TARONGA
CONSERVATION SOCIETY AUSTRALIA
Australian Registry of Wildlife Health

A GOOD PICTURE IS WORTH A THOUSAND WORDS:
A PRACTICAL GUIDE TO EFFECTIVE GROSS PATHOLOGY PHOTOGRAPHY

Hall, J and Rose, K. (2013) A Practical Guide to Effective Gross Pathology Photography. Wildlife Disease Association (Australasia), Grampians, Victoria. October 2013.

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As part of my role as the Information & Resource Coordinator for the Australian Registry of Wildlife Health I manage all of the material that relates to cases within the Registry's Database. These include a large collection of glass slides, wax blocks, paper records and gross pathology images. We have cases submitted from all over the country, and some from overseas, and sometimes all we receive is a couple of photographs and the question – "What do you reckon this is?"

Some of these images, though not of the highest quality, are fine for their purpose….

Image 1: Multiple cartilaginous exostoses (Pacific Black Duck)

Image 2: Extensive fat necrosis/saponification of fat (Rusa Deer)

Image 3: White-winged Chough – Avian Pox?

Multiple cartilaginous exostoses (Pacific Black Duck)

Extensive fat necrosis/saponification of fat (Rusa Deer)

White-winged Chough – Avian Pox?

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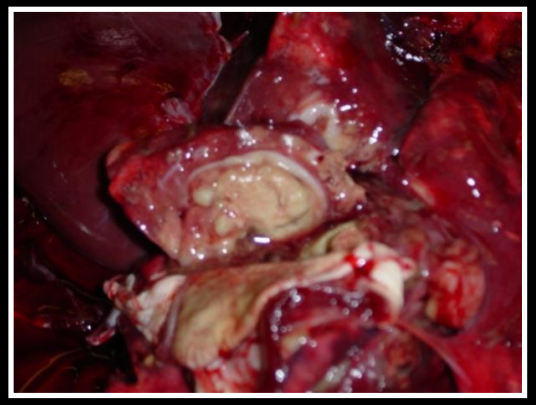
Some, are not.

Images such as these promote questions such as:

- What tissue is that?
- Where is that lesion?
- How big is that lesion?



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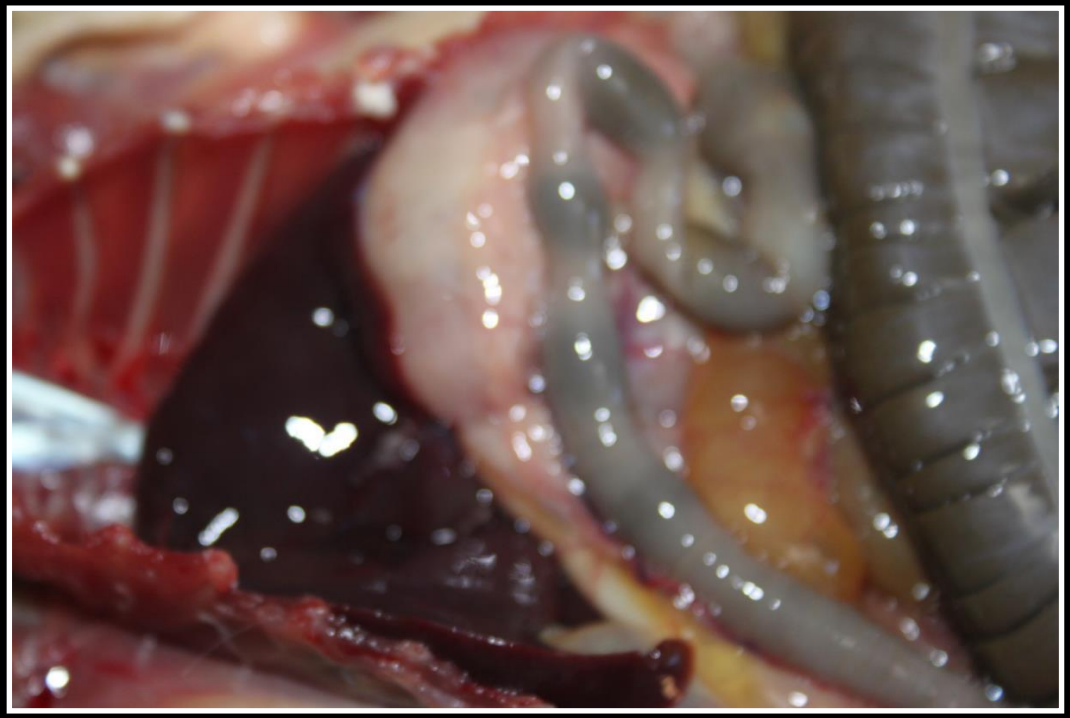
This is not a good photograph.

