

# IGLOO READER PRO GUIDE VERSION 3.0

1. QUICK START
2. SAMPLE COLLECTION
3. RESULTS EVALUATION
4. BIOMARKERS &  
REFERENCE INTERVALS

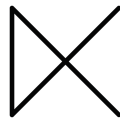


Dx365 GmbH  
Hedwig-Porschütz-Str. 14,  
10557 Berlin, Germany,  
[info@dx365.world](mailto:info@dx365.world), <https://www.igloo.today/>

These are the guides for the Igloo Reader Pro device and subsequent biomarker tests. Before use, we strongly recommend that you read the full instructions for both the device and the test. This guide is for training and daily reference only and may not include all important information. The information in this guide is educational and does not qualify as medical advice. Always recommend that your customers use local reference ranges and consult a healthcare professional for diagnosis and treatment.

For the latest support materials or to leave feedback, please visit the Support section on our website: <https://www.igloo.today/>. We regularly update these resources to make them as helpful as possible.

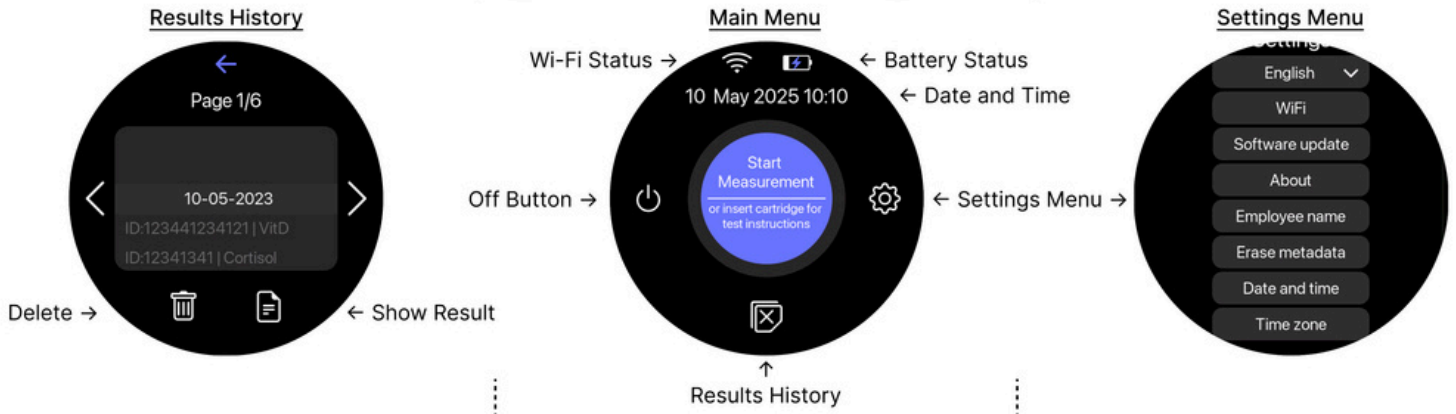
Thank you for using our device.



# TABLE OF CONTENTS

QUICK START	4
IGLOO.HEALTH INFO	5
SAMPLE COLLECTION	6
RESULTS EVALUATION	7
FERRITIN	8
VITAMIN D	11
TSH	15
LIPID PANEL & BLOOD GLUCOSE	18
HBA1C	28
BLOOD GLUCOSE & HBA1C COMPARISON	31
CPR/HS-CRP	33
TESTOSTERONE	37
ABOUT IGLOO & DX365	42

# Igloo Reader Navigation



## Before the measurement

1



To turn the reader on - press the power button on the circle-shaped rubber bottom of the device.

2



Please connect to Wi-Fi to download calibration data. Once downloaded for a test lot, it is stored on the device and Wi-Fi is no longer required for that lot.

Alternatively, run one measurement using the Dx Care app and the reader will download and store the calibration data automatically.

Please make sure to set the time zone so the device can automatically sync the correct time from the internet.

## Measurement procedure

3



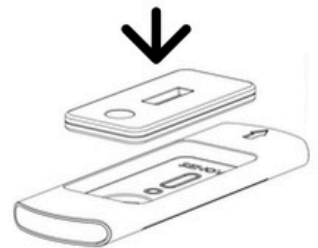
Press the button Start Measurement. Alternatively, insert the adapter with an unused test cassette into the reader. The reader will display a QR code linking to the instructions, which you can scan with your phone.

4



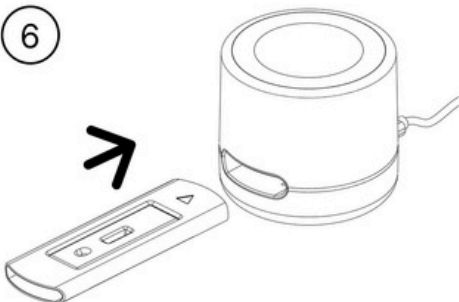
Fill in Patient Identifier, Age and Sex. By default, the incubation timer is enabled and will automatically count down the required test time. If you want to run the test without the timer, turn it off.

5



After collecting the sample, completing sample preparation, and adding the solution to the test cassette, place the cassette into the adaptor supplied with the reader. Please check the "Correct Orientation" marking on the adaptor for the test cassette.

6



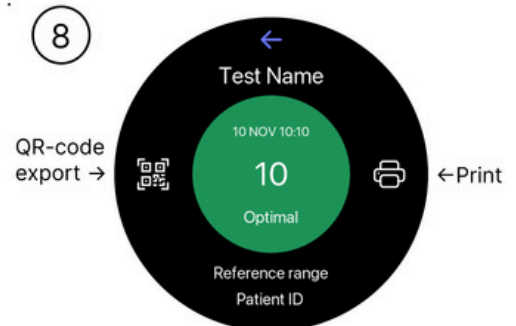
Insert the adapter with the test cassette into Reader to start the measurement. Please do it quickly so the measurement timer works correctly.

7



Measurement is now under way. Please make sure not to eject the adapter or cassette during measurement.

8



Your first measurement is complete. Each test result can be exported or printed.

