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## Overview

### Useful For

Evaluating patients who present with a subacute neurological disorder of undetermined etiology and have risk factors for lung cancer

Reporting an end titer result from spinal fluid specimens

### Testing Algorithm

If the indirect immunofluorescence pattern suggests Purkinje cell cytoplasmic antibody type 2 (PCA-2), then this test will be performed at an additional charge.

### Method Name

Only orderable as a reflex. For more information see:

DMC2 / Dementia, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid

ENC2 / Encephalopathy, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid

EPC2 / Epilepsy, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid

MDC2 / Movement Disorder, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid

MAC1 / Myelopathy, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid

Indirect Immunofluorescence Assay (IFA)

### NY State Available

Yes

## Specimen

### Specimen Type

CSF

### Ordering Guidance

Serum is preferred. Spinal fluid testing is particularly useful when interfering antibodies are present in the serum.

### Specimen Required

Only orderable as a reflex. For more information see:

-DMC2 / Dementia, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid

-ENC2 / Encephalopathy, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid

-EPC2 / Epilepsy, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid

-MDC2 / Movement Disorder, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid

-MAC1 / Myelopathy, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid

**Container/Tube:** Sterile vial**Specimen Volume:** 4 mL**Specimen Minimum Volume**

2 mL

**Reject Due To**

Gross hemolysis	Reject
Gross lipemia	Reject
Gross icterus	Reject

**Specimen Stability Information**

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

**Clinical & Interpretive****Clinical Information**

Purkinje cell autoantibodies (PCA) are among the antineuronal antibodies (ANNA) recognized clinically as markers of a patient's immune response to specific cancers (paraneoplastic autoantibodies).

In 1976, a PCA, defined by indirect immunofluorescence, was described by Dr. John Trotter and colleagues as a serological accompaniment of cerebellar ataxia related to Hodgkin lymphoma. That autoantibody is now known as anti-Tr or PCA-Tr.

PCA-1 (or anti-Yo), first described in 1983, serves as a serological marker for a new or recurrent carcinoma of the ovary, other Mullerian tissue, or breast. PCA-1-positive patients are women in 99% of cases. They usually present with subacute cerebellar degeneration, but 10% have sensory or motor neuropathy.

In 2000, the Mayo Clinic Neuroimmunology Laboratory described and named PCA-2, a new IgG marker of an immune response to small-cell lung carcinoma (SCLC) in patients presenting with a subacute paraneoplastic neurologic disorder.

Other autoantibody markers of immune response to SCLC include ANNA-1, ANNA-2, ANNA-3, amphiphysin, collapsin response-mediator protein-5 (CRMP-5) IgG, antiglial/neuronal nuclear antibody type 1 (AGNA-1), neuronal calcium channel antibodies (N-type > P/Q-type), ganglionic acetylcholine receptor antibodies, muscle acetylcholine receptor antibodies, neuronal potassium channel antibodies, and striational antibodies.

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**Reference Values**

Only orderable as a reflex. For more information see:

- DMC2 / Dementia, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid
- ENC2 / Encephalopathy, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid
- EPC2 / Epilepsy, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid
- MDC2 / Movement Disorder, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid
- MAC1 / Myelopathy, Autoimmune/Paraneoplastic Evaluation, Spinal Fluid

<1:2

Neuron-restricted patterns of IgG staining that do not fulfill criteria for Purkinje cell cytoplasmic antibody type 2 may be reported as "unclassified antineuronal IgG." Complex patterns that include non-neuronal elements may be reported as "uninterpretable."

**Interpretation**

A positive value (at 1:2 dilution or higher) is consistent with neurological autoimmunity and justifies a thorough search for a lung cancer, particularly small-cell carcinoma. The cancers are usually limited in metastasis. An extrapulmonary primary small-cell carcinoma (eg, skin, breast, larynx, cervix, prostate) should be considered.

Purkinje cell autoantibody type 2 is found in less than 2% of patients with uncomplicated small-cell lung carcinoma.

**Cautions**

Western blot with native neuronal proteins may be required to detect a positive result when interfering autoantibodies preclude interpretation of immunofluorescence pattern.

**Supportive Data**

Purkinje cell autoantibody type-2 (PCA-2) binds to the cytoplasm of cerebellar neurons in a characteristic pattern. Western blots of reduced/denatured cerebellar and small-cell lung carcinoma proteins reveal a common antigenic band, approximately 280 kDa.(1) Nine of 10 seropositive patients initially identified had a subacute neurological presentation (elements of encephalomyeloneuropathy) and 9 of 10 had lung cancer confirmed.(1) Similar neurological and oncological correlations have been observed in 30 subsequently identified seropositive patients.(Lennon VA: Unpublished data)

**Clinical Reference**

1. Galanis E, Frytak S, Rowland KM, et al: Neuronal autoantibody titers in the course of small-cell lung carcinoma and platinum-associated neuropathy. *Cancer Immunol Immunother* 1999 May-June;48(2-3):85-90
2. Vernino S, Lennon VA: New Purkinje cell antibody (PCA-2): marker of lung cancer-related neurological autoimmunity. *Ann Neurol* 2000 Mar;47(3):297-305
3. McKeon A, Tracy JA, Pittock SJ, Parisi JE, Klein CJ, Lennon VA. Purkinje cell cytoplasmic autoantibody type 1 accompaniments: the cerebellum and beyond. *Arch Neurol*. 2011 Oct;68(10):1282-9. doi: 10.1001/archneurol.2011.128
4. Hetzel DJ, Stanhope CR, O'Neill BP, Lennon VA: Gynecologic cancer in patients with subacute cerebellar degeneration predicted by anti-Purkinje cell antibodies and limited in metastatic volume. *Mayo Clin Proc*. 1990 Dec;65(12):1558-15635
5. Horta ES, Lennon VA, Lachance DH, et al: Neural autoantibody clusters aid diagnosis of cancer. *Clin Cancer Res*. 2014 Jul;20(14):3862-3869

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**Performance****Method Description**

The patient's specimen is tested by a standardized immunofluorescence assay that uses a composite frozen section of mouse cerebellum, kidney, and gut tissues. After incubation with the specimen and washing, fluorescein-conjugated goat-antihuman IgG is applied. Neuron-specific autoantibodies are identified by their characteristic fluorescence staining patterns. Specimens that are scored positive for any neuronal nuclear or cytoplasmic autoantibody are titrated. 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;4[5]:e385. Published 2017 Jul 18. doi:10.1212/NXI.0000000000000385)

**PDF Report**

No

**Day(s) Performed**

Monday through Sunday

**Report Available**

6 to 8 days

**Specimen Retention Time**

2 days

**Performing Laboratory Location**

Mayo Clinic Laboratories - Rochester Main Campus

**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**

86256

## Test Definition: PC2TC

Purkinje Cell Cytoplasmic Antibody Type 2  
(PCA-2) Titer, Spinal Fluid

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**LOINC® Information**

Test ID	Test Order Name	Order LOINC® Value
PC2TC	PCA-2 Titer, CSF	94364-7

Result ID	Test Result Name	Result LOINC® Value
43447	PCA-2 Titer, CSF	94364-7