ARUP LABORATORIES
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500 Chipeta Way, Salt Lake City, UT 84108-1221
Jonathan R. Genzen, MD, PhD, Chief Medical Officer

Client: Example Client ABC123
123 Test Drive
Salt Lake City, UT 84108
UNITED STATES

Physician: Doctor, Example

Patient: Patient, Example

DOB	2/8/1975
Gender:	Male
Patient Identifiers:	01234567890ABCD, 012345
Visit Number (FIN):	01234567890ABCD
Collection Date:	00/00/0000 00:00

Phospho-Tau/Total-Tau/A Beta42, CSF

ARUP test code 3016444

Phospho-Tau/Total-Tau/A Beta42, Interp

SEE NOTE

This test detected the A-beta 42 to T-tau Index (ATI) and levels of P-tau protein in the cerebrospinal fluid (CSF) in the normal range.

Performed by: Athena Diagnostics, Inc.
200 Forest Street, 2nd Floor
Marlborough, MA 01752

V Datta MD, PhD,

Phospho-Tau/Total-Tau/A Beta42, Results

SEE NOTE

Interpretive Result Table

---------INTERPRETATION: Not Consistent with Alzheimer Disease TEST: A-beta 42 TECHNICAL RESULT: 899.2 pg/ml REFERENCE RANGE: Not consistent with AD: P-Tau <54 pg/ml and ATI >1.2 Borderline: P-Tau 54-68 pg/mL and/or ATI 0.8-1.2, AD: P-Tau >68 pg/mL and ATI <0.8 INTERPRETATION: TEST: T-Tau TECHNICAL RESULT: 288.4 pg/ml REFERENCE RANGE: Not consistent with AD: P-Tau <54 pg/ml and ATI >1.2 Borderline: P-Tau 54-68 pg/mL and/or ATI 0.8-1.2, AD: P-Tau >68 pg/mL and ATI <0.8 INTERPRETATION: TEST: P-Tau TECHNICAL RESULT: 39.9 pg/ml REFERENCE RANGE: Not consistent with AD: P-Tau <54 pg/ml and ATI >1.2 Borderline: P-Tau 54-68 pg/mL and/or ATI 0.8-1.2, AD: P-Tau >68 pg/mL and ATI <0.8

---------INTERPRETATION: TEST: ATI TECHNICAL RESULT: 1.55 REFERENCE RANGE: Not consistent with AD: P-Tau <54 pg/ml and ATI >1.2 Borderline: P-Tau 54-68 pg/mL and/or ATI 0.8-1.2, AD: P-Tau >68 pg/mL and ATI <0.8

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Phospho-Tau/Total-Tau/A Beta42, Comments

SEE NOTE

H=High, L=Low, *=Abnormal, C=Critical

Comments: This analysis detected CSF levels of A-beta 42 peptide (A-beta 42), total tau (T-tau) and phospho-tau (P-tau) proteins which are not consistent with a diagnosis of Alzheimer's disease (AD).

Recommendations: Health care providers, please contact the Athena Diagnostics Client Services Department at 1-800-394-4493 if you wish to speak with a clinical consultant regarding this test result. Background information: Alzheimer's disease (AD) is the most common form of dementia, accounting for 60-70% of cases (1). AD manifests initially with subtle progressive memory loss that eventually becomes severe and incapacitating. Behavioral deficits, including social withdrawal, aggression, depression and hallucinations, are also present (3). Pathologically, AD is characterized by the formation of beta-amyloid plaques and neurofibrillary tangles within the brain, and cerebral cortical atrophy (4). The CSF based biomarkers A-beta 42 peptide (A-beta 42), phospho-tau (P-tau) and total tau (T-tau) can aid in the diagnosis of AD. The combination of A-beta 42 and Ttau results are express as the A-beta 42 to T-tau Index (ATI). ATI is calculated as A-beta 42/(240 + 1.18 x T- tau) and represents a ratio normalized by the discrimination line A-beta 42 = 240 + 1.18 x T-tau (4, 5). Studies performed with over 70 participants, showed that the cutoff value of ATI = 1, yields a sensitivity of 85-94% and specificity of 54-95% in distinguishing AD from non-AD populations (4, 5). An ATI of <1.0 is typical of AD, while a value >1.0 is typical of control populations. Additionally, the CSF levels of P-tau have been found to discriminate AD from other dementias with sensitivities of 72-88% and specificities of 78-83% (1). Athena considers ATI values of 0.8 to 1.2 and P-tau levels of 54-68 pg/ml as borderline results. The combination of all three biomarkers has been reported to have an average sensitivity and specificity of 85% and 90%, respectively (6).

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Phospho-Tau/Total-Tau/A Beta42, Method	SEE NOTE

Detection of proteins was performed by Enzyme Linked Immunosorbent Assay (ELISA) methodology.

Limitations of analysis: Although rare, false positive or false negative results may occur. All results should be interpreted in the context of clinical findings, relevant history, and other laboratory data.

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Phospho-Tau/Total-Tau/A Beta42, Ref	SEE NOTE

H=High, L=Low, *=Abnormal, C=Critical

Background References
1. Ferreira, D, et al. (2014) Front Aging Neurosci 6: 47. (PMID: 24715863) 2. Bird, T. (2008) Genet Med 10:231-9 (PMID:18414205) 3. Braak, H, et al. (1991) Acta Neuropathol 82: 239-59. (PMID: 1759558) 4. Hulstaert, F, et al. (1999) Neurology 52: 1555-62. (PMID: 10331678) 5. Blennow, K. (2004) NeuroRx 1: 213-25. (PMID: 15717022) 6. Blennow, K, et al. (2015) Alzheimers Dement 11: 58-69. (PMID: 24795085)
been determined by Athena Diagnostics. It has not been cleared or approved by the U.S. Food and Drug Administration. This assay has been validated pursuant to the CLIA regulations and is used for clinical purposes.

Laboratory oversight provided by Vivekananda Datta, M.D., Ph.D., CLIA license holder, Athena Diagnostics (CLIA# 22D0069726)

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VERIFIED/REPORTED DATES

Procedure	Accession	Collected	Received	Verified/Reported
Phospho-Tau/Total-Tau/A Beta42, Interp	23-123-105397	00/00/0000 00:00	00/00/0000 00:00	00/00/0000 00:00
Phospho-Tau/Total-Tau/A Beta42, Results	23-123-105397	00/00/0000 00:00	00/00/0000 00:00	00/00/0000 00:00
Phospho-Tau/Total-Tau/A Beta42, Comments	23-123-105397	00/00/0000 00:00	00/00/0000 00:00	00/00/0000 00:00
Phospho-Tau/Total-Tau/A Beta42, Method	23-123-105397	00/00/0000 00:00	00/00/0000 00:00	00/00/0000 00:00
Phospho-Tau/Total-Tau/A Beta42, Ref	23-123-105397	00/00/0000 00:00	00/00/0000 00:00	00/00/0000 00:00

END OF CHART

H=High, L=Low, *=Abnormal, C=Critical