MAYO CLINIC LABORATORIES

Test Definition: BMAMA

Basic Metabolic Panel, Serum

Overview

Useful For

Routine health monitoring or patient monitoring while hospitalized for information regarding metabolism, including the current kidney status, electrolyte, and acid/base balance, and blood glucose

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
KS	Potassium, S	Yes	Yes
NAS	Sodium, S	Yes	Yes
CL	Chloride, S	Yes	Yes
HCO3	Bicarbonate, S	Yes	Yes
AGAP	Anion Gap	No	Yes
BUN	Bld Urea Nitrog (BUN), S	Yes	Yes
CRTS1	Creatinine with eGFR, S	Yes	Yes
CA	Calcium, Total, S	Yes	Yes
GLURA	Glucose, Random, S	Yes	Yes

Method Name

KS, NAS, CL: Potentiometric, Indirect Ion-Selective Electrode
HCO3: Photometric/Enzymatic
AGAP: Calculation
BUN: Photometric, Urease
CRTS1: Enzymatic Colorimetric Assay
CA: Photometric
GLURA: Enzymatic Photometric Assay

NY State Available

Yes

Specimen

Specimen Type

Serum

Shipping Instructions

Necessary Information

Patient's age and sex are required.

Specimen Required

Collection Container/Tube:

Preferred: Serum gel

Acceptable: Red top

Submission Container/Tube: Plastic vial

Specimen Volume: 0.5 mL

Collection Instructions:

1. Serum gel tubes should be centrifuged within 2 hours of collection.
2. Red-top tubes should be centrifuged and the serum aliquoted into a plastic vial within 2 hours of collection.

Forms

If not ordering electronically, complete, print, and send a Renal Diagnostics Test Request (T830) with the specimen.

Specimen Minimum Volume

0.4 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated	24 hours	

Clinical & Interpretive

Clinical Information

The basic metabolic panel measures 8 analytes and calculates an anion gap. It is used to assess kidney status, electrolyte, and acid/base balance, and blood glucose.

Reference Values

SODIUM

<1 year: Not established

> or =1 year: 135-145 mmol/L

POTASSIUM

<1 year: Not established

> or =1 year: 3.6-5.2 mmol/L

CHLORIDE

<1 year: Not established

1-17 years: 102-112 mmol/L
> or =18 years: 98-107 mmol/L

BICARBONATE
Males:
<1 year: Not established
1-2 years: 17-25 mmol/L
3 years: 18-26 mmol/L
4-5 years: 19-27 mmol/L
6-7 years: 20-28 mmol/L
8-17 years: 21-29 mmol/L
> or =18 years: 22-29 mmol/L

Females:
<1 year: Not established
1-3 years: 18-25 mmol/L
4-5 years: 19-26 mmol/L
6-7 years: 20-27 mmol/L
8-9 years: 21-28 mmol/L
> or =10 years: 22-29 mmol/L

ANION GAP
<7 years: Not established
> or =7 years: 7-15

BLOOD UREA NITROGEN
Males:
<12 months: Not established
1-17 years: 7-20 mg/dL
> or =18 years: 8-24 mg/dL

Females:
<12 months: Not established
1-17 years: 7-20 mg/dL
> or =18 years: 6-21 mg/dL

CREATININE
Males:
0-11 months: 0.17-0.42 mg/dL
1-5 years: 0.19-0.49 mg/dL
6-10 years: 0.26-0.61 mg/dL
11-14 years: 0.35-0.86 mg/dL
> or =15 years: 0.74-1.35 mg/dL

Females:

0-11 months: 0.17-0.42 mg/dL
1-5 years: 0.19-0.49 mg/dL
6-10 years: 0.26-0.61 mg/dL
11-15 years: 0.35-0.86 mg/dL
> or =16 years: 0.59-1.04 mg/dL

ESTIMATED GLOMERULAR FILTRATION RATE (eGFR)
>= 18 years old: > or =60 mL/min/BSA (body surface area)
Estimated GFR calculated using the 2021 CKD-EPI creatinine equation
Note: eGFR results will not be calculated for patients younger than 18 years old.

CALCIUM
<1 year: 8.7-11.0 mg/dL
1-17 years: 9.3-10.6 mg/dL
18-59 years: 8.6-10.0 mg/dL
60-90 years: 8.8-10.2 mg/dL
>90 years: 8.2-9.6 mg/dL

GLUCOSE
0-11 months: Not established
> or =1 year: 70-140 mg/dL

Interpretation

Basic metabolic panel results are usually evaluated in conjunction with each other for patterns of results. A single abnormal test result could be indicative of something different than if more than 1 of the test results are abnormal. Many conditions will cause abnormal results including kidney failure, breathing problems, and diabetes-related complications.

