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Ear Swabs: Technique & Interpretation

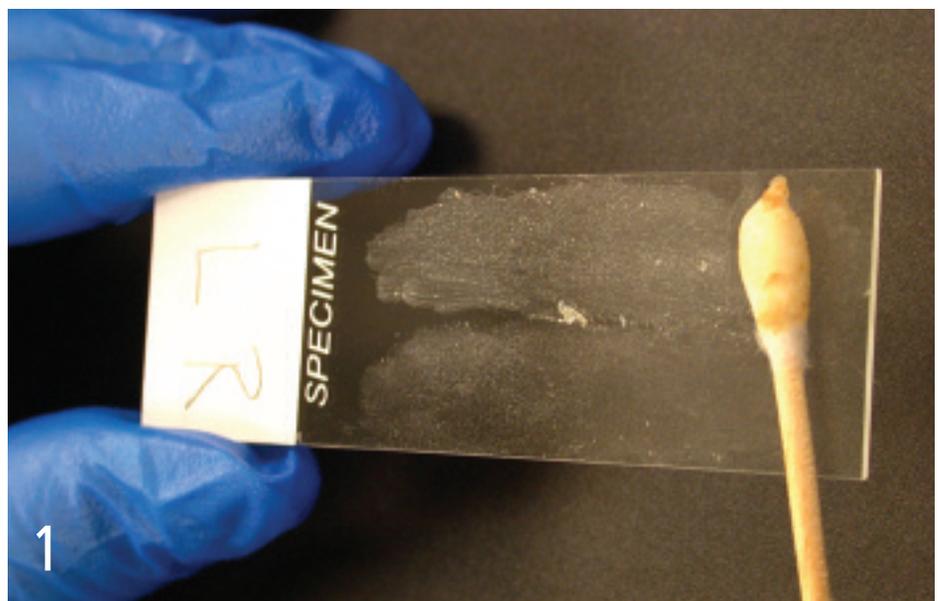
Otitis externa is one of the most common reasons dogs are presented to a veterinarian. Cytologic evaluations of ear swabs are crucial for assessment and management of recurrent ear infections.

Technique

Cytologic examination of ear swabs is a simple and quick in-house method to microscopically assess a patient's ears. Samples for cytologic examination are obtained by gently inserting cotton swabs into the horizontal ear canal. The swab is then rolled onto a microscopic slide until the specimen is evenly distributed (**Figure 1**).

For simple and fast staining, modified Wright's stain (Diff-Quik; diagnostics.siemens.com) is used. In order to reliably evaluate microorganisms, 5 to 10 HPFs (magnification, 100×; with immersion oil) should be assessed and findings averaged and recorded.

When ectoparasites are suspected, suspicious material should be placed, with a few drops of mineral oil, on a microscopic slide, followed by a coverslip. Mites can be easily detected at low magnifications (4× or 10×).



Preparation of ear cytology—rolling a cotton swab evenly over a microscope slide

Questions & Answers

Q • When should ear cytology be performed?

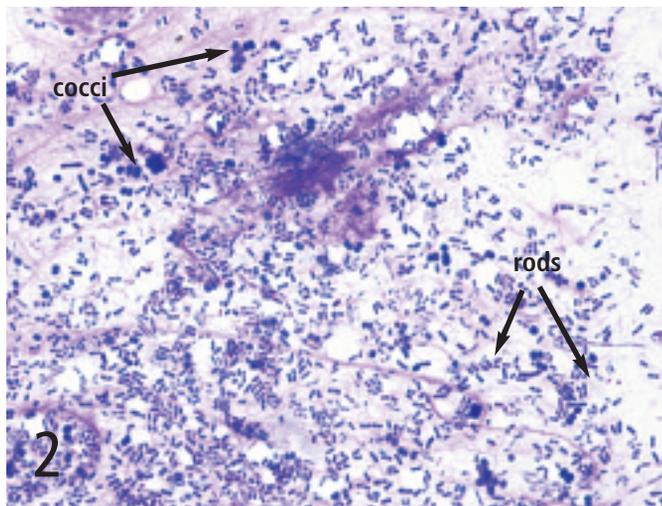
A • Ear cytology should be done for every patient with nonresponsive or recurrent otitis. It should also be performed at each follow-up examination to help evaluate the response to therapy, adjust treatment if necessary, and determine when therapy can be stopped. Depending on duration of therapy, cytology should be repeated every 2 to 4 weeks until otitis is resolved.

