TESTING FOR HYPERAMMONEMIA

The Essentials

National Urea Cycle Disorders Foundation
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HYPERAMMONEMIA IS A LIFE-THREATENING CONDITION THAT CAN AFFECT PATIENTS AT ANY AGE.[1]

A LIFE-THREATENING CONDITION

Hyperammonemia is a metabolic disorder characterized by excess ammonia in the blood that can affect patients at any age. **If left untreated, hyperammonemia may lead to irreversible neurological damage or death.**[1] Thus, particular care should be taken when sampling and handling plasma specimens to increase the positive predictive value of ammonia test results.[2]

SIGNS AND SYMPTOMS OF ACUTE HYPERAMMONEMIA

Signs and symptoms of acute hyperammonemia are nonspecific and are mostly neurological in origin.[3] Symptoms may include:

- Somnolence and lethargy progressing to coma[3]
- Vomiting (metabolic acidosis)[1]
- Seizures[1]
- Peripheral circulatory failure[1]
- Cerebral edema (respiratory alkalosis)[1]
- Liver failure[1]
- Multiorgan failure[1]
- Postpartum psychosis[1]
- In neonates: sepsis-like picture, respiratory distress, hypo/hyperthermia[1]

COMMON CAUSES OF HYPERAMMONEMIA

Common causes of hyperammonemia include[4]:

- Liver failure
- Reactions to drugs (e.g., valproic acid)
- Hemolytic disease
- Gastrointestinal bleeds
- Urea cycle disorders (UCDs) or other inborn errors of metabolism (IEMs)[2,5]

ACCURATE BLOOD AMMONIA DRAW AND ANALYSIS: THE ESSENTIAL STEPS

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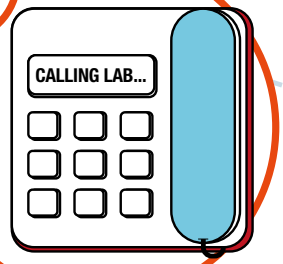
Levels of ammonia can be affected by sampling technique, transport, and analytical technique.[6] Follow these steps to to ensure an accurate plasma ammonia result:

1



STAT Lab Alert

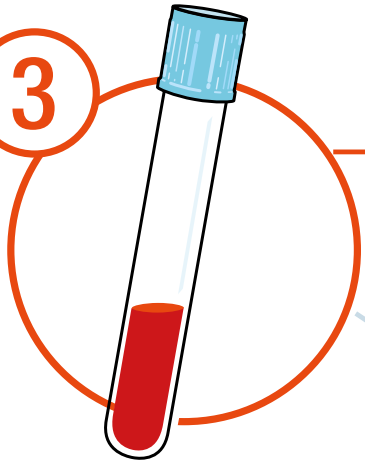
Alert the laboratory to the incoming STAT order.[2]

2

Free-Flowing Venous or Arterial Blood Sample

Prepare to collect a free-flowing venous or arterial blood sample. **Do not use a tourniquet**, and keep the patient's arm as relaxed as possible.[4,7,8]

3



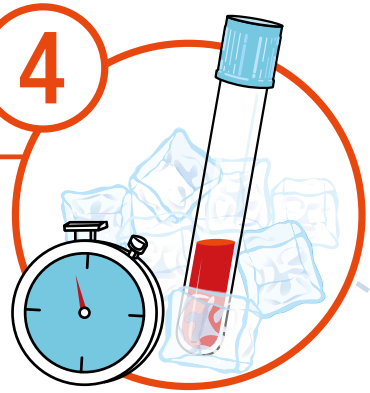
Lithium Heparin or EDTA Tube

Collect the blood sample in a **specimen tube** (preferably pre-chilled) containing either lithium heparin or EDTA as an anticoagulant.[1,7]

4

Ice & Transport to Lab

Place the sample on ice. **Order the sample to be handled STAT** (transported to lab, separated within 15 minutes of draw, and analyzed immediately).[2,7]



> **Newborns who develop severe hyperammonemia after 24 hours of age usually have a UCD or an organic acidemia—both IEMs.[5]**

> **In older patients, liver disease is a likely cause of hyperammonemia. However, UCDs should be considered since 69% of UCD patients present with symptoms of hyperammonemia later in life.[9,10]**

SPEED AND ACCURACY

- The management of a hyperammonemic crisis not only demands a **rapid** plasma ammonia reading but also an **accurate** one.[1]
- Critical clinical decisions depend on having the right diagnostic information.
- Hyperammonemic crises can develop quickly, increasing the risk of neurological damage and death.[1]
- If hyperammonemia is confirmed, treatment should not be delayed.[1]
- Consider calling a metabolic geneticist.

LAB PROCEDURES AND ANALYSIS

The test for ammonia should only take a few minutes after receipt of the sample, so clinicians can expect a rapid report from the laboratory.[1] Direct procedures, such as enzymatic methods, are more widely used than indirect procedures to measure plasma ammonia levels, as they are more easily automated.[11]

NORMAL BLOOD AMMONIA REFERENCE LEVELS

Decision limits of plasma ammonia concentrations*[7] (to be interpreted with the clinical situation[1]):

Approximate age	µmol/L
Premature neonates	< 150
Term neonates	< 100
Infants	< 40
Adults	11-32

*Individual laboratory reference levels may vary.

INTERPRETATION OF RESULTS

The goal is to rule out hyperammonemia without delay.[1]

If hyperammonemia is confirmed, other laboratory tests that may be helpful in diagnosing a urea cycle disorder (UCD) or other causes of hyperammonemia include[1]:

- Blood glucose, blood gases, electrolytes, lactate, and transaminases
- Plasma amino acids and blood acylcarnitines
- Urine amino acids, organic acid, and orotic acid

Regardless of cause, any delay in recognizing or treating hyperammonemia increases the risk of irreversible brain damage or death.[1]

RAPID, ACCURATE BLOOD AMMONIA DRAW AND ANALYSIS: A QUICK SUMMARY

- Alert laboratory to STAT order
- Sample free-flowing venous or arterial blood – no tourniquet
- Use lithium heparin or EDTA tube
- Immediately place sample on ice, with orders to be handled STAT

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www.checkammonia.com

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