MAYO CLINIC LABORATORIES

Test Definition: PT217

Phospho-Tau 217, Plasma

Overview

Useful For

Evaluation of individuals, aged 50 years and older, presenting with cognitive impairment who are being assessed for Alzheimer disease and other causes of cognitive decline

This test is **not intended as** a screening test for Alzheimer disease in asymptomatic individuals.

Method Name

Chemiluminescent Enzyme Immunoassay

NY State Available

Yes

Specimen

Specimen Type

EDTA Plasma

Ordering Guidance

This assay is useful for individuals presenting with mild cognitive impairment or early dementia. Results must be interpreted in conjunction with other diagnostic tools such as neurological examination, neurobehavioral tests, imaging, and routine laboratory tests.

This assay should not be ordered for individuals younger than 50 years or in cognitively unimpaired individuals regardless of age.

This assay should not be used to predict the development of dementia or other neurologic conditions.

Specimen Required

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)
Collection Container/Tube: Lavender top (EDTA)
Submission Container/Tube: Plastic screw-top vial
Specimen Volume: 0.6 mL plasma
Collection Information: Centrifuge and aliquot plasma into plastic vial. **Do not submit in original tube.**

Forms

If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:
-Neurology Specialty Testing Client Test Request (T732)
-General Test Request (T239)

Specimen Minimum Volume

Plasma: 0.5 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
EDTA Plasma	Refrigerated (preferred)	14 days	
	Ambient	72 hours	
	Frozen	90 days	

Clinical & Interpretive

Clinical Information

The two main neuropathologic features observed in the brain of patients with Alzheimer disease (AD) are the presence of plaques composed of beta-amyloid (Abeta) peptides and intracellular neurofibrillary tangles containing hyperphosphorylated Tau (p-Tau) proteins. To date, positron emission tomography (PET) and cerebrospinal fluid (CSF) biomarkers are the most widely used biomarkers in clinical practice for detection of Abeta and tau pathologies. There are several PET tracers that can detect the load of Abeta fibrils in the brain (amyloid-PET). Studies have demonstrated high concordance between the in vivo uptake of these amyloid-PET tracers and the density of Abeta plaques as determined post-mortem. In CSF, Abeta42 concentrations and especially the ratios of Abeta42/Abeta40 and p-Tau181/Abeta42 concentrations correlate strongly with amyloid-PET status and AD neuropathology. Several CSF Abeta and p-Tau assays on high-performing, fully automated platforms are currently used in clinical practice. However, there is a need for accurate AD blood-based biomarkers that are easily accessible and minimally invasive.

Different p-Tau isoforms that are increased in the presence of amyloid pathology are detectable in plasma, including pTau181, pTau217, and pTau231. Head-to-head comparisons of assays for p-Tau181, p-Tau217, and p-Tau231 using plasma from patients with mild cognitive impairment indicate that increases in plasma p-Tau217 were superior at detecting AD pathology and predicting future development of AD dementia. Both p-Tau181 and p-Tau217 were associated with both Abeta plaques and tau tangles, with p-Tau217 showing stronger correlations with both pathologies. In addition, plasma concentrations of p-Tau217, but not p-Tau181 and p-Tau231, have been shown to increase over time in people with abnormal brain Abeta deposition correlating with brain atrophy and cognitive decline.

Reference Values

Negative: < or =0.185 pg/mL
Intermediate: 0.186-0.324 pg/mL
Positive: > or =0.325 pg/mL

Interpretation

Negative: A normal (negative) phosphorylated Tau217 (p-Tau217) result is consistent with a negative (normal) amyloid-positron emission tomography (PET) scan result. This result indicates a reduced likelihood that an individual has neuropathological changes associated with Alzheimer disease.

Intermediate: An intermediate p-Tau217 result cannot accurately differentiate between the presence or absence of neuropathological changes associated with Alzheimer disease. Further testing, such as amyloid-positron emission tomography (PET) or cerebrospinal fluid Abeta42 and tau biomarkers, is needed to determine the likelihood of neuropathological changes associated with Alzheimer disease being present.

Positive: An elevated (positive) p-Tau217 result is consistent with a positive (abnormal) amyloid-positron emission tomography (PET) scan result. This result is consistent with the presence of neuropathological changes associated with Alzheimer disease. In the proper clinical context this test is supportive of Alzheimer disease being related to current clinical symptoms. This test has not been demonstrated to provide information on the risk of an asymptomatic individual developing symptoms related to Alzheimer disease in the future.

Clinical performance of this test was established in a study of 427 individuals aged 50 years and older with mild cognitive impairment or early dementia with a 64% prevalence of amyloid pathology defined by an amyloid-PET and a Centiloid scale value of 25 or more. For detection of an abnormal amyloid-PET, pTau217 test sensitivity at the lower cutpoint (< or =0.185 pg/mL) was 92% and the specificity at the upper cutpoint (> or =0.325 pg/mL) was 96%. The diagnostic performance of this test has not been established in asymptomatic individuals.

Cautions

Phosphorylated Tau217 (p-Tau217) results must be interpreted in conjunction with other diagnostic tools, such as neurological examination, neurobehavioral tests, imaging, and routine laboratory tests.

This assay should not be ordered for individuals younger than 50 years.

Elevations of p-Tau217 may be seen in individuals with impaired kidney function associated with chronic kidney disease and should be interpreted with caution in these situations.

False-positive or false-negative test results may occur.

The performance of this test was evaluated using specimens obtained from a US White population. At this time, it is uncertain if similar clinical performance will be observed in other racial and ethnic groups.

