

TELECYTOLOGY – IMPROVING YOUR PRACTICE WITH “MICRO” MANAGEMENT

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A new client walks in the front door with “Angel” – a ten-year-old DSH with a small lump between the shoulder blades. Even before you take the history, alarms go off in your head. Following an otherwise unremarkable physical exam, you suggest that the best thing to do would be to aspirate the mass. You get a good sample and prepare the cytology. During your evaluation of the slide, you snap a few pictures and upload them to the Web. Shortly, the fax beeps and the answer comes back – pigmented basal cell tumor – and you breathe a sigh of relief. Total elapsed time – one hour. Before the owner even pulls into her driveway, you’ve left a message on the answering machine to call back in and schedule what is now a routine surgery.

Sound like the practice of the future? No, it’s actually the practice of today, and one that might be yours for considerably less than you would imagine.

Due to today’s increase in quality and availability of digital cameras, as well as their plummeting prices, veterinary medicine is poised on the brink of a telemedicine revolution. For as little as

\$1200, you can now purchase a microscope-ready camera system that will readily capture diagnostic images from your scope, as well as the exam room, surgical suite, even the hospital Christmas party.



“Micro”-management can be an effective new tool.

Digital cameras are more user-friendly than ever before, and even technophobic practitioners are flocking to add them to their diagnostic armamentarium. “The development of single-lens reflex digital cameras has revolutionized veterinary telecytology “ notes Bill Campbell, DVM, CEO and founder of RemoteVet, Inc. (Kennesaw GA, <http://www.remotevet.com>) “We are using technology everyone is already familiar with, and shooting the images directly through the eyepiece of your existing microscope.”

While some practitioners who wish to capture large numbers of images may look toward purchasing a high-end digital camera and permanent microscope mount, most practices are currently gravitating toward

multipurpose handheld cameras that can rapidly turn a clinic's microscope into a diagnostic telecytology system.

Reviewing the Basics

Telecytology systems are composed of four major components: a microscope, a digital camera, a coupling device (which attaches the camera to the microscope), and an Internet-ready computer. While most practices have a serviceable microscope, it is important to realize at the outset, that the quality of the microscope has the most profound impact of any component of your system. Even the most expensive camera on the market can only record the images presented to it, and that thirty-year-old scope you bought with the practice may quickly prove to be the weak link in your system.

Today's standard Pentium-based PC's or Macs, designed for photorealistic videogames and multimedia can easily handle the rigors of telecytology. Just to be on the safe side, make sure that you have a minimum of 256Mb RAM to assist in processing your imaging data. As image files can be relatively large – up to 5 megabytes before compression – make sure that your hard drive exceeds 20 gigabytes.

One of the most impressive aspects of telecytology – especially for your clients – is the speed with which you can get the diagnosis from a board-certified consultant. (Three to 24 hour turnaround is the rule at most commercial labs that provide this service in the U.S.; however, for a small fee, one-hour stat service is available.) However, you may

need to do away with that old dial-up modem to truly take advantage of the speed factor. With DSL, cable modems, and even satellite service now available in most areas, the delays in transmitting large image files over a slow dialup may quickly wear thin.

Of course, the key to telecytology is the purchase of a digital camera that will capture acceptable images through your scope. With the many brands and models available on the market today, it is helpful to know the features which will “make or break” your new telecytology system.

Choosing a Digital Camera

First, look for a camera with 2.1 megapixel resolution or higher. The number of pixels is a good representation of the image resolution achievable by the camera. These cameras will easily capture the 1024 x 768 resolution images that are recommended for telecytologic diagnosis. Second, make sure that your camera has screw threads on the inside of the lens. This will make mounting it to your scope (or other camera-enabled instruments) much easier and less expensive. (The Nikon CoolPix 950 and several Olympus models have standard thread configuration.) Third, a telephoto feature and manual focusing will greatly improve the quality of your microscopic images. Finally, make sure that your camera has sufficient memory to store a lot of images, so you don't have to continually shuffle memory cards or floppy disks, an annoying and time-consuming process.

Finally, a camera mount is required to connect your camera to the microscope eyepiece (or camera port.) Adapters utilize the existing threads on the camera lens to connect to one of the eyepieces. With the proper SLR-type camera, you can now view the image on the camera's screen and focus the image with the microscope. It's that easy!

If you want to ensure the highest quality images, you may want to add an image processing program such as Adobe Photoshop (or a host of less expensive, though slightly less powerful programs.) These programs will allow you to correct minor flaws, such as underexposure, poor contrast, and slight focus deficiencies, as well as to crop images, rotate images, and otherwise focus attention on salient points of interest.

Making Sense of Your Images

Once you have your images, then you need to find a consultant to read them. Unfortunately, few laboratories currently offer this service. However, companies that specialize in telemedicine services (including teleradiology and teleultrasonography) also offer telecytology services, including RemoteVet, Inc. and Veterinary Diagnostic Imaging and Cytopathology (Portland OR, <http://www.vdic.com>) Currently, telecytology accounts for 5-8% of their submissions. "Most practices first become involved with other forms of telemedicine such as radiology or ultrasound," acknowledges VDIC's Michele Menard DVM, a board-certified clinical pathologist and telecytology expert. "However, they markedly increase their diagnostic yield when they

realize that they can combine it with cytology via ultrasound-guided needle biopsies."

Today any practitioner who can surf the Web can submit telecytology cases for consultation. Electronic consultants provide easily navigable online portals for the transfer of your images and associated case data over the Internet. However, telecytology is far more than just good images. According to Dr. Frank Smith Jr. (in the online *Veterinary Telemedicine Journal*, <http://www.vetmedtelemedicine.com>), "While beautiful images of lesions are important, the significance of those lesions is often difficult to interpret without knowing the history, physical findings, and laboratory results." In other words, just as you wouldn't want to diagnose your patients without doing a physical exam or necessary bloodwork, a good pathologist would never wish to diagnose images in a vacuum. Too much additional data is far better than too little.

Yet for all of the technical advancement, the success of your telecytology consultation is still predicated largely on the human factor. "Good cytologic technique is still the key to a successful telecytology case," Says Dr. Menard. "A definitive diagnosis most often comes in cases where appropriate fields from a well-stained, cellular smear are photographed."

It is also important to select telecytology cases appropriately. Tissues or neoplasms that do not readily exfoliate, or excessively bloody aspirates prove even more difficult to diagnose via telecytology as by traditional glass slides. Dr. Menard suggests that lesions

that are best suited for telecytologic diagnosis include cutaneous and subcutaneous lesions, solid organs such as liver, lymph node, and prostate, solid tissue lesions of the chest and abdomen (including the lung and kidney), and a wide variety of sediments smears.

Teleconsultants also provide a wide range of information on telecytology and other teledisciplines on their web sites. An excellent treatise on telecytology can be found at the VDIC web site (<http://www.vdic.com/telemedicine/telecytology.html>), and a more multidisciplinary approach can be viewed at the Veterinary Telemedicine Journal (<http://www.vetmedtelemedicine.com>)

While telecytology isn't for every practice, or for every case, it can be a wonderful diagnostic tool for your practice, allowing you to expedite definitive treatment on your most difficult cases. If you have the right equipment, as well as good cytologic technique, telecytology isn't just easy – it's a snap!