platform comparison studies. Accepted reference standards included amyloid PET, tau PET, cerebrospinal fluid biomarkers, neuropathological assessment, and specialist clinical diagnosis. Preclinical studies, case reports, conference abstracts, publications without full text, and studies without separately reported plasma p-tau217 results were excluded.

Data extracted from eligible publications included study population characteristics, analytical platform, diagnostic cut-offs, reference standard, area under the receiver operating characteristic curve (AUC), sensitivity, specificity, and predictive values. Information on preanalytical variables, comorbidities, assay standardization, and organizational barriers was also considered.

Because of differences among platforms, populations, cut-offs, and reference standards, the findings were synthesized narratively. The evidence was organized into three principal categories: analytical platforms for p-tau217, diagnostic performance, and challenges associated with implementation in clinical practice.

Results

1. Current Diagnosis of Alzheimer's Disease

The reviewed recommendations indicate that AD diagnosis should not rely solely on the presence of clinical symptoms. European intersocietal recommendations support a multistep, patient-centered process in which diagnostic tests are selected according to the individual clinical syndrome and the results of preceding assessments. The framework was developed by experts representing 11 European scientific societies (Frisoni et al., 2024).

The initial assessment includes a detailed history, laboratory investigations, and structural brain imaging, most commonly magnetic resonance imaging (MRI) or computed tomography (CT), with electroencephalography used in selected cases. These findings guide the choice of subsequent biomarker investigations. Biological confirmation of AD is based primarily on evidence of amyloid-β and tau pathology, obtained through cerebrospinal fluid (CSF) biomarkers such as Aβ42, Aβ42/Aβ40, phosphorylated tau, and total tau, or through amyloid PET. FDG-PET, tau PET, SPECT, and other methods may be used according to the clinical question. Both European recommendations and revised Alzheimer's Association criteria emphasize that no single universal test panel is appropriate for every patient (Frisoni et al., 2024; Jack et al., 2024).

1.1. Clinical Assessment of Cognitive Impairment

The reviewed guidelines identify a detailed history obtained from the patient and, whenever possible, from a person familiar with the patient's everyday functioning as the foundation of diagnostic assessment. Information from the patient alone may be insufficient because insight into deficits may be limited. The history should address symptom onset, rate of progression, the dominant cognitive or behavioural changes, and their effect on functional independence.

Assessment should cover memory, orientation, language, attention, executive and visuospatial functions, behaviour, mood, and instrumental activities of daily living. Information on comorbidities, medication use, alcohol intake, sleep quality, vascular risk factors, and family history of dementia is also relevant (Atri et al., 2024).

Cognitive assessment should use validated screening instruments, such as the Mini-Mental State Examination or Montreal Cognitive Assessment. A single score should not be interpreted independently of age, education, language, emotional state, and sensory function. Comprehensive neuropsychological assessment is indicated in atypical, equivocal, or diagnostically complex cases to define the pattern of impairment across cognitive domains (Atri et al., 2024).

Basic laboratory testing is intended primarily to identify potentially reversible or aggravating causes of cognitive impairment. The DETeCD-ADRD recommendations include a complete blood count, a metabolic panel, vitamin B12, and thyroid-stimulating hormone among first-line investigations, with additional tests selected according to symptoms, comorbidities, and individual risk factors (Atri et al., 2024).

Differential diagnosis includes delirium, depression, medication effects, thyroid disease, vitamin deficiencies, cerebrovascular disease, and other neurodegenerative disorders. Particular attention is required to distinguish AD from dementia with Lewy bodies, frontotemporal dementia, and vascular cognitive impairment, while recognizing that mixed pathologies are common.

1.2. Structural and Functional Neuroimaging

Structural neuroimaging is recommended as part of the basic diagnostic evaluation. MRI is generally preferred because it enables detailed assessment of cerebral atrophy, including medial temporal and hippocampal atrophy, and can reveal vascular lesions, microbleeds, previous infarcts, tumours, hydrocephalus, and other abnormalities. This test is important both for assessing neurodegeneration and for ruling out alternative causes of cognitive impairment. CT remains a useful alternative when MRI is unavailable, contraindicated, or not tolerated (Shi et al., 2026).

PET methods provide complementary information. Amyloid PET assesses fibrillar amyloid-β deposition. A negative scan substantially reduces the probability that AD pathology explains the cognitive syndrome, whereas a positive scan confirms amyloid deposition but does not by itself establish that AD is the sole cause of symptoms, because amyloid may be present before symptom onset or coexist with other disorders (Chapleau et al., 2022).

Tau PET visualizes the distribution of aggregated tau. In contrast to amyloid deposition, which may precede symptoms by many years, the regional distribution of tau is more closely associated with neurodegeneration and the severity and topography of cognitive impairment. Tau PET can therefore support biological staging, although its availability remains limited (Maschio & Ni, 2022).

FDG-PET depicts regional glucose metabolism and provides an indirect measure of synaptic and neuronal function. AD is commonly associated with hypometabolism in temporoparietal regions, the posterior cingulate cortex, and the precuneus. FDG-PET may support differential diagnosis, whereas amyloid PET directly evaluates amyloid pathology; the choice between methods should therefore be guided by the clinical question and the results of prior assessment.

1.3. Cerebrospinal Fluid Biomarkers

CSF analysis enables assessment of core biomarkers related to AD, including Aβ42, the Aβ42/Aβ40 ratio, phosphorylated tau, and total tau. Reduced CSF Aβ42 is associated with cerebral amyloid deposition. Ratios combining p-tau or total tau with Aβ42 may show closer agreement with amyloid PET than Aβ42 alone (van Harten et al., 2022).