Q • What information can be obtained from microscopic examination of ear swabs?

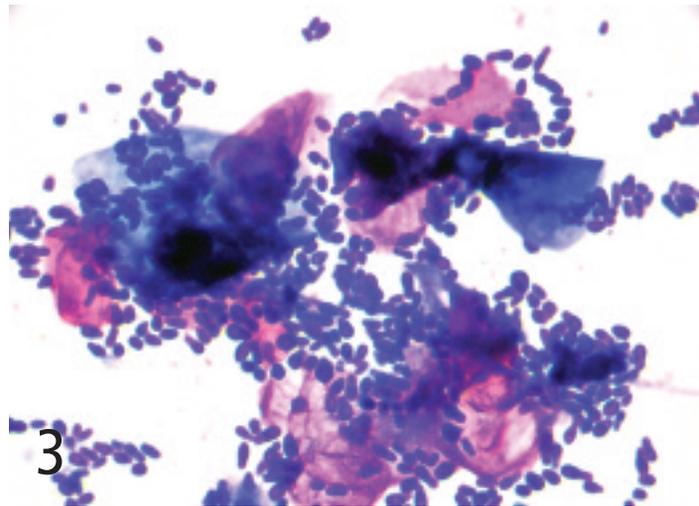
A • Microscopic examination is an effective method for semiquantitative evaluation of bacteria, yeast, parasites, and presence of inflammatory cells. It is not unusual for a patient to present with a mixed bacterial and yeast infection. The following factors should be considered when evaluating ear cytology:

Bacteria: The most common bacteria found in ears are cocci (*Staphylococcus*, *Streptococcus*) and rods (*Pseudomonas*, *Proteus*). These

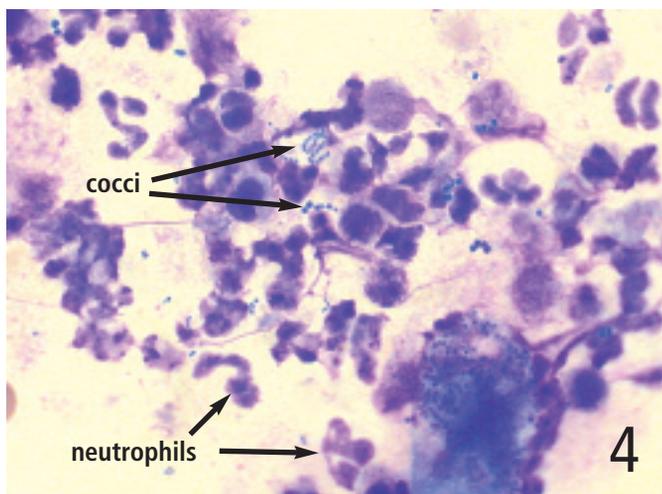
HPF = high-power field



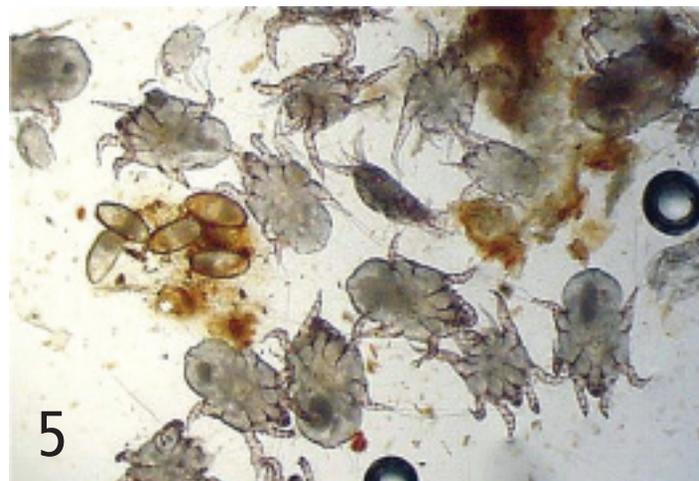
Cocci and rods too numerous to count (modified Wright's stain; original magnification, 100×; immersion oil)



