

Overview

Useful For

Evaluating new onset encephalopathy (noninfectious or metabolic) comprising confusional states, psychosis, delirium, memory loss, hallucinations, movement disorders, sensory or motor complaints, seizures, dyssomnias, ataxias, nausea, vomiting, inappropriate antidiuresis, coma, dysautonomias, or hypoventilation using serum specimens

The following accompaniments should increase of suspicion for autoimmune encephalopathy:

- Headache
- Autoimmune stigmata (personal or family history or signs of diabetes mellitus, thyroid disorder, vitiligo, poliosis [premature graying], myasthenia gravis, rheumatoid arthritis, systemic lupus erythematosus)
- History of cancer
- Smoking history (20 or more pack-years) or other cancer risk factors
- Inflammatory cerebral spinal fluid (or isolated protein elevation)
- Neuroimaging signs suggesting inflammation

Evaluating limbic encephalitis (noninfectious)

Directing a focused search for cancer

Investigating encephalopathy appearing during or after cancer therapy and not explainable by metastasis or drug effect

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
AEESI	Encephalopathy, Interpretation, S	No	Yes
AMPCS	AMPA-R Ab CBA, S	No	Yes
AMPHS	Amphiphysin Ab, S	No	Yes
AGN1S	Anti-Glial Nuclear Ab, Type 1	No	Yes
ANN1S	Anti-Neuronal Nuclear Ab, Type 1	No	Yes
ANN2S	Anti-Neuronal Nuclear Ab, Type 2	No	Yes
ANN3S	Anti-Neuronal Nuclear Ab, Type 3	No	Yes
CS2CS	CASPR2-IgG CBA, S	No	Yes
CRMS	CRMP-5-IgG, S	No	Yes
DPPIS	DPPX Ab IFA, S	No	Yes
GABCS	GABA-B-R Ab CBA, S	No	Yes
GD65S	GAD65 Ab Assay, S	Yes	Yes

GFAIS	GFAP IFA, S	No	Yes
IG5IS	IgLON5 IFA, S	No	Yes
LG1CS	LGI1-IgG CBA, S	No	Yes
GL1IS	mGluR1 Ab IFA, S	No	Yes
NCDIS	Neurochondrin IFA, S	No	Yes
NIFIS	NIF IFA, S	No	Yes
NMDCS	NMDA-R Ab CBA, S	No	Yes
PCABP	Purkinje Cell Cytoplasmic Ab Type 1	No	Yes
PCAB2	Purkinje Cell Cytoplasmic Ab Type 2	No	Yes
PCATR	Purkinje Cell Cytoplasmic Ab Type Tr	No	Yes
SP7IS	Septin-7 IFA, S	No	Yes

Reflex Tests

Test Id	Reporting Name	Available Separately	Always Performed
AGNBS	AGNA-1 Immunoblot, S	No	No
AINCS	Alpha Internexin CBA, S	No	No
AMPIS	AMPA-R Ab IF Titer Assay, S	No	No
AMIBS	Amphiphysin Immunoblot, S	No	No
AN1BS	ANNA-1 Immunoblot, S	No	No
AN2BS	ANNA-2 Immunoblot, S	No	No
CRMWS	CRMP-5-IgG Western Blot, S	Yes	No
DPPCS	DPPX Ab CBA, S	No	No
DPPTS	DPPX Ab IFA Titer, S	No	No
GABIS	GABA-B-R Ab IF Titer Assay, S	No	No
GFACS	GFAP CBA, S	No	No
GFATS	GFAP IFA Titer, S	No	No
IG5CS	IgLON5 CBA, S	No	No
IG5TS	IgLON5 IFA Titer, S	No	No
GL1CS	mGluR1 Ab CBA, S	No	No
GL1TS	mGluR1 Ab IFA Titer, S	No	No
NFHCS	NIF Heavy Chain CBA, S	No	No
NIFTS	NIF IFA Titer, S	No	No
NFLCS	NIF Light Chain CBA, S	No	No
NMDIS	NMDA-R Ab IF Titer Assay,	No	No