It's out of focus and if there is a lesion in there, well, good luck finding it. Everyone takes bad photos like this, I know I do. But in this day and age, there is absolutely no excuse for having or submitting a photo like this as the only record for a lesion in a pathology case. Take another, take 10 more, until you get a good, in focus shot, that clearly represents the story of the lesion in question – and delete all the rest.



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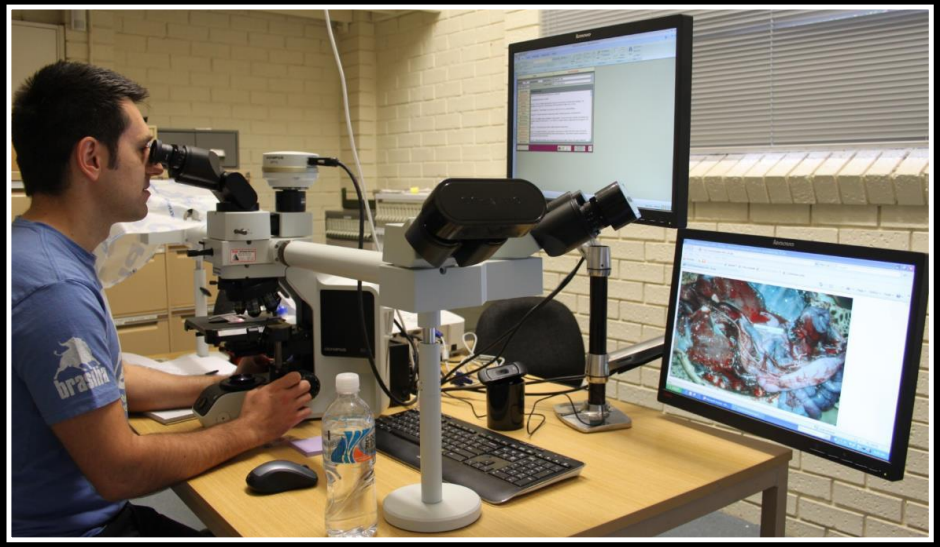
Pathology is a visual science. If you don't have the vocabulary to explain what you are seeing then you can certainly use an image to convey what you have seen. These images, either visual, or verbal, are an essential tool in arriving at a diagnosis.

I look at a lot of gross pathology images – so I know what works, and what doesn't. I also appreciate that in certain situations it is difficult to get the 'best' picture – like when you're working in the field, or working alone. I also appreciate that sometimes an image is taken simply to send in to accompany a written report so it doesn't matter too much what the quality is like. But what if it does?

What if, the image you casually snap during a gross post mortem is the only gross image of a new or emerging disease? What if, some time down the track when the histopath comes back you realise that this is something new, something to publish, something you don't have any quality pictures of because you didn't take the time to set up your specimen for a good picture when you had the chance? Hopefully I can give you some tips to get the best out of your images with a few steadfast rules for specimen photography so even if the image isn't perfect, it is still suitable for sharing.



"Photography in gross and clinical anatomy is not only essential for accurate documentation of morphological findings, but also important for sharing knowledge and experience."

Barut and Ertilav 2011

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Firstly – let's keep things simple. The image quality of the compact, point-and-shoot digital camera or modern mobile phone is more than sufficient for obtaining quality gross pathology images. Bells and whistles are not necessary. I could tell you all about the finer details of aperture, focus, shutter speeds, depth of field, etc. but it is not essential information for getting a good shot. What you need to consider is 7 simple steps.....

