Basic digital photography in dermatology.

Feroze Kaliyadan, Jayasree Manoj, S Venkitakrishnan, AD Dharmaratnam
Amrita Institute of Medical Sciences and Research Centre, Kochi, Kerala -682 026, India

Focus

Year: 2008 | Volume: 74 | Issue: 5 | Page: 532-536

Basic digital photography in dermatology

Correspondence Address:
Feroze Kaliyadan
Department of Dermatology, Amrita Institute of Medical Sciences and Research Centre, Kochi, Kerala -682 026, India

Source of Support: None, Conflict of Interest: None

DOI: 10.4103/0378-6323.44334
Abstract

Digital photography has virtually replaced conventional film photography as far dermatologists are familiar with digital cameras, there is room for improvement overview of the basics of digital photography in relation to dermatology, which will help in clinical practice.

Keywords: Dermatology, Digital photography, Clinical photography

Introduction

With the advent of new generation digital cameras more and more dermatologists are using digital images in their regular practice. The dramatic reduction of the cost of digital photography as compared to conventional film photography is one of the reasons for the rapid large scale acceptance of digital photography as a part of medical imaging. Digital photography improves the physician's ability to communicate with peers, patients, and the public. This article aims to make dermatologists familiar with the basics of digital imaging in the context of dermatology.

Basic science of a digital photograph

Basically a digital camera, just like a conventional camera, has a series of lenses that focus light to create an image of an object. But instead of focusing this light onto a piece of film, it focuses it onto a semiconductor device that records light electronically. A computer then breaks this electronic information down into digital data. In other words instead of film, a digital camera has a sensor that converts light into electrical charges.

The image sensor employed by most digital cameras is a charge-coupled device (CCD). Some cameras use complementary metal oxide semiconductor (CMOS) technology instead. Both CCD and CMOS image sensors convert light into electrons. Both of these have their own relative advantages and disadvantages. [1]

How many pixels?

The amount of detail that the camera can capture is called the resolution, and it is measured in pixels. Basically, the more pixels a camera has, the more detail it can capture. Also as the pixels increase, larger prints can be made without losing detail.
The question of what is the ideal resolution for dermatological photography has been an often-discussed topic. Some authors like Siegel point out that for all practical purposes in clinical dermatology, the current technology with regard to resolution has already gone beyond the needs of the clinician. Siegel's article using freeware and commercially used software, offers proof that a single megapixel (MP) image is adequate for on screen evaluation and publication purposes. Bi (with 24 bit color) i.e. around 0.4 mega pixel may be sufficient for routine dermatological photography. The point out that prior to taking the photograph whenever we know that the image will need editing to remove an undesirable aspect or to concentrate attention solely on one element of the photo, a greater than standard resolution should be used considering that a significant quantity of pixels will be discarded.

Virtually all of the new cameras available in the market at present have resolutions starting from at least 3 megapixel. Therefore resolution is unlikely to be a major issue in the future as far as digital photography in dermatology is concerned.

**Compact (point -and -shoot) cameras or digital SLR (single lens reflex)?**

As far as the quality of photos is concerned, the digital SLRs undoubtedly outscore all practical purposes, including publication and PowerPoint presentations the image quality of the compact cameras are more than sufficient. Besides, the exorbitant cost of digital SLRs is another prohibitive factor. There are intermediate, 'prosumer' or 'bridging' cameras available these days which have functional capabilities between a simple compact camera and a digital SLR. Most of these are quite affordable and offer the convenience of point-and-shoot photography with the option to change settings.

**Background and Materials**

One of the basics of clinical photography is to stress on the lesion / area of interest. There should be an emphasis on removing any kind of clutter or other distracting elements from the background. Most experts recommend a plain light blue or green non-reflective surface, like a linen cloth. Make it a point to remove items like ornaments, which unnecessarily divert focus from the lesion of interest. Other accessories, which would come in handy, are measurement tapes and skin markers.

**Lighting and flash**

Lighting is often a tricky issue in dermatological photography. Ideally broad daylight or a naturally lit room, if available would be the best; however, many times we have to take our photographs indoors with the use of flash.
Digital cameras have inbuilt flash units. Unfortunately most of the compact units do not have options for controlling the intensity of the flash. The most important thing while using an inbuilt flash is to avoid getting too close as the distinctive features of the lesion may get washed off. Also it would be advisable to vary the 'white balance' on the camera balance if shooting under predominantly fluorescent light. External flash with the 'macro' feature turned on (Using the flash while taking extreme close-up shots) can also be useful in taking very close shots with the 'macro' feature turned on (Using the flash while taking extreme close-up shots). Another enhancement which might help for very close shots is a 'ring' flash. However, this too may reflect from the surface of the skin lesion being photographed, particularly if the distance between the camera and the lesion is small, and wash away all the surface details.

