TEST

CO2 blood test

A CO2 blood test measures mainly bicarbonate to assess fluid and acid-base balance.

WHAT IT MEASURES
Mostly bicarbonate, the main carbon dioxide form in blood

SAMPLE
Blood

FASTING NEEDED?
No, unless another test in the same panel requires it

HOW LONG IT TAKES
About five minutes

RESULTS IN
Same day to several days, based on laboratory processing

USED FOR
Screening, diagnosis, and monitoring of acid-base or electrolyte problems

MAIN LIMITATION
False low results from sample air exposure

Overview

A CO2 blood test measures the total amount of carbon dioxide-related substances in your blood. Most of this is bicarbonate , an electrolyte that helps keep your blood from becoming too acidic or too alkaline.

This test does not mainly measure the carbon dioxide gas you breathe out. A blood gas test is better for measuring carbon dioxide gas directly and assessing breathing.

CO2 is often included in a basic metabolic panel or comprehensive metabolic panel. These panels also measure substances such as sodium, potassium, chloride, glucose, and kidney-related markers.

The result can help show whether your fluid, electrolyte, or acid-base balance may be disturbed. Acid-base balance means the system your lungs and kidneys use to keep blood acidity within a safe range.

Why the test is ordered

A healthcare professional may order a CO2 blood test as part of a routine panel or to investigate a possible fluid, kidney, breathing, or acid-base problem.

It may be used to:

The result is rarely interpreted by itself. Other test results, your symptoms, medical history, and medicines provide important context.

- Check electrolyte and acid-base balance
- Help assess kidney or lung conditions
- Investigate ongoing vomiting, diarrhea, weakness, or unusual breathing
- Monitor a condition or medicine that can change bicarbonate levels
- Help interpret abnormal sodium, potassium, chloride, or kidney test results

Who should have the test

You may have this test during a general health check, before a procedure, during hospital care, or while a known condition is being monitored.

It may also be appropriate if you have persistent fluid loss from vomiting or diarrhea, a kidney condition, a serious infection, uncontrolled blood sugar, or a lung condition that affects breathing.

There is no need to arrange the test solely because of a single mild or nonspecific symptom. A healthcare professional can decide whether a CO2 test or a different assessment is more useful.

How to prepare

You usually do not need to fast for a CO2 blood test. However, fasting may be required if glucose, cholesterol, or another fasting test is being collected at the same time. Follow the instructions supplied with your appointment.

Tell the person ordering the test about prescription medicines, over-the-counter products, and supplements. Diuretics like furosemide or hydrochlorothiazide , bicarbonate-containing products, some seizure medicines, steroids like prednisone or hydrocortisone , and certain other medicines can affect the result. Do not stop a medicine unless you have been told to do so.

Avoid unusually strenuous exercise just before the test. Drink water normally unless you have

been given fluid restrictions for a medical reason.

What happens during the test

A healthcare professional places a small needle into a vein, usually in your arm. Blood is collected into a tube and sent to a laboratory. The needle is then removed, and pressure is applied to the area.

The blood draw usually takes about five minutes. Results may be available the same day, although outpatient and specialist laboratories may take several days.

This test uses a standard venous blood sample. It is different from an arterial blood gas, which usually takes blood from an artery and measures acidity, oxygen, and carbon dioxide gas.

Understanding your results

Results are usually reported as millimoles per litre, written as mmol/L. Some laboratories use milliequivalents per litre, or mEq/L.

Use the reference range printed on your own report. Ranges and interpretation vary by laboratory, age, sex, pregnancy status, medicines, and clinical context.

A low CO2 result usually means the bicarbonate level is low. Possible explanations include bicarbonate loss through diarrhea, reduced acid removal by the kidneys, a buildup of acids, or the body's response to rapid or prolonged overbreathing. Sample handling can also produce a falsely low result.

A high result may occur when the body loses acid through prolonged vomiting, retains bicarbonate, or compensates for long-term carbon dioxide retention caused by some lung or breathing problems. Certain medicines and fluid changes can also contribute.

