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Better clinical and post mortem photography: A crash course in ten technical tips

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Abstract

For forensic clinicians and pathologists, photography of bodily regions, injuries and skin lesions present a number of technical challenges including proper framing, avoidance of distortion, choice of background and inclusion of a properly orientated scale. Photography of internal organs at autopsy presents further difficulties with regard to correct exposure, light reflections and limited depth of field. Situations commonly arise in clinical forensic and autopsy practice which require photographic documentation but which may not warrant calling upon the clinical photographer or police Scenes of Crime Officer. This article provides a brief explanation of various technical considerations which will allow forensic practitioners and technicians to take their own high quality external and internal photographs. Technical aspects discussed include aperture, shutter speed, ISO, depth of field, camera shake, and use of flash, scales, focal planes and backgrounds. The possible pitfalls encountered in several common photographic situations are illustrated and discussed, together with suggested workarounds and camera settings. Whilst the photographic examples presented here mostly relate to autopsy practice, the general principles and technical discussion also apply to wider clinical forensic photography practice.

Keywords: Photography; Post mortem; Techniques; Autopsy; Forensic; Pathology

1 Introduction

Forensic Medical Examiners and professionals working in Sexual Assault Referral Centres (SARC) were issued with useful and detailed working practical photographic guidelines by the Photography in Custody (PICS) Working Group in 2017.[1] These guidelines provide clear and logical consideration of the issues involved in the entire process of evidential photography. ‘Before Photography’ considerations include facilities, equipment, lighting and consent. Issues discussed in the ‘During Photography’ phase included composition, backgrounds, use of linear scales and the “three photo principle” for close-ups of injuries and specific lesions. ‘After Photography’ issues include enhancement, storage and submission of images.

The practical aspects specific to evidential photography in relation to Non Accidental Injuries in children were detailed by the Institute of Medical Illustrators in 2018 together with a suggested practical approach.[2]

Evans et al. gave a detailed practical explanation of the photographic documentation of patterned cutaneous injuries which included technical details of the equipment used and preparation required.[3] They emphasised the importance of correctly positioning the camera sensor in relation to both the injury itself and the linear scale in order to avoid the various types of photographic distortion. Angular (Type 1) Distortion occurs when the sensor and camera back are not exactly parallel to the plane of the injury or skin surface. Magnification (Type 2) Distortion will result if the linear scale and injury/surface are not in the same plane, i.e. not equidistant from the sensor. Tilting of the plane of the scale from that of the injury/surface will result in Type 3 distortion. Finally, a flexible scale may wrap or warp around a curved skin surface to cause Type 4 Distortion.

Payne-James further stresses the importance of photographs being appropriately labelled, sharply focused, depicting an identifiable anatomical location, and taken alongside appropriate scales and colour charts so that subsequent expect review can be conducted for medico-legal purposes.[4] Many of these considerations apply equally to other forms of clinical, forensic and autopsy photography and will not be repeated in this more technical article. The focus here will be on some of the camera-related technical difficulties which are commonly encountered in clinical and autopsy practice and how they may be overcome.

2 Ten technical tips:

2.1 Consider using a digital SLR camera

A Digital Single Lens Reflex (DSLR) camera (see Fig. 1) is more versatile for clinical use than a compact or bridge camera since it allows for full control over exposure. Exposure is in turn dependent on Aperture (the size of the opening in the lens), Shutter Speed (the length of time the shutter remains open) and the Sensitivity of the sensor (expressed as ISO - International Organisation for Standardisation).

Fig. 1 Equipment used. (A) Canon EOS 5D mark III camera body with Canon EF 50mm f/2.5 Compact Macro Lens. (B) Canon Speedlite 600EX-RT Flash Gun. (C) Sigma EM-140DG Ring Flash (with 52mm adapter ring on lens).

alt-text: Fig. 1

SLR cameras also allow the option to capture RAW images of high quality directly from the sensor without the compression associated with capture as JPG. However, JPG files, being much smaller and widely compatible, are much more commonly utilised for storage, transfer and upload/download.

The camera used in this paper was a full frame Canon 5D Mark III D-SLR and images were captured as JPG.

2.2 Consider the lens

Lenses are interchangeable on SLR cameras, allowing use of high quality fixed focal length (prime) lenses, specialised macro lenses and variable focal length (zoom) lenses.

The **focal length** of a lens is the distance from the centre of the lens system to the sensor when the subject is in focus. A lens with a short focal length (18mm) is known a wide-angle lens, whereas one with a long focal length (200mm) is called a telephoto lens. A Zoom lens incorporates a range of focal lengths, e.g. 18–55mm and is operated by twisting a ring on the lens barrel.

Focal distance or **subject distance** is measured between the subject and the sensor (although in practice, to the lens). This could be anything from a few centimetres for a close up of an injury to about 3 or 4 m for an overview

of a body. Although macro lenses allow for close up focusing, they suffer from limited Depth of Field (DoF) and a greater likelihood of blurring due to camera shake. Standard 50mm prime lenses and standard zooms (e.g. 18-55 mm, 28–70mm) are the most suitable lenses for everyday clinical and mortuary use.

The lens used in this paper was a Canon EF 50mm f/2.5 Compact Macro which has a closest focusing distance of 23 cm.

2.3 Consider the lens aperture

The lens aperture is the size of the central opening within the lens through which light passes on its way to the sensor. Aperture is variable, controlled either automatically by the camera (in Auto or Program Modes) or manually by the photographer (in Aperture Priority and Manual Exposure Modes).

The Depth of Field (DoF) is the zone of acceptable sharpness which extends either side of the focal point, both back towards the camera to the Near Point, and into the distance to the Far Point (see Fig. 2).