Increased phosphorylated tau reflects AD-associated alterations in tau metabolism. P-tau181 is widely used in routine CSF testing, whereas evidence suggests that p-tau217 may increase early in response to amyloid-β pathology (Janelidze et al., 2020). Total tau is a marker of neuronal injury but is not specific to AD because it may be elevated in other neurological conditions. Combining an abnormal amyloid marker with elevated p-tau generally provides greater diagnostic information than interpreting individual biomarkers in isolation (van Harten et al., 2022; Zetterberg & Blennow, 2021).

CSF biomarkers are particularly useful in early or atypical presentations, when clinical and imaging findings are discordant, and in differential diagnosis. Their reliability is affected by the sampling procedure, tube type, transport, storage time, and analytical method. International recommendations therefore emphasize standardization of preanalytical handling to reduce interlaboratory variability (Hansson et al., 2021).

1.4. Limitations of Current Diagnostic Methods

Despite their diagnostic value, current methods have important limitations. PET examinations are expensive and require dedicated scanners, appropriate radiotracers, and experienced personnel. Their availability is therefore concentrated in larger clinical and research centers and is insufficient for universal use among all individuals reporting memory concerns (Leuzy et al., 2025).

CSF biomarker testing is more widely available than PET in many settings but requires lumbar puncture. Although the procedure is generally safe, it may cause patient concern and requires trained staff and an appropriate clinical infrastructure. Differences in sample collection, storage, analytical platforms, and laboratory-specific cut-offs remain additional sources of variability (Hansson et al., 2021).

These limitations support the development of simpler, less expensive, and minimally invasive triage tests. Plasma biomarkers, including p-tau217, may help identify patients who require confirmatory PET or CSF testing. They should, however, be integrated into a multistep diagnostic pathway rather than replace comprehensive clinical assessment.

2. Plasma p-tau217

2.1. p-tau217 Across the Alzheimer's Disease Continuum

In a study of 1,402 participants from three cohorts, Palmqvist and colleagues found a strong association between plasma p-tau217 and both amyloid and tau pathology. P-tau217 differentiated AD from other neurodegenerative diseases more accurately than the other evaluated methods (Palmqvist et al., 2020).

The association between p-tau217 and amyloid-β deposition was detectable even in individuals without dementia. Longitudinal findings indicate that plasma p-tau217 increases during early AD stages and may be useful for identifying early biological changes and monitoring progression of AD (Mattsson-Carlgren et al., 2020).

These results suggest that increased plasma p-tau217 is not merely a nonspecific consequence of neuronal injury. Its early elevation is closely associated with amyloid-β pathology, while further increases occur alongside the development of tau pathology and clinical progression.

2.2. p-tau217 Compared With Other Plasma p-tau Biomarkers

A 2025 systematic review and meta-analysis found that p-tau217 was among the most promising blood biomarkers for diagnosis of AD. Table 1 summarizes the pooled diagnostic performance of the evaluated p-tau isoforms (Therriault et al., 2025).

Table 1. Diagnostic performance of plasma p-tau biomarkers based on the meta-analysis by Therriault et al. (2025)

Biomarker	Sensitivity	Specificity	AUROC	Diagnostic odds ratio	Interpretation
p-tau217	88.1%	88.7%	91.1%	50.7	Highest overall diagnostic performance among the evaluated biomarkers.
p-tau181	80.5%	76.4%	81.5%	13.4	Lower overall accuracy than p-tau217.
p-tau205	76.6%	86.0%	85.1%	20.2	Lower overall accuracy than p-tau217.
p-tau212	84.5%	87.3%	90.3%	41.2	Second-highest diagnostic performance after p-tau217.
p-tau231	75.2%	75.3%	80.2%	9.3	Lowest sensitivity and specificity among the presented biomarkers.

The meta-analysis therefore supports a higher diagnostic potential for p-tau217 than for the other evaluated p-tau biomarkers, particularly for detecting the biological pathology of AD. Nevertheless, results should be interpreted according to the analytical platform, cut-off, pretest probability, and clinical presentation. Prospective implementation studies using prespecified, independently validated thresholds are still needed because many of the primary studies included in the meta-analysis were at high risk of bias (Therriault et al., 2025).

3. Analytical Platforms for the Measurement of Plasma p-tau217

Recent studies have measured plasma p-tau217 primarily with mass-spectrometry-based methods and immunoassays. Table 2 compares the major analytical platforms and the findings reported in the studies included in this review.

Table 2. Comparison of analytical platforms used to measure plasma p-tau217

Publication	Platform or method	Key findings for p-tau217
Montoliu-Gaya et al. (2023) Nature Aging	Immunoprecipitation coupled with mass spectrometry. Simultaneous measurement of p-tau181, p-tau199, p-tau202, p-tau205, p-tau217, p-tau231, and two non-phosphorylated tau peptides in plasma.	The method enabled simultaneous measurement of multiple tau fragments. P-tau217 correlated with amyloid PET (r =.70) and tau PET (r =.58). Absolute plasma p-tau217 achieved an AUC of.85 for amyloid PET positivity, while the phosphorylated-to-non-phosphorylated ratio increased the AUC to.94.
Barthélemy et al. (2024) Nature Medicine	Mass spectrometry in the BioFINDER-2 and Knight ADRC cohorts; measurement of %p-tau217 as the ratio of p-tau217 to the corresponding non-phosphorylated tau fragment.	Across two independent cohorts, %p-tau217 achieved an AUC of approximately.97 for amyloid PET and.97 for tau PET. Among cognitively impaired participants, accuracy was 89%–90% for amyloid PET and 87%–88% for tau PET.
Ashton et al. (2024) JAMA Neurology	Commercial high-sensitivity ALZpath pTau217 immunoassay using monoclonal antibodies directed against p-tau217.	The assay was evaluated in three cohorts and showed accuracy similar to CSF biomarkers for identifying amyloid and tau PET pathology.

