



C-peptide

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Also known as: Insulin C-peptide; Connecting Peptide Insulin; Proinsulin C-peptide

Formal name: C-peptide

Related tests: [Insulin](#); [Glucose](#)

At a Glance

Why Get Tested?

To help evaluate insulin production by the **beta cells** in the pancreas or to help determine the cause of low **blood glucose** ([hypoglycemia](#))

When to Get Tested?

When you have **diabetes** and your health practitioner wants to determine if you are producing enough of your own insulin or if it is time to supplement oral medication with insulin injections or an insulin pump; when your health practitioner suspects that you have **insulin resistance**; when you have documented hypoglycemia

Sample Required?

A blood sample drawn from a vein in your arm and sometimes a **24-hour urine sample**

Test Preparation Needed?

Fasting for 8 to 10 hours before blood testing is usually required.

The Test Sample

What is being tested?

C-peptide is a substance, a short chain of **amino acids**, that is released into the blood as a byproduct of the formation of **insulin** by the pancreas. This test measures the amount of C-peptide in a blood or urine sample.

In the pancreas, within specialized cells called **beta cells**, proinsulin, a biologically inactive molecule, splits apart to form one molecule of C-peptide and one molecule of insulin. Insulin is vital for the transport of **glucose** into the body's cells and is required on a daily basis. When insulin is required and released from the beta cells into the blood in response to increased levels of glucose, equal amounts of C-peptide are also released. Since C-peptide is produced at the same rate as insulin, it is useful as a marker of insulin production.

In particular, C-peptide testing can be used to help evaluate the production of insulin made by the body (**endogenous**) and to help differentiate it from insulin that is not produced by the body but is taken in as diabetic medication (**exogenous**) and so does not generate C-peptide. This test may be done in conjunction with an **insulin test**.

How is the sample collected for testing?

A blood sample is obtained by inserting a needle into a vein in the arm. If a **24-hour urine sample** is required, all urine produced over a 24-hour time period will be collected.

Is any test preparation needed to ensure the quality of the sample?

Fasting for 8 to 10 hours before blood testing is usually required.

The Test

How is it used?

C-peptide testing can be used for a few different purposes. C-peptide is a substance produced by the **beta cells** in the pancreas when proinsulin splits apart and forms one molecule of C-peptide and one molecule of **insulin**. Insulin is the **hormone** that is vital for the body to use its main energy source, **glucose**. Since C-peptide and insulin are produced at the same rate, C-peptide is a useful marker of insulin production.

The following are some purposes of C-peptide testing:

- A C-peptide test is not ordered to help diagnose **diabetes**, but when a person has been newly diagnosed with diabetes, it may be ordered by itself or along with an **insulin level** to help determine how much insulin a person's pancreas is still producing (**endogenous** insulin).
- In **type 2 diabetes**, the body is resistant to the effects of insulin (**insulin resistance**) and it compensates by producing and releasing more insulin, which can also lead to beta cell damage. Type 2 diabetics usually are treated with oral drugs to stimulate their body to make more insulin and/or to cause their cells to be more sensitive to the insulin that is already being made. Eventually, because of the beta cell damage, type 2 diabetics may make very little insulin and require injections. Any insulin that the body does make will be reflected in the C-peptide level; therefore, the C-peptide test can be used to monitor beta cell activity and capability over time and to help a health practitioner determine when to begin insulin treatment.
- People who are on insulin therapy, regardless of the source of the insulin, may develop **antibodies** to insulin. These typically interfere with tests for insulin, making it nearly impossible to directly evaluate endogenous insulin production. In these cases, C-peptide measurement is a useful alternative to testing for insulin.
- C-peptide measurements can also be used in conjunction with insulin and **glucose levels** to help diagnose the cause of documented **hypoglycemia** and to monitor its treatment. Symptoms of hypoglycemia may be caused by excessive supplementation of insulin, alcohol consumption, inherited liver enzyme deficiencies, **liver** or **kidney disease**, or by **insulinomas**.
- The C-peptide test may be used to help diagnose Insulinomas. These are tumors of the **islet cells** in the pancreas that can produce uncontrolled amounts of insulin and C-peptide and can cause **acute** episodes of hypoglycemia. C-peptide tests may be used to monitor the effectiveness of insulinoma treatment and to detect recurrence.
- Sometimes a C-peptide test may be used to help evaluate a person diagnosed with **metabolic syndrome**, a set of risk factors that includes abdominal obesity, increased blood glucose and/or insulin resistance, unhealthy blood lipid levels, and high blood pressure (**hypertension**).
- Rarely, when someone has had his pancreas removed or has had pancreas islet cell transplants, intended to restore the ability to make insulin, C-peptide levels may be used to verify the effectiveness of treatment and continued success of the procedure.