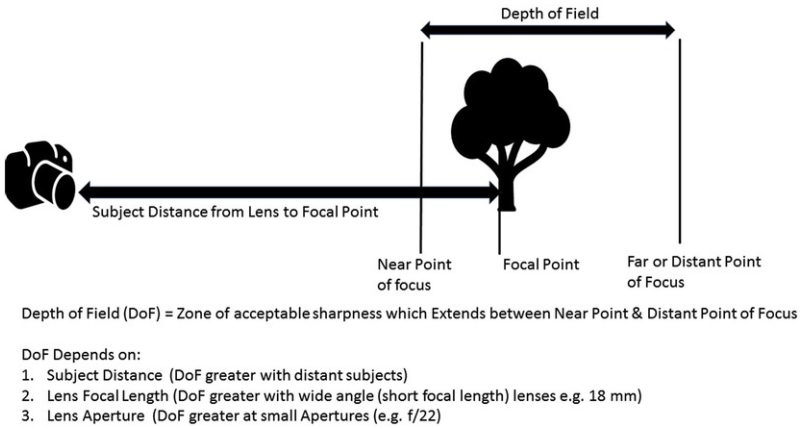

Fig. 2 Depth of Field (DoF) and the factors affecting it.

alt-text: Fig. 2

Depth of Field depends on 3 factors:

1. Lens focal length - an 18mm wide angle lens has much greater DoF than a 200mm telephoto.
2. Subject distance - DoF is greater at long subject distance and can be very narrow at close range.
3. Lens Aperture - DoF is greater with small aperture openings (f/22) than with wider apertures (f/2.8).

Depth of field can be calculated for any combination of camera body, lens, aperture and subject distance using a smartphone App such as SetMyCamera or DoF Calc (see Fig. 3).[5] Approximately two thirds of the DoF, or zone of acceptable sharpness, extends between the focal point and Far Focus Point and one third extends back towards the camera (between the focal point and the Near Focal Point). At close distances the zone of sharpness (DoF) can be very small and most of the image may appear blurred (Fig. 4 A).

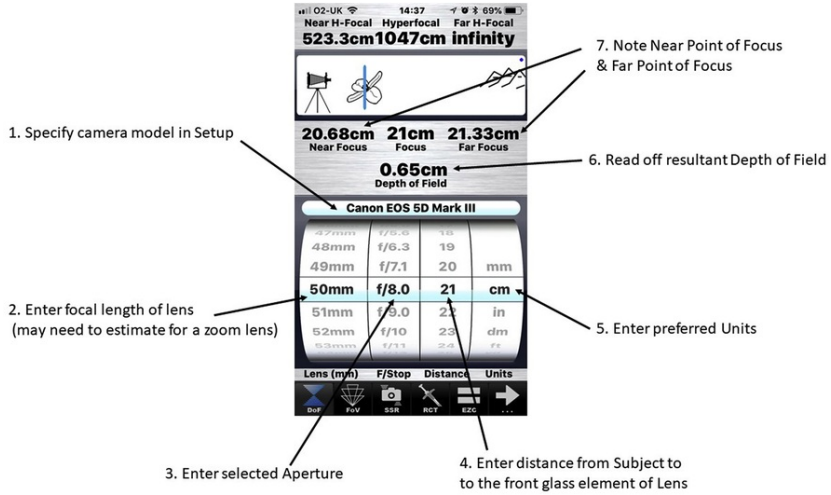

Fig. 3 Instructions for use of SetMyCamera App for calculating DoF.

alt-text: Fig. 3

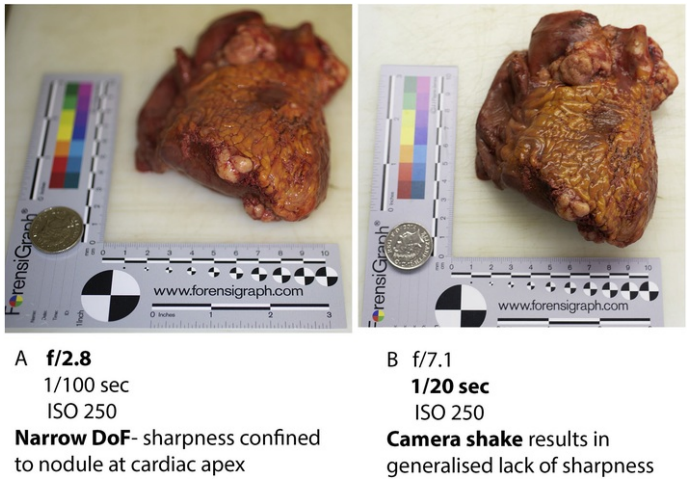

Fig. 4 (A) Limited Depth of Field due to wide aperture (f/2.8). (b) Camera Shake at slow shutter speed (1/40 sec) causing generalised lack of sharpness throughout the image.

alt-text: Fig. 4

The maximum (widest) aperture opening of the lens is stated on the lens barrel itself and is expressed in terms of an f number. Confusingly, a small f number (f/2.8) indicates a large aperture opening and a large f number (f/22 or f/16) indicates a small aperture opening. It is perhaps more helpful to consider that small F numbers give small (shallow) DoF and large F numbers give large (deeper) DoF. Most standard zoom lenses would have a maximum aperture of f/3.5–4.5 and a minimum aperture of f/22. Higher quality prime lens typically have larger maximum apertures of f/2.8 or f/1.8.