# BEST PRACTICE FOR SAMPLE COLLECTION

## PREPARATION



Ensure hands are warm and well perfused before sampling. If needed, warm hands in warm water for ~2 minutes and dry thoroughly.

Check for conditions that may affect results (e.g., cold fingers, poor circulation, callus, edema).

### Why it matters:

Warming the hands improves blood flow, making it easier to collect enough sample and ensuring accurate results.

## DISINFECTION



Let the alcohol disinfectant sit for about 30 seconds and fully air dry before taking the blood sample.

### Why it matters:

This approach prevents sample contamination or dilution.

## DROP HANDLING

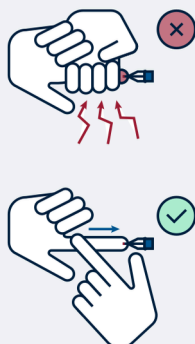


Discard the first drop of capillary blood. Use the second drop.

### Why it matters:

Reduces tissue fluid interference.

## CAPILLARY BLOOD SAMPLING



Avoid excessive squeezing or massaging of the finger.

Hold the finger parallel to the floor. If needed to obtain sufficient volume, apply gentle pressure proximal to the puncture site.

### Why it matters:

Excessive squeezing can affect results. Proper technique ensures reliable capillary measurements.

## SAMPLE VOLUME



Collect the exact volume specified in the test IFU.

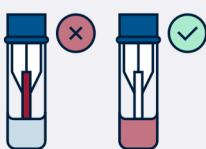
### Why it matters:

Exact volume ensures proper assay performance.

## TIMING AND HANDLING



Mix the sample thoroughly by shaking for 30 seconds.



Ensure the capillary is completely emptied into the tube; gently tap the tube if necessary and visually confirm that all blood has been released.



Follow incubation times and handling steps precisely.

### Why it matters:

Following the protocol maintains analytical accuracy and reliability.

This information is educational and does not qualify for a medical advice. Always use local reference ranges and consult a healthcare professional for diagnosis and treatment.

[Video and text instructions for every test](#)





*For informational purposes only - not a substitute for medical advice.*

Igloo Health is a personal health tracking application that allows patients to store and monitor their blood test results over time. It is designed to support health awareness and facilitate informed conversations with healthcare professionals.

## Access your results anytime, anywhere with the Igloo Health App

Download on the  
App Store



Download on the  
Google Play



1. Find health checks
2. Browse available capillary blood test panels and locate nearby testing sites.
3. Store results securely
4. Results are saved locally on the device and can be tracked over time

More info: [igloo.health](https://igloo.health)

# RESULTS EVALUATION

Biomarker testing is subject to natural biological and analytical variability. Small differences between methods, devices, or repeated measurements are normal and expected.

The Igloo Reader Pro uses manufacturer-defined calibration data. Results should be interpreted with consideration of the inherent variability present in all diagnostic testing.

<b>Category</b>	<b>What it means</b>	<b>Examples of impact</b>
Biological variability	Natural fluctuations within the individual	Age, sex, time of day, recent food intake, hydration, stress
Sample collection	Technique used during specimen collection	Insufficient volume, contamination, excessive squeezing, improper handling. Impaired peripheral circulation may cause capillary results to differ from venous blood.
Sample storage and transport	Conditions before analysis	Heat, cold, light exposure, delayed testing
Assay specificity	Differences in test design	Detection of different biomarker forms or isoforms; method differences
Measurement units	Reporting format differences	ng/mL vs nmol/L; required unit conversions
Medication and lifestyle	External influences on biomarker levels	Supplements, prescription drugs, alcohol, caffeine, physical activity

[Igloo Reader Pro results evaluation](#)



# FERRITIN

## General information



[How to perform test](#)  
[Ferritin by](#)  
[Wizbiotech](#)



[How to perform test](#)  
[Ferritin by](#)  
[Lansionbio](#)

## Key takeaways

- [Ferritin](#) is the body's iron-storage protein.
- Low ferritin is one of the early signs of iron deficiency and iron-deficiency anemia.

## What is ferritin?

Ferritin is an iron-storage protein found in cells. A ferritin blood test estimates the body's iron reserves and is used to detect iron deficiency.

## Why is ferritin important?

Ferritin plays a key role as the body's primary iron storage protein. Iron is essential for making healthy red blood cells, which deliver oxygen to tissues, sustain organ function, and support proper brain development and cognition.

## How is ferritin measured?

- Sample: Small blood sample.
- Units: ng/mL

Rapid ferritin tests may differ slightly from laboratory results - this is normal and does not mean the device is faulty. Use these ranges to explain results clearly to customers and guide next steps.

# FERRITIN

## Reference intervals

### **Result: Error / No control line**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Result: 0**

What it means: Test did not detect ferritin - ferritin concentration is either below detection limit or the test is invalid.

How to explain/action: Repeat the test. If the result is still 0, this suggests very low ferritin; explain to the customer possible iron deficiency. Recommend seeing a healthcare professional for diagnosis and supplementation.

### **Result: < 30 ng/mL**

What it means: Low ferritin - possible iron deficiency.

How to explain/action: Inform customer of possible iron deficiency. Recommend seeing a healthcare professional for diagnosis and supplementation.

### **Result: 30 - 300 ng/mL**

What it means: Normal ferritin level.

How to explain/action: Reassure customer that ferritin is within normal range. Encourage routine health monitoring.

### **Result: > 300 ng/mL**

What it means: High ferritin - may indicate inflammation or iron overload.

How to explain/action: Advise customer to consult a healthcare professional to investigate causes.

# FERRITIN

## Additional information

### Key factors influencing results:

Biological: inflammation, infection, iron supplementation, liver diseases.

Preanalytical: hemolysis, storage, transport.

Assay/matrix: differences between serum and capillary plasma.

### Key points to keep in mind:

- 1) Point-of-care results can differ slightly from lab tests. Small variations (e.g., ferritin 50 vs 70 ng/mL) are common and do not mean the device is faulty.
- 2) If you see 0 or error (no control line), the test might not work - always repeat.
- 3) For borderline or unusual values, advise customers to seek follow-up testing and medical advice instead of assuming device problems.
- 4) Ferritin levels can rise more slowly and stay elevated longer during inflammation compared to CRP. While CRP peaks early and drops quickly as inflammation resolves, ferritin may remain high even after CRP returns to normal. This is normal and should be considered when interpreting ferritin results.

