

IDEXX inVue Dx Ear Cytology:

Key concepts and considerations

How IDEXX inVue Dx ear cytology works

The IDEXX inVue Dx™ Cellular Analyzer analyzes the patient sample suspended in fluid, where cells and microorganisms disperse in three dimensions, enabling clearer separation and visualization. Using fluorescent staining, AI image recognition, and high resolution imaging, it automatically identifies and classifies yeast, bacteria (rods and cocci), and detects the presence or absence of white blood cells and mites.

Why IDEXX inVue Dx results may not match glass slides' results

Slide scoring is subjective

There is no standardized approach to glass slide scoring, and different methods can yield different results. While 0–4+ scoring is commonly used, clinicians often apply their own scoring criteria, which can vary from one clinician to another, leading to inconsistent slide interpretation. In contrast, the IDEXX inVue Dx analyzer applies consistent numerical thresholds to every sample, providing standardized, objective results.

Sample collection and preparation techniques can vary

- + Microorganisms are unevenly distributed throughout the ear canal. Multiple swabs from the same ear can capture different microbial populations, making comparison difficult
- + Heat-fixation of glass slides has the potential to damage cells or leave behind char debris that can make glass slide interpretation difficult.
- + Glass slide staining time and technique can vary between people.

Low positive results and normal flora

An IDEXX inVue Dx 0–trace result does not necessarily indicate the absence of bacteria or yeast. It indicates levels below the threshold for a 1+/few result. Low levels of microorganisms are a normal part of ear flora, and some breeds have higher yeast and/or bacteria populations with few or no clinical signs. For example, basset hounds, Newfoundland dogs, and Sphynx cats can have large amounts of yeast in their ears, with no or very few clinical signs.

Misidentification and contamination

- + Artifacts and other structures can sometimes be mistaken for microorganisms on a slide, such as:
 - Environmental fungal spores, pollen grains, stain precipitate, fibers, and dust.
 - Yeast can look like bacteria at low powers (4x–10x).
 - Those shown in the figures¹ below:

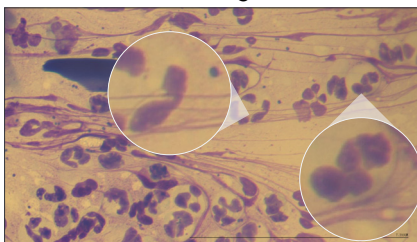


Figure 1. Lobular neutrophil nuclei can be misidentified as yeast (also shown: coccoid bacteria, neutrophils, skin cells, and nuclear [chromatin] streaming).

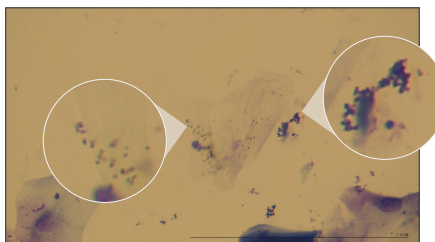


Figure 2. Melanin granules and stain precipitate can mimic bacteria (also shown: two rod-shaped bacteria and skin cells in the center with brown-black melanin granules and adjacent blue-purple stain precipitate).

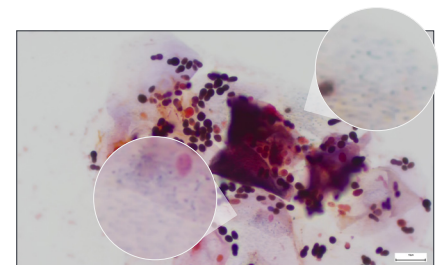


Figure 3. Skin cells contain blue keratohyalin granules that can mimic bacteria (also shown: several skin cells and yeast).

Note: The IDEXX inVue Dx analyzer does not identify these structures.

- + Artifacts or false positives from:
 - Stain or slide contamination related to improper storage and/or handling.
 - Microscope contamination or maintenance-related problems, such as misalignment or cleaning required.

Why the analyzer's results can vary from clinical signs

- + **Low microorganism counts on cytology:** Recent ear cleaning or medication use, early stages of an atopic flare before infection develops, foreign bodies, and contact hypersensitivity can have a lower than expected quantity of microorganisms.
- + **Parasites:** External parasites (such as *Sarcoptes* infestation or flea bite hypersensitivity) can cause significant scratching without cytologic evidence of infection.
- + **Sampling challenges:** Painful ears and chronic ear canal narrowing or thickening can make it difficult to collect a representative sample, resulting in falsely low or negative cytology findings.
- + **Patient factors:** Pets with endocrine disease, immunosuppression, and/or a naturally stoic temperament can show few clinical signs despite substantial ear disease.
- + **Anatomical differences:** Breed-related ear canal anatomy can affect how closely cytology findings reflect disease severity.

Differences in culture results and the analyzer's results

There is known variation between culture and cytology results.^{2,3}

Why an IDEXX inVue Dx result may be **negative** when the culture is **positive**

Some microorganisms behave differently in culture than they do in the ear, so low numbers on cytology can become high colony counts on culture. For instance, *Proteus* or *Bacillus* species can swarm on a culture plate, producing strongly positive culture results with no or low positive cytology results.

Why an IDEXX inVue Dx result may be **positive** when the culture is **negative**

- + Contamination of the culture swab with medication could make a culture negative. The antibiotic may not be inhibiting in vivo growth (in the ear). It might be sufficient to inhibit in vitro growth (in a culture dish).
- + White blood cells can make microorganisms nonviable in culture.
- + Very low numbers of microorganisms on the culture swab may not grow in culture.
- + Prolonged or incorrect transport conditions can make cultures negative.
- + Yeast generally does not grow well in aerobic bacterial culture media, so IDEXX inVue Dx could report yeast and there would be no growth on culture.

References

1. Images used in figures 1 and 2 provided with permission by Elizabeth Layne, DVM, DACVD. Image used in figure 3 provided with permission.
2. Graham-Mize CA, Rosser EJ Jr. Comparison of Microbial Isolates and Susceptibility Patterns From the External Ear Canal of Dogs With Otitis Externa. *JAAHA* 2004 Feb;40(2):102–108. doi:10.5326/0400102
3. Layne E, Yore K, Drake C et al. Correlation and agreement between ear cytological results and culture [abstract FC-35]. *Vet Dermatol.* 2024;35:38.