	S		
PC1BS	PCA-1 Immunoblot, S	No	No
PCTBS	PCA-Tr Immunoblot, S	No	No
AGNTS	AGNA-1 Titer, S	No	No
APHTS	Amphiphysin Ab Titer, S	No	No
AN1TS	ANNA-1 Titer, S	No	No
AN2TS	ANNA-2 Titer, S	No	No
AN3TS	ANNA-3 Titer, S	No	No
CRMTS	CRMP-5-IgG Titer, S	No	No
NCDCS	Neurochondrin CBA, S	No	No
NCDTS	Neurochondrin IFA Titer, S	No	No
PC1TS	PCA-1 Titer, S	No	No
PC2TS	PCA-2 Titer, S	No	No
PCTTS	PCA-Tr Titer, S	No	No
SP7CS	Septin-7 CBA, S	No	No
SP7TS	Septin-7 IFA Titer, S	No	No

Testing Algorithm

If client requests or if the immunofluorescence (IFA) patterns suggest collapsin response-mediator protein-5-IgG (CRMP-5-IgG), then CRMP-5-IgG IFA titer and CRMP-5-IgG Western blot will be performed at an additional charge.

If the IFA patterns suggest amphiphysin antibody, then amphiphysin IFA titer and amphiphysin immunoblot will be performed at an additional charge.

If the IFA pattern suggests antiglial nuclear antibody (AGNA)-1, then AGNA-1 IFA titer and AGNA-1 immunoblot will be performed at an additional charge.

If the IFA pattern suggests antineuronal nuclear antibody type 1 (ANNA-1), then ANNA-1 IFA titer, ANNA-1 immunoblot, and ANNA-2 immunoblot will be performed at an additional charge.

If the IFA pattern suggests ANNA-2 antibody, then ANNA-2 IFA titer, ANNA-2 immunoblot, and ANNA-1 immunoblot will be performed at an additional charge.

If the IFA pattern suggests Purkinje cytoplasmic antibody type 1 (PCA-1), then PCA-1 IFA titer and PCA-1 immunoblot will be performed at an additional charge.

If IFA pattern suggests PCA-Tr antibody, then PCA-Tr IFA titer and PCA-Tr immunoblot will be performed at an additional charge.

If the IFA pattern suggests IgLON5 antibody, then IgLON5 IFA titer and IgLON5 cell-binding assay (CBA) will be performed at an additional charge.

If AMPA (alpha-amino-3-hydroxy-5-methyl-4-isoxazole propionic acid) receptor antibody CBA is positive, then

AMPA-receptor antibody IFA titer assay will be performed at an additional charge.

If gamma-aminobutyric acid B (GABA-B) receptor antibody is positive, then GABA-B-receptor antibody IFA titer assay will be performed at an additional charge.

If the IFA pattern suggests glial fibrillary acidic protein (GFAP) antibody, then GFAP IFA titer and GFAP CBA will be performed at an additional charge.

If N-methyl-D-aspartate (NMDA) receptor antibody CBA is positive, then NMDA-receptor antibody IFA titer assay will be performed at an additional charge.

If the IFA pattern suggests dipeptidyl-peptidase-like protein-6 (DPPX) antibody, then DPPX antibody CBA and DPPX IFA titer will be performed at an additional charge.

If the IFA pattern suggests metabotropic glutamate receptor 1 (mGluR1) antibody, then mGluR1 antibody CBA and mGluR1 IFA titer will be performed at an additional charge.

If the IFA pattern suggests neuronal intermediate filament (NIF) antibody, then alpha internexin CBA, NIF heavy chain CBA, NIF light chain CBA, and NIF IFA titer will be performed at an additional charge.