### References

NIH Office of Dietary Supplements - Iron: Health Professional Fact Sheet.

NIH Office of Dietary Supplements - Iron: Consumer Fact Sheet.

Mayo Clinic – Ferritin test.



[Learn more about Ferritin](#)

# VITAMIN D

## General information



[How to perform test  
Vitamin D by Unimed](#)

### Key takeaways

- Vitamin D is required to absorb calcium and keep bones strong.
- 25(OH)D (hydroxycalciferol) reflects cholecalciferol and ergocalciferol.
- The lab marker for vitamin D is 25-hydroxyvitamin D.

### What is Vitamin D?

Vitamin D is a fat-soluble vitamin that the body makes with sunlight (Vitamin D3 or cholecalciferol) and gets from foods and supplements (D2 or ergocalciferol). In blood, vitamin D status is assessed with 25(OH)D (hydroxycalciferol), which reflects both, cholecalciferol and ergocalciferol.

### What is the role of Vitamin D?

Vitamin D supports calcium absorption, bone mineralization, muscle, and immune function. Low levels of vitamin D raise the risk of rickets in children and osteomalacia in adults. Very high levels, usually from supplements, can contribute to hypercalcemia.

Vitamin D measurement is used in dentistry. Adequate vitamin D levels may support stronger osseointegration, which can contribute to better dental implant stability. When vitamin D is lacking, the bone's ability to remodel around the implant may be reduced, potentially delaying healing and raising the chance of complications.

### How is Vitamin D measured?

- Sample: Blood.
- Analyte: 25(OH)D.
- Units: ng/mL.

Rapid vitamin D tests may differ slightly from laboratory results - this is normal and does not indicate a faulty device. Use the following ranges to explain results clearly to customers and guide appropriate next steps.

# VITAMIN D

## Reference intervals

### **Result: Error / No control line**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Result: < 12 ng/mL**

What it means: Critically low vitamin D levels.

How to explain/action: Advise urgent medical consultation for supplementation and treatment.

### **Result: 12 – 20 ng/mL**

What it means: Low vitamin D, increased risk of bone and health problems.

How to explain/action: Recommend seeing a healthcare professional for supplementation advice and lifestyle changes (e.g., more sun exposure).

### **Result: 20 – 30 ng/mL**

What it means: Below optimal vitamin D levels; customer may benefit from supplementation.

How to explain/action: Suggest discussion with a healthcare provider, encourage safe sun exposure and nutrition adjustment.

### **Result: 30 – 100 ng/mL**

What it means: Sufficient\* vitamin D levels for most individuals..

How to explain/action: Reassure customer; suggest maintaining healthy habits, routine monitoring.

### **Result: > 100 ng/mL**

What it means: Higher than normal levels; risk of toxicity if elevated.

How to explain/action: Recommend consulting healthcare provider to review supplementation and diet.

### **Result: > 100 ng/mL**

What it means: Potentially toxic level of vitamin D.

How to explain/action: Recommend urgent consultation with a healthcare provider.

# VITAMIN D

## Additional information

### \*Sufficient levels vs clinical target levels of vitamin D

In adults, the reference interval for sufficient vitamin D is commonly reported as **30-100 ng/mL**, in line with the Endocrine Society Clinical Practice Guideline (Holick et al., J Clin Endocrinol Metab, 2011) and consistent with the reference ranges used by major clinical laboratories and test producers. Always refer to the Instructions for Use (IFU) of the specific test kit.

While the sufficiency reference interval commonly extends to 100 ng/mL, a Central and Eastern European expert consensus (Płudowski et al., Nutrients, 2022; doi: 10.3390/nu14071483) classifies **30 - 50 ng/mL** as the vitamin D sufficiency target in clinical practice, with levels above **60 ng/mL** considered an area of uncertainty, and levels above 100 ng/mL as oversupply.

Individuals seeking guidance on their personal target level should consult a healthcare professional, as optimal values may vary depending on age, health status, and individual circumstances.

### Key factors influencing results:

Biological: age, sex, BMI, fat tissue storage, sun exposure.

Preanalytical: fasting status, recent supplements, sample handling (light, temperature).

Assay/matrix: capillary vs venous, serum/plasma type, immunoassay specificity.



[Learn more about Vitamin D](#)

# VITAMIN D

## Additional information

### Key points to keep in mind:

- 1) Variation between tests: Vitamin D results can vary across different testing methods and labs. Differences in assay types (immunoassay vs. LC-MS/MS) may cause discrepancies - this doesn't necessarily mean vitamin D status has changed.
- 2) Daily and day-to-day fluctuations: Vitamin D levels can vary throughout the day and on different days, with levels often higher midday and lower in mornings or evenings.
- 3) Seasonal and environmental factors: Sunlight exposure, season, diet, and supplementation influence vitamin D levels.
- 4) Biological variability: Individual factors like body weight, genetics, and binding proteins can affect results.
- 5) Testing conditions: Proper sample handling and storage are critical to accuracy. Complete (100%) PRE-MIXING of finger-prick blood with sample buffer is EXTREMELY important and CRITICAL Step to get correct result. Incomplete mixing of Blood with Buffer means Sample Preparation has been compromised, and the test result is likely to show lower values.

### References

- NIH Office of Dietary Supplements - Vitamin D: Health Professional Fact Sheet.  
NIH Office of Dietary Supplements - Vitamin D: Consumer Fact Sheet.  
NIH Office of Dietary Supplements - Vitamin D Standardization Program (VDSP).  
French CB et al. 25-Hydroxyvitamin D variability within-person due to diurnal rhythm and illness: a case report. *J Med Case Rep.* 2019 Feb 4;13(1):29. doi: 10.1186/s13256-018-1948-9.
- Holick et al., Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab*, 2011; doi: 10.1210/jc.2011-0385.
- Płudowski et al., Clinical Practice in the Prevention, Diagnosis and Treatment of Vitamin D Deficiency: A Central and Eastern European Expert Consensus Statement. *Nutrients*, 2022; doi: 10.3390/nu14071483.



