TEST

Gram stain of skin lesion

A Gram stain checks material from a skin lesion for bacteria and inflammatory cells.

WHAT IT MEASURES
Bacteria and inflammatory cells in material from a skin lesion

SAMPLE
Swab, pus, fluid, or tissue from the skin lesion

FASTING NEEDED?
No

HOW LONG IT TAKES
Usually a few minutes

RESULTS IN
Same day to one day; timing varies by laboratory

USED FOR
Rapid support for diagnosis and treatment decisions

MAIN LIMITATION
Negative stains can miss infection when bacteria are scarce

Overview

A Gram stain is a rapid laboratory test used to look for bacteria in material collected from a skin lesion. A lesion is any area of abnormal or damaged skin, such as a sore, blister, ulcer, abscess, wound, or crusted patch.

The sample is spread onto a glass slide and treated with several dyes. Bacteria that retain the first dye appear purple and are called Gram-positive . Bacteria that take up the second dye appear pink or red and are called Gram-negative .

The laboratory also looks at bacterial shape and arrangement. For example, a report may describe round bacteria in clusters or rod-shaped bacteria. It may also mention white blood cells, which can be a sign of inflammation.

A Gram stain provides an early clue rather than a complete answer. It usually cannot name the exact species or show which antibiotics like amoxicillin or doxycycline are likely to work. A culture, molecular test, or tissue examination may still be needed.

Why the test is ordered

The test may be ordered when a skin lesion could be infected and there is material that can be collected. This may include pus, drainage, fluid beneath a blister, or tissue from a deeper wound.

A Gram stain may help your care team:

The test is not routinely useful for every red or painful area of skin. In uncomplicated cellulitis, where the skin is inflamed but remains closed, there may be no suitable surface sample. Swabbing intact skin is likely to collect normal skin bacteria rather than bacteria from deeper tissue.

- Quickly check whether bacteria are visible
- See whether the bacteria appear Gram-positive or Gram-negative
- Assess whether inflammatory cells are present
- Choose initial treatment while other results are pending
- Decide whether culture or additional testing is needed

Who should have the test

You may be offered a Gram stain if you have an open, draining, crusted, or pus-filled skin lesion. It may also be considered for a wound that is not healing as expected, a recurrent abscess, or an infection that appears unusual or has not responded to initial treatment.

Testing can be especially useful when the result could change treatment or when a reliable sample can be obtained from pus or deeper tissue.

Not every wound needs laboratory testing. A healthcare professional will consider the appearance and depth of the lesion, your general health, recent antibiotics, and whether you have signs of a more widespread infection.

How to prepare

You do not need to fast. You can usually eat, drink coffee, take routine medicines, and follow your normal daily schedule.

Do not stop an antibiotic unless your prescriber tells you to. However, tell the person collecting the sample about any antibiotic, antiseptic cream, or medicated dressing you have recently used. These can reduce the number of bacteria found.

Follow any instructions about dressings or washing. Unless asked, avoid scrubbing the lesion or applying antiseptic immediately before the appointment. If the area is covered, you may be asked to leave the dressing in place until the sample is collected.

Tell the healthcare professional if you take blood-thinning medicine or have a bleeding disorder, particularly if fluid will be removed with a needle or a biopsy is planned.

What happens during the test

The collection method depends on the lesion.

For a draining wound, the surrounding skin may be cleaned before a sterile swab is passed over fresh drainage or into the deeper part of the wound. Surface crust, dead tissue, or old drainage may be removed first because these can contain bacteria that are not causing the problem.

If there is a pocket of fluid or pus, a needle and syringe may be used to collect it. A local anaesthetic may be offered. For a deep or persistent lesion, a small tissue sample may be taken during a biopsy.

The sample is sent to the laboratory. A thin layer is placed on a slide, stained, and examined under a microscope. Collection often takes only a few minutes, although aspiration or biopsy takes longer.

Understanding your results

Gram stain reports are usually descriptive rather than numerical. There is no universal reference range.

A result may report:

Finding many bacteria together with white blood cells can support the possibility of infection, but the result must match the lesion and your overall condition. Bacteria may also live on the skin or colonise a wound without invading tissue.

"No organisms seen" does not rule out infection. The sample may contain too few bacteria to see, the infection may be deeper than the sampled area, or antibiotics may have reduced the bacterial count.

