# Test Definition: EDN

Eosinophil Derived Neurotoxin, Serum

## Overview

### Useful For

Evaluating patients suspected to have a condition associated with eosinophilia or hypereosinophilia

Evaluating patients with elevated peripheral blood eosinophil counts

Managing patients with elevated eosinophil-derived neurotoxin in the context of eosinophil-associated diseases

### Method Name

Fluorescence Enzyme Immunoassay (FEIA)

### NY State Available

Yes

## Specimen

### Specimen Type

Serum

### Specimen Required

**Supplies:** Sarstedt Aliquot Tube, 5 mL (T914)
**Container/Tube:**
**Preferred:** Serum gel
**Acceptable:** Red top
**Submission Container/Tube:** Plastic vial
**Specimen Volume:** 0.5 mL
**Collection Instructions:** Within 12 hours of collection, centrifuge and aliquot serum into a plastic vial. Serum cannot sit on either gel or cells for longer than 12 hours.

### Specimen Minimum Volume

0.3 mL

### Reject Due To

| | |
|---|---|
| Gross hemolysis | OK |
| Gross lipemia | OK |
| Gross icterus | OK |
| Heat-treated specimen | Reject |

| | |
|---|---|
| If serum is on cell pellet or gel for >12 hours | Reject |

### Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|---|---|---|---|
| Serum | Refrigerated (preferred) | 7 days | |
| | Frozen | 21 days | |

## Clinical & Interpretive

### Clinical Information

Eosinophils are a type of white blood cell (WBC) that derives from myeloid progenitor cells.(1) They are a critical part of the immune response to helminth and other infections and play a significant role in allergic diseases. Eosinophils are characterized by their cytoplasmic granules, which appear dark red when stained with eosin. These cytoplasmic granules contain a number of cytotoxic proteins, including major basic protein, eosinophil cationic protein, and eosinophil-derived neurotoxin (EDN). Upon activation, eosinophils degranulate, with subsequent release of these proteins into the extracellular space. These proteins exhibit a variety of activities, with EDN being a ribonuclease having antiviral activity.

Eosinophils generally comprise less than 5% of the total WBC count. Eosinophilia, or elevated numbers of eosinophils in the peripheral blood, can be defined as mild (up to 1500/mcL), moderate (1500-5000/mcL), or severe (>5000/mcL).(2) Hypereosinophilia (HE) identifies a situation in which peripheral eosinophils >1500/mcL are detected at least 2 occasions at least 4 weeks apart. Causes of HE can be classified as secondary (reactive), primary (neoplastic) or idiopathic. Some secondary (reactive) causes of HE include allergy, parasite infection, and autoimmunity. Additionally, secondary (reactive) HE can occur in the context of a malignancy (paraneoplastic), such as solid-organ cancer, T-cell lymphoma/leukemia, and Hodgkin lymphoma. In contrast, primary (neoplastic) HE occurs in situations of clonal myeloid/lymphoid stem cells; in this case, the eosinophils originate from the malignant clone. Lastly, idiopathic HE is reserved for cases where no underlying cause can be identified.

In some cases, peripheral HE leads to infiltration of tissues by the eosinophils. Hypereosinophilic syndrome (HES) identifies patients in whom organ damage occurs and is caused by degranulation of eosinophils within the target organ. The most commonly involved organ systems in HES are the skin, lungs, and gastrointestinal tract.(2) Evaluation of patients with peripheral HE begins with screening for second causes (infection, allergy, etc) and assessing for organ damage though imaging, functional testing, and tissue pathology.(3) Although peripheral blood eosinophil counts are used to identify patients with HE, they may not always accurately reflect elevated numbers of eosinophils found in tissues. In addition, absolute counts also do not indicate the level of eosinophil activation and degranulation. EDN concentrations have been shown to correlate with peripheral blood eosinophil counts and may provide additional information related to activation status.(4,5)

### Reference Values

<70 mcg/L: Normal

70-99 mcg/L: Borderline
> or =100 mcg/L: Elevated
Reference values apply to all ages.

