

Digital still photography can be useful office tool

New technology is cost effective and can greatly boost practice efficiency



**Tech
Talk**

By Sandra M.
Brown, MD

Digital still cameras, which store an optically captured image on a digital memory medium, are rapidly increasing in resolution and image quality and declining in cost. A digital still camera can quickly become an indispensable tool in your practice.

How DSP works

Most cameras for digital still photography (DSP) are equipped with features familiar to users of point-and-shoot or semi-automatic single lens reflex (SLR) cameras: a flash, a shutter button, a delay timer, a zoom lens, and a variety of focus options (automatic, shutter priority, aperture priority, or manual).

Instead of capturing the optical information in silver granules on film, digital cameras contain a special photo-sensitive chip that transforms the image into a digital file stored on the camera's memory medium. This memory may be an ordinary diskette or a special type of storage such as SmartMedia, Memory Stick or CompactFlash.

Digital cameras have built-in liquid crystal displays (LCDs) that allow the photographs to be reviewed immediately and discarded if they are poor. Saved image files can be retrieved, modified, renamed, and stored in alternate locations. They can be printed on photographic paper on any color inkjet printer.

Advantages of DSP

The principal advantage of DSP is cost. Once the initial investment is made in the camera and peripherals, there is zero marginal cost. Poor-quality or redundant pictures can be deleted. Because images can be reviewed immediately, you can continue taking photographs until you are sure you have a satisfactory picture of the lesion, or the rapidly moving child.

Savings also accrue from decreased staff time spent sorting, mounting, labeling, and filing 35-mm slides. Storage costs are decreased to the cost of memory used for image storage, and for offices with electronic medical records (EMR), retrieval costs are zero.

You can use the camera to take pictures of neuroimaging studies, or any other document (such as a perimetry printout) you wish to convert to electronic picture-file storage.

For those who lecture using PowerPoint or similar software, and for authors, digital photographs are enormously more efficient than 35-mm

slides. Digital photographs are also ideal for Internet collaborations.

Disadvantages of DSP

There are several disadvantages to consider as well.

■ **Disadvantage #1:** If you do not have computer access from all your exam rooms, you will have to "go elsewhere" to review digital images that have not been printed. Depending on your office layout and volume, this may present a serious disincentive.

One way to deal with this is to print photographs that are needed for insurance purposes or longitudinal follow-up: this is easy and cheap using an inkjet color printer and any of the numerous "glossy photo quality" papers designed for inkjet printers.

■ **Disadvantage #2:** If you buy a camera that does not use a diskette as the storage medium, you or a staff mem-

ber will have to retrieve each numbered image from the memory card manually, review it, rename it so the patient can be identified, and store it on your computer's hard drive or another location. Higher-memory flashcards are still sufficiently expensive that it would be inefficient to use them as permanent storage. If you buy the Sony Mavica, which saves directly to an ordinary diskette, the diskette can be easily labeled and stored in the paper medical record.

Decision points

Here are several points to consider when buying a digital camera.

■ **Resolution:** The number of pixels captured for each image defines resolution. More pixels equals higher resolution. The higher the resolution, the larger the printed photograph can become before it begins to look "pixellated"—having the appearance of numerous color tiles or squares with jagged edges. Should you buy the highest-pixel camera available? Not necessarily.

Digital cameras generally fall into the 1, 2, or 3 megapixel range. One-megapixel cameras make good 4×6 prints and produce smaller image files that import easily into other programs. Two-megapixel cameras can take photographs that print very well up to 8×10; 3-megapixel cameras can print even larger photographs, and provide "same as film" quality for smaller prints.

In my experience, the 1-megapixel Sony Mavica takes both external and slit lamp photographs with sufficient clarity that pictures can be used for longitudinal follow-up. A 2-megapixel camera takes external, macro (close-up),

and slit lamp photographs that are suitable for all clinical and publishing purposes. Moving up to 3 megapixels probably does not add much to the clinical utility of the camera and will significantly increase the amount of memory needed to store each image.

■ **Other features:** Macro capability is critical. Lid, conjunctival, and some corneal lesions can be photographed more easily using the camera in macro mode than using the slit lamp. The true macro ability of digital cameras varies widely, and this may be one feature to check out personally.