2.4 Consider the shutter speed

Shutter speed is the length of time the shutter stays open to expose the sensor to light when a photograph is being taken. It is expressed in seconds for long exposures and in fractions of second for faster shutter speeds (e.g. 1/1000 sec). **Camera shake** refers to the generalised but imperceptible movement of the hand held camera, mostly as a consequence of physiological tremor. At slow shutter speeds this often results in generalised blur or a subtle lack

of sharpness accross the entire photograph (Fig. 4 B). Camera shake is more likely to occur at close focusing distances and with heavier telephoto or zoom lenses of long focal length (>100mm). After taking every photo it is good practice to check the LCD screen in playback mode for correct exposure (by reviewing the histogram) and for acceptable sharpness (by zooming in on the image).

As a general rule of thumb, the shutter speed (expressed as a fraction of a second) should be greater than the focal length of the lens. This means that a 50mm lens can usually be hand-held at shutter speeds of 1/60 sec and faster without camera shake, whereas a 200 mm lens will require a shutter speed faster than 1/250 sec to avoid blur. Most modern cameras (when used in Auto or Program Exposure Mode) will select a shutter speed which is fast enough to hand hold at the focal length of the lens in use. However, this is often at the expense of a large aperture and/or high ISO (see below).

Easy ways to eliminate camera shake are to increase shutter speed (usually requiring an increase in ISO), using a tripod to steady the camera itself, or by use of electronic flash.

2.5 Consider the exposure

The three factors affecting exposure (Aperture size, Shutter speed and ISO) are related by the Exposure Triangle (Fig. 5).

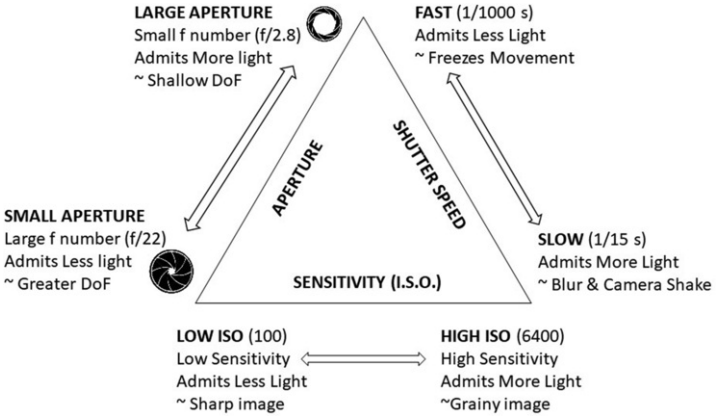

Fig. 5 The Exposure Triangle showing the relation of Aperture, Shutter Speed and ISO Sensitivity.

alt-text: Fig. 5

In Auto & Program (P) Exposure Modes the camera selects a combination of Aperture, Shutter Speed and ISO to give a correct exposure. In P Mode these settings can be over-ridden or “shifted” by rotating the main dial to change the combination of aperture and shutter speed whilst still maintaining correct overall exposure.

In Aperture Priority Exposure Mode (AV) the Aperture is primarily altered by the photographer and the camera will secondarily select a corresponding shutter speed (and ISO if this is set to ISO-Auto) to give correct exposure. Closing the aperture down (e.g. from f/7.1 to f/8) reduces the amount of light hitting the sensor and requires the camera to automatically compensate by reducing the shutter speed (e.g. slowing down from 1/60 to 1/30 sec) to let more light onto the sensor and maintain correct exposure.

In Shutter Priority Exposure Mode (TV or S) the shutter speed is primarily altered by the photographer and the camera will secondarily select a corresponding aperture (and ISO if set to ISO-Auto) to give correct exposure. Increasing the shutter speed (e.g. quickening from 1/60 to 1/125 sec) reduces the amount of light hitting the sensor and requires the camera to automatically compensate by widening the aperture (e.g. from f/7.1 to f/6.3) to allow more light in and thereby maintain correct exposure.

It is often desirable to increase the ISO (sensitivity of the sensor) in order to utilise a shutter speed which is fast enough to hand hold without camera shake. Increasing the ISO may also allow selection of an aperture which is small enough to give adequate depth of field. It is useful to set ISO to ‘Auto” in order to enable the camera to automatically increase ISO in dim lighting conditions, as required.

Any deliberate change in light exposure made by the photographer is measured in **stops**. A one stop increment in exposure represents a doubling of the amount of light hitting the sensor. This can be effected by doubling the ISO sensitivity of the sensor (e.g. from 200 to 400), **OR** by slowing (doubling) the shutter speed (e.g. from 1/60 to 1/30 second), **OR** by opening the aperture (e.g. from f/8 to f/5.6). Conversely, decreasing exposure by one stop halves the amount of light hitting the sensor. This can be effected by halving ISO from 200 to 100, **OR** by halving the shutter speed from 1/60 to 1/125 second, **OR** by closing the aperture from f/8 to f/11.

2.6 Consider the lighting

Common light sources encountered in clinical and mortuary settings might include daylight, fluorescent and tungsten bulbs, or a mixture of types. Each type is associated with a distinctive colour cast which requires the camera to be set to the corresponding White Balance setting. This is more important when capturing images as JPGs and less important with RAW files which allow White Balance to be easily back-corrected in software.Any light source may introduce reflective glare or “hot-spots” off the moist reflective surfaces of skin, organs and tissues. This a particular problem when using flash (Fig. 6 A, B, C).