For more information, see the following algorithms:

[Autoimmune/Paraneoplastic Encephalopathy Evaluation Algorithm-Serum](#)
[Central Nervous System Demyelinating Disease Diagnostic Algorithm](#)

Special Instructions

- [Autoimmune/Paraneoplastic Encephalopathy Evaluation Algorithm-Serum](#)
- [Central Nervous System Demyelinating Disease Diagnostic Algorithm](#)

Method Name

AGN1S, AGNTS, AMPHS, APHTS, AMPIS, ANN1S, AN1TS, ANN2S, AN2TS, AN3TS, ANN3S, CRMS, CRMTS, DPPIS, DPPTS, GABIS, GFAIS, GFATS, IG5IS, IG5TS, GL1IS, GL1TS, NCDIS, NCDTS, NIFIS, NIFTS, NMDIS, PCABP, PC1TS, PCAB2, PC2TS, PCATR, PCTTS, SP7IS, SP7TS: Indirect Immunofluorescence Assay (IFA)
AMPCS, CS2CS, DPPCS, GABCS, GFACS, IG5CS, LG1CS, GL1CS, NCDCS, AINCS, NFLCS, NMFCS, NMDCS, SP7CS: Cell Binding Assay (CBA)
CRMWS: Western Blot (WB)

AGNBS, AMIBS, AN1BS, AN2BS, PC1BS, PCTBS: Immunoblot (IB)

GD65S: Radioimmunoassay (RIA)

NY State Available

Yes

Specimen**Specimen Type**

Serum

Ordering Guidance

Multiple neuroimmunology profile tests are available. For testing that is performed with each profile, see [Autoimmune Neurology Antibody Matrix](#).

This test is intended to be ordered for **adult** patients. If this test is ordered for a patient younger than 18 years of age, it will be canceled and automatically reordered by the laboratory as PCDES / Pediatric Autoimmune Encephalopathy/CNS Disorder Evaluation, Serum. The pediatric autoimmune CNS disorders evaluation is part of an evolving approach to testing for autoimmune neurological disorders using phenotypic-specific evaluations that include multiple antibodies known for their disease association.

Necessary Information

Provide the following information:

- Relevant clinical information
- Ordering provider name, phone number, mailing address, and e-mail address

Specimen Required**Patient Preparation:**

1. For optimal antibody detection, specimen collection is recommended prior to initiation of immunosuppressant medication or intravenous immunoglobulin treatment.
2. This test should not be requested for patients who have recently received radioisotopes, therapeutically or diagnostically, because of potential assay interference. The specific waiting period before specimen collection will depend on the isotope administered, the dose given, and the clearance rate in the individual patient. Specimens will be screened for radioactivity prior to analysis. Radioactive specimens received in the laboratory will be held 1 week and assayed if sufficiently decayed or canceled if radioactivity remains.

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)

Collection Container/Tube:

Preferred: Red top

Acceptable: Serum gel

Submission Container/Tube: Plastic vial

Specimen Volume: 4 mL

Collection Instructions: Centrifuge and aliquot serum into a plastic vial.

Forms

[If not ordering electronically, complete, print, and send](#) 1 of the following with the specimen:

-[Neurology Specialty Testing Client Test Request](#) (T732)

-[General Test Request](#) (T239)

Specimen Minimum Volume

2.5 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	Reject
Gross icterus	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	28 days	
	Frozen	28 days	
	Ambient	72 hours	

Clinical & Interpretive
Clinical Information

Autoimmune encephalopathies extend beyond the classically recognized clinical and radiological spectrum of "limbic encephalitis." They encompass a diversity of neurological presentations with subacute or insidious onset, including confusional states, psychosis, delirium, memory loss, hallucinations, movement disorders, sensory or motor complaints, seizures, dyssomnias, ataxias, eye movement problems, nausea, vomiting, inappropriate antidiuresis, coma, dysautonomias, or hypoventilation. A diagnosis of autoimmune encephalopathy should be suspected based on the clinical course, coexisting autoimmune disorder (eg, thyroiditis, diabetes), serological evidence of autoimmunity, spinal fluid evidence of intrathecal inflammation, neuroimaging or electroencephalographic abnormalities, and favorable response to trial of immunotherapy.