[Learn more about Vitamin D](#)

# THYROID-STIMULATING HORMONE (TSH)

## General information



[How to perform test TSH by Alltest](#)



[How to perform test TSH by Lansionbio](#)

## Key takeaways

- [Thyroid-stimulating hormone](#) (TSH) controls thyroid hormone production.
- High TSH typically suggests underactive thyroid; low TSH suggests overactive thyroid.

## What is TSH?

TSH is a pituitary hormone that stimulates the thyroid to make and release thyroxine (T4) and triiodothyronine (T3). In a healthy situation, there is a negative feedback loop in the organism - when T4 and T3 fall, TSH rises; when T4 and T3 rise, TSH falls.

Because TSH shifts earlier and more strongly than T4 and T3, it is used as a screen for thyroid dysfunction and helps distinguish primary (thyroid) from central (pituitary) causes. Persistently abnormal TSH is linked to symptoms and risks of hypo- or hyperthyroidism, and in iodine-poor settings to goiter and neurodevelopmental risks in pregnancy if deficiency is severe.

## How is TSH measured?

- Sample: Blood.
- Units: mIU/L (mU/L).

Rapid TSH tests may differ slightly from laboratory results - this is normal and does not indicate a faulty device. Use the following ranges to explain results clearly to customers and guide appropriate next steps. Normal reference ranges vary by lab, age, and physiological conditions like pregnancy, so always consider the reference printed on the test report when possible.

# THYROID-STIMULATING HORMONE (TSH)

## Reference intervals

### **Result: Error / No control line**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Result: 0**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Result: < 0.4 mIU/L**

What it means: Low TSH - may indicate an overactive thyroid (hyperthyroidism).

How to explain/action: Explain to a customer that low TSH suggests the thyroid may be producing too much T3 and T4 hormones; recommend discussing results with a healthcare provider for further evaluation and additional tests (e.g., free T4).

### **Result: 0.4 – 4.0 mIU/L**

What it means: Normal thyroid-stimulating hormone level - likely normal thyroid function.

How to explain/action: Reassure customer that TSH is within the common reference range; routine monitoring is usually sufficient unless there are symptoms or specific clinical concerns to be addressed with a healthcare provider.

### **Result: > 4.0 mIU/L**

What it means: High TSH - may indicate an underactive thyroid (hypothyroidism).

How to explain/action: Inform the customer that high TSH suggests the thyroid may not be producing enough T3 and T4 hormones; advise consulting a healthcare provider for confirmation and further evaluation.

# THYROID-STIMULATING HORMONE (TSH)

## Additional information

### Key factors influencing results:

Biological: inflammation, infection, iron supplementation, liver diseases.

Preanalytical: hemolysis, storage, transport, handling.

Assay/matrix: differences between serum and capillary plasma.

### Key points to keep in mind:

- 1) TSH levels naturally fluctuate throughout the day. Low results may sometimes be due to the time the sample was taken - testing earlier or later in the day can produce different values.
- 2) TSH can also be influenced by age, pregnancy, medications, illness, and stress.
- 3) Reference ranges can vary between laboratories and testing methods - slight differences do not necessarily indicate a problem.
- 4) A single TSH measurement is a screening tool; definitive diagnosis requires follow-up testing and clinical evaluation.

### References

NIH National Library of Medicine - Thyroid Stimulating Hormone.

NIH Office of Dietary Supplements - Iodine: Fact Sheet for Health Professionals.

Martin I. Surks, TSH Reference Limits: New Concepts and Implications for Diagnosis of Subclinical Hypothyroidism, *Endocrine Practice*, 19, 6, 2013, 1066-1069, ISSN 1530-891X.



[Learn more about TSH](#)

# BLOOD LIPIDS AND GLUCOSE TESTING

## General information



How to perform test  
Lipids and Glucose  
by Konsung

## Key takeaways

- A lipid panel measures four core cardiometabolic biomarkers in a single test: total cholesterol, triglycerides, HDL cholesterol, and blood glucose.
- Together, these markers provide a more complete picture of cardiovascular and metabolic health than any single value alone.
- Point-of-care lipid panel testing enables pharmacies to support early risk awareness, preventive counseling, and timely referral.

## What is a lipid panel?

A lipid panel is a blood test that measures the levels of key lipids and metabolic markers circulating in the bloodstream. With Igloo Reader Pro, the panel covers total cholesterol, triglycerides, HDL cholesterol (high-density lipoprotein cholesterol), and blood glucose - four biomarkers that together provide a meaningful overview of cardiovascular and metabolic health.

Each marker captures a different aspect of how the body processes and transports lipids (fats) and sugars. Total cholesterol reflects the overall amount of cholesterol in the blood. HDL cholesterol signals how efficiently cholesterol is being cleared from circulation. Triglycerides indicate how the body stores and mobilizes energy. Blood glucose provides a direct measure of how the body is managing blood sugar at the time of testing. Assessed together, these four values form a practical cardiometabolic snapshot that can guide conversations about lifestyle, risk, and the need for further clinical evaluation.

# BLOOD LIPIDS AND GLUCOSE TESTING

## General information

### What does each marker in a lipid panel mean?

#### **Total cholesterol**

Total cholesterol is a measure of the overall amount of cholesterol circulating in the blood. It represents the combined contribution of cholesterol carried by different lipoprotein fractions, including LDL, HDL, and VLDL. Cholesterol is an essential component of cell membranes and is required for the production of hormones, bile acids, and vitamin D. However, when levels are persistently elevated, the risk of atherosclerosis - the buildup of plaques in arterial walls - increases.

Total cholesterol is used as a first-line screening marker to assess lipid status and to determine whether more detailed lipid testing is appropriate. It is most meaningful when interpreted alongside other markers, particularly HDL cholesterol, which accounts for a protective fraction of the total.

According to the National Heart, Lung, and Blood Institute (NHLBI), cholesterol levels are influenced by genetics, diet, physical activity, body weight, age, and metabolic health.