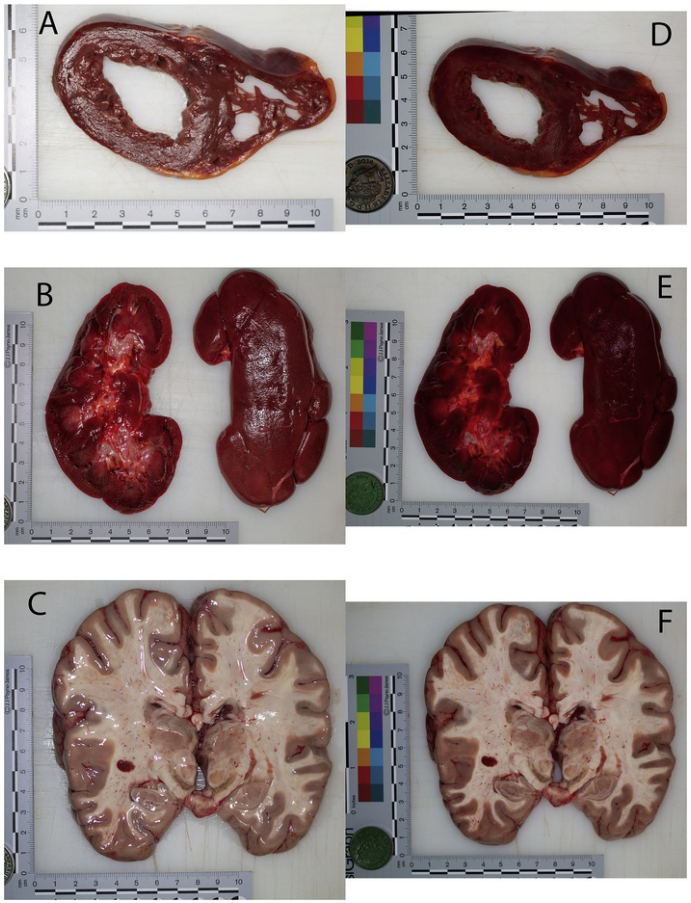

Fig. 6 Glare due to Flash on slices of (A) Heart, (B) Kidney, (C) Brain.Elimination of glare using Flash Cross Polarisation technique on (D) Heart, (E) Kidney, (F) Brain.

alt-text: Fig. 6

Reflections from any light source can be counteracted by use of a rotating polarising filter fitted to the lens. However, polarising filters will typically reduce the amount of light reaching the sensor (by up to 2 stops) with a consequent need for a higher ISO, a larger aperture (with reduced depth of field) or a slower shutter speed (with the increased risk of camera shake).

2.7 Consider using flash

A practical solution to eliminating colour cast is to use electronic flash, which has a similar colour temperature to daylight. Flash also eliminates camera shake since the usual shutter speeds employed by the camera are in the range 1/60 to 1/200 sec.

Pop-up integral flash is a feature on many modern DSLRs. Although convenient and powerful enough for some applications, the proximity of the light source to the axis of the lens may result in the lens casting a crescentic

shadow over the lower part of the image, particularly when using bulky or wide-angle lenses (see Fig. 7).

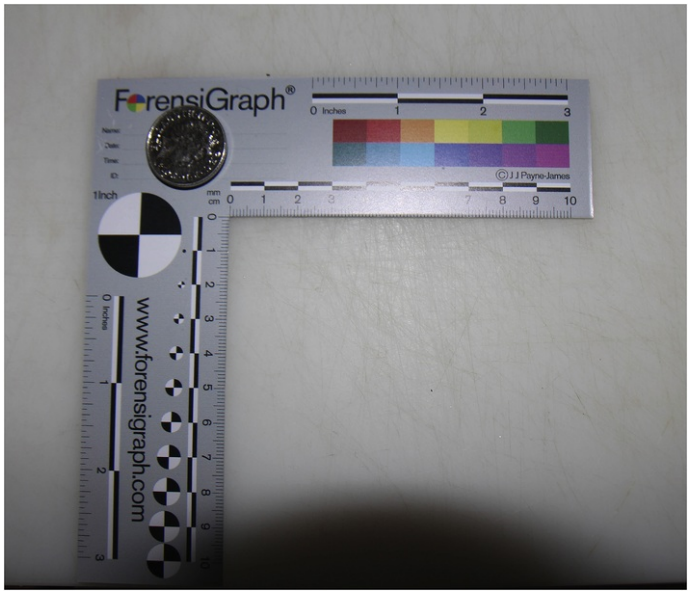

Fig. 7 Pop-up flash casting lens shadow over the lower part of image.

alt-text: Fig. 7

Modern hotshoe-mounted Flash guns (Fig. 1 B) are powerful and very forgiving in terms of exposure. They will automatically illuminate the main subject correctly, largely irrespective of the aperture and shutter speed selected by the photographer. This is achieved thanks to Through the Lens (TTL) flash metering whereby the required flash output is calculated in response to an imperceptible pre-flash. With this information stored, the main burst of flash which follows during the actual exposure is automatically curtailed when the main subject has been correctly exposed. The background, which is usually beyond the range of the flash output, is often under exposed, particularly at faster shutter speeds (see Fig. 8 B).