Kivisäkk et al. (2024) Scientific Reports	MSD S-PLEX assay using high-sensitivity electrochemiluminescence.	In 131 participants, the assay achieved an AUC of.98 for distinguishing biomarker-confirmed AD from controls. P-tau217 was 3.9-fold higher in the AD group, and the assay showed a low limit of quantification and good precision.
Warmenhoven et al. (2025) Brain	Head-to-head comparison of five tests: two mass-spectrometry methods and immunoassays developed by Lilly Research Laboratories, Johnson & Johnson Innovative Medicine, and ALZpath.	All tests identified abnormal amyloid PET (AUC.91–.96) and tau PET (AUC.94–.97). Mass-spectrometry %p-tau217 performed best for amyloid PET, with accuracy.93, sensitivity.91, and specificity.94; immunoassay accuracy ranged from.83 to.88.
Palmqvist et al. (2025a) Nature Medicine	Fully automated chemiluminescent Lumipulse p-tau217 assay.	The study included 1,767 patients with cognitive symptoms in four cohorts. AUC values were.93–.96. Performance was comparable with mass spectrometry in specialist care but somewhat lower in primary care and among older patients.

Note. Results obtained using different p-tau217 platforms are not directly interchangeable. Each method requires independently validated cut-offs and interpretation within the intended clinical population. AUC = area under the receiver operating characteristic curve.

4. Diagnostic Performance of Plasma p-tau217

The reviewed studies consistently reported high performance of plasma p-tau217 for identifying biological features of AD. However, performance varied across publications because of differences in analytical platform, cut-off selection, reference standard, and population characteristics (Ashton et al., 2024; Barthélemy et al., 2024; Palmqvist et al., 2024, 2025a; Warmenhoven et al., 2025).

4.1. Diagnostic Test Parameters

Diagnostic performance was evaluated mainly using sensitivity, specificity, predictive values, and AUC. Sensitivity is the proportion of individuals with AD pathology who are correctly classified as positive, whereas specificity is the proportion without the pathology who are correctly classified as negative. The positive predictive value is the probability that pathology is present following a positive result, and the negative predictive value is the probability that pathology is absent following a negative result. Predictive values depend on the prevalence of pathology in the tested population. AUC summarizes the overall ability of a test to distinguish reference-positive from reference-negative cases, with values close to 1.0 indicating excellent discrimination. Agreement was most commonly assessed against amyloid PET, tau PET, or CSF biomarker profiles.

4.2. Detection of Amyloid Pathology

Plasma p-tau217 showed strong agreement with amyloid PET and CSF amyloid biomarkers. Ashton and colleagues reported that a commercially available p-tau217 immunoassay identified biological AD with accuracy comparable to CSF testing, and that interpretive ranges were reproducible across independent cohorts (Ashton et al., 2024).

In the study by Barthélemy and colleagues, mass-spectrometry-based %p-tau217 achieved an AUC of approximately.97 for amyloid PET. Among cognitively impaired individuals, classification accuracy for amyloid pathology was 89%–90% (Barthélemy et al., 2024).

Multimarker profiles may provide additional information. Palmqvist and colleagues compared mass-spectrometry %p-tau217 alone with the APS2 algorithm, which combined %p-tau217 and Aβ42/Aβ40. Both APS2 and %p-tau217 alone showed high accuracy in patients with cognitive symptoms evaluated in primary and secondary care (Palmqvist et al., 2024).

4.3. Detection of Tau Pathology

Plasma p-tau217 was also associated with tau PET and CSF tau biomarkers. In the study by Barthélemy and colleagues, %p-tau217 achieved an AUC of approximately.98 for abnormal tau PET, with classification accuracy of 87%–88% among cognitively impaired participants (Barthélemy et al., 2024).

4.4. Differentiation of Alzheimer's Disease From Other Disorders

Palmqvist and colleagues found that plasma p-tau217 differentiated AD from other neurodegenerative diseases more accurately than the evaluated plasma markers and MRI measures, with performance comparable to key PET and CSF methods (Palmqvist et al., 2020).

In a direct comparison of AD and frontotemporal lobar degeneration, p-tau217 outperformed p-tau181, particularly for identifying amyloid PET positivity and in its stronger association with tau PET signal (Thijssen et al., 2021).

In patients with dementia with Lewy bodies or Parkinson's disease dementia, elevated p-tau217 may indicate coexisting AD pathology rather than α-synuclein pathology itself (Hall et al., 2021).

Postmortem evidence further indicates that elevated p-tau217 in non-AD dementias, including cases with cerebrovascular or other co-pathologies, should not automatically be regarded as a false-positive result. Instead, it may reflect concurrent AD neuropathological change. Accordingly, p-tau217 identifies AD-related amyloid and tau pathology but cannot independently establish the principal cause of a patient's cognitive syndrome (Kivisäkk et al., 2026).

4.5. Performance in Different Patient Groups

The greatest clinical utility has been demonstrated in people with mild cognitive impairment or mild dementia, in whom the pretest probability of AD is moderate or high. In established dementia, p-tau217 can support differential diagnosis, but a positive result does not exclude mixed pathology.

In cognitively unimpaired populations, p-tau217 may identify early amyloid-related change; however, the lower prevalence of pathology reduces the positive predictive value. Positive results in this setting more often require confirmation with PET or CSF biomarkers (Ashton et al., 2024).

In the study of 1,213 patients, p-tau217-based tests achieved high accuracy in both primary and secondary care (Palmqvist et al., 2024).

For the fully automated Lumipulse platform, AUC values ranged from.93 to.96, with classification accuracy of approximately 89%–91% in specialist care and 85% in primary care (Palmqvist et al., 2025a).