#### **HDL cholesterol (HDL-C)**

High-density lipoprotein cholesterol (HDL-C) is often described as the "good" cholesterol because of its role in reverse cholesterol transport. HDL particles collect excess cholesterol from the bloodstream and peripheral tissues and carry it back to the liver, where it is processed and removed from the body. This transport function is associated with a protective effect on the cardiovascular system.

Unlike total cholesterol and triglycerides - where higher values are generally associated with greater risk - HDL cholesterol is a marker where higher levels are considered favorable. Low HDL cholesterol is associated with reduced cholesterol clearance capacity and is an independent risk factor for cardiovascular disease. According to the NHLBI, HDL cholesterol levels are influenced by genetics, diet, physical activity, body weight, smoking status, age, and metabolic health.

# BLOOD LIPIDS AND GLUCOSE TESTING

## General information

### What does each marker in a lipid panel mean?

#### Triglycerides

Triglycerides are the most common type of fat found in the body and in the blood. Under normal conditions, surplus dietary calories are converted into triglycerides, stored in adipose tissue, and released between meals to meet energy needs - a healthy and tightly regulated process. Problems arise when the liver chronically overproduces and releases triglycerides into the bloodstream, typically due to insulin resistance, excess intake of refined carbohydrates, or alcohol. This overwhelms the body's clearance capacity, leading to persistently elevated circulating triglyceride levels. High circulating triglycerides are associated with low HDL cholesterol and more atherogenic LDL subtypes - a pattern characteristic of metabolic syndrome and increased cardiovascular risk.

Triglycerides are an important complement to cholesterol measurements. Even when total cholesterol appears within an acceptable range, elevated triglycerides can indicate underlying metabolic dysregulation - including insulin resistance, metabolic syndrome, or increased hepatic lipid production - that is not captured by cholesterol alone.

According to the NHLBI, triglyceride levels are influenced by diet (particularly refined carbohydrates and alcohol), physical activity, body weight, genetics, and metabolic health.

# BLOOD LIPIDS AND GLUCOSE TESTING

## General information

### What does each marker in a lipid panel mean?

#### **Blood glucose**

Blood glucose measures the concentration of glucose - the body's primary energy source - in the blood at the time of testing. Glucose enters the bloodstream following the digestion of carbohydrates and is regulated by insulin, a hormone produced by the pancreas. When this regulatory system is disrupted, blood glucose levels can become persistently elevated - a condition that underlies prediabetes and type 2 diabetes.

Including blood glucose in a lipid panel test is clinically meaningful because insulin resistance and impaired glucose metabolism frequently co-occur with dyslipidemia. Many individuals with abnormal lipid values also show elevated fasting glucose or glucose intolerance, and vice versa. Identifying these patterns together enables a more complete cardiometabolic risk assessment in a single testing session.

Blood glucose results are most informative when the customer has fasted for at least 8 hours prior to testing. Non-fasting results can still provide useful information but should be interpreted with this context in mind.

For customers with borderline or elevated fasting glucose results, Igloo's on-the-spot HbA1c test offers a clinically important complement. Where blood glucose captures a single moment in time, HbA1c reflects average blood sugar levels over the preceding two to three months, making the two markers most informative when considered together.

# BLOOD LIPIDS AND GLUCOSE TESTING

## General information

### How is the lipid panel measured?

- Sample: Small capillary blood sample (fingerprick)
- Markers measured: Total cholesterol, HDL cholesterol, triglycerides, blood glucose
- Units: mmol/L
- Result time: Minutes

Interpretation: Lipid panel results are most informative when the four markers are considered together rather than in isolation. Always follow the instructions for use (IFU) provided with your testing device and kit to ensure accurate results in your point-of-care setting. Results should be interpreted using local reference ranges and in the personal context of each individual customer.

# BLOOD LIPIDS AND GLUCOSE TESTING

## Reference intervals: Total cholesterol

### **Result: Error / No control line**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Result: 0**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Total cholesterol**

#### **Result: <5 mmol/L**

What it means: Healthy level of total cholesterol.

How to explain/action: Reassure customer; maintain healthy habits, routine monitoring.

### **Total cholesterol**

#### **Result: >5 mmol/L**

What it means: Borderline high or higher than normal total cholesterol level.

How to explain/action: Recommend consulting healthcare provider to discuss potential interventions.

# BLOOD LIPIDS AND GLUCOSE TESTING

## Reference intervals: HDL cholesterol

### **Result: Error / No control line**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Result: 0**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **HDL cholesterol**

**Result for men: <1.0 mmol/L**

**Result for women: <1.2 mmol/L**

What it means: Borderline low or lower than normal level of HDL cholesterol.

How to explain/action: Recommend consulting healthcare provider to discuss potential interventions.

### **HDL cholesterol**

**Result for men: >1.0 mmol/L**

**Result for women: >1.2 mmol/L**

What it means: Healthy level of HDL cholesterol.

How to explain/action: Reassure customer; maintain healthy habits, routine monitoring.

# BLOOD LIPIDS AND GLUCOSE TESTING

## Reference intervals: Triglycerides

### **Result: Error / No control line**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Result: 0**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Triglycerides**

#### **Result: <1.7 mmol/L**

What it means: Healthy level of triglycerides.

How to explain/action: Reassure customer; maintain healthy habits, routine monitoring.

### **Triglycerides**

#### **Result: >1.7 mmol/L**

What it means: Borderline high or higher than normal triglycerides level.

How to explain/action: Recommend consulting healthcare provider to discuss potential interventions.

# BLOOD LIPIDS AND GLUCOSE TESTING

## Reference intervals: Blood glucose

### **Result: Error / No control line**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Result: 0**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Blood glucose**

#### **Result: <4 mmol/L**

What it means: Low blood glucose level (hypoglycemia).

How to explain/action: Hypoglycemia in customers with diabetes needs immediate medical attention. Recommend consulting healthcare provider to discuss potential interventions.

### **Blood glucose**

#### **Result: 4.0 - 5.4 mmol/L**

What it means: Healthy blood glucose level.

How to explain/action: Reassure customer; maintain healthy habits, routine monitoring.