THE BASICS

- Focus
- Light
- Specimen Preparation
- Orientation
- Background
- Rulers/Labels
- Composition

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Let's do a quick exercise. Stick your palm right in front of your face, right up close. Your hand is out of focus isn't it? Now keep looking at your hand and slowly move it away from your face. At some point, it suddenly comes into focus and you can clearly see every detail. Your camera, just like your eye, has a minimal focal point. Sometimes, up close is too close.

This means, that for some lesions or small items, it will be better to take a wide, in focus shot that you can crop to zoom in during post production. Even a macro lens has its limitations – you just need to know how to use it.

Depth of field should be adequate to bring the whole subject into focus - out of focus material distracting.

If you are having trouble with getting a parallel plane. Move! Either yourself or your subject. Tilt your board if you have to.

FOCUS

- Out of focus material is distracting
- Eye is naturally drawn to a point of focus
- Depth of field should be adequate to bring the whole subject into focus
  - More easily achieved if plane of focus parallel to subject
  - Sometimes up close is too close
- Check the review screen! Delete anything that's not in focus (you'll thank yourself later)

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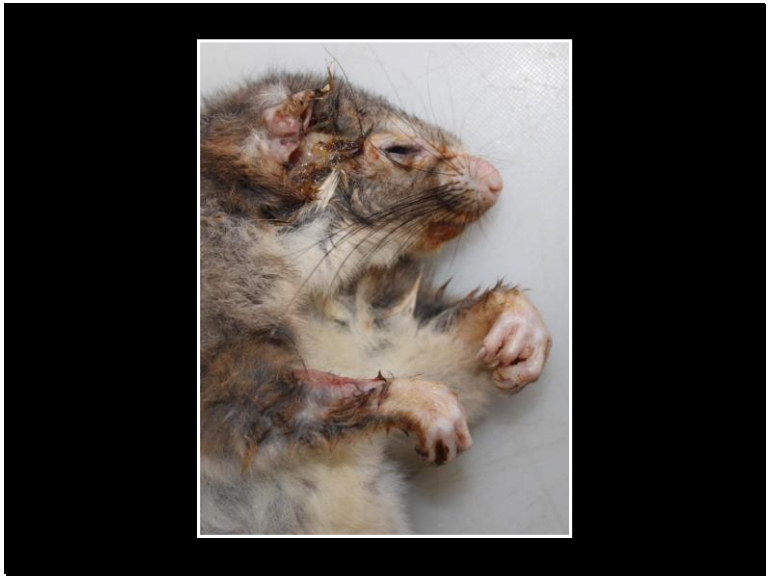
Focus

Here you can see that the top slide shows two blurry photos of a possum. What are the images trying to tell you? It must be some lesions on the head, and something might be wrong with the paws. Right? Because the camera is too close to the subject, the camera is unable to focus on the subject and we are left with some out of focus images which are impossible to assess for lesions.

In the bottom slide, you are clearly able to make out lesions associated with the possums ears and forearms. This was achieved by simply pulling back a bit from the subject. It also means, in this instance, that only one image is needed instead of two. Perfect.



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Light: Some of the problems you may encounter with light will depend on your light source. You will encounter different issues depending on whether you are outside or inside, and whether you have access to an in-built flash or external light source. I can't address all of these without delving into techniques, but there are some easy key tips that you can remember in any situation!

Wet tissues tend to reflect light so sometimes it helps to blot wet tissues to dry them off. Stainless steel tables are also notorious for reflecting light, it can help in some situations to put the subject on a different background, but we'll talk about that later.

A big problem can be the photographers shadow! Leaning across the subject, and blocking overhead light can create shadow. Stepping back and tilting the board can again help with this. A tripod, a photobox with a boom arm to hold the camera, or a camera remote are also great tools.

LIGHT

- Light and shadow is necessary to create a 3D effect
- Too much light can create shine and obscure lesions
  - Wet tissues tend to reflect light
  - Partially wet surfaces can be distracting
- Watch out for overhead light casting shadows
- Built in flash vs. extra light vs. natural light

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Once upon a time you had to really consider any images you took because the development process was so much slower, and more expensive. You used to have to set up your picture, take 1 or 2 photos, and hope that they were ok as you sent the film off to be processed, which could take a week – all the while you're hoping they came out ok because you couldn't see what you'd actually taken until you had those prints in your hand. They come back and there is something wrong – damn – opportunity lost.