When is it ordered?

C-peptide levels may be ordered when a person has been newly diagnosed with **type 1 diabetes** as part of an evaluation of the person's "residual **beta cell** function."

With **type 2 diabetes**, the test may be ordered on a regular basis when a health practitioner wants to monitor the status of a person's beta cells and **insulin** production over time and to determine if/when insulin injections may be required.

C-peptide levels may be done when there is documented **acute** or recurring low **blood glucose (hypoglycemia)** and/or excess insulin is suspected. Symptoms of hypoglycemia include:

- Sweating
- Palpitations
- Hunger
- Confusion
- Blurred vision
- Fainting
- In severe cases, seizures and loss of consciousness

However, many of these symptoms can occur with other conditions as well.

When a person has been diagnosed with an **insulinoma**, a C-peptide test may be ordered periodically to monitor the effectiveness of treatment and to detect tumor recurrence.

Rarely, C-peptide levels may be monitored over time when someone has had his pancreas removed or has had pancreas **islet cell** transplants.

What does the test result mean?

A high level of C-peptide generally indicates a high level of **endogenous** insulin production. This may be in response to a high **blood glucose** caused by glucose intake and/or **insulin resistance**. A high level of C-peptide is also seen with **insulinomas** and may be seen with low **blood potassium**, **Cushing syndrome**, and **renal failure**.

When used for monitoring, decreasing levels of C-peptide in someone with an insulinoma indicate a response to treatment; levels that are increasing may indicate a tumor recurrence.

A low level of C-peptide is associated with a low level of insulin production. This can occur when insufficient insulin is being produced by the **beta cells**, with **diabetes** for example, or when production is suppressed by treatment with **exogenous** insulin.

Is there anything else I should know?

C-peptide testing is not widely used and may not be available in every laboratory. If a series of C-peptide tests are going to be performed, they should be done at the same laboratory using the same method.

Even though they are produced at the same rate, C-peptide and **insulin** leave the body by different routes. Insulin is processed and eliminated mostly by the liver, while C-peptide is removed by the kidneys. Since the **half-life** of C-peptide is about 30 minutes compared to insulin's 5 minutes, normally there will be about 5 times as much C-peptide in the blood as insulin.

Common Questions

1. Can I do a C-peptide test at home like I can when I check my blood glucose?

No. The C-peptide test requires special equipment and training to perform.

2. If I need to go on the insulin pump, will I need a C-peptide test?

You may. Insulin pumps are usually recommended for those who are not producing sufficient insulin. Sometimes a C-peptide test will be ordered during an initial evaluation to check the status of your **beta cells** and to see if you are still producing insulin.

3. What else is C-peptide used for?

Researchers are starting to better understand the role of C-peptide in the body. Some studies have been conducted to evaluate the use of C-peptide as a therapy for those with **diabetes**. Results have been promising, showing decreased diabetic complications with improvements in kidney function, blood flow, and nerve function. However, further studies are needed.

Related Pages

On This Site

Conditions: [Diabetes](#), [Kidney Disease](#), [Liver Disease](#), [Insulin Resistance](#), [Metabolic Syndrome](#)

Elsewhere On The Web

[American Diabetes Association](#)

[CDC Diabetes Public Health Resource](#)

[National Diabetes Education Program](#)

[MedlinePlus Diabetes Interactive Tutorial: Diabetes - Introduction](#)

[MedlinePlus Medical Encyclopedia: Hypoglycemia](#)

[MedlinePlus Medical Encyclopedia: Insulinoma](#)

Article Sources

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