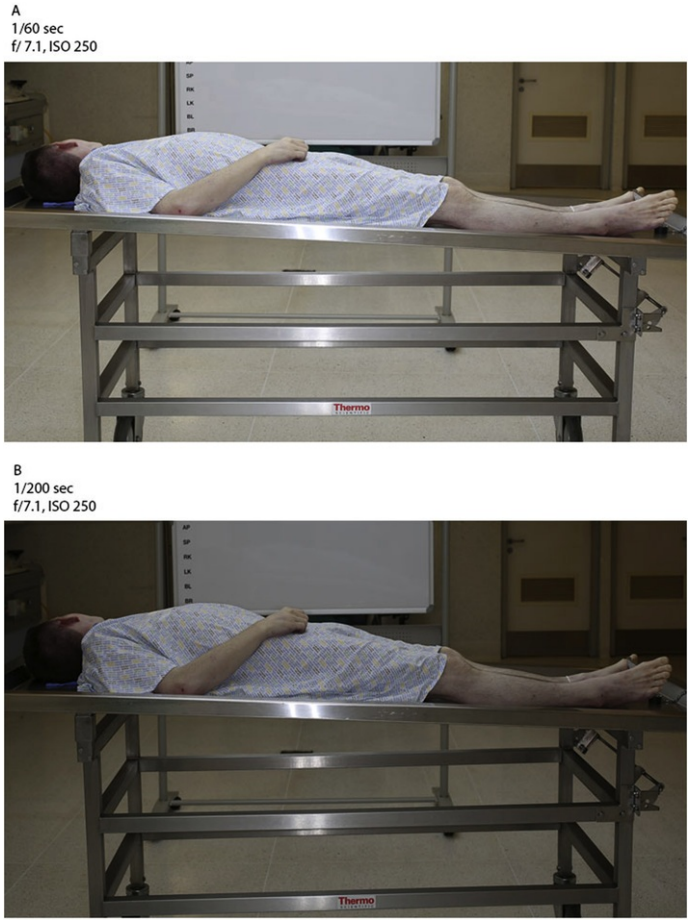

Fig. 8 Full length body photographs using flash. The body itself is similarly exposed by automatic TTL flash in both images. (A) Slower shutter speed (1/60 sec) gives brighter background ambient exposure. (B) Faster shutter speed (1/200 sec) gives reduced background ambient exposure.

alt-text: Fig. 8

When a hotshoe flash is used to illuminate a subject at close range, the position of the flash head lies relatively high above the axis of the lens. This may result in uneven exposure of the subject, with the top of the image relatively over-exposed (being closer to the flash head), and the bottom of the image relatively under-exposed (see Fig. 9 A, B). Most modern flash guns have tilt and swivel heads which enable the user to bounce the flash light off an adjacent light coloured reflective surface (most often walls and ceilings) (see Fig. 9C, D). This will soften and diffuse the light and serves to reduce glare and strong shadows. A simple plastic flash diffuser clipped on to the flash head will also help to soften the harsh flash lighting. Better still, use of Ring Flash equipment is recommended as it provides more even lighting at close/macro range since it has two bulbs, placed either side of the lens and very close to its axis (see Fig. 1C).

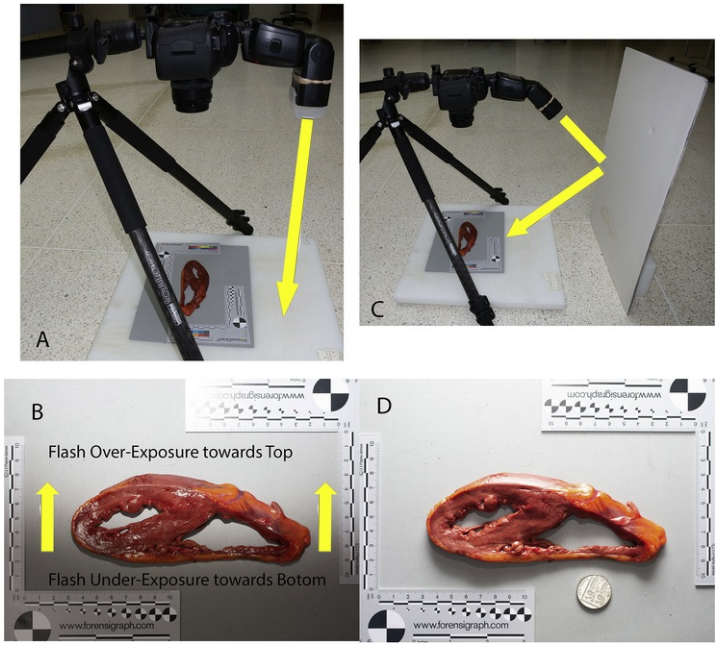

Fig. 9 Camera mounted on a tripod over specimen slices placed on the ground. (A, B) Direct flash causes uneven top-lighting. (C, D) Flash bounced off white reflective board gives more even illumination.

alt-text: Fig. 9

A further useful technique, known as flash cross polarisation, reduces flash glare by utilising polarising filters on both the lens and the flash light source.[6] When the polarising filters are rotated such that their axes of polarisation are at right angles to each other, they are said to be cross polarised. This causes a reflective coin to appear black (Fig. 10C). Although more cumbersome, cross flash polarisation gives the best results with patterned skin injuries (Fig. 10C) and on wet surfaces such as teeth and organ slices (Fig. 6 D, E, F).

Fig. 10 The 3 Photo principle for close-up of tattoo. (A) Distant orientation image with landmarks. (B) Close-up image without scale. (C) Close-up image with scale.

alt-text: Fig. 10

2.8 Consider focal plane, scale and background

In order to avoid perspective distortion, photographs should be taken with the camera back (and therefore the sensor) placed parallel to the surface of the subject (Fig. 9); this is particularly important for close up subjects (ref 3). This means that the axis of the lens should be squarely at right angles to the surface of the subject in order to avoid angular distortion (Type 1 error). An L-shaped rigid measuring scale should be placed in the corner of the frame and in the same focal plane as the subject, i.e. with the subject and the scale at the same distance from the lens. This will avoid magnification distortion (Type 2 photographic distortion). Focal plane is particularly important with close up subjects, when DoF might only extend over a few millimetres. The scale should be in sharp focus along both axes of the L scale. Although adhesive scales are convenient to use in many situations, they should be avoided when photographing evidentially important injuries such as patterned injuries and bite marks, as wrapping around curved surfaces introduces Type 4 distortion. Even flexible scales may be easily distorted by fingertip pressure.