Now we live in a time of digital photography, where you can click away at a subject and take as many photos as you like, at no cost for wasted film, and hunt for 'the perfect shot'. Sounds simple.

Unfortunately, this 'perfect shot' is still not always achieved.

Image 1: The subject is slightly blurred, the image is too dark, and the subject is half covered in shadow.

Image 2: The lighting is much improved but overexposed making the subject pale and 2-dimentional. The specimen label is also missing!

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Image 3: The stainless steel post mortem room table, paired with the overhead downlights, means that there is excessive shine and bounced back light that disrupts this photograph. Turning off those focal lights, and/or placing the carcass on a matte background will help illuminate this problem. The specimen label is also missing.

Image 4: By placing large bodies on the floor you are able to get a good, level plane, image of the entire carcass. Unfortunately, in this image, the photographers body is casting a shadow over the middle of the turtle. This could be avoided by stepping back from the carcass, or better yet, in this instance, moving to the other side of the carcass so as not to block the light.

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Like reading a page of text, your eyes are trained to start interpreting an image from certain cues and from left to right. Additionally, in specimen photography, standardisation is as important for comparable, reproducible and valid results as it is with any science.

This means laying your specimen out in anatomically correct alignment – i.e. the head at the top and the tail at the bottom, the thoracic tissues above the abdominal tissues, or from left to right.

Multiple pieces or individual tissues are distracting. If you do need to take one photograph with individual pieces, or serial sections, lay them out with even spacing so that they aren't touching, but close enough so that context isn't lost (comparisons, etc.).

Incorrect position can create perspective distortion again emphasising the importance of a parallel planes. This is especially important in forensic photography.

ORIENTATION

- Standardisation - anatomically correct alignment
- Incorrect positioning can create perspective distortion
  - Parallel planes needed
  - Move your specimen
- Multiple pieces are distracting!
  - Don't place different tissues together in one picture
  - If serial sections useful, consider the spacing between tissues (i.e. not too crowded but not too far apart as to lose context)