4.6. Two-Cut-off Strategy

A two-cut-off strategy uses a lower threshold below which AD pathology is unlikely and an upper threshold above which it is highly likely. Results between these thresholds form an intermediate zone and require confirmation with PET or CSF biomarkers.

In the study by Barthélemy and colleagues, the two-threshold approach increased accuracy to approximately 95% (Barthélemy et al., 2024).

For the Lumipulse assay, the same strategy increased accuracy to 92%–94%, while 12%–17% of patients remained in the intermediate zone. This approach may reduce the number of confirmatory procedures but does not eliminate the need to interpret p-tau217 in conjunction with clinical findings (Palmqvist et al., 2025a).

5. Implementation of p-tau217 in Clinical Practice

5.1. Potential Position in the Diagnostic Pathway

The reviewed publications support the use of p-tau217 within a multistep diagnostic process rather than as a stand-alone basis for diagnosis. Testing may be considered after clinical and neurological assessment, neuropsychological evaluation, and structural brain imaging. P-tau217 can then provide an initial estimate of the probability of AD pathology. A negative result may reduce the need for further biomarker testing, whereas a positive or intermediate result may indicate the need for amyloid PET or CSF analysis (Palmqvist et al., 2025a, 2025b).

The Alzheimer's Association clinical practice guideline emphasizes that blood-based biomarker results should be interpreted within the clinical context and according to the performance characteristics of the specific assay (Palmqvist et al., 2025b).

5.2. Primary Versus Specialist Care

The clinical value of p-tau217 depends on the prevalence of AD pathology in the tested population. In primary care, where pretest probability is generally lower, the positive predictive value may be lower and the negative predictive value higher than in specialist memory clinics. In secondary care, the opposite pattern is expected.

In the study by Palmqvist and colleagues, the fully automated p-tau217 assay achieved an AUC of.93–.96. Classification accuracy was approximately 85% in primary care and 89%–91% in specialist care. These differences indicate that the same cut-off should not be applied uncritically across clinical settings. Primary-care implementation also requires clinician education and access to specialist consultation and confirmatory testing (Palmqvist et al., 2025a).

5.3. Assay Standardization and Cut-offs

Differences among analytical platforms constitute a major barrier to implementation. Assays use different antibodies, calibrators, detection systems, and reporting units. Head-to-head studies have shown that tests measuring the same analyte may differ in diagnostic accuracy and are not directly interchangeable (Warmenhoven et al., 2025).

In an interlaboratory study, p-tau217 showed better cross-platform agreement than several other p-tau forms, but substantial quantitative differences remained. Certified reference materials, harmonized calibration procedures, external quality assessment, and assay- and population-specific cut-offs are therefore required (Ashton et al., 2025).

5.4. Preanalytical Factors

Most p-tau217 studies have used EDTA plasma. The collection tube and specimen type should follow the procedure validated for the particular assay because plasma and serum results cannot be assumed to be equivalent.

Kurz and colleagues found that p-tau217 remained stable in whole blood for up to 24 hours at room temperature and in separated plasma for approximately 6 hours, with acceptable stability across several freeze–thaw cycles (Kurz et al., 2023).

Bali and colleagues reported that centrifugation after thawing improved the agreement of plasma p-tau217 with CSF biomarkers, whereas up to three freeze–thaw cycles had no material effect on the result (Bali et al., 2024). Despite its relative stability, laboratory procedures should standardize the time to centrifugation, storage temperature, transportation, and the number of freeze–thaw cycles (Bali et al., 2024; Kurz et al., 2023).

5.5. Biological and Clinical Factors

P-tau217 concentrations may be influenced by factors unrelated to the burden of AD pathology. Yun and colleagues reported higher values in individuals with chronic kidney disease, anemia, and lower body mass index. P-tau217 was inversely associated with estimated glomerular filtration rate, hemoglobin, and body mass index (Yun et al., 2026). Cut-offs adjusted for these factors improved classification, particularly in patients with impaired kidney function or anemia. Interpretation should also consider age, disease stage, and the pretest probability of AD pathology.

5.6. Cost and Organization of Diagnostic Services

Automated assays can process large numbers of samples without the infrastructure required for PET or specialized CSF analysis. They may therefore serve as triage tests that reduce the use of more expensive and invasive procedures. Cost-effectiveness will nevertheless depend on the price of the assay, disease prevalence, the proportion of intermediate results, and the consequences of false-positive and false-negative classifications. The analysis by Yun and colleagues suggested that appropriately selected cut-offs may improve accuracy and reduce costs, although a two-threshold strategy inevitably leaves a subgroup requiring further PET assessment (Yun et al., 2026).

Discussion

The reviewed evidence indicates that plasma p-tau217 is one of the most accurate blood biomarkers for identifying the biological features of AD. High AUC values, sensitivity, and specificity have been reported for both mass-spectrometry methods and selected immunoassays. This does not mean, however, that every p-tau217 assay is sufficiently accurate for independent diagnostic use. The meta-analysis by Pahlke and colleagues showed substantial variability across individual tests according to analytical platform, cut-off, population, and reference standard (Pahlke et al., 2025).

The highest analytical performance has generally been reported for %p-tau217 measured by immunoprecipitation associated with mass spectrometry. In a head-to-head comparison, this method achieved an accuracy of.93 for amyloid positivity, whereas the evaluated immunoassays achieved accuracies of.83–.88. (Warmenhoven et al., 2025). Mass spectrometry is, however, expensive, technically complex, and difficult to implement outside of reference laboratories. Fully automated immunoassays such as Lumipulse may therefore have greater potential for routine practice because they provide high throughput, reduce manual handling, and can be integrated into clinical laboratory workflows (Palmqvist et al., 2025a).