The commonly used ABFO and Forensigraph type L-scales also incorporate circles with crosshairs. These enable the planar orientation of the scale to be easily checked by ensuring the vertical and horizontal lines contained within the circle are of equal length.

Often the lens has difficulty focusing on flat, relatively featureless areas such as skin and it may be useful to instead align the focus frame on the edge of the scale nearest the subject, half-press and hold the shutter button to

hold focus (often accompanied by a confirmatory beep) before recomposing the image and completely pressing the shutter button to take the photograph. However, for close up subjects more accurate focus is obtained by keeping the camera still and instead selecting an alternative focus point from the many available in the viewfinder area.

The **3 Photo Principle** suggests taking a sequence of 3 photographs of any important lesion or injury (Ref 1).

(1). Long range to provide an appreciation of location,

(2). Close up without a scale and

(3). Close up with a scale (Fig. 10).

Use of a mid-toned, neutral coloured, non-reflective background will reduce clutter and distractions. Cotton theatre green sheets are often used but these tend to show up unattractive wet soak marks in a mortuary setting. Wipeable, mid toned plastic surfaces and films are preferable. Most camera metering systems take account of the average light levels from around the entire scene and give an overall exposure which is biased towards correct reproduction of the mid tones (a tone known as 18% grey). The best exposure of the specimen is therefore achieved against a mid-toned background (ideally a photographic 18% Grey), waterproof and non-reflective material (see Fig. 11 E).

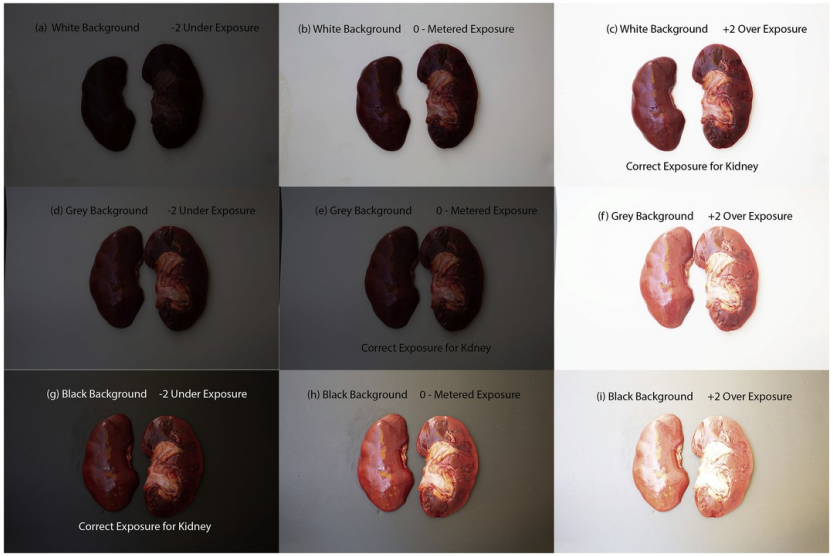

Fig. 11 The effect of Background Colour and Exposure compensation on kidney slices. (A) White Background, Under-Exposure (- 2 stops). (B) White Background, Metered Exposure. (C) White Background, Over-Exposure (+2 stops) provides best results for the kidney itself. (D) 18% Grey Background, Under-Exposure (- 2 stops). (E) 18% Grey Background, Metered Exposure provides best results for the kidney. (F) 18% Grey Background, Over-Exposure (+2 stops). (G) Black Background, Under-Exposure (- 2 stops) provides best results for the kidney. (H) Black Background, Metered Exposure. (I) Black Background, Over-Exposure (+2 stops). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article).

alt-text: Fig. 11

It should be understood that inclusion of a large proportion of white or light coloured background will fool the camera meter into considering that the scene is quite bright overall and the camera will automatically reduce overall exposure to 18% grey; in doing so the main subject may be relatively underexposed (see Fig. 11 B). If a light background is to be used, exposure should be increased by +1 or even +2 stops to keep the background light and to maintain correct exposure of the specimen itself (see Fig. 11C).

Conversely, inclusion of a large proportion of dark background will fool the camera meter into considering that the scene is quite dark overall and the camera will automatically increase overall exposure to 18% grey; this time the main subject may be relatively over exposed (see Fig. 11H). If a dark background is to be used, exposure should be decreased by −1 or even −2 stops to keep the background dark and to maintain correct exposure of the specimen itself (see Fig. 11 G). If in doubt about exposure, a series of images can be taken at different exposure values using the camera's “Exposure Compensation” or “Auto Exposure Bracketing” functions (e.g. −2, −1, 0, +1, +2). Background-

induced exposure errors may also occur with the use of electronic flash.

2.9 Consider a tripod or stand

Use of a tripod will stabilise the camera and allow for use of slower shutter speeds without the risk of camera shake. However, tripods can be cumbersome to use and may represent a tripping hazard in a clinical or mortuary environment. Some tripods have a removable centre column which allows construction of a set up similar to a copy stand (see Fig. 9).

A dedicated copy stand allows the camera to be moved up and down a centrally placed vertical rod. Twin bulbs or flash lights can be symmetrically placed and angled to eliminate shadows on the horizontally placed specimen. A zoom lens and a flip out LCD screen are very useful camera features in this situation.

