

## Blood Test Results: CMP Explained

### Comprehensive Metabolic Panel (CMP)

Definition: Measures kidney and liver function, electrolyte levels

Substance	What It Is	Reference Ranges *			What a Low Number May Mean	What a High Number May Mean
		USA	UK/EU	Australia/Canada		
Glucose (fasting or non-fasting)	Sugar in the blood	70-99 mg/dL (fasting) 70-125 mg/dL (non-fasting)			Hypoglycemia, liver disease, adrenal insufficiency, excess insulin	Hyperglycemia, certain types of diabetes, prediabetes, pancreatitis, hyperthyroidism
Sodium (Na)	An electrolyte which keeps your body in balance	136-144 mEq/L			Use of diuretics, diarrhea, adrenal insufficiency	Kidney dysfunction, dehydration, Cushing's syndrome
Potassium (K)	An electrolyte and mineral	3.7-5.2 mEq/L			Use of diuretics or corticosteroids (such as prednisone or cortisone)	Acute or chronic kidney failure, Addison's disease, diabetes, dehydration
Chloride (Cl)	An electrolyte	96-106 mmol/L			Emphysema, chronic lung disease	Dehydration, Cushing's syndrome, kidney disease
Carbon dioxide (bicarbonate) (CO2)	Gaseous waste product from metabolism	20-29 mmol/L			Kidney disease, certain toxic exposures, severe infection	Lung diseases, including COPD
BUN (blood urea nitrogen)☺	A waste product formed in the liver and carried to the kidneys, filtered out of blood, and excreted through urine	7-20 mg/dL			Malnutrition	Liver or kidney disease, heart failure
Creatinine	A chemical waste produced by muscle metabolism	0.8-1.4 mg/dL			Low muscle mass, malnutrition	Chronic or temporary decrease in kidney function
BUN/creatinine ratio		10:1 to 20:1			Malnutrition	Blood in bowels, kidney obstruction, dehydration
Calcium (Ca)	A mineral stored in the hard part of bones	8.5-10.9 mg/dL			Calcium, magnesium, or Vitamin D deficiency; malnutrition; pancreatitis; neurological disorders	Kidney disease, hyperparathyroidism, cancer, excess vitamin D intake
Magnesium (Mg)	An electrolyte	1.8-2.6 mEq/L			Diabetes, high blood calcium levels, kidney disease, pancreatitis, hypoparathyroidism	Dehydration, Addison's disease, hyperparathyroidism, hypothyroidism, kidney failure
Protein (total)	Chains of amino acids essential for the growth and repair of cells	6.3-7.9 g/dL			Malnutrition, liver disease, kidney disease	Liver disease, kidney disease, dehydration, multiple myeloma, WM
Albumin	Protein that keeps fluid from leaking out of blood vessels and that nourishes tissues and transports nutrients through the body	3.9-5.0 g/dL			Malnutrition, liver disease, kidney disease	Dehydration
Globulin	Alpha, beta, and gamma proteins; some are produced by the liver and others by the immune system	2.0-3.5 g/dL			Malnutrition, liver disease, kidney disease	Multiple myeloma, WM, leukemia, rheumatoid arthritis, lupus, and other autoimmune diseases
Albumin/globulin ratio		1.7-2.2			Multiple myeloma, WM, autoimmune diseases, liver disease, kidney disease	Certain genetic conditions, some leukemias, liver dysfunction, hypogammaglobulinemia
Bilirubin (direct or total)	A pigment in the bile, a digestive fluid produced by the liver	0-0.3 mg/dL (direct) 0.3-1.9 mg/dL (total)			Generally not a concern	Liver disease, bile duct disorder, red cell destruction
Alkaline phosphatase (ALP)	Enzyme found in the liver and bones	44-147 IU/L			Malnutrition	Paget's disease or certain cancers that spread to bone, bile duct obstruction, liver cancer
Alanine amino-transferase (ALT)	Enzyme found mostly in the liver	8-37 IU/L			Generally not a concern	Certain toxins such as excess acetaminophen or alcohol, hepatitis
Aspartate amino-transferase (AST)	Enzyme found in liver, muscle, and other tissues	10-34 IU/L			Generally not a concern	Excess acetaminophen, hepatitis muscle injury
Glomerular filtration rate (GFR)	Checks how well the kidneys are working by estimating how much blood passes through the glomeruli (filters) of the kidneys each minute	90-120 mL/min/1.73 m2			Chronic kidney disease or kidney failure; GFR decreases progressively with age	Generally not a concern

\* Reference ranges can vary by age, sex, methods of testing, and other factors. There are no nationally established reference ranges for CMP and CBC values; instead, each laboratory tests a population and establishes its own reference ranges. Therefore, the reference ranges quoted are only approximate.

#### KEY

mg: milligram g: gram mmol: millimole mEq: milliequivalent dL: deciliter  
 IU: international unit L: liter mL: microliter pg: picogram fL: femtoliter  
 m: meter mL: milliliter