This assay should not be used for cognitively unimpaired (asymptomatic) individuals to predict the development of dementia or other neurological conditions.

The safety and effectiveness of this test have not been established for monitoring the effect of disease monitoring therapies or for predicting development of dementia or other neurologic conditions.

p-Tau217 concentrations have not been established to correlate with disease severity.

Results obtained with different assay methods or kits may be different and cannot be used interchangeably.

In rare cases, some individuals can develop antibodies to mouse or other animal antibodies (often referred to as human anti-mouse antibodies or heterophile antibodies) that may cause interference in some immunoassays. Caution should be used in interpretation of results, and the laboratory should be alerted if the result does not correlate with the clinical

presentation.

Clinical Reference

1. Arranz J, Zhu N, Rubio-Guerra S, et al. Diagnostic performance of plasma pTau 217, pTau 181, Ab 1-42 and Ab 1-40 in the LUMIPULSE automated platform for the detection of Alzheimer disease. Preprint. Res Sq. 2023;rs.3.rs-3725688. doi:10.21203/rs.3.rs-3725688/v1
2. Brum WS, Cullen NC, Janelidze S, et al. A two-step workflow based on plasma p-tau217 to screen for amyloid b positivity with further confirmatory testing only in uncertain cases. Nat Aging. 2023;3(9):1079-1090. doi:10.1038/s43587-023-00471-5
3. Mattsson-Carlgren N, Collij LE, Stomrud E, et al. Plasma biomarker strategy for selecting patients with Alzheimer disease for antiamyloid immunotherapies JAMA Neurol. 2024;81(1):69-78. doi:10.1001/jamaneurol.2023.4596
4. Janelidze S, Berron D, Smith R, et al. Associations of plasma phospho-tau217 levels with tau positron emission tomography in early Alzheimer disease. JAMA Neurol. 2021;78(2):149-156. doi:10.1001/jamaneurol.2020.4201
5. Blennow K, Galasko D, Perneczky R, et al. The potential clinical value of plasma biomarkers in Alzheimer's disease. Alzheimers Dement. 2023;19(12):5805-5816. doi:10.1002/alz.13455
6. Ashton NJ, Puig-Pijoan A, Mila-Aloma M, et al. Plasma and CSF biomarkers in a memory clinic: Head-to-head comparison of phosphorylated tau immunoassays. Alzheimers Dement. 2023;19(5):1913-1924. doi:10.1002/alz.12841
7. Mielke MM, Dage JL, Frank RD, et al. Performance of plasma phosphorylated tau 181 and 217 in the community. Nat Med. 2022;28(7):1398-1405. doi:10.1038/s41591-022-01822-2
8. Palmqvist S, Janelidze S, Quiroz YT, et al. Discriminative Accuracy of Plasma Phospho-tau217 for Alzheimer Disease vs Other Neurodegenerative Disorders. JAMA. 2020;324(8):772-781. doi:10.1001/jama.2020.12134
9. Gonzalez-Ortiz F, Kac PR, Brum WS, Zetterberg H, Blennow K, Karikari TK. Plasma phospho-tau in Alzheimer's disease: towards diagnostic and therapeutic trial applications. Mol Neurodegener. 2023;18(1):18. doi:10.1186/s13024-023-00605-8
10. Barthelemy NR, Horie K, Sato C, Bateman RJ. Blood plasma phosphorylated-tau isoforms track CNS change in Alzheimer's disease. J Exp Med. 2020;217(11):e20200861. doi:10.1084/jem.20200861
11. Jack CR, Wiste HJ, Algeciras-Schimnich A, et al. Predicting amyloid PET and tau PET stages with plasma biomarkers. Brain. 2023;146(5):2029-2044. doi:10.1093/brain/awad042
12. Karikari TK, Ashton NJ, Brinkmalm G, et al. Blood phospho-tau in Alzheimer disease: analysis, interpretation, and clinical utility. Nat Rev Neurol. 2022;18(7):400-418. doi:10.1038/s41582-022-00665-2

Performance

Method Description

Plasma calibrator or specimen is added to particle solution. Phosphorylated Tau217 (p-Tau217) in specimens or calibrators specifically binds to anti-p-Tau217 monoclonal antibody (mouse) on the particles and antigen-antibody immunocomplexes are formed. The particles are washed and rinsed to remove unbound materials. Alkaline phosphatase (ALP)-labeled anti-Tau monoclonal antibodies (mouse) are added and specifically bind to the prior formed immunocomplexes on the particles, and additional immunocomplexes are formed. The particles are washed and rinsed to remove unbound materials. Substrate solution is added and mixed with the particles and 3-(2'-spiroadamantane)-4-methoxy-4-(3"-phosphoryloxy) phenyl-1,2-dioxetane disodium salt (AMPPD) contained in the substrate solution is dephosphorylated by the catalysis of ALP indirectly conjugated to particles. Luminescence (at a maximum wavelength of 477 nm) is generated by the cleavage reaction of dephosphorylated AMPPD. The luminescent

signal reflects the amount of p-Tau217 in the sample.(Unpublished Mayo method)

PDF Report
No

Day(s) Performed
Monday through Friday

Report Available
1 to 3 days

Specimen Retention Time
6 months

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Superior Drive

Fees & Codes

Fees
- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification
This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information
84393

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
PT217	Phospho-Tau(217), P	104663-0

Result ID	Test Result Name	Result LOINC® Value
217PT	pTau217, P	104663-0
PTINT	pTau217 Interpretation	69048-7