Detection of one or more neural autoantibodies aids the diagnosis of autoimmune encephalopathy and may guide a search for cancer. Pertinent autoantibody specificities include:

- Neurotransmitter receptors and ion channels such as neuronal voltage-gated potassium channels (and interacting synaptic and axonal proteins, leucine-rich glioma inactivated 1 [LGI1] protein and contactin associated protein 2 [CASPR2]), ionotropic glutamate receptors (N-methyl-D-aspartate receptor [NMDA] and 2-amino-3-[5-methyl-3-oxo-1,2-oxazol-4-yl] propanoic acid [AMPA]), metabotropic gamma-aminobutyric acid (GABA)-B receptors
- Enzymes, signaling molecules, and RNA-regulatory proteins in the cytoplasm and nucleus of neurons (glutamic acid decarboxylase 65 [GAD65], collapsin response-mediator protein-5 neuronal [CRMP-5], antineuronal nuclear antibody-type 1 [ANNA-1], and ANNA-2)

Importantly, autoimmune encephalopathies are reversible. Misdiagnosis as a progressive (currently irreversible) neurodegenerative condition is not uncommon and has devastating consequences for the patient. Clinicians must consider the possibility of an autoimmune etiology in the differential diagnoses of encephalopathy. For example, a potentially reversible disorder justifies a trial of immunotherapy for the detection of neural autoantibodies in patients

presenting with symptoms of personality change, executive dysfunction, and psychiatric manifestations.

A triad of clues helps to identify patients with an autoimmune encephalopathy:

- 1) Clinical presentation (subacute symptoms, onset rapidly progressive course, and fluctuating symptoms) and radiological findings consistent with inflammation
- 2) Detection of neural autoantibodies in serum or cerebrospinal fluid (CSF)
- 3) Favorable response to a trial of immunotherapy

Detection of neural autoantibodies in serum or CSF informs the physician of a likely autoimmune etiology, may heighten suspicion for a paraneoplastic basis, and guide the search for cancer. Neurological accompaniments of neural autoantibodies are generally not syndromic but diverse and multifocal. For example, LGI1 antibody was initially considered to be specific for autoimmune limbic encephalitis, but, over time, other presentations have been reported, including rapidly progressive course of cognitive decline mimicking neurodegenerative dementia. Comprehensive antibody testing is more informative than selective testing for 1 or 2 neural antibodies. Some antibodies strongly predict an underlying cancer. For example, small-cell lung carcinoma (ANNA-1, CRMP-5-IgG), ovarian teratoma (NMDA-R), and thymoma (CRMP-5 IgG).

An individual patient's profile autoantibody may be informative for a specific cancer type. For example, in a patient presenting with encephalitis who has CRMP 5 IgG, and subsequent testing reveals muscle acetylcholine receptor (AChR) binding antibody, the findings should raise a high suspicion for thymoma. Testing of CSF for autoantibodies is particularly helpful when serum testing is negative, though in some circumstances testing both serum and CSF simultaneously is pertinent. Testing of CSF is recommended for some antibodies in particular (such as NMDA-R antibody and glial fibrillary acidic protein [GFAP]-IgG) because CSF testing is both more sensitive and specific. In contrast, serum testing for LGI1 antibody is more sensitive than CSF testing.

