Liquid Chromatography-Tandem Mass Spectrometry for Measurement of Urine Metanephrines

Background Information

Pheochromocytomas are neuroendocrine tumors that may produce excess catecholamines (epinephrine, norepinephrine and dopamine) and metanephrines (metanephrine and normetanephrine) and can present as unexplained hypertension.\textsuperscript{1} Urinary fractionated metanephrines assay has been recommended as one of the first-line tests for diagnosis of pheochromocytoma.\textsuperscript{1,2}

Metanephrine and normetanephrine are derived from epinephrine and norepinephrine, respectively. Metanephrines are primarily produced in the adrenal chromaffin cells, with some production occurring in the extraneuronal tissues.\textsuperscript{1}

Although liquid chromatography with electrochemical detection (LC-ECD) represents one of the most commonly used techniques for measuring urinary metanephrines, it suffers from analytical interference, tedious sample preparation and relatively high imprecision.\textsuperscript{2} New methods have recently been reported using LC with tandem mass spectrometric detection (LC-MS/MS), which offers better specificity, less manual sample preparation and shorter chromatographic time.\textsuperscript{3,4}

Clinical Indications

Elevated levels of metanephrines in urine may assist the diagnosis of pheochromocytoma.

Interpretation

- Metanephrine reference range: 52 - 341 $\mu g$/24hr
- Normetanephrine reference range: 88 - 444 $\mu g$/24hr

Limitations of the Assay

1. The method is linear from 42 - 5406 ng/mL and 61 - 2666 ng/mL for metanephrine and normetanephrine, respectively.
2. Minimum sample size of 1.5 mL is required.
3. This is a laboratory-validated assay that uses analyte specific reagents (ASR), which will be indicated.

Methodology\textsuperscript{5}

This assay measures total metanephrines after hydrolysis.

1. Urine metanephrines are extracted by solid phase extraction and analyzed by liquid chromatography-tandem mass spectrometry.
2. Specimen pH should be adjusted to $< 3$ immediately upon arrival in the laboratory.
3. Specimen should be kept at 4°C until assayed.

References


Related tests

- Plasma metanephrines
- Plasma catecholamines
- Urine catecholamines
## Test Overview

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Metanephrines, urine 24hr; Metanephrines, urine random</th>
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<tbody>
<tr>
<td>Metanephrine Reference Range</td>
<td>52 – 341 µg/24hr</td>
</tr>
<tr>
<td>Normetanephrine Reference Range</td>
<td>88 – 444 µg/24hr</td>
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<tr>
<td>Patient Preparation</td>
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<tr>
<td>Specimen Requirements</td>
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