P-tau217 may reduce the number of PET examinations and lumbar punctures, but it should not automatically replace these methods in every clinical situation. Barthélemy and colleagues demonstrated that high-quality %p-tau217 measurement can achieve performance similar or superior to clinically established CSF tests for detecting AD pathology (Barthélemy et al., 2024).

The 2025 Alzheimer's Association guideline states that a blood-based biomarker test may substitute for amyloid PET or CSF biomarkers in specialist care if the specific assay achieves at least 90% sensitivity and 90% specificity. Tests with at least 90% sensitivity and 75% specificity may be used as tools for qualification for further diagnosis process. These recommendations apply to patients with objective cognitive impairment and do not replace comprehensive clinical and specialist assessment (Palmqvist et al., 2025b).

A two-cut-off strategy appears safer than a single universal threshold. The lower cut-off can identify patients in whom pathology is unlikely, whereas the upper cut-off indicates a high probability of pathology. Patients in the intermediate zone are referred for PET or CSF testing. With the automated Lumipulse assay, this approach increased accuracy to approximately 92%–94%, while 12%–17% of patients remained in the indeterminate group. The principal advantage is a reduction in confirmatory testing without encouraging premature diagnosis (Palmqvist et al., 2025a).

Results obtained in specialist clinics cannot be transferred directly to primary care. In specialists' care, the prevalence of AD pathology is higher, which increases the positive predictive value. The fully automated assay achieved an accuracy of approximately 89%–91% in specialist care and approximately 85% in primary care (Palmqvist et al., 2025a). In practice, diagnostic thresholds and the interpretation of predictive values should therefore reflect pretest probability and the intended setting (Therriault et al., 2024).

Comorbidities may further complicate interpretation. Impaired kidney function is associated with higher circulating concentrations of soluble tau and may increase the risk of false-positive classifications. The ratio of phosphorylated T217 to total T217 partly reduced this influence. Age, disease stage, sampling conditions, and sample storage should also be considered before implementation (Janelidze et al., 2023).

Within the European diagnostic pathway, p-tau217 should be considered as the next step in diagnosis after clinical and neuropsychological assessment and structural brain imaging. It may then function as a first-line biomarker that helps select patients for further investigations to detect AD. This approach is consistent with the European consensus, which recommends selecting first- and second-line biomarkers according to the clinical syndrome and the results of preceding investigations (Frisoni et al., 2024). The clinical value of p-tau217 therefore depends not only on its analytical accuracy but also on platform-specific cut-offs, pretest probability, patient characteristics, and its position within the overall diagnostic process.

Conclusions

Plasma p-tau217 is one of the most promising blood biomarkers for supporting the diagnosis of Alzheimer's disease. The reviewed evidence demonstrates strong associations with both amyloid and tau pathology, and its diagnostic performance frequently exceeds that of other plasma p-tau biomarkers. Particularly high accuracy has been achieved using immunoprecipitation coupled with mass spectrometry, including %p-tau217 measurements. Widespread implementation of mass spectrometry remains limited by cost, technical complexity, and the need for specialized laboratory infrastructure. Fully automated immunoassays therefore currently have the greatest implementation potential because they offer high throughput, shorter analytical times, and compatibility with routine clinical laboratories.

Despite its high performance, p-tau217 should not be treated as a completely independent basis for an AD diagnosis. The result must be interpreted in relation to the clinical presentation, neuropsychological findings, structural brain imaging, and the pretest probability of disease. Its most appropriate current role is as a first-line or triage biomarker used to identify patients who require further investigation. A negative result may reduce the need for expensive or invasive tests, whereas a positive or indeterminate result may require confirmation with PET or CSF biomarkers.

A two-cut-off strategy may reduce misclassification by distinguishing likely negative, likely positive, and intermediate results. Diagnostic thresholds should nevertheless be developed separately for specific platforms and populations because performance depends on disease prevalence, clinical setting, and patient characteristics. Age, kidney function, anemia, body mass index, and other comorbidities may affect reliability. The principal implementation barriers are incomplete assay standardization, limited interchangeability of platforms, differences in calibration and reporting units, and insufficient interlaboratory quality control. Further research should prioritize independent validation of cut-offs, direct platform comparisons, and evaluation in real-world primary and specialist care so that plasma p-tau217 can be incorporated safely into everyday clinical practice.

Funding: This research received no external funding.

Conflict of interest: No conflicts of interest to declare.

Ethical approval: Ethical approval was not required because this narrative review was based exclusively on previously published literature and did not involve human participants, animals, or identifiable patient data.