### **Blood glucose**

#### **Result: >5.4 mmol/L**

What it means: High blood glucose level (hyperglycemia).

How to explain/action: Hyperglycemia may indicate diabetes, and people with diabetes can experience hyperglycemia episodes frequently. Recommend consulting healthcare provider to discuss potential interventions.

# BLOOD LIPIDS AND GLUCOSE TESTING

## Additional information

### Key factors influencing results:

- 1) Fasting: For the most accurate triglyceride and blood glucose results, customers should ideally fast for 8-12 hours before testing (water is permitted). Total cholesterol and HDL cholesterol are less affected by food intake but fasting is still recommended for a full panel.
- 2) Timing: Morning testing is generally preferred due to the fasting required.
- 3) Medications: Lipid-lowering therapies (such as statins or fibrates) and antidiabetic medications will affect results. This context should always be noted when interpreting values.
- 4) Lifestyle context: Recent changes in diet, physical activity, alcohol intake, illness, or acute stress can temporarily influence lipid and glucose values.

### Additional points to keep in mind:

Repeat testing: A single lipid panel result is informative, but trends over time are more clinically meaningful.

Customers with borderline values benefit from repeat testing and regular monitoring.

## References

National Heart, Lung, and Blood Institute, Blood Cholesterol, What is Blood Cholesterol?

National Library of Medicine, HDL: The "Good" Cholesterol, also called: High-density lipoprotein

NHS, Cholesterol levels

National Heart, Lung, and Blood Institute, High Blood Triglycerides

Mayo clinic, Triglycerides: Why do they matter?

National Library of Medicine, Blood Glucose, also called: Blood sugar

British Heart Foundation, Blood sugar levels: what is normal?

Mayo clinic, Hypoglycemia

Cleveland clinic, Hyperglycemia: high blood sugar

NIH, National Library of Medicine - Hemoglobin A1C.



[Learn more about Lipid panel and blood glucose](#)

# GLYCATED HEMOGLOBIN (HbA1c)

## General information



[How to perform test](#)

[HbA1c by](#)

[Lansionbio](#)

## Key takeaways

- HbA1c is [glycated hemoglobin](#)
- HbA1c reflects average blood sugar over approximately 2-3 months
- HbA1c correlates with an estimated average glucose (eAG)

## What is HbA1c?

HbA1c (glycated hemoglobin) forms when glucose attaches to hemoglobin inside red blood cells. Because red blood cells circulate for approximately 120 days in the human body, HbA1c captures long-term glycemia (high blood sugar) better than a single glucose reading with a typical glucometer.

## Why is HbA1c important?

Clinicians use HbA1c to diagnose diabetes and to monitor long-term control of diabetes or metabolic syndrome. Lowering an elevated HbA1c is associated with lower risk of diabetes complications.

Rapid HbA1c tests may differ slightly from laboratory results - this is normal and does not mean the device is faulty. Use these ranges to explain results clearly to customers and guide next steps.

## How is HbA1c measured?

- Sample: Small blood sample.
- Units: Results are primarily reported as a percentage (%). Some reports also include IFCC units (mmol/mol), and estimated average glucose (eAG) reference tables may be used for interpretation.
- Fasting is not required.

# GLYCATED HEMOGLOBIN (HbA1c)

## Reference intervals

### **Result: Error / No control line**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Result: 0**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Result: < 5.7**

What it means: Normal glycemic control.

How to explain/action: Reassure customer. Encourage healthy habits and routine screening.

### **Result: 5.7 – 6.4**

What it means: Prediabetes range.

How to explain/action: Explain increased risk. Recommend lifestyle changes, follow-up testing, visit of a medical professional.

### **Result: ≥ 6.5**

What it means: Diabetes range.

How to explain/action: Advise medical consultation for diagnosis and management.

# GLYCATED HEMOGLOBIN (HbA1c)

## Additional information

### Key factors influencing results:

Biological: hemoglobin variants, anemia, recent blood loss.

Preanalytical: incorrect sample labeling, storage, hemolysis.

Assay/matrix: capillary vs venous may slightly differ.

### Key points to keep in mind:

1) Point-of-care variation can differ slightly from lab results - small differences (e.g., HbA1c just above/below a cutoff) are often within expected biological/test variability and not a device malfunction.

2) If you see 0 or error (no control line), the test may not work - repeat the test.

3) For borderline values (especially near 5.7–6.5), users should advise follow-up testing and/or clinician review rather than assume the tool is wrong.

4) HbA1c results can be affected by sample storage and environmental temperature. Studies have shown that when whole blood samples are stored at non-optimal temperatures, measured HbA1c values can change compared to samples stored at recommended conditions like refrigeration or freezing. Improper temperature conditions during storage or prolonged exposure to heat may lead to inaccurate results.

5) HbA1c can be measured using capillary whole blood from a fingerstick at the point of care or from venous whole blood. Fasting is not required. Because capillary point-of-care results may vary, diagnostic decisions should be confirmed with a venous blood sample where appropriate.

## References

NIH, National Library of Medicine - Hemoglobin A1C.



[Learn more about HbA1c](#)

# BLOOD GLUCOSE & HbA1c

## Results look different

Blood glucose and HbA1c measure different aspects of glycaemia:

- Blood glucose reflects the glucose level at a specific moment
- HbA1c reflects the average glucose exposure over the previous ~8-12 weeks

Because they measure different timeframes and are influenced by different biological factors, results may sometimes not match. This is common and does not automatically indicate an error or disease change.

### Scenario 1: High blood glucose but low HbA1c

Possible explanation:

This pattern may occur when recent glucose levels have increased but the longer-term average is still lower, or when HbA1c is affected by factors that reduce its value.

Examples include:

- recent change in diet, illness, stress, or medication
- short-term hyperglycaemia not yet reflected in HbA1c
- conditions shortening red blood cell lifespan (e.g. some anaemias)
- chronic kidney disease or certain medications affecting HbA1c reliability

What pharmacists can advise customers:

- repeat glucose monitoring as recommended
- review recent lifestyle or medication changes
- discuss results with their general practitioner or diabetes team
- consider follow-up testing if mismatch persists

# BLOOD GLUCOSE & HbA1c

## Results look different

### Scenario 2: Low blood glucose but high HbA1c

Possible explanation:

This pattern may occur when current glucose is improved but previous levels were higher, or when HbA1c is influenced by factors that increase its value independently of glucose.