Reference Values

Test ID	Reporting name	Methodology*	Reference value
AEESI	Encephalopathy, Interpretation, S	Medical interpretation	NA
AMPCS	AMPA-R Ab CBA, S	CBA	Negative
AMPHS	Amphiphysin Ab, S	IFA	Negative
AGN1S	Anti-Glial Nuclear Ab, Type 1	IFA	Negative
ANN1S	Anti-Neuronal Nuclear Ab, Type 1	IFA	Negative
ANN2S	Anti-Neuronal Nuclear Ab, Type 2	IFA	Negative
ANN3S	Anti-Neuronal Nuclear Ab, Type 3	IFA	Negative
CS2CS	CASPR2-IgG CBA, S	CBA	Negative
CRMS	CRMP-5-IgG, S	IFA	Negative
DPPIS	DPPX Ab IFA, S	IFA	Negative
GABCS	GABA-B-R Ab CBA, S	CBA	Negative
GD65S	GAD65 Ab Assay, S	RIA	< or =0.02 nmol/L Reference values apply to all ages.
GFAIS	GFAP IFA, S	IFA	Negative
IG5IS	IgLON5 IFA, S	IFA	Negative

LG1CS	LGI1-IgG CBA, S	CBA	Negative
GL1IS	mGluR1 Ab IFA, S	IFA	Negative
NCDIS	Neurochondrin IFA, S	IFA	Negative
NIFIS	NIF IFA, S	IFA	Negative
NMDCS	NMDA-R Ab CBA, S	CBA	Negative
PCABP	Purkinje Cell Cytoplasmic Ab Type 1	IFA	Negative
PCAB2	Purkinje Cell Cytoplasmic Ab Type 2	IFA	Negative
PCATR	Purkinje Cell Cytoplasmic Ab Type Tr	IFA	Negative
SP7IS	Septin-7 IFA, S	IFA	Negative

Reflex Information:

Test ID	Reporting name	Methodology*	Reference value
AGNBS	AGNA-1 Immunoblot, S	IB	Negative
AGNTS	AGNA-1 Titer, S	IFA	<1:240
AINCS	Alpha Internexin CBA, S	CBA	Negative
AMPIS	AMPA-R Ab IF Titer Assay, S	IFA	<1:240
APHTS	Amphiphysin Ab Titer, S	IFA	<1:240
AMIBS	Amphiphysin Immunoblot, S	IB	Negative
AN1BS	ANNA-1 Immunoblot, S	IB	Negative
AN1TS	ANNA-1 Titer, S	IFA	<1:240
AN2BS	ANNA-2 Immunoblot, S	IB	Negative
AN2TS	ANNA-2 Titer, S	IFA	<1:240
AN3TS	ANNA-3 Titer, S	IFA	<1:240
CRMTS	CRMP-5-IgG Titer, S	IFA	<1:240
CRMWS	CRMP-5-IgG Western Blot, S	WB	Negative
DPPCS	DPPX Ab CBA, S	CBA	Negative
DPPTS	DPPX Ab IFA Titer, S	IFA	<1:240
GABIS	GABA-B-R Ab IF Titer Assay, S	IFA	<1:240
GFACS	GFAP CBA, S	CBA	Negative
GFATS	GFAP IFA Titer, S	IFA	<1:240
IG5CS	IgLON5 CBA, S	CBA	Negative
IG5TS	IgLON5 IFA Titer, S	IFA	<1:240
GL1CS	mGluR1 Ab CBA, S	CBA	Negative
GL1TS	mGluR1 Ab IFA Titer, S	IFA	<1:240
NCDCS	Neurochondrin CBA, S	CBA	Negative
NCDTS	Neurochondrin IFA Titer, S	IFA	<1:240
NFHCS	NIF Heavy Chain CBA, S	CBA	Negative
NIFTS	NIF IFA Titer, S	IFA	<1:240
NFLCS	NIF Light Chain CBA, S	CBA	Negative
NMDIS	NMDA-R Ab IF Titer Assay, S	IFA	<1:240
PC1BS	PCA-1 Immunoblot, S	IB	Negative
PC1TS	PCA-1 Titer, S	IFA	<1:240
PC2TS	PCA-2 Titer, S	IFA	<1:240
PCTBS	PCA-Tr Immunoblot, S	IB	Negative