REFERENCES

1. Alzheimer's Association. (2021). Alzheimer's disease facts and figures. *Alzheimer's & Dementia, 17*(3). https://doi.org/10.1002/alz.12328
2. Ashton, N. J., Brum, W. S., Di Molfetta, G., Benedet, A. L., Arslan, B., Jonaitis, E. M., Langhough, R., Cody, K. A., Wilson, R. E., Carlsson, C. M., Vanmechelen, E., Montoliu-Gaya, L., Lantero-Rodriguez, J., Rahmouni, N., Tissot, C., Stevenson, J., Servaes, S., Therriault, J., Pascoal, T. A., … Zetterberg, H. (2024). Diagnostic accuracy of a plasma phosphorylated tau 217 immunoassay for Alzheimer disease pathology. *JAMA Neurology, 81*(3). https://doi.org/10.1001/jamaneurol.2023.5319
3. Ashton, N. J., Keshavan, A., Brum, W. S., Andreasson, U., Arslan, B., Droescher, M., Barghorn, S., Vanbrabant, J., Lambrechts, C., Van Loo, M., Stoops, E., Iyengar, S., Ji, H., Xu, X., Forrest-Hay, A., Zhang, B., Luo, Y., Jeromin, A., Vandijck, M., … Zetterberg, H. (2025). The Alzheimer's Association Global Biomarker Standardization Consortium (GBSC) plasma phospho-tau round robin study. *Alzheimer's & Dementia, 21*(2). https://doi.org/10.1002/alz.14508
4. Atri, A., Dickerson, B. C., Clevenger, C., Karlawish, J., Knopman, D., Lin, P. J., Norman, M., Onyike, C., Sano, M., Scanland, S., & Carrillo, M. (2024a). Alzheimer's Association clinical practice guideline for the diagnostic evaluation, testing, counseling, and disclosure of suspected Alzheimer's disease and related disorders (DETeCD-ADRD): Executive summary of recommendations for primary care. *Alzheimer's & Dementia, 21*(6). https://doi.org/10.1002/alz.14333
5. Bali, D., Hansson, O., & Janelidze, S. (2024). Effects of certain pre-analytical factors on the performance of plasma phospho-tau217. *Alzheimer's Research & Therapy, 16*(1). https://doi.org/10.1186/s13195-024-01391-1
6. Barthélemy, N. R., Salvadó, G., Schindler, S., He, Y., Janelidze, S., Collij, L. E., Saef, B., Henson, R. L., Chen, C. D., Gordon, B. A., Li, Y., La Joie, R., Benzinger, T. L. S., Morris, J. C., Mattsson-Carlgren, N., Palmqvist, S., Ossenkoppele, R., Rabinovici, G. D., Stomrud, E., … Hansson, O. (2024). Highly accurate blood test for Alzheimer's disease comparable or superior to clinical CSF tests. *Nature Medicine, 30*, 1–1. https://doi.org/10.1038/s41591-024-02869-z
7. Chapleau, M., Iaccarino, L., Soleimani-Meigooni, D., & Rabinovici, G. D. (2022). The role of amyloid PET in imaging neurodegenerative disorders: A review. *Journal of Nuclear Medicine, 63*(Supplement 1), 13S–19S. https://doi.org/10.2967/jnumed.121.263195
8. Frisoni, G. B., Festari, C., Massa, F., Cotta Ramusino, M., Orini, S., Aarsland, D., Agosta, F., Babiloni, C., Borroni, B., Cappa, S. F., Frederiksen, K. S., Froelich, L., Garibotto, V., Haliassos, A., Jessen, F., Kamondi, A., Kessels, R. P., Morbelli, S. D., O'Brien, J. T., … Nobili, F. (2024). European intersocietal recommendations for the biomarker-based diagnosis of neurocognitive disorders. *The Lancet Neurology, 23*(3), 302–312. https://doi.org/10.1016/S1474-4422(23)00447-7
9. GBD 2019 Dementia Forecasting Collaborators. (2022). Estimation of the global prevalence of dementia in 2019 and forecasted prevalence in 2050: An analysis for the Global Burden of Disease Study 2019. *The Lancet Public Health, 7*(2). https://doi.org/10.1016/S2468-2667(21)00249-8
10. Hall, S., Janelidze, S., Londos, E., Leuzy, A., Stomrud, E., Dage, J. L., & Hansson, O. (2020). Plasma phospho-tau identifies Alzheimer's co-pathology in patients with Lewy body disease. *Movement Disorders, 36*(3), 767–771. https://doi.org/10.1002/mds.28370
11. Hansson, O., Batrla, R., Brix, B., Carrillo, M. C., Corradini, V., Edelmayer, R. M., Esquivel, R. N., Hall, C., Lawson, J., Le Bastard, N., Molinuevo, J. L., Nisenbaum, L. K., Rutz, S., Salamone, S. J., Teunissen, C. E., Traynham, C., Umek, R. M., Vanderstichele, H., Vandijck, M., … Blennow, K. (2021). The Alzheimer's Association international guidelines for handling of cerebrospinal fluid for routine clinical measurements of amyloid β and tau. *Alzheimer's & Dementia, 17*(9), 1575–1582. https://doi.org/10.1002/alz.12316
12. Jack, C. R., Andrews, J. S., Beach, T. G., Buracchio, T., Dunn, B., Graf, A., Hansson, O., Ho, C., Jagust, W., McDade, E., Molinuevo, J. L., Okonkwo, O. C., Pani, L., Rafii, M. S., Scheltens, P., Siemers, E., Snyder, H. M., Sperling, R., Teunissen, C. E., & Carrillo, M. C. (2024). Revised criteria for diagnosis and staging of Alzheimer's disease: Alzheimer's Association Workgroup. *Alzheimer's & Dementia, 20*(8). https://doi.org/10.1002/alz.13859
13. Janelidze, S., Barthélemy, N. R., He, Y., Bateman, R. J., & Hansson, O. (2023). Mitigating the associations of kidney dysfunction with blood biomarkers of Alzheimer disease by using phosphorylated tau to total tau ratios. *JAMA Neurology*. https://doi.org/10.1001/jamaneurol.2023.0199