Examples include:

- recent improvement in glucose control
- iron deficiency anaemia
- haemoglobin variants (genetic differences in the structure of haemoglobin)
- longer red blood cell lifespan
- biological differences between individuals in haemoglobin glycation

What pharmacists can advise customers:

- continue regular monitoring
- avoid interpreting a single reading alone
- discuss possible causes with their healthcare professional
- follow recommended repeat laboratory testing if advised

## References

NIH, National Library of Medicine - Hemoglobin A1C.

Rohlfing CL et al. Effects of whole blood storage on hemoglobin a1c measurements with five current assay methods. *Diabetes Technol Ther.* 2012 Mar;14(3):271-5. doi: 10.1089/dia.2011.0136.

Niazpour F et al. The Effect of Blood Sample Storage Conditions on HbA1c Concentration. *Clin Lab.* 2019 Jul 1;65(7). doi: 10.7754/Clin.Lab.2019.190114.

Mann, DM, et al. Understanding discordance between HbA1c and blood glucose measurements. doi: 10.2337/dc12-1479

# hs-CRP/CRP

## General information



[How to perform test  
CRP by \*\*Wizbiotech\*\*](#)



[How to perform test  
CRP by \*\*Lansionbio\*\*](#)

## Key takeaways

- hs-CRP measures low-level inflammation that can influence long-term cardiovascular health
- It provides additional insight beyond cholesterol and blood sugar tests
- Testing helps support earlier awareness and prevention-focused care

## What is hs-CRP?

C-reactive protein (CRP) is produced by the liver in response to inflammation anywhere in the body. Traditional CRP testing is designed to detect higher levels seen in infections or active inflammatory disease.

High-sensitivity CRP (hs-CRP) uses a more precise assay that detects much lower concentrations, allowing clinicians to assess chronic, low-grade inflammation associated with atherosclerosis and cardiovascular risk - even in otherwise healthy individuals.

## Why is hs-CRP important?

Inflammation plays a central role in plaque formation and instability within blood vessels. Elevated hs-CRP levels are consistently associated with a higher risk of heart attack, stroke, and other cardiovascular events, largely independent of cholesterol levels.

hs-CRP is most useful for risk refinement, particularly in people with borderline or intermediate cardiovascular risk, helping to develop and evaluate the efficacy of prevention strategies alongside standard risk markers.

# hs-CRP/CRP

## General information

### Important note about hs-CRP:

hs-CRP testing detects inflammation but does not pinpoint its cause. Elevated hs-CRP levels may result from infections, injuries, or other non-cardiac conditions. It's important to advise customers that a high result doesn't automatically indicate heart disease and recommend follow-up with a healthcare provider for accurate diagnosis and management.

### How is hs-CRP measured?

- Sample: Small blood sample.
- Units: mg/L.

Because inflammation levels can fluctuate, clinicians often repeat testing - especially if results are elevated - and avoid testing during acute illness or known infection to determine a stable baseline.

Rapid hs-CRP/CRP tests may differ slightly from laboratory results - this is normal and does not indicate a faulty device. Use the following ranges to explain results clearly to customers and guide appropriate next steps. Reference ranges may vary slightly by lab and test method.

# hs-CRP/CRP

## Reference intervals

### **Result: Error / No control line**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Result: 0 - 1 mg/L**

What it means: Low risk, low inflammation - indicates low risk for cardiovascular disease.

How to explain/action: Reassure customer, suggest to maintain healthy lifestyle and routine health monitoring.

### **Result: 1 – 3 mg/L**

What it means: Average risk, moderate inflammation - average risk for cardiovascular disease.

How to explain/action: Recommend healthy lifestyle changes and follow-up testing as well as consultation with a healthcare provider.

### **Result: > 3 mg/L**

What it means: High risk, elevated inflammation - higher risk for cardiovascular disease or active inflammation/infection.

How to explain/action: Advise customer to consult healthcare provider for further evaluation and possible additional testing.

# hs-CRP

## Additional information

### Key factors influencing results:

Biological: infection, inflammation, recent exercise, medications (NSAIDs, steroids).

Preanalytical: sample handling, hemolysis, storage conditions.

Assay/matrix: capillary vs venous differences.

### Key points to keep in mind:

- 1) Point-of-care results can differ slightly from lab tests. Small variations are common and do not mean the device is faulty.
- 2) If you see an error or no control line, the test might not have worked - always repeat.
- 3) For borderline or unusual values, advise customers to seek follow-up testing and medical advice instead of assuming device problems.
- 4) Ferritin levels can rise more slowly and stay elevated longer during inflammation compared to CRP. While CRP peaks early and drops quickly as inflammation resolves, ferritin may remain high even after CRP returns to normal. This is normal and should be considered when interpreting CRP and ferritin results.

### References

Mayo Clinic - C-reactive protein test

Medline Plus - C-reactive protein

Testing - hs-CRP Test (C-Reactive Protein High-Sensitivity)

Agency for Healthcare Research and Quality (AHRQ) - Assessing Cardiovascular Risk: Guideline Synthesis

Beyhoff N et al. Prognostic Impact of High-Sensitivity C-Reactive Protein in Patients Undergoing Percutaneous Coronary Intervention According to BMI. *J Am Coll Cardiol Intv.* 2020 Dec, 13 (24) 2882–2892.

<https://doi.org/10.1016/j.jcin.2020.09.024>



[Learn more about CRP](#)

# TESTOSTERONE

## General information



[How to perform test](#)  
[Testosterone by](#)  
[Unimed](#)

### Key takeaways

- Testosterone is important for overall health: It plays a key role in energy, mood, muscle and bone health, and sexual function for both men and women.
- Accurate measurement matters: Levels can fluctuate by time of day, age, menstrual cycle (in women), and lifestyle factors like sleep, stress, and diet.

