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## MAGNIFYING THE SKIN – DOES IT JUST MAKE WHAT I ALREADY KNOW BIGGER?

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The skin is a wonderful organ because when things go wrong, we can actually see the pathological changes (lesions). The ability to see the skin allows clinicians to make and prioritise lists of differential diagnoses, and in some cases, make a specific diagnosis (see the earlier talk "Understanding the language of the skin"). However, a number of changes can occur in the skin that are not visible to the naked eye. In these cases, magnification of the skin can increase the specificity of the pathological changes. Magnification of gross skin lesions can be achieved using a magnifying glass or a digital camera. Magnification of microscopic skin lesions and parasites is obtained by collection of surface samples and examination under a microscope, or by biopsy and histopathology.

### USING A MAGNIFYING GLASS

Providing the clinician has reasonably good near vision, the use of a magnifying glass to examine skin lesions is rarely helpful. In most cases, it just makes what you already know bigger. However, a magnifying glass can be used to detect some ectoparasites that are difficult to see with the naked eye. These include lice and *Trombicula* larvae. A magnifying glass is also a component of some Woods lamps. However, positive fluorescence of hairs is easily visible to the naked eye so this is not essential. A magnifying glass can be useful in carefully examining areas of alopecia to determine if the hairs have been broken off close to the skin surface.

### USING DIGITAL IMAGES

Surprisingly, taking digital images of skin lesions and then enlarging them on the computer can be a very useful way of precisely characterising and detecting skin lesions. The still images can be scrutinised far more slowly, clearly and closely than is possible in the moving animal. This technique is particularly helpful for looking at subtle lesions such as focal areas of erosion or ulceration, vesicles, areas of hypopigmentation, and the precise configuration and depth of lesions. In some cases, lesions are noticed that were completely missed during the physical examination. Such careful analysis can actually help in decision making about further diagnostic tests or treatment regimes.

### USING A MICROSCOPE

The main way in which the skin, or its components, are magnified is with the use of a microscope. The microscope is the single most important piece of equipment in the practice laboratory. A binocular microscope is required with 4X, 10X, 40X and 100X lenses. With the 10X eyepieces, final magnifications of 40X, 100X, 400X and 1000X are obtained. Without a good quality microscope, accurate dermatological diagnosis is impossible. It is important that the various settings of the microscope (field diaphragm, condenser focus knob, condenser centering screws) have been set up correctly. If the microscope has been recently purchased, it should have been optimally configured by the manufacturer on delivery. If not, it is well worth having it serviced because, with time, the settings on a microscope tend to change

leading to sub-optimal performance. The microscope should be placed in a fixed location in the laboratory on a bench or table at a suitable height in front of a comfortable stool or seat. Crouching over the microscope in a cramped corner of a room does not lend itself to slide viewing and can lead to neck or back discomfort. There should also be space around the microscope to store slides and immersion oil.

The major uses of the microscope for dermatological diagnosis include examination of skin scrapings, tape strips, trichograms, cytology slides and histopathological analysis of skin biopsies. In all cases, the diagnostic value of the tests depends on the quality of the sample as much as the knowledge and interpretational skills of the clinician or pathologist. The correct sites must be chosen for sample collection and the correct amount of material collected. With any freshly acquired sample, (e.g. skin scraping, cytological specimen, trichogram), it is important to use a cover slip. This provides a flat optical surface and greatly enhances the clarity of the image. For skin scrapings and trichograms, the cover slip is suspended on the mineral oil within which the sample is contained. For cytological specimens, a drop of immersion oil should be placed on the slide so that it covers the sample. The cover slip can then be suspended on top. When viewing slides, it is important that the sample is neither too thick nor spread out too far over the slide. If too thick, the specimen is difficult to examine and diagnostic findings can be missed. If spread out too far, the slide takes longer to examine than it should, reducing working efficiency. With experience, it is possible to judge how much material should be put on a slide so that it can be properly examined under the area of a cover slip. Placing extra material outwith the area of a cover slip is non-productive because it can't be adequately examined.

When viewing skin scrapings and trichograms, it is useful to increase the contrast by turning down the condenser. This provides better definition of parasites and hairs against the pale background. When viewing cytological specimens (or histopathology slides) the condenser should be opened to allow as much light as possible to pass through the slide. This provides better clarity and detail of the stained cells. The light setting should be modified so that each individual slide is optimally illuminated.

Skin scrapings and/or unstained tape strips should be performed in any animal presenting with pruritus, alopecia, scaling, papulo-pustular eruptions, erosions, or draining tracts. Magnification at 40X should be used for examination of these samples as all common parasites are visible under this power including lice, *Sarcoptes*, *Cheyletiella*, *Demodex*, *Otodectes*, *Notoedres* and *Trombicula*. In suspected cases of demodicosis, magnification at 100X can also be helpful to scan for juvenile stages and eggs.

Trichograms should be performed in any animal presenting with alopecia, and may be helpful in animals presenting with pruritus or scaling. They may provide diagnostic information in cases of demodicosis, pediculosis, cheyletiellosis, dermatophytosis, feline symmetrical alopecia, endocrine alopecias, colour dilution alopecia and trichorrhexis nodosa. Slides should be initially scanned at 40X magnification and then scrutinised on 400X for hair shaft abnormalities and fungal spores.

Cytological specimens should be obtained in any animal presenting with pruritus, seborrhoea, pustules, ulcers, draining tracts, non-healing wounds, otitis or lumps/swellings. They may be diagnostic in cases of staphylococcal pyoderma, *Malassezia* dermatitis, otitis externa, eosinophilic

granuloma complex, other bacterial infections (rods, nocardiosis, actinomycosis, atypical mycobacterial infections), deep fungal infections (sporotrichosis, cryptococcosis, blastomycosis, histoplasmosis, coccidio-mycosis, mycetoma), pemphigus foliaceus, and cutaneous lumps/swellings (abscess, follicular cyst, lipoma, sebaceous adenoma, mast cell tumour, cutaneous lymphoma, round cell tumours, epithelial tumours, mesenchymal tumours). Cytology slides should be initially scanned on 40X to find an area of interest and then scrutinised on higher powers (X400 and X1000) for cellular details, microorganisms, hair shaft abnormalities and fungal spores.

Skin biopsy and histopathological examination is an invaluable diagnostic technique in veterinary dermatology. Many skin conditions can only be diagnosed by examination of biopsies. In other situations, biopsy is useful in ruling out more serious differential diagnoses or narrowing the list of potential causes. However, the selection of biopsy sites,

collection technique, tissue handling and orientation are all critical if good results are to be obtained. If poor specimens are submitted, the pathologist will only make what you already know bigger! Skin biopsies should be performed in any animal presenting with a skin condition that appears unusual, behaves in an unexpected way, appears serious, or is not responding to rational treatment; has alopecia or scaling that cannot be diagnosed by preliminary tests; has a macular, papular, or pustular eruption that is not caused by parasites or infections; has persistent erosions, ulcers or draining tracts; has depigmentation or unexplained hyperpigmentation; has persistent lumps, swellings, nodules or a suspected neoplastic lesion; has a suspected autoimmune disease; or has a suspected skin condition that can only be diagnosed on biopsy. However, note that biopsy and histopathology of dogs with allergies, superficial pyoderma, *Malassezia* dermatitis, and parasitic infestations is only likely to make what you already know bigger.