Malassezia yeast organisms (too numerous to count) clustered around keratinocytes (modified Wright's stain; original magnification, 100×; immersion oil).



Multiple clusters of cocci and high numbers of neutrophils (modified Wright's stain, original magnification, 100×; immersion oil)



Multiple ear mites and cluster of 5 mite eggs (mineral oil; original magnification, 4×)

bacteria are approximately 0.5 to 1.5 μm in diameter (Figure 2).

Yeast: *Malassezia pachydermatis* is the most common budding organism found in canine ears. This yeast is typically peanut-shaped, with a size ranging from 3 to 5 μm . These organisms are often clustered around keratinocytes (Figure 3).

Cells: An occasional keratinocyte is to be expected, but in high numbers they may indicate

seborrhea. Neutrophils with intracellular bacteria are typical in active ear infections with severe inflammation (Figure 4).

Ectoparasites: The most common parasite, usually found in dark-brown crumbly discharge within the ear canal (especially in cats), is the ear mite *Otodectes cynotis* (Figure 5).

Demodex mites may also be seen on ear smears (Figure 6).

Q • When are cytologic findings clinically relevant?

A • Cocci and yeast belong, to some degree, in the normal microbiological skin flora. There is no absolute number, which can make it difficult to determine whether findings are normal or abnormal. Thus, in every case the importance of the microscopic findings should be determined in conjunction with other clinical signs (eg, inflammation, head shaking, scratching). Even low numbers of organisms, such as 1 to 5 cocci or *Malassezia* species per HPF, are considered

HPF = high-power field

relevant if the ears are both-
ering the animal. Presence
of bacterial rods (eg,
Pseudomonas species)
should always be considered
pathogenic.

**Q • Why is ear cytology
more reliable than
bacterial and fungal
culture?**

A • Culturing allows identi-
fication of an organism and
provides its sensitivity, which
is important if systemic ther-
apy is considered in patients
with otitis media. However, culture and suscepti-
bility results must be interpreted very carefully
because differences between laboratories are
common, growth of nonpathogenic bacteria can
be observed, and *Malassezia* yeast may fail to
grow on lipid-poor culture media. In addition, it
is not unusual that findings on cytology do not
correlate with culture results.

Because most patients with otitis externa can be
managed successfully with topical therapy only,
culture and susceptibility testing may not be
necessary. Susceptibility of bacteria depends on
drug concentration; since a much higher local
concentration is achieved with topical therapy,
such test results may not be clinically relevant.
For this reason, in my opinion ear cytology
more accurately reflects the true microbial pop-
ulation within the ear canal.

**Q • How should cytologic findings be
recorded?**

A • Ear cytology should be repeated at each fol-
low-up examination. A standardized method
does not exist, but the approach in the **Box** may
be helpful. The same scale can be applied to
recording inflammatory cells. A numeric scale
may be more objective and minimizes interob-
server variations, especially if a patient is seen
by a different doctor at each visit. ■



Two adult *Demodex* mites (mineral oil; original magnification, 10×).

**Numeric Scale for
Recording Number
of Organisms**

**Estimate the number of organisms
present as:**

- 0 (no organisms per HPF)
- 1 (1–3 organisms per HPF)
- 2 (4–10 organisms per HPF)
- 3 (11–30 organisms per HPF)
- 4 (> 30 organisms per HPF)

See Aids & Resources, back page, for
references, contacts, and appendices.
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