An abnormal result does not identify the cause by itself. Your healthcare professional may compare it with sodium and chloride and calculate an anion gap . This calculation can help narrow down why acid is building up or bicarbonate is changing.

A mildly abnormal value may only need a repeat test, especially if you feel well and the rest of the panel is normal.

What affects the results

Several factors can change the number without indicating a new illness.

The most important laboratory-related issue is contact with air. Carbon dioxide can escape from an open or poorly sealed tube, producing a falsely low result. Delayed processing or problems filling and storing the sample can also affect it.

Changes within your body may include:

A recent large transfusion or major medical treatment can also alter acid-base and electrolyte results. Make sure the healthcare professional interpreting the result knows about recent hospital care.

- Recent strenuous exercise, which can temporarily increase acid production
- Dehydration or receiving intravenous fluids
- Vomiting, diarrhea, or laxative use
- Kidney function, because the kidneys regulate bicarbonate
- Rapid breathing, chronic lung disease, or recent changes in ventilation
- Pregnancy, which normally changes breathing and bicarbonate balance
- Age and the reference range used by the laboratory
- Medicines such as diuretics, acetazolamide, topiramate, steroids, or bicarbonate products

Accuracy and limitations

Laboratory CO2 measurement is generally reliable when the sample is collected, sealed, transported, and processed correctly. Air exposure is a common reason for a result to read lower than the level in your bloodstream.

The test can correctly show that bicarbonate is outside the expected range, but it cannot reliably say why. Kidney problems, breathing changes, fluid loss, medicines, and several metabolic conditions may produce similar results. A single normal measurement may also miss a short-lived disturbance that has already resolved.

A CO2 blood test may suggest an acid-base problem when none is present if the sample was mishandled. It may also appear normal when two opposing problems occur at the same time.

When more detail is needed, a venous or arterial blood gas can measure blood acidity and carbon dioxide pressure. An arterial blood gas may be preferred when accurate oxygen or ventilation measurements are needed.

Risks and complications

A blood draw may cause brief pain, a small bruise, or light bleeding at the needle site. Some people feel faint, but serious complications are uncommon.

What happens next

If your result is within your laboratory's range and agrees with your other tests, no specific follow-up may be needed.

A mildly abnormal result is often repeated, particularly if sample handling could have affected it. Your healthcare professional may also review your medicines and check chloride, potassium, glucose, kidney function, or a blood gas.

Seek routine medical follow-up if you have an abnormal result, ongoing vomiting or diarrhea, or persistent symptoms that have not been explained.

Seek urgent medical care for severe difficulty breathing, new confusion, fainting, a seizure, severe weakness, or a rapid decline in your condition. Do not wait for a routine appointment or repeat blood test if these symptoms are present.

Common questions

Can I drink coffee before a CO2 blood test?

Usually, yes. If the CO2 test is part of a fasting panel, have only water during the fasting period. Check your appointment instructions.

Does the time of day matter?

Usually not enough to require a particular appointment time. Timing may matter when the result is being compared with medicines, treatment, meals, or earlier tests.

Can I exercise beforehand?

Normal daily activity is generally fine. Avoid unusually hard exercise immediately beforehand because it can temporarily change acid production, breathing, and hydration.

Do I need to fast?

Not for the CO2 measurement itself. You may need to fast because of another test ordered with it.

Is CO2 the same as bicarbonate?

On a standard chemistry panel, the reported CO2 value mostly represents bicarbonate. It is not the same measurement as carbon dioxide pressure on a blood gas test.

Why would the test be repeated?

A repeat can confirm an unexpected result and rule out temporary changes or sample-handling problems. It may also show whether a treatment or condition is changing over time.

Sources

- MedlinePlus Medical Test: Carbon Dioxide Blood Test , U.S. National Library of Medicine
- Clinical Methods: Serum Total Carbon Dioxide , National Center for Biotechnology Information Bookshelf
- MedlinePlus Medical Test: Basic Metabolic Panel , U.S. National Library of Medicine
- MedlinePlus Medical Test: Blood Gases , U.S. National Library of Medicine
- Overview of Acid-Base Balance , Merck Manual Consumer Version