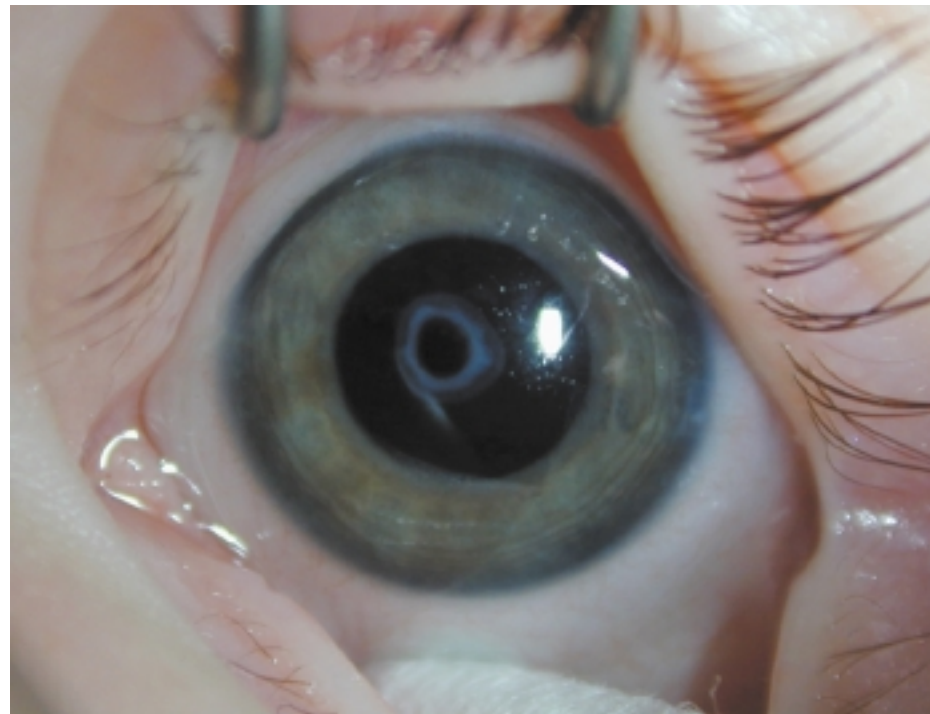
A digital still camera can quickly become an indispensable tool in your practice.

Figure 1



This close-up of a cutaneous horn is an example of the kind of images digital photography can provide in an office setting.

Figure 2



Sommering's ring, photographed with a digital camera.

Optical zoom is critical. Almost all digital cameras come equipped with "digital zoom." This is simple electronic manipulation of the image to enlarge it, and causes pixellation. A 2× or 3× optical zoom is typical on better 2-megapixel cameras, and some cameras have 10× optical zoom.

Flash location is less critical. Many digital cameras have a side-mounted flash. In my experience, a camera with a side-mounted flash will show a flash reflex centered in the pupil as long as you are 3 feet or more away from the subject; optical zoom can be used from this distance to capture the eyes only.

■ **How to shop:** Start online. I have found the reader reviews at www.Amazon.com to be more helpful than reviews at photography Web sites.

Then, check out select models in stores. Look for the location and arrangement of control buttons and the shutter, clarity and brightness of the LCD, and smoothness of the optical zoom element. Most cameras use buttons as toggles or arrow-keys to move between menu items displayed on the LCD. Are the menus and sub-menus confusing? Try changing a few settings without resorting to the instructions.

■ **Peripherals and other items:** After you have purchased your digital camera, you will probably find you need some or all of the following items:

Figure 3

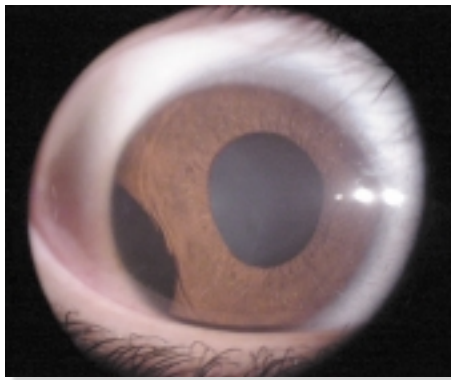
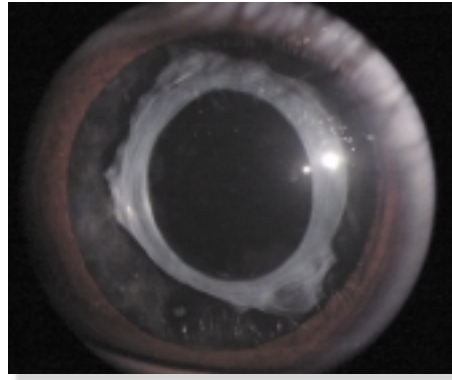


Figure 4



Digital images of iridodialysis (left) and a child with IOL and capsular fibrosis (right).

Figure 5



Digital external photograph of child with esotropia and left inferior oblique overaction. (Photographs courtesy of Sandra M. Brown, MD)

- *A larger memory card than the one supplied with the camera.* This is particularly true if you photograph numerous patients before sitting down to “clean off” your memory card.

- *Rechargeable batteries and charger.* A digital camera will consume ordinary alkaline batteries at a great rate, espe-

memory card is removed from the camera, inserted into the reader, and the files are accessed and manipulated exactly as though they were on a separate drive. A reader with a USB connection is extremely fast and does not require a separate power source. A nice feature on some newer cameras is a direct computer connection that uses a USB port.