PCTTS	PCA-Tr Titer, S	IFA	<1:240
SP7CS	Septin-7 CBA, S	CBA	Negative
SP7TS	Septin-7 IFA Titer, S	IFA	<1:240

*Methodology abbreviations:

Immunofluorescence assay (IFA)

Cell-binding assay (CBA)

Western blot (WB)

Radioimmunoassay (RIA)

Immunoblot (IB)

Neuron-restricted patterns of IgG staining that do not fulfill criteria for ANNA-1, ANNA-2, CRMP-5-IgG, PCA-1, PCA-2, or PCA-Tr may be reported as "unclassified anti-neuronal IgG." Complex patterns that include nonneuronal elements may be reported as "uninterpretable."

Note: CRMP-5 titers lower than 1:240 are detectable by recombinant CRMP-5 Western blot analysis. CRMP-5 Western blot analysis will be done on request on stored serum (held 4 weeks). This supplemental testing is recommended in cases of chorea, vision loss, cranial neuropathy, and myelopathy. Call the Neuroimmunology Laboratory at 800-533-1710 to request CRMP-5 Western blot.

Interpretation

Neuronal, glial, and muscle autoantibodies are valuable serological markers of autoimmune encephalopathy and of a patient's immune response to cancer. These autoantibodies are usually accompanied by subacute neurological symptoms and signs are not found in healthy subjects. It is not uncommon for more than 1 of the following autoantibody specificities to be detected in patients with an autoimmune encephalopathy:

- Plasma membrane autoantibodies: N-methyl-D-aspartate (NMDA) receptor; 2-amino-3-(5-methyl-3-oxo-1,2-oxazol-4-yl) propanoic acid (AMPA) receptor; gamma-amino butyric acid (GABA-B) receptor; neuronal ACh receptor. These are all potential effectors of neurological dysfunction.
- Neuronal nuclear autoantibodies, type 1 (ANNA-1), type 2 (ANNA-2), or type 3 (ANNA-3)
- Neuronal or muscle cytoplasmic antibodies: amphiphysin, Purkinje cell antibodies (PCA-1) and PCA-2, CRMP-5, GAD65, or striational

Cautions

Negative results do not exclude autoimmune encephalopathy or cancer.

This test does not detect Ma1 or Ma2 antibodies (also known as MaTa), which are sometimes associated with brainstem and limbic encephalitis in the context of testicular germ cell neoplasms. Scrotal ultrasound is advised for men who present with unexplained subacute encephalitis.

Intravenous immunoglobulin (IVIg) treatment prior to the serum collection may cause a false-positive result.

Clinical Reference

1. McKeon A, Lennon VA, Pittock SJ: Immunotherapy responsive dementias and encephalopathies. Continuum (Minneapolis). 2010 Apr;16(2 Dementia):80-101
2. Lucchinetti CF, Kimmell DW, Lennon VA: Paraneoplastic and oncological profiles of patients seropositive for type 1 anti-neuronal nuclear autoantibodies. Neurology. 1998;50:652-657

- Pittock SJ, Yoshikawa H, Ahlskog JE, et al: Glutamic acid decarboxylase autoimmunity with brainstem, extrapyramidal and spinal cord dysfunction. *Mayo Clin Proc.* 2006 Sep;81(9):1207-1214
- Lancaster E, Martinez-Hernandez E, Dalmau J: Encephalitis and antibodies to synaptic and neuronal cell surface proteins. *Neurology.* 2011 Jul 12;77(2):179-189
- Klein CJ, Lennon VA, Aston PA, et al: Insights from LGI1 and CASPR2 potassium channel complex autoantibody subtyping. *JAMA Neurol.* 2013 Feb;70(2):229-234

Performance

Method Description

Cell-Binding Assay:

Patient specimen is applied to a composite slide containing transfected and nontransfected HEK-293 cells. After incubation and washing, fluorescein-conjugated goat-antihuman IgG is applied to detect the presence of patient IgG binding. (Package insert: IIFT: Neurology Mosaics, Instructions for the indirect immunofluorescence test. EUROIMMUN; FA_112d-1_A_UK_C13; 02/2019)

Indirect Immunofluorescence Assay:

The patient's sample is tested by a standardized immunofluorescence assay that uses a composite frozen section of mouse cerebellum, kidney, and gut tissues. After incubation with sample and washing, fluorescein-conjugated goat-antihuman IgG is applied. Neuron-specific autoantibodies are identified by their characteristic fluorescence staining patterns. Samples that are scored positive for any neuronal nuclear or cytoplasmic autoantibody are titrated to an endpoint. Interference by coexisting non-neuron-specific autoantibodies can usually be eliminated by serologic absorption. (Honorat JA, Komorowski L, Josephs KA, et al: IgLON5 antibody: neurological accompaniments and outcomes in 20 patients. *Neurol Neuroimmunol Neuroinflamm* 2017 Jul 18;4(5):e385. doi: 10.1212/NXI.0000000000000385)

Radioimmunoassay:

Duplicate aliquots of patient specimen are incubated with (125)I-labeled antigen. Immune complexes, formed by adding secondary (goat)-antihuman immunoglobulin, are pelleted by centrifugation and washed. Gamma emission from the washed pellet is counted, and mean counts per minute (cpm) are compared with results yielded by high-positive and -negative control sera. Specimen yielding cpm higher than the background cpm yielded by normal human specimen are retested to confirm positivity and titrated as necessary to obtain a value in the linear range of the assay. The antigen binding capacity (nmol per liter) is calculated from the cpm precipitated at a dilution yielding a linear range value. (Griesmann GE, Kryzer TJ, Lennon VA: Autoantibody profiles of myasthenia gravis and Lambert-Eaton myasthenic syndrome. In: Rose NR, Hamilton RG, et al, eds. *Manual of Clinical and Laboratory Immunology*. 6th ed. ASM Press; 2002:1005-1012; Jones AL, Flanagan EP, Pittock SJ, et al: Responses to and outcomes of treatment of autoimmune cerebellar ataxia in adults. *JAMA Neurol.* 2015 Nov;72[11]:1304-1312. doi: 10.1001/jamaneurol.2015.2378)

Immunoblot:

All steps are performed at room temperature (18 to 28 degrees C) utilizing the EUROBlot One instrument. Diluted patient serum (1:101) is added to test strips (strips containing recombinant antigen manufactured and purified using biochemical methods) in individual channels and incubated for 30 minutes. Positive specimens will bind to the purified recombinant antigen and negative specimens will not bind. Strips are washed to remove unbound serum antibodies and then incubated with anti-human IgG antibodies (alkaline phosphatase-labelled) for 30 minutes. The strips are again

washed to remove unbound anti-human IgG antibodies and nitroblue tetrazolium chloride/5-bromo-4-chloro-3-indolylphosphate (NBT/BCIP) substrate is added. Alkaline phosphatase enzyme converts the soluble substrate into a colored insoluble product on the membrane to produce a black band. Strips are digitized via picture capture on the EUROBlot One instrument and evaluated with the EUROLineScan software. (O'Connor K, Waters P, Komorowski L, et al: GABAA receptor autoimmunity: A multicenter experience. *Neurol Neuroimmunol Neuroinflamm*. 2019 Apr 4;6[3]:e552. doi: 10.1212/NXI.0000000000000552)

Western Blot:

Neuronal antigens extracted aqeuously from adult rat cerebellum, full-length recombinant human collapsin response-mediator protein-5 (CRMP-5), or full-length recombinant human amphiphysin protein is denatured, reduced, and separated by electrophoresis on 10% polyacrylamide gel. IgG is detected autoradiographically by enhanced chemiluminescence. (Yu Z, Kryzer TJ, Griesmann GE, Kim K, Benarroch EE, Lennon VA: CRMP-5 neuronal autoantibody: marker of lung cancer and thymoma-related autoimmunity. *Ann Neurol*. 2001 February;49[2]:146-154; Dubey D, Jitprapaikulsan J, Bi H, et al: Amphiphysin-IgG autoimmune neuropathy: A recognizable clinicopathologic syndrome. *Neurology*. 2019 Nov 12;93(20):e1873-e1880. doi: 10.1212/WNL.00000000000008472)

PDF Report

No

Day(s) Performed

Profile tests: Monday through Sunday; Reflex tests: Varies

Report Available

8 to 12 days

Specimen Retention Time

28 days

Performing Laboratory Location

Rochester

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 Regional Manager. 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. This test has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

- 86255 x 21
- 86341 x 1
- 84182-AGNBS (if appropriate)
- 86256 AGNTS (if appropriate)
- 86255-AINCS (if appropriate)
- 86256-AMPIS (if appropriate)
- 86256 APHTS (if appropriate)
- 84182-AMIBS (if appropriate)
- 84182-AN1BS (if appropriate)
- 86256 AN1TS (if appropriate)
- 84182-AN2BS (if appropriate)
- 86256 AN2TS (if appropriate)
- 86256 AN3TS (if appropriate)
- 86256 CRMTS (if appropriate)
- 84182-CRMWS (if appropriate)
- 86255-DPPCS (if appropriate)
- 86256-DPPTS (if appropriate)
- 86256-GABIS (if appropriate)
- 86255-GFACS (if appropriate)
- 86256-GFATS (if appropriate)
- 86255-IG5CS (if appropriate)
- 86256-IG5TS (if appropriate)
- 86255-GL1CS (if appropriate)
- 86256-GL1TS (if appropriate)
- 86255 NCDCS (if appropriate)
- 86256 NCDTS (if appropriate)
- 86255-NFHCS (if appropriate)
- 86256-NIFTS (if appropriate)
- 86255-NFLCS (if appropriate)
- 86256-NMDIS (if appropriate)
- 84182-PC1BS (if appropriate)
- 86256 PC1TS (if appropriate)
- 86256 PC2TS (if appropriate)
- 84182-PCTBS (if appropriate)
- 86256 PCTTS (if appropriate)
- 86255 SP7CS (if appropriate)
- 86256 SP7TS (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
ENS2	Encephalopathy, Autoimm/Paraneo, S	94697-0

Result ID	Test Result Name	Result LOINC® Value
89080	AGNA-1, S	94341-5
81722	Amphiphysin Ab, S	94340-7
80150	ANNA-1, S	94342-3
80776	ANNA-2, S	94343-1
83137	ANNA-3, S	94344-9
83077	CRMP-5-IgG, S	94815-8
81596	GAD65 Ab Assay, S	94345-6
83138	PCA-2, S	94351-4
9477	PCA-1, S	94350-6
83076	PCA-Tr, S	94352-2
61516	NMDA-R Ab CBA, S	93503-1
61518	AMPA-R Ab CBA, S	93489-3
61519	GABA-B-R Ab CBA, S	93428-1
34257	Encephalopathy, Interpretation, S	69048-7
618896	IFA Notes	48767-8
64279	LGI1-IgG CBA, S	94287-0
64281	CASPR2-IgG CBA, S	94285-4
64930	DPPX Ab IFA, S	82976-2
64928	mGluR1 Ab IFA, S	94347-2
605155	GFAP IFA, S	94346-4
606946	IgLON5 IFA, S	96476-7
606964	NIF IFA, S	96486-6
615867	Neurochondrin IFA, S	In Process
615875	Septin-7 IFA, S	In Process