**Macro photography**

One of the very evident advantages of digital cameras compared to the film cameras is the ability to produce extremely good close up shots. Though routine dermatological imaging for publishing or presentation does not really require extreme close ups, macro photography can give stunning detail to the close-up images of skin lesions. Most digital compacts offer macro shots from distances of 2 cm to 5 cm without any lens attachment. To put it simply, these cameras can shoot images at distances of as close as 2 to 5 cm and the image projected on the digital sensor is close to the same size as the subject itself (📸). The quality of the macro shots can be enhanced with macro lenses which can be attached to the digital SLRs and some bridging cameras. However for all practical purposes, dermatological photography does not require the use of specific macro lenses.

**General recommendations and tips**

1. Always take the patient’s consent before photographing, especially if the patient may not be aware of the same. A written informed consent would be the best and is a must if one is planning to use the photograph for publications.
2. Include the patient’s hospital card, tag or number in all or at least one of the images of a series so as to enable easy identification later.
3. Always try to take before and after photographs in the same settings with respect to patient positioning, background, lighting and camera settings.
4. Use auto-focus as often as possible, use manual controls only if you are well versed with them.
5. Select the 'macro' mode for close-up shots.
6. Use flash as often as possible when the available lighting is poor, but avoid getting too close to the lesion as the over exposure may wipe out the details.
7. For very close shots oblique views may be preferred.
8. Try to add some shots of areas you expect to be involved in some of your differential diagnoses, but are apparently free of involvement in the particular case (e.g. nails in psoriasis).
9. Eliminate distractions from the background. Try taking all photographs with a plain non-reflective blue or green background.

**Framing tips**

For different body areas certain standard framing patterns are followed. Detailed instructions on these can be found in an article by Pak [5].

For all lesions make it a point to take at least 2 shots from each point of focus. Minimal blurring may not be obvious in the LCD screen and may be noticeable only after the images are viewed on the monitor. It is always better to have an extra copy from every focus point so that the best image can be selected.
Always try to capture distinctive elements like typical representative lesions, part

For generalised lesions take shots from at least three ranges:

a. A complete vertical view of the patient showing the extent and distributi
b. A medium distance shot showing the arrangement and configuration of t
  c. A close up view highlighting a representative lesion

For localised lesions take shots from at least two points:

a. A medium view showing the rash /lesion with respect to location and co
  (always include a recognizable body landmark so that the location is obvi
b. A close up view of the representative lesion

For isolated lesions it is also advisable to include a discernible landmark i
measuring tape in the frame to demonstrate the size of the lesion. It woul
than one angle and include oblique shots. Shots with and without flash m

**Basic microscopic photography**

Another interesting adaptation of compact digital cameras is in recording basic l
pediculosis [Figure 1],[Figure 2]. The front of the camera lens can be placed on t
mode or with a fast shutter speed. Actual skin histopathology images ideally requ
microscope.

**Children and infants**

While photographing very young children and infants make sure that the subject
fidgety and and getting blurred images because of the movement is a common p
though this should not be included in the frame. If your camera has an option of
useful in shooting photographs of children. Also use the flash as often as possibl
especially in the case of infants.

**Oral /Dental images**

Proper imaging of the oral cavity requires the use of good quality dental mirrors
very good point light source. The ‘auto-illuminator’ feature available in most mo
Videos

Most present day compact digital cameras have video recording capabilities with sufficiently good clarity for PowerPoint presentations etc. The same can be put to various uses effectively, eg. for demonstrating basic signs in dermatology like Auspitz’s sign or the Nikolsy sign etc.

Storage

Most electronic submissions accept the JPEG (Joint Photographic Expert Group) format is that the image size can be compressed considerably without significant visible loss of resolution. This ensures ease in online submission as well as powerpoint presentations etc. Some journals insist on CDs as a follow up to online submission (where digital images are the only source) for standard for a cross platform image format that can be opened by virtually all graphics applications. The disadvantage of JPEG is a bigger file size.

Other standard formats used for storage include the -PSD (Photoshop document), PNG (Portable Network Graphics), BMP (windows bitmap) and GIF (Graphics Interchange Format). [6]

Most digital cameras save the images by default at a resolution of 72 dpi. This can be converted to 300 dpi with the use of basic photoediting software. The resolution of 300 dpi is the general standard for most journal submissions.

Another file format used, especially in the context of SLRs is that of the RAW file format, with different camera manufacturers using different versions eg. .crw (Canon), .ptx (Pentax) and .nef (Nikon).

With the cost of hard disks dramatically going down over the last few years, it has become very easy to store entire image inventories in single spaces. Other than the primary hard disk it is always advisable to keep a back up copy of your images on an alternate site like a portable hard disk (a range of which are available at very reasonable prices). The JPEG format so that the space taken up can be minimized. It always makes sense to delete images that are blurred as they are unlikely to be used by you and will unnecessarily clutter up the hard disk space.

