MAYO CLINIC LABORATORIES

# Test Definition: HALO

Haloperidol, S

## Overview

### Useful For

Optimizing haloperidol dosage

Monitoring patient compliance

Assessing toxicity

### Method Name

Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS)

### NY State Available

Yes

## Specimen

### Specimen Type

Serum Red

### Specimen Required

**Collection Container/Tube:** Red top (serum gel/SST are **not** acceptable)

**Submission Container/Tube:** Plastic vial

**Specimen Volume:** 1 mL

**Collection Instructions:**

1. Draw blood immediately before next scheduled dose.

2. Centrifuge and aliquot serum into plastic vial within 2 hours of collection.

### Forms

If not ordering electronically, complete, print, and send a Therapeutics Test Request (T831) with the specimen.

### Reject Due To

| | |
|---|---|
| Gross hemolysis | OK |
| Gross lipemia | OK |
| Gross icterus | OK |

### Specimen Minimum Volume

0.3 mL

### Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|---|---|---|---|
| Serum Red | Refrigerated (preferred) | 28 days | |
| | Ambient | 28 days | |
| | Frozen | 28 days | |

## Clinical & Interpretive

### Clinical Information

Haloperidol (Haldol) is a member of the butyrophenone class of neuroleptic drugs used to treat psychotic disorders (eg, schizophrenia). It is also used to control the tics and verbal utterances associated with Tourette syndrome and in the management of intensely hyperexcitable children who fail to respond to other treatment modalities.

The daily recommended oral dose for patients with moderate symptoms is 0.5 to 2.0 mg; for patients with severe symptoms, 3 to 5 mg may be used. However, some patients will respond only at significantly higher doses.

Haloperidol is metabolized in the liver to reduced haloperidol, its major metabolite.(1,2)

Use of haloperidol is associated with significant toxic side effects, the most serious of which include tardive dyskinesia, which can be irreversible, extrapyramidal reactions with Parkinson-like symptoms, and neuroleptic malignant syndrome. Less serious side effects can include hypotension, anticholinergic effects (blurred vision, dry mouth, constipation, urinary retention), and sedation. The risk of developing serious, irreversible side effects seems to increase with increasing cumulative doses over time.(1,3)

### Reference Values

HALOPERIDOL:

5-16 ng/mL

REDUCED HALOPERIDOL:

10-80 ng/mL

## Interpretation

Studies show a strong relationship between dose and serum concentration (4); however, there is a modest relationship of clinical response or risk of developing long-term side effects to either dose or serum concentration.

A therapeutic window exists for haloperidol, but some patients may respond to concentrations outside of this range. Patients who respond at serum concentrations between 5 to 16 ng/mL show no additional improvement at concentrations greater than 16 to 20 ng/mL.(3,5) Some patients may respond at concentrations less than 5 ng/mL, and others may require concentrations significantly greater than 20 ng/mL before an adequate response is attained.

Due to interindividual variation, the serum concentration should only be used as one factor in determining the appropriate dose and must be interpreted in conjunction with the clinical status.

Although the metabolite, reduced haloperidol, has minimal pharmacologic activity, evidence has been presented suggesting that an elevated ratio of reduced haloperidol-to-haloperidol (ie, >5) is predictive of a poor clinical response.(3,6) A reduced haloperidol-to-haloperidol ratio of less than 0.5 indicates noncompliance; the metabolite does not accumulate except during steady-state conditions.

## Cautions

Potentially interfering drugs include hydroxyzine (interferes with haloperidol), tiagabine (interferes with reduced haloperidol), and quetiapine (interferes with internal standard resulting in artificially low haloperidol).

## Clinical Reference

1. Lawson GM: Monitoring of serum haloperidol. Mayo Clin Proc. 1994 Feb;69(2):189-190

2. Ereshefsky L, Davis CM, Harrington CA, et al: Haloperidol and reduced haloperidol plasma levels in selected schizophrenic patients. J Clin Psychopharmacol. 1984 Jun;4(3):138-142

3. Volavka J, Cooper TB: Review of haloperidol blood level and clinical response: looking through the window. J Clin Psychopharmacol. 1987 Feb;7(1):25-30

4. Moulin MA, Davy JP, Debruyne D, et al: Serum level monitoring and therapeutic effect of haloperidol in schizophrenic patients. Psychopharmacology. 1982;76(4):346-350

5. van Putten T, Marder SR, Mintz J, Polant RE: Haloperidol plasma levels and clinical response: a therapeutic window relationship. Am J Psychiatry. 1992 Apr;149 (4):500-505

6. Shostak M, Perel JM, Stiller RL, Wyman W, Curran S: Plasma haloperidol and clinical response: a role for reduced haloperidol in antipsychotic activity? J Clin Psychopharmacol. 1987 Dec;7(6):394-400

7. Hiemke C, Bergemann N, Clement HW, et al: Consensus Guidelines for Therapeutic Drug Monitoring in Neuropsychopharmacology: Update 2017. Pharmacopsychiatry. 2018 Jan;51(1-02):9-62. doi: 10.1055/s-0043-116492

8. Rifai N, Horvath AR, Wittwer CT, eds: Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018

## Performance

### Method Description
Liquid-liquid extraction with liquid chromatography-tandem mass spectrometry detection.(Unpublished Mayo method)

### PDF Report
No

### Specimen Retention Time
14 days

### Performing Laboratory Location
Rochester

## Fees & Codes

### 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
80173

### LOINC® Information

# Test Definition: HALO

Haloperidol, S

| Test ID | Test Order Name | Order LOINC Value |
|---|---|---|
| HALO | Haloperidol, S | 87550-0 |

| Result ID | Reporting Name | LOINC® |
|---|---|---|
| 80339 | Haloperidol, S | 3669-9 |
| 169 | Reduced Haloperidol | 38364-6 |