- *AC adapter for the camera.* This is probably necessary only if you plan to import pictures from the camera rather than using a memory card reader. Surprisingly, the AC adapter is not always included with the camera.

- *Software.* You'll want digital image manipulation software such as Adobe PhotoShop and printing software such as HP PhotoPrinting.

Digital cameras should be thought of as “slow” cameras. Even in fully automatic mode with excellent illumination, there is some “hang time” between the time you press the shutter and the time the camera takes the picture.

Here are some tips I have learned with the Nikon CoolPix 950, which I ordinarily use in auto-focus mode:

- Watch for low batteries, marked by a noticeable slow-down in focusing speed, before the camera alerts you.

- When using macro mode, turn off the flash and use another light source to illuminate the lesion or eye directly. More light equals faster focusing. If you are very close, a side-mounted flash will give oblique or scattered illumination

to the lesion. Also, if you are bracing your arms against your chest for a very tight macro, hold your breath.

- Turn off the red-eye reduction. You may need to turn it off every time you use the camera. Red-eye reduction also increases hang time.

- Don't discard photographs that look bad on the LCD screen unless they are obviously out of focus or off target. They often look better and are more useful when seen on the monitor.

- Take pictures looking at the LCD rather than through the view finder.

- Take many photographs.

Shooting through optics

It is possible to hold the camera up to a slit lamp or microscope ocular “free hand” and get an excellent photograph. For slit lamp photographs, you need a cooperative patient who can maintain a precise position.

There is a learning curve to aligning the camera's optical axis with that of the ocular. Microscope photos are easier to take due to the coaxial illumination and patient stability. Other tips:

- Use the regular focusing mode.

- Hold the camera as close as possible to the rim of the ocular of your dominant eye.

- Use the slit lamp or microscope to establish focus, not the camera.

- Turn off the flash.

Slit lamp adapters exist for the Nikon CoolPix cameras (from Haag-Streit) and for the Sony Mavica (from IntraOptics, ttevis@intraoptics.com).

Naming imported files

Whether or not you are using individual diskettes to store images on patients, you may wish to keep a collection of digital images on your hard drive.

Some Windows operating systems support file names with multiple elements separated by periods or dashes. An example might be `sandra brown.5692519.corneal opacity os.jpg`. Using a consistent file naming structure allows you to search for images by patient name, medical record number, or pathology (e.g., all slides showing corneal opacities).

PowerPoint presentations

A picture taken at the normal or “full” resolution setting on a 2-megapixel camera will generally be 1.6×1.2 megapixels. If it is imported directly into a PowerPoint slide, the image will be much larger than the slide and only a portion will show. Presentations with lots of full-size photographs are very large files that load slowly.

There are three general approaches to the presentation problem:

- Take 1-megapixel photographs. These import into PowerPoint and can be resized to fit the slide, if needed, by grabbing the corner resize box.

- Resize your photographs using your photo manipulation software. The standard size 640×480 is ideal for Pow-

erPoint. This will actually decrease the amount of information stored for that image. If you wish to keep the full-resolution photograph, you will end up with a “large” and a “small” version of each photograph.

- Resize the photograph after it is imported into the PowerPoint presentation. Click on the enormous photograph, then go to Format-Picture-Size. There are a variety of routes to downsize the photograph. This allows you to keep one large copy of a photograph as the permanent copy, but you must then repeat the process if you use the same photograph in multiple presentations.

Cropping images

Cropping and rotating are very easy with photo manipulation software. The one caveat is that cropping decreases the file size.

If you severely crop an image taken with a 2-megapixel camera and print it out at a larger size, it will look pixellated.

If you are taking a photograph intended to demonstrate a lesion of one eye, don't take a mid-face picture then crop to one eye; use the macro mode.

A note on video

Many digital still cameras now have video capability. Depending on the resolution and memory card size, they can take 45-second or longer video clips. The cost of this feature is declining rapidly. ♠

author info

Sandra M. Brown, MD, is an associate professor in the Department of Ophthalmology and Visual Sciences at Texas Tech University Health Sciences Center in Lubbock. She practices pediatric ophthalmology and adult strabismus ophthalmology and serves on the AAPOS Public Education Committee.



H. Jay Wisnicki, MD, editor of Tech Talk, is the head of the ophthalmology department at Beth Israel

Medical Center in New York. He has a background in computers and electrical engineering. He serves on the AAO New Education Technology Committee and advises in other areas in health-care information technology. Send comments and suggestions about Tech Talk to Dr. Wisnicki at OT@en.com.

Saved image files can be retrieved, modified, renamed, and stored in alternate locations.

cially if you use the camera with the LCD on. Some cameras come with rechargeable batteries and a charger.

- *Memory card reader.* Although digital cameras can import images to your computer directly, if the connection is through a serial or parallel port, the process is often slow and extremely battery-intensive. A very helpful peripheral is a memory card reader. The