2.10 Technical considerations and suggested settings in common situations

2.10.1 Whole body photography (see Fig. 8)

Settings: Aperture of f/7.1 provides adequate DoF at 3 m distance. Ring flash provides even exposure of whole body. Note that the body itself is similarly exposed by flash in Fig. 8 A & B, whilst the background is darker with a faster shutter speed of 1/200 sec in Fig. 8 B.

Whole body photography is of questionable value in practice as it often proves difficult to fit the whole body in one photograph. Instead, consider taking a series overlapping regional photographs (see below).

2.10.2 Regional external photographs

Include anatomical landmarks. A scale is not routinely required.

The following sequence of overlapping regional photographs will cover the entire body at post mortem:

1. Identifiable paperwork or case number,
2. Toe tag,
3. Right lower limb (focus on knee at a distance of ~150 cm),
4. Right upper limb (focus on elbow at a distance of ~90 cm),
5. Right torso (focus on nipple at a distance of ~100 cm),
6. Right oblique side of face and neck (focus on cheek at a distance of ~50 cm),
7. Frontal face,
8. Left oblique face and neck,
9. Left upper limb,
10. Left torso,
11. Left lower limb,
12. Genitalia,
13. Back.

Example of Regional photograph of the right upper limb (Fig. 10 A).

Taken with 50mm lens, focussed on the knee at a distance of about 90cm.

Settings: Aperture of f/7.1 gives adequate DoF. (App indicates DoF of 13 cm, from NPF at 84cm to FPF at 97 cm), Shutter Speed of 1/160 sec is suitable for use with TTL flash and will also eliminate camera shake. ISO 250. Ring flash provides

even exposure.

2.10.3 Close up of skin lesions, tattoos or injuries using the 3 photo principle (see Fig. 10 A, B, C)

Settings: Manual Exposure Mode, f/7.1, 1/60 sec, ISO 250.

Taken with 50mm lens at a subject distance of about 27cm. At this close range DoF becomes very limited (App indicates DoF of 1 cm, from NPF at 26.5 cm to FPF at 27.5 cm). It therefore becomes important to ensure that the plane of the skin is at right angles to the axis of the lens (and therefore skin is parallel to the plane of the sensor). Inclusion of an L-shaped scale with both axes in sharp focus will help establish the correct plane.Fig. 10C shows use of Ring Flash with crossed Polarisation (polarising filters on flash head and lens at 90^0 to each other) to eliminate all glare off the skin. Note that, without reflections, the coin now appears black.

2.10.4 Autopsy specimen on the cutting bench

Here the technical problems arise due to the close subject distance and the oblique angle of view. In practice, Depth of Field should ideally extend from the front edge to the far edge of the specimen.

In Fig. 12, the 50mm lens was focused on the near edge of the kidney (at a distance of 21cm).

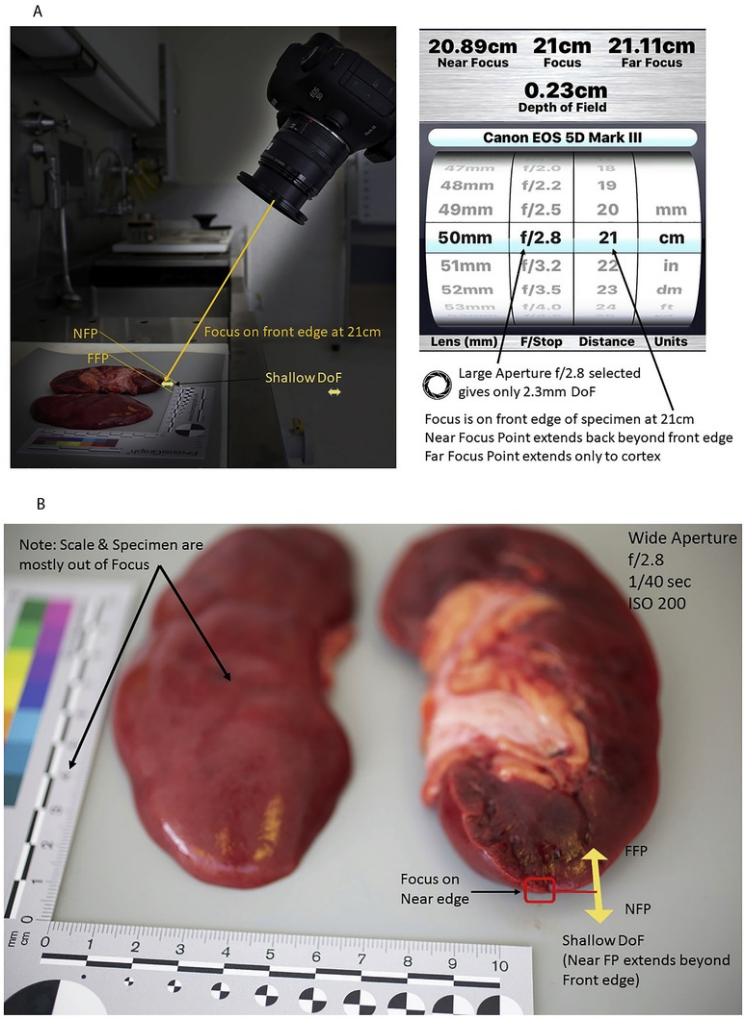

Fig. 12 Images of Kidney slices taken at the cutting bench with wide Aperture (f/2.8). (A) Angle of view seen side on and DoF parameters when focused on near edge of kidney specimen (21 cm). (B) Kidney and scale show very localised zone of sharpness due to limited Depth of Field The shutter speed was probably too slow to hand hold (1/40 sec), requiring use of a tripod to avoid camera shake.

alt-text: Fig. 12

Settings: Manual Exposure Mode, **Wide Aperture f/2.8**, 1/40 sec, ISO 200.

