TEST

Stool gram stain

A stool gram stain uses a microscope to examine the shapes and staining patterns of bacteria in stool.

WHAT IT MEASURES
Bacterial shapes and Gram-staining patterns in stool

SAMPLE
Fresh stool

FASTING NEEDED?
No

HOW LONG IT TAKES
About 5 to 10 minutes for collection

RESULTS IN
Usually one day; timing varies by laboratory

USED FOR
Supporting diagnosis of selected intestinal infections

MAIN LIMITATION
Normal stool bacteria can obscure or resemble pathogens

Overview

A stool gram stain is a laboratory test that looks at bacteria and other cells in a stool sample under a microscope. The sample is treated with coloured dyes using a method called Gram staining.

Bacteria that remain purple are described as Gram-positive . Those that appear pink or red are called Gram-negative . The laboratory also looks at bacterial shape, such as round bacteria called cocci or rod-shaped bacteria called bacilli.

Stool normally contains a very large and varied community of bacteria. This makes a stool gram stain harder to interpret than a Gram stain from a body site that should not contain bacteria.

The test may provide a quick, preliminary clue in selected situations. However, it usually cannot identify the exact organism causing an infection. Stool culture or molecular tests, such as polymerase chain reaction (PCR), are usually more useful for that purpose.

Why the test is ordered

A stool gram stain may be ordered as part of an assessment for infectious diarrhea. It is not routinely needed for every episode of diarrhea, and some laboratories do not offer it as a standard stool test.

Depending on the laboratory, the test may be used to look for:

A finding may help guide further testing, but it rarely confirms a diagnosis by itself. For example, curved Gram-negative rods may raise suspicion for Campylobacter , but culture or a molecular test is generally needed to identify the organism.

A Gram stain cannot show whether a bacterium produces a toxin. It also does not reliably determine which antibiotics like amoxicillin or doxycycline would work. Those questions require other tests.

- Unusual numbers or patterns of bacteria
- Bacteria with a distinctive shape, such as curved rods
- White blood cells, which can suggest intestinal inflammation
- Yeast or other visible organisms

Who should have the test

This test is generally used only when a healthcare professional or laboratory believes that direct microscopy could add useful information.

Stool testing may be considered when diarrhea is severe, bloody, prolonged or linked to travel, an outbreak, immune suppression or recent antibiotic use. Even in these situations, a stool gram stain may not be the preferred test. The choice may instead include stool culture, a molecular infection panel, a parasite examination or a specific test for Clostridioides difficile .

A stool gram stain is not a general screening test for people without symptoms. It also cannot reliably measure whether your normal intestinal bacteria are "balanced" or healthy.

Seek prompt medical advice for bloody diarrhea, persistent fever or signs of dehydration. Emergency assessment may be needed if you are confused, fainting, unable to keep fluids down, passing very little urine or having severe, worsening abdominal pain.

How to prepare

You do not usually need to fast or change what you eat. Continue your usual medicines unless you have been given different instructions.

Tell the healthcare professional who ordered the test about recent antibiotics, probiotics, bismuth-containing medicines, laxatives or bowel preparation. These can alter the bacteria or cells seen in the sample. Do not stop prescribed treatment solely to prepare for this test.

You will usually receive a clean collection container and written instructions. Label the container as directed. If possible, pass urine before collecting the stool so that urine does not mix with it.

Avoid collecting stool directly from toilet water. A clean disposable collection tray, dry bedpan or plastic sheet placed according to the laboratory's instructions may be used.

What happens during the test

You pass stool into a clean, dry collection device. Using the supplied scoop, you transfer a small amount into the specimen container. If the stool contains bloody, slimy or watery areas, the instructions may ask you to include material from those areas.

Close the container firmly and wash your hands with soap and water. Return the sample within the time stated by the laboratory. Some samples must be examined quickly, while others can be placed in a transport solution.

In the laboratory, a thin layer of stool is placed on a glass slide. It is stained with several dyes and examined under a microscope. The collection itself usually takes only a few minutes.

Understanding your results

Results are often descriptive rather than a single number. A report may describe Gram-positive or Gram-negative bacteria, their shapes and whether white blood cells or yeast were seen.

"Mixed bacterial flora" means that several types of bacteria were present. This is common in stool and does not by itself show infection.