## Interpretation

Eosinophil-derived neurotoxin (EDN) concentrations greater than or equal to 100 mcg/L, in the presence of elevated numbers of peripheral blood or tissue-resident eosinophils, may be suggestive of inflammation or increased disease activity in patients with eosinophil-associated diseases.

In the context of normal eosinophil counts, EDN concentrations greater than 70 mcg/L may indicate cellular activation and degranulation.

In the context of elevated eosinophil counts, EDN concentrations less than or equal to 70 mcg/L may indicate limited or absent cellular activation.

## Cautions

Prolonged contact of serum with the cell pellet can lead to increased concentrations of serum eosinophil-derived neurotoxin (EDN). Serum should be aliquoted into a plastic vial immediately (within 12 hours) after centrifugation.

Elevated concentrations of EDN are not diagnostic for any specific condition and should be correlated with other laboratory data and clinical information.

Normal EDN concentrations do not exclude the possibility of eosinophilia or hypereosinophilia.

## Supportive Data

An internal study evaluated the correlation between serum eosinophil-derived neurotoxin (EDN) concentrations and peripheral blood eosinophil counts. A cohort of samples that spanned the measurement range for absolute eosinophil counts were collected (n=110). When samples were stratified according to clinical cutoffs for eosinophil counts, a significant difference in EDN concentrations between normal (median: 43.8, 95% CI: 32.8–54.0 mcg/L, n=40) and elevated (median: 120.0, 95% CI: 95.4–149.0 mcg/L, n=70) groups ($p<0.0001$) was observed. Moreover, the three samples that were considered hypereosinophilic (>1.5 x 10(9) cells/L) all had very high concentrations of EDN (median: 200 mcg/L). A receiver operating characteristic (ROC) analysis demonstrated an area under the curve of 0.841 in assessing overall sensitivity and specificity of EDN for eosinophilia. Based on the ROC curve, borderline and abnormal cutoffs were selected at 70 mcg/L and 100 mcg/L, respectively. Both cutoffs demonstrated a specificity of 85% for eosinophilia. However, the cutoff of 70 mcg/L had an improved sensitivity of 74.3% compared to 100 mcg/L with a sensitivity of 57.1%.

## Clinical Reference

1. Wechsler ME, Munitz A, Ackerman SJ, et al. Eosinophils in health and disease: A state-of-the-art review. Mayo Clin Proc. 2021;96(10):2694-2707
2. Mattis DM, Wang SA, Lu CM. Contemporary classification and diagnostic evaluation of hypereosinophilia. Am J Clin Pathol. 2020;154(3):305-318
3. Shomali W, Gotlib J. World Health Organization and International Consensus Classification of eosinophilic disorders: 2024 update on diagnosis, risk stratification and management. Am J Hematol. 2024;99(5):946-968
4. Rutten B, Young S, Rhedin M, et al. Eosinophil-derived neurotoxin: A biologically and analytically attractive asthma biomarker. PLoS ONE. 2021;16(2):e0246627

5. Rydell N, Nagao M, Ekoff H, et al. Development of an automated ImmunoCAP research assay for eosinophil derived neurotoxin and its use in asthma diagnosis in children. Pract Lab Med. 2019;17:300138

## Performance

### Method Description
Testing for eosinophil-derived neurotoxin is performed using a laboratory-developed immunoassay.(Unpublished Mayo method)

### PDF Report
No

### Day(s) Performed
Tuesday

### Report Available
2 to 8 days

### Specimen Retention Time
14 days

### 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
83520

### LOINC® Information

| Test ID | Test Order Name | Order LOINC® Value |
|---|---|---|
| EDN | Eosinophil Derived Neurotoxin, S | 100976-0 |

MAYO CLINIC LABORATORIES

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Eosinophil Derived Neurotoxin, Serum

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|---|---|---|
| EDN | Eosinophil Derived Neurotoxin, S | 100976-0 |