14. Janelidze, S., Stomrud, E., Smith, R., Palmqvist, S., Mattsson, N., Airey, D. C., Proctor, N. K., Chai, X., Shcherbinin, S., Sims, J. R., Triana-Baltzer, G., Theunis, C., Slemmon, R., Mercken, M., Kolb, H., Dage, J. L., & Hansson, O. (2020). Cerebrospinal fluid p-tau217 performs better than p-tau181 as a biomarker of Alzheimer's disease. *Nature Communications, 11*(1), 1683. https://doi.org/10.1038/s41467-020-15436-0
15. Kivisäkk, P., Fatima, H. A., Cahoon, D. S., Otieno, B., Chacko, L., Minooei, F., Demos, C., Stengelin, M., Sigal, G., Wohlstadter, J., & Arnold, S. E. (2024). Clinical evaluation of a novel plasma pTau217 electrochemiluminescence immunoassay in Alzheimer's disease. *Scientific Reports, 14*(1). https://doi.org/10.1038/s41598-024-51334-x
16. Kivisäkk, P., Fatima, H., Wu, C.-Y., Padmanabhan, N., Romero, D., Gorham, T., Weik, M., Dodge, H. H., Scherzer, C. R., Das, S., Chibnik, L. B., Blacker, D. L., Gomez-Isla, T., Oakley, D. H., Frosch, M. P., Hyman, B. T., Demos, C., Sigal, G., Wohlstadter, J. N., … Arnold, S. E. (2026). Postmortem associations between Alzheimer disease pathology and plasma pTau217, GFAP, and NfL in AD and AD-related dementias. *Neurology, 106*(4). https://doi.org/10.1212/WNL.0000000000214351
17. Kurz, C., Stöckl, L., Schrurs, I., Suridjan, I., Gürsel, S. Ü., Bittner, T., Jethwa, A., & Perneczky, R. (2023). Impact of pre-analytical sample handling factors on plasma biomarkers of Alzheimer's disease. *Journal of Neurochemistry, 165*(1), 95–105. https://doi.org/10.1111/jnc.15757
18. Leuzy, A., Bollack, A., Pellegrino, D., Teunissen, C. E., La Joie, R., Rabinovici, G. D., Franzmeier, N., Johnson, K., Barkhof, F., Shaw, L. M., Arkhipenko, A., Schindler, S. E., Honig, L. S., Rial, A. M., Schöll, M., Zetterberg, H., Blennow, K., Hansson, O., & Farrar, G. (2025). Considerations in the clinical use of amyloid PET and CSF biomarkers for Alzheimer's disease. *Alzheimer's & Dementia, 21*(3). https://doi.org/10.1002/alz.14528
19. Long, J. M., & Holtzman, D. M. (2019). Alzheimer disease: An update on pathobiology and treatment strategies. *Cell, 179*(2), 312–339. https://doi.org/10.1016/j.cell.2019.09.001
20. Maschio, C., & Ni, R. (2022). Amyloid and tau positron emission tomography imaging in Alzheimer's disease and other tauopathies. *Frontiers in Aging Neuroscience, 14*. https://doi.org/10.3389/fnagi.2022.838034
21. Mattsson-Carlgren, N., Janelidze, S., Palmqvist, S., Cullen, N., Svenningsson, A. L., Strandberg, O., Mengel, D., Walsh, D. M., Stomrud, E., Dage, J. L., & Hansson, O. (2020). Longitudinal plasma p-tau217 is increased in early stages of Alzheimer's disease. *Brain, 143*(11), 3234–3241. https://doi.org/10.1093/brain/awaa286
22. Montoliu-Gaya, L., Benedet, A. L., Tissot, C., Vrillon, A., Ashton, N. J., Karikari, T. K., Triana-Baltzer, G., Qu, Y., Theunis, C., Hirtz, C., Lehmann, S., Blennow, K., Zetterberg, H., & Pascoal, T. A. (2023). Mass spectrometric simultaneous quantification of tau species in plasma shows differential associations with amyloid and tau pathologies. *Nature Aging, 3*, 661–669. https://doi.org/10.1038/s43587-023-00405-1
23. Pahlke, S., Kahale, L. A., Mahinrad, S., Sousa-Pinto, B., Vieira, R. J., McAteer, M. B., Claessen, T., Contador, J., Hofmann, A., Kuchenbecker, L. A., Machado, L. S., Warmenhoven, N., Yakoub, Y., Palmqvist, S., Schindler, S. E., Teunissen, C., Whitson, H. E., Zetterberg, H., Edelmayer, R., & Tampi, M. P. (2025). Blood-based biomarkers for detecting Alzheimer's disease pathology in cognitively impaired individuals within specialized care settings: A systematic review and meta-analysis. *Alzheimer's & Dementia, 21*(11). https://doi.org/10.1002/alz.70828
24. Palmqvist, S., Janelidze, S., Quiroz, Y. T., Zetterberg, H., Lopera, F., Stomrud, E., Su, Y., Chen, Y., Serrano, G. E., Leuzy, A., Mattsson-Carlgren, N., Strandberg, O., Smith, R., Villegas, A., Sepulveda-Falla, D., Chai, X., Proctor, N. K., Beach, T. G., Blennow, K., … Hansson, O. (2020). Discriminative accuracy of plasma phospho-tau217 for Alzheimer disease vs other neurodegenerative disorders. *JAMA, 324*(8), 772–781. https://doi.org/10.1001/jama.2020.12134
25. Palmqvist, S., Tideman, P., Mattsson-Carlgren, N., Schindler, S. E., Smith, R., Ossenkoppele, R., Calling, S., West, T., Monane, M., Verghese, P. B., Braunstein, J. B., Blennow, K., Janelidze, S., Stomrud, E., Salvadó, G., & Hansson, O. (2024). Blood biomarkers to detect Alzheimer disease in primary care and secondary care. *JAMA, 332*(15). https://doi.org/10.1001/jama.2024.13855
26. Palmqvist, S., Warmenhoven, N., Anastasi, F., Pilotto, A., Janelidze, S., Tideman, P., Stomrud, E., Mattsson-Carlgren, N., Smith, R., Ossenkoppele, R., Tan, K., Dittrich, A., Skoog, I., Zetterberg, H., Quaresima, V., Tolassi, C., Höglund, K., Brugnoni, D., Puig-Pijoan, A., … Hansson, O. (2025a). Plasma phospho-tau217 for Alzheimer's disease diagnosis in primary and secondary care using a fully automated platform. *Nature Medicine*. https://doi.org/10.1038/s41591-025-03622-w
27. Palmqvist, S., Whitson, H. E., Allen, L. A., Suarez-Calvet, M., Galasko, D., Karikari, T. K., Okrahvi, H. R., Paczynski, M., Schindler, S. E., Teunissen, C. E., Zetterberg, H., Carrillo, M. C., Edelmayer, R. M., Mahinrad, S., McAteer, M. B., Kahale, L. A., Pahlke, S., & Tampi, M. P. (2025b). Alzheimer's Association clinical practice guideline on the use of blood-based biomarkers in the diagnostic workup of suspected Alzheimer's disease within specialized care settings. *Alzheimer's & Dementia, 21*(7). https://doi.org/10.1002/alz.70535
28. Petersen, K. K., Milà-Alomà, M., Li, Y., Du, L., Xiong, C., Tosun, D., Saef, B., Saad, Z. S., Du-Cuny, L., Coomaraswamy, J., Mordashova, Y., Rubel, C. E., Meyers, E. A., Shaw, L. M., Dage, J. L., Ashton, N. J., Zetterberg, H., Ferber, K., Triana-Baltzer, G., … Schindler, S. E. (2026). Predicting onset of symptomatic Alzheimer's disease with plasma p-tau217 clocks. *Nature Medicine*. https://doi.org/10.1038/s41591-026-04206-y