### What is testosterone?

Testosterone is a key hormone for both men and women. In men, it is produced primarily in the testicles, while in women it is produced in the ovaries and adrenal glands. Testosterone influences energy, mood, muscle and bone health, and sexual function in both sexes. While levels are much higher in men, women's testosterone is also important for overall health, and imbalances can impact vitality, mood, and reproductive function. Because some point-of-care tests have a detection limit above typical female levels, certain tests are currently intended for male customers, although understanding female levels remains clinically important.

Accurate measurement of testosterone allows individuals to identify potential hormonal imbalances that may contribute to fatigue, low libido, changes in mood, or altered body composition.

### How is testosterone measured?

- Sample: Blood.
- Analyte: Total testosterone (includes free and bound).
- Units: ng/dL or ng/mL.

Interpretation: Always follow the instructions for use (IFU) provided with your point-of-care device and test kit. Remember that results can vary depending on time of day, age, sex, and other individual factors.

The most reliable measurement is total testosterone, which includes both free and bound hormone. Devices like the [Igloo Reader Pro](#) provide rapid, point-of-care results suitable for men, helping customers receive timely information to discuss with a healthcare professional.

# TESTOSTERONE

## Reference intervals

There are several ways to test testosterone levels, but the most reliable method measures the total testosterone in the blood. Results are usually reported in ng/mL. Ideally, each laboratory should establish normal ranges based on its local population and on the sample type (serum, plasma, venous blood, capillary blood).

This test is intended for **adult male customers only**. Testosterone levels in women are significantly lower than in men and, regardless of cycle phase, typically fall below the limit of detection of this test (1.0 ng/mL). As a result, this test is not suitable for assessing testosterone levels in women. Women suspecting abnormal testosterone levels should consult their doctor for appropriate clinical testing.

The following age-dependent values can be used as general guidelines for normal testosterone levels in adult men.

### **Result: Error / No control line**

What it means: Test did not run correctly.

How to explain/action: Repeat the test. If the issue persists, check sample and instructions.

### **Result in adult male: < 1 ng/mL**

What it means: Low testosterone level.

How to explain/action: The patient's results show lower testosterone levels, which can sometimes be linked to symptoms like low energy or reduced sex drive. It would be important to discuss these results with a healthcare professional for further evaluation.

### **Result in adult male: 3 – 10 ng/mL**

What it means: The patient's testosterone levels are within the normal range

How to explain/action: Reassure the customer and suggest continuing healthy habits along with routine monitoring to support overall well-being.

### **Result in adult male: > 10 ng/mL**

What it means: The customer's results are above the typical range, which is uncommon in adult men.

How to explain/action: Encourage the customer to speak with a healthcare professional to understand the results and any possible underlying causes.

# TESTOSTERONE

## Additional information

### Key factors influencing results:

#### Biological factors:

- Age and development: Testosterone gradually rises during puberty in young males and naturally declines with age, so results must be interpreted according to age.
- Sex and hormonal cycle in women: Testosterone levels are lower in women and normally fluctuate across the menstrual cycle, which may affect interpretation.
- Sleep, stress, and illness: Poor sleep or chronic stress can temporarily reduce testosterone, while acute illness or inflammation can also impact levels.
- Recent exercise or physical activity: Intense exercise may transiently change testosterone levels.
- Medications: Certain drugs, including hormone therapies, can affect hormone production or binding.

#### Preanalytical factors:

- Fasting and preparation: Fasting for at least 8 hours and avoiding alcohol or caffeine the night before improves measurement accuracy.
- Timing of the test: Testosterone is highest in the morning (7–10 a.m.); testing outside this window may result in lower readings.
- Sample handling: Improper collection, hemolysis, or storage conditions can alter test results.

#### Assay/matrix factors:

- Capillary vs. venous blood: Testosterone levels can differ slightly depending on whether capillary (fingerstick) or venous blood is used.
- Laboratory method/device: Different assays (immunoassay vs. mass spectrometry) may produce varying results.

# TESTOSTERONE

## Additional information

### Key points to keep in mind:

- Testosterone fluctuates naturally: Levels vary during the day, with age, and depending on lifestyle factors. Routine monitoring helps identify trends over time.
- Context matters: Interpretation should consider the customer's age, sex, symptoms, and lifestyle.
- Healthcare guidance is essential: Always refer customers to a healthcare professional for abnormal or borderline results for proper evaluation and management.

### References

Shalender B et al., Testosterone Therapy in Men With Hypogonadism: An Endocrine Society Clinical Practice Guideline, *The Journal of Clinical Endocrinology & Metabolism*, Volume 103, Issue 5, May 2018, Pages 1715–1744, doi: 10.1210/jc.2018-00229

Mulhall JP et al. Evaluation and Management of Testosterone Deficiency: AUA Guideline. *Journal of Urology*. 2018 Aug 1;200(2):423–32. doi: 10.1016/j.juro.2018.03.115

Leproult R, Van Cauter E. Effect of 1 week of sleep restriction on testosterone levels in young healthy men. *JAMA*. 2011 Jun 1;305(21):2173-4. doi: 10.1001/jama.2011.710.

Cleveland Clinic - Health Essentials - Why Are Testosterone Levels Decreasing?

Cleveland Clinic - [Testosterone](#)

NIH - StatPearls - Testosterone



[Learn more about Testosterone](#)

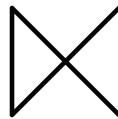


## About Igloo / Dx365

Igloo is a point-of-care diagnostics solution developed by DX 365 GmbH, designed to make biomarker testing fast, accessible, and reliable outside of traditional laboratory settings.

The Igloo Reader Pro enables qualitative and quantitative testing across a broad range of biomarkers using certified test kits from multiple manufacturers. Results are available within minutes and can be securely stored, visualized, and managed via compatible mobile and desktop applications.

Igloo is used in pharmacies, dental clinics, medical practices, corporate wellness settings, and other point-of-care environments, supporting evidence-based decision-making and streamlined testing workflows.



### For enquiries, please contact:

Dx365 GmbH  
Hedwig-Porschütz-Straße 14  
10557 Berlin  
Germany  
<https://www.igloo.today/>