A report describing one bacterial shape as predominant may provide a clue, but it is not proof that the organism caused your symptoms. Many normal intestinal bacteria have similar appearances, and different species can look alike after staining.

White blood cells can occur when the intestinal lining is inflamed. They do not identify the cause, and their absence does not rule out infection or inflammation.

There is no universal normal reference range for a stool gram stain. Reporting methods and interpretation vary by laboratory, age, sex, pregnancy status, medicines and clinical context. The result should be considered alongside your symptoms, other stool tests and recent medical history.

What affects the results

Several factors can change what is seen even when the laboratory performs the stain correctly.

Recent antibiotics can reduce susceptible bacteria and allow other organisms to become more noticeable. Probiotics can also change the mixture. Bismuth, laxatives and bowel-cleansing preparations may alter stool contents or dilute the sample.

Collection and handling are especially important:

Diet, age, recent travel, hospitalization and underlying bowel conditions can affect the normal bacterial community. Pregnancy and sex generally have less direct effect on the stain, but they may influence how the overall illness and test results are assessed.

A recent blood transfusion does not usually affect a stool gram stain.

- Toilet water or urine can dilute or contaminate the stool
- Delay before testing can allow some bacteria to die or multiply
- Incorrect storage temperature can change the organisms present
- A very small sample may not contain an organism found elsewhere
- Sampling only a solid area may miss cells in mucus or watery material

Accuracy and limitations

Gram staining usually classifies visible bacteria correctly when there are enough intact organisms and the slide is prepared well. Its main weakness in stool testing is not the staining method itself. It is the large number of normal bacteria already present.

The test can miss an infection when the disease-causing organism is present in low numbers, is unevenly spread through the stool or does not stain clearly. Antibiotic treatment, delayed transport and poor storage can also make a false-negative result more likely.

The test can appear to suggest infection when there is none. Normal bacteria may resemble a pathogen, and contamination can introduce additional organisms. Seeing bacteria does not

prove that they caused the symptoms.

A stool culture is better when living bacteria must be identified and tested against antibiotics. Molecular tests are often better for rapidly detecting the genetic material of specific bacteria, viruses or parasites. Toxin or molecular testing is used for suspected C. difficile . Parasite microscopy or antigen testing may be more appropriate after certain travel or exposure histories.

No single stool test detects every possible cause of diarrhea.

Risks and complications

Collecting a stool sample has no expected physical complications. The main concern is accidental contact with stool, which can be reduced by closing the container securely and washing your hands well afterward.

A rectal swab, if used instead of passed stool, may cause brief pressure or mild discomfort.

What happens next

A normal or non-specific gram stain does not always end the investigation. If symptoms continue, the healthcare professional who ordered the test may consider a stool culture, molecular panel, parasite tests, blood tests or tests for intestinal inflammation.

If the stain suggests a particular type of bacterium, the laboratory may perform or recommend a more specific test. Treatment decisions are usually based on the full clinical picture and confirmatory results rather than the Gram stain alone.

For mild symptoms that are improving, routine follow-up may be all that is needed. Arrange earlier review if diarrhea persists, returns repeatedly or is accompanied by weight loss, fever or blood.

Seek urgent help for worsening dehydration, severe abdominal pain or repeated vomiting. Confusion, collapse, inability to drink or very little urine can require emergency care.

Common questions

Can I drink coffee before a stool gram stain?

Yes. Fasting is not normally required, so coffee is usually allowed. Follow any separate instructions if other tests are being collected at the same time.

Does the time of day matter?

Usually not. What matters more is returning the sample within the laboratory's stated time and storing it correctly while you wait.

Can I exercise before collecting the sample?

Yes. Exercise does not usually affect the staining result. Avoid collecting the sample in a situation where it could become contaminated.

Can I collect the sample while taking antibiotics?

Yes, if that is when you were instructed to collect it. Antibiotics can reduce or change the bacteria seen, so report when you started them. Do not delay or stop prescribed antibiotics without medical advice.

Can the test detect parasites or worms?

It is not designed for that purpose. A parasite examination, antigen test or molecular test is usually needed when a parasitic infection is suspected.

Is this the same as a stool culture?

No. A Gram stain looks at stained material through a microscope. A culture attempts to grow living bacteria so they can be identified and, when appropriate, tested for antibiotic susceptibility.

Sources

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