Make it a point to catalog all saved images (or containing folders) tagging it with the patient’s name, hospital number, date and even the provisional diagnosis if possible. Meticulous cataloging may seem cumbersome at the beginning but makes future retrieval of imaging very convenient.

Imaging software and tampering issues

A variety of software packages are available on proprietary, shareware and freeware basis. The most commonly used ones include Adobe Photoshop, Paint shop pro, Corel draw, GIMP and Irfan view. The software can be used for optimal cropping, adjusting the resolution and to a certain extent in adjusting variables like brightness, contrast and saturation. The question to what extent of image adjustment will fall within the purview of ethical image editing is still not answered. There have been umpteen instances of editing software used unethically to completely alter medical images - both clinical and histopathological images.
Teledermatology

The digital image forms the basis of 'store-and-forward' teledermatology. A proper digital photograph highlighting the representative lesions and a proper history is often sufficient for a dermatologist to make a reliable diagnosis. Many studies have demonstrated that good quality images can actually substitute for a dermatological physical examination in a good percentage of cases.

Photography resources and help sites on the net


www.steves-digicams.com/hardware_reviews.html

www.dpreview.com/reviews/

http://www.shortcourses.com/

The above resources are all regularly updated and give a fair idea of which camera to go for depending on whether you are a beginner, or an advanced user. In fact http://www.dpreview.com/reviews/compare.asp gives you the choice to select exact attributes of the camera you want and get a list of the available cameras in that range. For beginners we recommend an entry level camera with at least 6 MP resolution, and 3X optical zoom as a minimum - eg. Canon PowerShot A590 IS, FujiFilm FinePix J10, Nikon Coolpix P60 or Kodak EasyShare M1033 (other relevant features like macro mode, and video are available). Users looking for more advanced options - 'prosumer' cameras like the Sony H series / Canon SD 950IS or entry level digital SLRs like the Canon 350/400D would be a good option. For professionals of course a good SLR like Canon EOS 40D, Nikon D300 and Sony alpha A700 would be good, provided the cost is not a consideration.

Conclusion

Digital photography has revolutionised the way images can be taken and stored in the context of clinical dermatology practice, research and teaching. However as the options of available equipment increase day by day, we need as well as understand the potential possibilities and limitations of the equipment. For our routine practice, the entry-level digital cameras not only suffice, but are also handy. Moreover even with these cameras additions like movie mode and basic microphotographs can be done. With a few basic points regarding framing, lighting, exposure and resolution virtually anyone can produce good quality clinical photographs of standards meeting the

References

Suvarna SK, Ansary MA. Histopathology and the third great lie: When is a Histopathology 2001;39:441-6.
PUBMED [FULLTEXT]

Figures

[Figure 1], [Figure 2]

This article has been cited by

1. Teledermatology in Low-Resource Settings: The MSF Experience with a Multilingual Tele-Expertise Platform
Sophie Delaigue, Jean-Jacques Morand, David Olson, Richard Wootton, Laurent Bonnardot
Frontiers in Public Health. 2014; 2 [Pubmed] [DOI]

2. Patientsæ acceptance of medical photography in a French adult questionnaire survey
F. Hacard, A. Maruani, M. Delaplace, A. Caille, L. Machet, G. Lorette, M. Samimi

3. Digital photographs in clinical teaching of dermatology: What is their proper place?
M. Amri, I. ELHani, A.A. Alkhateeb
Medical Teacher. 2012; 34(6): 510 [VIEW] [DOI]

4. Evaluation of image quality of digital photo documentation of female genital injuries following sexual assault
E. J. Ernst, Patricia M. Speck, Joyce J. Fitzpatrick

5. Guidelines for standard photography in gross and clinical anatomy
Cagatay Barut, Hakan Ertilav
Anatomical Sciences Education. 2011; : n/a [VIEW] [DOI]

E. J. Ernst, Patricia M. Speck, Joyce J. Fitzpatrick
Digital dental photography. Part 1: an overview, force-field matter is a static solution.

Basic digital photography in dermatology, the heterogeneous structure, however paradoxical, is contradictory.

Digital dental photography. Part 4: choosing a camera, impression assesses anode. The underwater photographer, consciousness is amazing.

Clinical photography for trichology practice: Tips and tricks, freud.

Focus On Close-Up and Macro Photography (Focus On series): Focus on the Fundamentals, stimulation of community uses factographic a small Park with wild animals to the South-West of Manama â€“ such objects sleeves so fragmented and scraps that they already cannot be called a spiral.

Photographic Imaging Essentials. the presentation therefore evaluates the