29. Shi, Q., Hou, J., Peng, X., Xu, Z., Wang, Y., & Cao, D. (2026). Magnetic resonance imaging analysis for Alzheimer's disease diagnosis using artificial intelligence: Methods, challenges, and opportunities. *Ageing Research Reviews, 113*, 102943. https://doi.org/10.1016/j.arr.2025.102943
30. Therriault, J., Brum, W. S., Trudel, L., Macedo, A. C., Bitencourt, F. V., Martins-Pfeifer, C. C., Nakouzi, M., Pola, I., Wong, M., Kac, P. R., Real, A. P., Witherow, C., Karikari, T. K., Moscoso, A., Zimmer, E. R., Schöll, M., Pascoal, T., Benedet, A. L., Ashton, N. J., … Rosa-Neto, P. (2025). Blood phosphorylated tau for the diagnosis of Alzheimer's disease: A systematic review and meta-analysis. *The Lancet Neurology, 24*(9), 740–752. https://doi.org/10.1016/S1474-4422(25)00227-3
31. Therriault, J., Janelidze, S., Benedet, A. L., Ashton, N. J., Martínez, J. A., Gonzalez-Escalante, A., Bellaver, B., Alcolea, D., Vrillon, A., Karim, H., Mielke, M. M., Hong, C. H., Roh, H. W., Contador, J., Pijoan, A. P., Algeciras-Schimnich, A., Vemuri, P., Graff-Radford, J., Lowe, V. J., … Rosa-Neto, P. (2024). Diagnosis of Alzheimer's disease using plasma biomarkers adjusted to clinical probability. *Nature Aging, 4*(11), 1529–1537. https://doi.org/10.1038/s43587-024-00731-y
32. Thijssen, E. H., La Joie, R., Strom, A., Fonseca, C., Iaccarino, L., Wolf, A., Spina, S., Allen, I. E., Cobigo, Y., Heuer, H., VandeVrede, L., Proctor, N. K., Lago, A. L., Baker, S., Sivasankaran, R., Kieloch, A., Kinhikar, A., Yu, L., Valentin, M.-A., … Boxer, A. L. (2021). Plasma phosphorylated tau 217 and phosphorylated tau 181 as biomarkers in Alzheimer's disease and frontotemporal lobar degeneration: A retrospective diagnostic performance study. *The Lancet Neurology, 20*(9), 739–752. https://doi.org/10.1016/S1474-4422(21)00214-3
33. van Harten, A. C., Wiste, H. J., Weigand, S. D., Mielke, M. M., Kremers, W. K., Eichenlaub, U., Dyer, R. B., Algeciras-Schimnich, A., Knopman, D. S., Jack, C. R., & Petersen, R. C. (2022). Detection of Alzheimer's disease amyloid beta 1-42, p-tau, and t-tau assays. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association, 18*(4), 635–644. https://doi.org/10.1002/alz.12406
34. Warmenhoven, N., Salvadó, G., Janelidze, S., Tideman, P., Mattsson-Carlgren, N., Stomrud, E., Smith, R., Ashton, N. J., Blennow, K., Zetterberg, H., Hansson, O., & Palmqvist, S. (2025). A comprehensive head-to-head comparison of key plasma phosphorylated tau 217 biomarker tests. *Brain, 148*(2), 416–431. https://doi.org/10.1093/brain/awae346
35. Yun, J., Lee, J., Shin, D., Lee, E. H., Kim, J. P., Ham, H., Gu, Y., Chun, M. Y., Kang, S. H., Kim, H. J., Na, D. L., Kim, K. W., Kim, S. E., Kim, Y., Kim, J., Jung, N.-Y., Kim, Y. J., Cho, S. H., Lee, J. S., … Kim, B. (2026). Plasma phosphorylated tau 217 cutoffs for amyloid pathology and kidney function, body mass index, and anemia. *JAMA Neurology, 83*(3), 269. https://doi.org/10.1001/jamaneurol.2025.5530
36. Zetterberg, H., & Blennow, K. (2021). Moving fluid biomarkers for Alzheimer's disease from research tools to routine clinical diagnostics. *Molecular Neurodegeneration, 16*(1). https://doi.org/10.1186/s13024-021-00430-x