Skin cytology is defined as the microscopic evaluation of material collected from the skin. It allows for microscopic evaluation of both cells and organisms. Skin cytology can provide extremely valuable information as to type and degree of infection present, evidence or suggestive features of parasites, a normal or abnormal immune response, or demonstrate the presence of immune mediated or neoplastic diseases. It is an inexpensive test to perform, but can provide very significant diagnostic information extremely rapidly, which can be used at the time the patient is presented to guide medical recommendations.

Skin cytology is probably the most common diagnostic test performed in veterinary dermatology practices. On a daily basis I'll examine upwards of 30-50 cutaneous cytology slides, which allows me to make medical decisions immediately. Obtaining cytology samples is typically quite easy and straightforward, and with practice the vast majority of samples can be read and interpreted in-house. In cases where the veterinarian and veterinary nurse are unsure of what they are examining, the samples can be sent on to a clinical pathologist for evaluation. I highly suggest if you work in a practice where samples are routinely sent to a clinical pathologist that you examine the sample before it is sent away, and then compare with the report from the laboratory (or make a copy to look at while reading the pathology report). This is a nice way to teach yourself with the cases that are seen on a daily basis. The disadvantage of being dependent on a pathologist to evaluate all cytology samples is that it eliminates the ability for rapid results and immediate decision making about how to treat the patient. I find this less of a concern in cases of neoplasia/autoimmune disease, but more of a concern when evaluating bacterial or yeast skin and ear infections.

In veterinary dermatology the vast majority of cytology is used to direct empirical therapy of bacterial and/or yeast skin and ear infections. In cases where culture and sensitivity are being pursued (for example in a case with a skin infection that hasn't responded well to standard antimicrobial therapy) I still always recommend performing skin cytology first-I have had situations where I see too numerous to count rod shaped organisms on cytology and then the lab only grows a coccoid bacteria, indicating that the lab did not grow all the organisms seen and a repeat culture is indicated.

Samples for skin cytology can be collected via direct impression smear, using clear adhesive tape to lift the sample, using a cotton swab to obtain exudate (swab smears), scrapings, fine needle aspiration, or using metal spatulas (or something similar) to obtain material from nail beds. Different slides should be used for different locations and lesions, and the slides should be labeled accordingly. In most cases, no cleaning or disinfection of the sample is indicated, and in fact doing this can make obtaining a proper sample more difficult.

Most samples, other than tape, are heat fixed, and then stained with Diff Quik or a comparable stain. The slides are dried (naturally or with a hair dryer, lighter or bibulous paper-I prefer a hair dryer) and then examined microscopically. Important things that are identified on cytology include bacteria, yeast, neutrophils, eosinophils, acantholytic cells (the cells that are present in pemphigus foliaceus or, more rarely, dermatophytosis) and neoplastic cells.

The most expensive requirement to perform cutaneous cytology is a good quality binocular microscope with a strong light source and high quality lenses. Many veterinary practices will use a separate microscope to perform cytology vs fecal exams, which prevents the expensive lens required to effectively read cytology samples from getting coated in floatation solution. Even with proper care microscopes will get dirty and should be professionally cleaned at least once yearly.

I will typically start by examining my slide on the 10x location to evaluate where the best sample is present, and then I'll proceed to the oil immersion view at 100x to evaluate for microorganisms and closely evaluate the cells. It is always recommend to begin at a low magnification to find an area where cellular material appears to be present, and then go to oil immersion for identification.

To become adept at what is abnormal, the cytologist must first become comfortable with what is normal. Cytology samples can be taken from the ears and skin of normal cats and dogs from various sites to look for normal structures such as keratinocytes, melanin, wax (especially from ear samples) and lipids. Melanin, especially, is often mistaken for rod shaped bacteria, and is characterized by it's yellow-brown hue. Normal flora yeast and bacteria can also be visualized from the surface of healthy skin and ears. Although there is variation based on body site and breed, in general it is believed that less than 1 type of each organism (rod, yeast or coccoid bacteria) per oil power field in the absence of inflammatory cells can be normal.

Abnormal findings include inflammatory cells (most commonly neutrophils, although eosinophils are common in many allergic conditions), nucleated keratinocytes, acantholytic keratinocytes, neoplastic cells and microorganisms. When examining cytology samples for microorganisms it is important to determine the type, relative numbers, and tissue (inflammatory) response.

The bacteria that are typically seen on cytology are coccoid or rod shaped, and rarely filamentous. Mycoplasma, rickettsia, L form bacteria and some spirochetes are too small to be seen with 100x in house microscope. Diff-Quik is the most commonly used stain, with the organisms staining a dark purple (basophilic) color. Coccoid bacteria from the skin and ears is most commonly Staphylococcus pseudintermedius, which is DIFFERENT from the Staphylococcus aureus that humans have. These coccoid bacteria
can be seen alone, in pairs, or in quads or clusters. It's harder to assume what a rod shaped bacteria is based on cytology, as Proteus, Pseudomonas and Corynebacteria can all look similar and can all be involved in infections. It is important to evaluate for inflammatory cells, especially neutrophils, to help determine if the immune system is mounting a response-this helps differentiate between infection and bacterial overgrowth. Neutrophils with the presence of intracellular coccoid bacteria taken from the skin is almost 100% indicative of a Staphylococcal pyoderma. If no bacteria are seen a bacterial skin infection can't be ruled out, because most infections are actually folliculitis, meaning the majority of the bacteria may be within the skin rather than on the surface. This does not apply to ears.

There is a bacterium that is often seen that is not pathogenic that can be alarming if not familiar with it. It is called Simonsiella and is a gram negative saprophyte that inhabits the oral cavity of a large number of mammals. They can be found on areas around the oral cavity, or on other locations if the pet has been licking that area excessively. This bacteria doesn't cause disease and doesn't require treatment, but it is an example of importance of recognizing normal bacterial flora.

Malassezia pachydermatis is the most common yeast organism seen on the skin and ears, although there are many other Malassezia organisms that can be found, as well as rarely Candida. Candida is not as much of a concern in pets as it is in people, and when it is pathogenic pseudohyphae will be present. As previously mentioned, Malassezia is part of the normal flora and it is not necessary pathogenic to see the occasional yeast organism on cytology. One research study found that on skin showing lesions greater than 1 yeast per oil power field (opt) was associated with certain diseases. There is no hard and fast rule for when the yeast is causing clinical symptoms or not, I make medical decisions whether to treat with an anti fungal shampoo or oral anti fungal based on their clinical symptoms and itch level.

Dermatophyte spores and hyphae can be seen on exfoliative or aspirational cytology in many patients with ringworm, although more easily in cats than dogs. The dermatophyte spores will appear as round spheres, surrounded by a capsule that looks like a clear halo. They are usually about double the size of coccoid bacteria. The hyphae are filamentous and don't always stain well-so look for the outline rather than the stain.

Although not often diagnosed in routine clinical practice, there are many fungal and protozoal organisms that be identified on cytology including Coccidioides, Cryptococcus, Sporothrix, Blastomyces and Histoplasma.

Ectoparasites are not commonly seen on cytology, but demodex and sarcoptes mites can rarely be found on routine cytology in severely affected cases.

Clinical cases will be used to exemplify the points above.