Reporting and interpretation vary by laboratory and clinical context. Age, sex, pregnancy status, medicines, and underlying health can also affect how the result is used, even though they do not directly change how bacteria take up the stain.

- Gram-positive bacteria: bacteria that appear purple
- Gram-negative bacteria: bacteria that appear pink or red
- Cocci: round bacteria
- Bacilli or rods: elongated bacteria
- White blood cells: cells associated with inflammation
- Epithelial cells: surface skin cells, which may suggest a superficial sample
- No organisms seen: no bacteria were visible on the examined slide

What affects the results

The quality and source of the sample often matter more than the staining process itself.

Important influences include:

Exercise, coffee, meals, and the time of day do not usually affect a skin lesion Gram stain. A recent blood transfusion also has no meaningful effect on this test.

- A surface-only sample: this may collect normal skin bacteria instead of bacteria from deeper tissue
- Recent antibiotics: bacteria may be damaged, reduced in number, or absent from the slide
- Antiseptics and wound cleaning: these can reduce the amount of recoverable bacteria
- Too little material: a dry swab or small sample can lead to a negative result
- Sampling the wrong area: the edge or surface may not represent a deeper infection
- Delayed transport: bacteria and cells can deteriorate if the sample is handled poorly
- Old or damaged bacteria: these may stain unevenly and appear "Gram-variable"
- Heavy debris or skin cells: these can make organisms difficult to see

Accuracy and limitations

A Gram stain works best when a good-quality sample contains enough bacteria to be seen. It can provide useful information quickly, but there is no single accuracy figure that applies to every type of skin lesion.

The test can miss an infection when bacterial numbers are low, antibiotics have already been started, or the infection lies deeper than the sampled area. Some organisms also stain poorly

or are not reliably detected with a routine Gram stain.

The test can appear positive when the bacteria are only normal skin organisms or wound colonisers. Contamination during collection can have the same effect. A positive stain therefore does not prove that the visible bacteria are causing the lesion.

Gram staining rarely identifies an organism to the species level. It also does not show which antibiotic will work. A bacterial culture is better for identification and antibiotic susceptibility testing, although culture can also be negative after antibiotic use. Molecular testing may be more suitable for certain difficult-to-grow organisms. A biopsy can be more informative when infection is deep or another skin condition is being considered.

Risks and complications

A swab may cause brief discomfort and slight bleeding, especially if the lesion is tender. There are usually no lasting effects.

Needle aspiration or biopsy has additional risks, including pain, bruising, bleeding, and a small risk of infection. Your care team should explain these risks and how to care for the site if either procedure is needed.

What happens next

The Gram stain may be available before a culture. Your care team may use it alongside the appearance of the lesion, your medical history, and other tests. Treatment may be started, continued, or adjusted when culture and antibiotic susceptibility results arrive.

For routine follow-up, ask when to expect the final culture result and whether you need a wound review. Take prescribed medicines as directed, and do not change antibiotics based only on wording in the laboratory report.

Seek urgent medical assessment if redness or swelling is spreading quickly, pain is becoming severe, you develop a high fever or shaking chills, or the skin becomes blistered, dusky, or black.

Call emergency services if you develop confusion, collapse, severe difficulty breathing, or another sudden life-threatening symptom.

Common questions

Can I drink coffee before the test?

Yes. Coffee, food, and other drinks do not affect a Gram stain from a skin lesion.

Does the time of day matter?

Usually not. The condition of the lesion and the quality of the sample matter more than collection time.

Can I exercise beforehand?

Yes, unless exercise will rub, contaminate, or reopen the area. Keep the dressing and lesion as clean as instructed.

Should I stop antibiotics before the sample is taken?

No, not unless your prescriber specifically tells you to. Antibiotics can make bacteria harder to detect, so tell the collector what you have taken and when.

Does a negative result mean the lesion is not infected?

No. A negative stain means no bacteria were seen on that slide. Low bacterial numbers, prior treatment, or a deeper infection can produce a negative result.

How is a Gram stain different from a culture?

A Gram stain gives a rapid visual description. A culture takes longer but may identify the organism and show which antibiotics are likely to work.

Sources

- MedlinePlus Medical Test: Gram Stain , US National Library of Medicine
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- Basic Laboratory Procedures in Clinical Bacteriology, second edition , World Health Organization, 2003