Cautions

No significant cautionary statements

Clinical Reference

1. Oh MS: Evaluation of renal function, water, electrolytes, and acid-base balance. In: McPherson RA, Pincus MR, eds. Henry's Clinical Diagnosis and Management by Laboratory Methods. 22nd ed. Elsevier Saunders; 2011:chap 14
2. Basic Metabolic Panel (BMP). Testing.com; Updated November 9, 2021. Accessed July 13, 2022. Available at www.testing.com/tests/basic-metabolic-panel-bmp/

Performance

Method Description

Sodium, Potassium, Chloride:
The ion selective electron (ISE) module indirectly measures the electromotive force (EMF) difference between an ISE and a reference electrode. The EMF of the ISE is dependent on the ion concentration of the sample. The EMF of the reference electrode is constant. An electronic calculation circuit converts EMF of the sample to the ion concentration of

the sample.(Package insert: ISE Indirect Na, K, CL: for Gen 2. Roche Diagnostics; 12/2020)

Bicarbonate:
This is a photometric rate reaction. Bicarbonate (HCO3[-]) reacts with phosphoenolpyruvate in the presence of phosphoenolpyruvate carboxylase to produce oxaloacetate and phosphate. The oxaloacetate produced is coupled with reduced nicotinamide adenine dinucleotide (NADH) in the presence of malate dehydrogenase to produce malate and NAD(+). The consumption of NADH causes a decrease in absorbance and is monitored in the ultraviolet range of 320 to 400 nm. The rate of change is directly proportional to the concentration of bicarbonate.(Package insert: Bicarbonate reagent. Roche Diagnostics; 04/2019)

Anion Gap:
This is a calculated result. The following equation is used to calculate the anion gap (A gap):
A gap =Na - (Cl + HCO3[-])

Blood Urea Nitrogen:
This is a kinetic UV assay where urease cleaves urea to form ammonia and carbon dioxide. The ammonia formed then reacts with alpha-ketoglutarate and NADH in the presence of urease/glutamate dehydrogenase to yield glutamate and NAD(+). The decrease in absorbance, due to the consumption of NADH, is measured kinetically and is proportional to the amount of urea in the sample.(Package insert: Urea/BUN reagent. Roche Diagnostics; 12/2019)

Creatinine:
This enzymatic method is based on the conversion of creatinine with the aid of creatininase, creatinase, and sarcosine oxidase to glycine, formaldehyde, and hydrogen peroxide. Catalyzed by peroxidase the liberated hydrogen peroxide reacts with 4-aminophenazone and HTIB (hydroxy[tosyloxy]iodobenzene) to form a quinone imine chromogen. The color intensity of the quinone imine chromogen formed is directly proportional to the creatinine concentration in the reaction mixture.(Package insert: Creatinine Plus ver.2. Roche Diagnostics; 02/2019)

Calcium:
Calcium ions react with NM-BAPTA (5-nitro-5'-methyl-1,2-bis[o-aminophenoxy]ethane-N,N,N',N'-tetraacetic acid) under alkaline conditions to form a complex. This complex reacts in the second step with EDTA. The change in absorbance is directly proportional to the calcium concentration and is measured photometrically.(Package insert: Calcium Gen.2 reagent, Roche Diagnostics; 07/2019)

Glucose:
Glucose in the sample, in the presence of hexokinase, is converted to glucose-6-phosphate (G6P). In the presence of nicotinamide adenine dinucleotide phosphate (NADP[+]), glucose-6-phosphate dehydrogenase oxides G6P to gluconate-6-phosphate and NADPH. The rate of NADPH formation is directly proportional to glucose concentration in the sample and is measured photometrically.(Package insert: Glucose Gen.3 Reagent. Roche Diagnostics; 11/2021)

PDF Report
No

Day(s) Performed
Monday through Sunday

Report Available

Same day/1 to 2 days

Specimen Retention Time

1 week

Performing Laboratory Location

Rochester

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 has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information

84132
84295
82435
82374
84520
82565
82310
82947

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
BMAMA	Basic Metabolic Panel, S	24321-2

Result ID	Test Result Name	Result LOINC® Value
AGAP	Anion Gap	33037-3
BUN	Bld Urea Nitrog (BUN), S	3094-0
CL	Chloride, S	2075-0
GLURA	Glucose, Random, S	2345-7
HCO3	Bicarbonate, S	1963-8
CA	Calcium, Total, S	17861-6
NAS	Sodium, S	2951-2
KS	Potassium, S	2823-3

CRTSA	Creatinine, S	2160-0
EGFR1	Estimated GFR (eGFR)	98979-8