Note the very limited DoF (App indicates DoF of only 0.23 cm (2.3 mm) from NPF at 20.89 cm to FPF at 21.11 cm). Not only is the DoF very narrow, but the portion extending between the Focal Point and the Near Point extends beyond the near edge of the specimen and is therefore wasted!

In Fig. 13, the 50mm lens was focused on the pelvis of the kidney (at a greater distance of 26 cm).

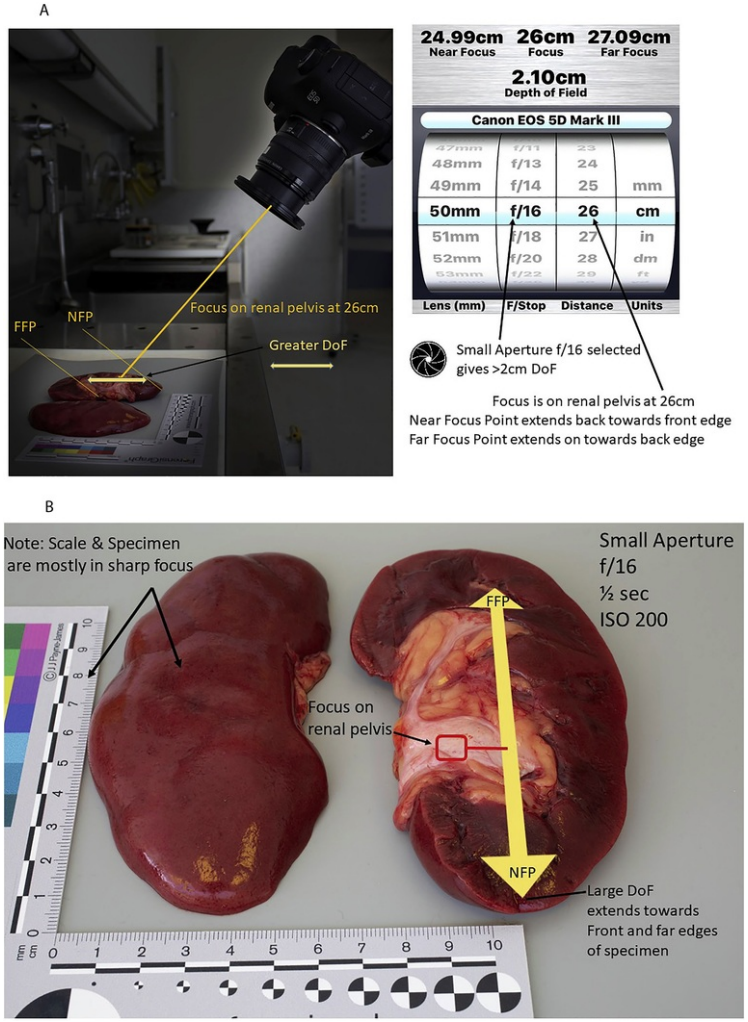

Fig. 13 Images of Kidney slices taken at the cutting bench with small Aperture (f/16). (A) DoF parameters when focused on renal pelvis (26 cm). (B) Kidney and scale show much greater zone of sharpness due to greater Depth of Field. The shutter speed was much too slow to hand hold (½ sec), requiring use of a tripod to avoid camera shake.

alt-text: Fig. 13

Settings: Manual Exposure Mode, **Small Aperture f/16**, 1/2 sec, ISO 200.

Note the greater DoF (App indicates DoF of 2.1 cm (21 mm) from NPF at 24.99 cm to FPF at 27.09 cm). Although DoF is still quite narrow, it covers the majority of the kidney specimen from front to back since the NPF now extends back towards the near edge of the specimen and the FPF extends on towards the far edge.

In both these cutting bench situations (taken without flash), the shutter speed was too slow to hand hold (1/40 and ½ sec) so that mounting the camera on a tripod was necessary to avoid pictures being blurred by camera shake.

2.10.5 Specimen on the floor or chair seat (Fig. 9)

Although more difficult to set up, having the plane of the specimen parallel to the plane of the camera sensor brings the entire surface of specimen into the focal plane. Since little DoF is now required, closer framing becomes possible, along with

use of wider apertures and faster shutter speeds. Hand-holding the camera may now be possible, even without use of flash.

2.10.6 Specimen on a copy stand

In this situation the plane of the camera sensor is parallel to the specimen and bidirectional angled lights or flash guns can be used to provide more even, shadowless lighting. The camera itself can be moved up and down the central rod to frame the subject. This set up is useful for tissue samples and organ slices. However, the weight of a zoom lenses may cause it to pull out to its widest view under gravity. Camera shake is unlikely if the camera and stand are stable. Depth of field is likely to be adequate unless very wide apertures are selected.

3 Suggested camera settings for most situations

Use a D-SLR in Manual Exposure Mode.

Use a 50 mm Macro lens or Standard zoom (28–70mm).

Use Ring Flash – gives correct exposure of main subject.

Aperture of f/8 or f/11 gives good Depth of Field (use App).

Shutter Speed of 1/60–1/200 sec (works well with flash).

ISO 200–400.

Use neutral tone background (18% Grey). Avoid black or white.

Include rigid L-Scale in corner of frame.

Keep plane of sensor parallel to surface of subject.

- Avoid 45° angle.
- Get right above organs slices – place specimen on the floor or on a stool

Don't get too close. Focus beyond near edge (avoids wasting DoF to Near Point).

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Queries and Answers

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