

Dental Digital Photography

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Digital photography is becoming very popular and its application to dentistry offers many advantages.

Digital photography allows for photographic freedom and immediate review of pictures. Pictures are easily distributed and this saves money. Most cameras have a small LCD screen so that the pictures can be reviewed and poor pictures can be deleted. The digital photographs can be directly placed in continuing education presentations without having to wait for them to be processed by a photolab. Inserting pictures can be accomplished even on the day of the lectures. Another advantage is that the pictures can be easily distributed. In the near future, dentists will likely be doing more teleconsulting and teleconferencing. These consultants could be e-mailed pictures and/or radiographs for review, without the referring dentist having to travel to the consultant's office.

The most common questions I receive about digital cameras and photographs include: 1) are the pictures photo-quality, 2) what is a good resolution, 3) what format are images stored in, 4) how large a storage card do I need, and 5) do these cameras have macro focus? Let's deal with each of these questions.

Are the pictures photo-quality?

Digital cameras capture images using a solid-state device called an image sensor. The most common sensors are based on CCD (charge-coupled device) technology. These sensors are about the size of a 5-cent piece. On the surface of the sensor are thousands or millions of photosensitive diodes. Each diode captures a single pixel of information; the more diodes, the higher the resolution. Each diode (pixel) uses different filters (red, green and blue) to create color by using the Additive Colour System. Newer sensors are generally larger; some cameras have CMOS (complementary metal oxide semiconductor) sensors.

Digital camera sensors are typically described in two ways: by their cross-sectional number of pixels or by the total number of pixels. Cameras can be described as having 1600 x 1200 pixels of resolution or as being a 2.1 megapixel camera. The greater the number of pixels, the higher the resolution, and the better the quality of the image. Also, the higher the resolution, the larger the resultant photo-quality prints.

What is a good resolution to use?

This depends on the parameters of the project. Cameras with a resolution of 2.1 megapixels will produce an 8" x 10.5" photo-quality print, assuming you are using a photo-quality printer. This level of resolution is also acceptable for PowerPoint presentation using a digital projector with the resolution of 1024 x 768 pixels. For images to be sent on the Internet, a lower resolution makes the file size smaller and makes the transmission of the image faster. Large images can also be compressed to make digital presentation sizes smaller (i.e., fewer megabytes) and decrease the amount of time you have to wait for the images to appear. Most digital cameras have different resolution settings ranging from low quality to high quality. In addition, they have multiple compression settings, typically described as basic, normal, and fine quality. Finally, when deciding what resolution to use, consider the resolution of your output device. If you take a high-quality picture and print it with a low-quality printer, the result will be a low-quality print.

What format should I store my images in?

The answer depends on the intended use. Images can be stored as uncompressed or compressed files. Uncompressed files, called TIFF (Tag Image File Format), are also known as "lossless" files. These can be manipulated without significant degradation. TIFF files are also very large, with file sizes as large as 10 megabytes or greater. These large files can quickly fill up even the largest hard drive. The most commonly used format for compressing files is called JPEG (pronounced "jay' peg," Joint Photographic Experts Group) compression. These files are known as "lossy" files. In many situations it may be more practical to use JPEG because it will save hard drive space. Many JPEG files are 500 kilobytes or less. When the JPEG files are uncompressed to show the picture, the human eye usually cannot distinguish the modifications. However, when the images are manipulated, they may result in some loss in quality. The higher the quality, the lower the compression. Conversely, the higher the compression the lower the quality. For situations requiring the best possible result (i.e., large pictures), the TIFF format is preferred. For PowerPoint digital presentation, or family pictures, a high quality JPEG is adequate.



How large a storage card do I need?

Many of the newer digital cameras have increased resolution capabilities. This equates to an increase in the size of each picture file. Most digital cameras come with an inadequately sized storage card. Therefore, if you plan to take high-quality, low-compression, high-resolution pictures, you will need to purchase a new removable storage card. There are a variety of storage media available. Most common are Type I and Type II cards, known as Compact Flash cards, Smart Media cards, or Memory Sticks. Newer cameras offer optical disks and micro-drives that have storage capacity of up to 1 gigabyte. Using 1600 x1200 resolution and then compressing the file with a high-quality, fine setting (e.g. JPEG), will result in a file size of about 400 kilobytes. If your camera has a 16-megabyte card, then you can fit approximately 40 pictures on each card. Simply asking the sales person how many pictures you can store on the disc if the camera is set to the highest setting will give you a reasonable indication of the value of the storage disk that comes with the camera.

Do these cameras have macro focus?

Dentists must have macro. Beware: what camera shops call "macro" is not what we call "macro." Many digital cameras have the ability to get the camera close to an object and still stay in focus. This is not what we want! We want to be able to zoom in closely to an object, what is termed by some camera companies as "micro" zoom. Many of the digital cameras have the capacity to perform micro zoom, but this usually requires the camera to be set on a close-up mode and focused, so that the lens is in macro position. Each camera is a little different; so make sure you check them out fully before purchasing. Also be aware of the difference between optical zoom and digital zoom. Optical zoom results in a real-time photo. Digital zoom uses interpolation of pixels to produce an enlarged picture.

One last word about digital cameras and pictures: watch out for interpolation. This is because as files are altered or enlarged, the computer has to interpolate pixels to fill-in areas not defined by the original picture. This may result in image degradation and/or pixelation. To prevent this from happening, take photos that result in an image equal to or larger than its intended use. This means that if you are planning to make 8" x 10" prints, don't take a 5" x 7" picture and expand it using your computer. This will result in a poor quality picture.

Below are the recommended features for a digital camera:

- User friendly
- Macro zoom capability (0.8")
- Flash capability with macro (micro) zoom
- Focus Lock
- Auto and Manual focus options
- Adjustable F-stop capability
- Multiple resolution settings
- Minimum working resolution=1024x786 (approximately 1 megapixel)
- Multiple compression settings
- Adequate image storage (64mb or higher)
- Easy to download images
- Rapid download capability
- LCD screen and viewfinder
- Screen or lens rotates
- Good rechargeable batteries (NiMH or Lithium)
- AC adapter

One final tip: Don't forget to back up your saved images!

Thanks to Alan J. Sutton for his permission to quote technical research in this article.

Simon heads up the photographic team at The Photo Shop and has helped many dental practices with professional shots of their practices, doctors and staff for use on their website, brochures and to create unique marketing images. If you would like to know more about how The Photo Shop can improve your image call Simon on (02) 9211 1477.