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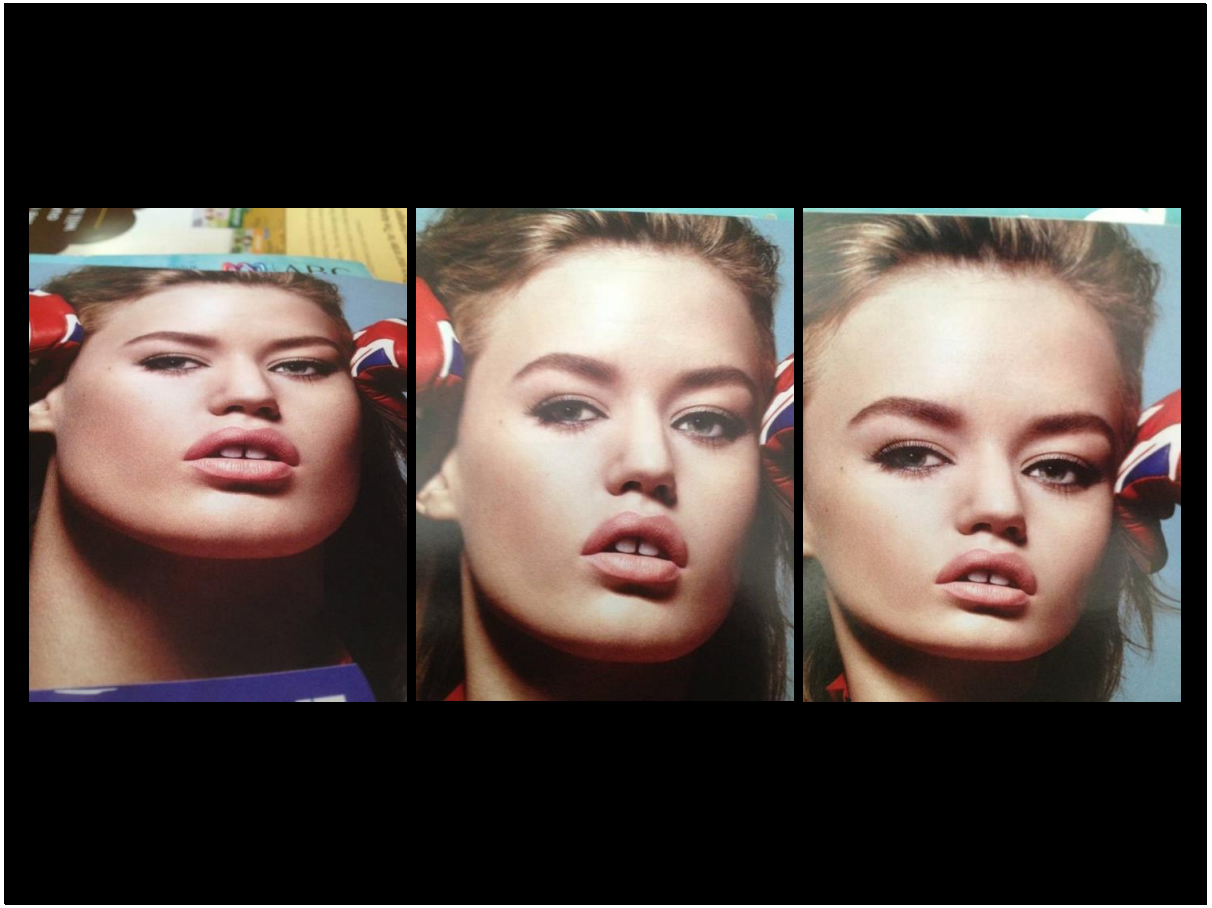
I keep mentioning a plane of focus so let's take a quick break from gross images to demonstrate why this is so important.

Basically, your camera lens must be parallel to your subject – whether that is a carcass, tissue, lesion, or ruler/measuring device.

If you do not maintain a parallel plane of focus, you will encounter all kinds of problems. Notably – distortion - making something smaller or larger than it really is.

The three images here are all of the same subject – a picture in a magazine. By angling the camera from the chin you distort the subject to appear as if she has a massive jaw. Angled from the top her forehead appears exaggerated. By taking the photo from a parallel plane, the subject in the image appears as she does in real life (even if someone has airbrushed out her imperfections!).

True to life representation of your subject is especially important in forensic cases where you may have to defend your description of a lesion, and its relevant size, etc.



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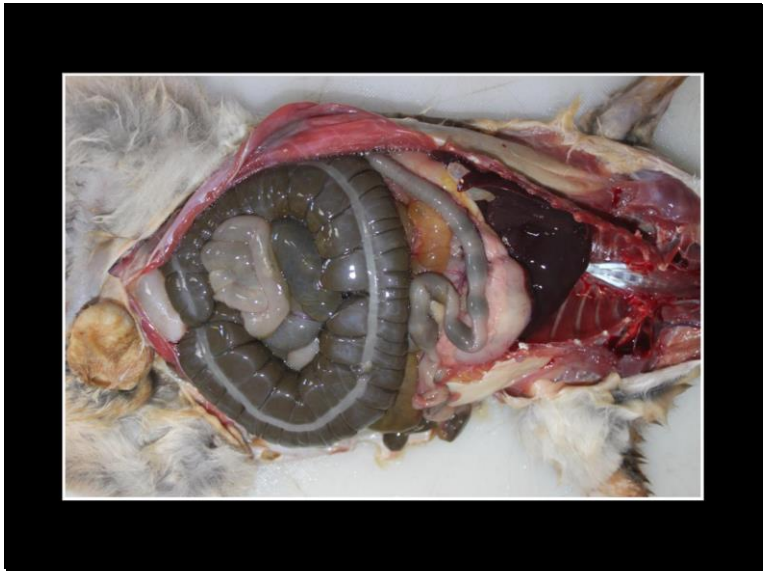
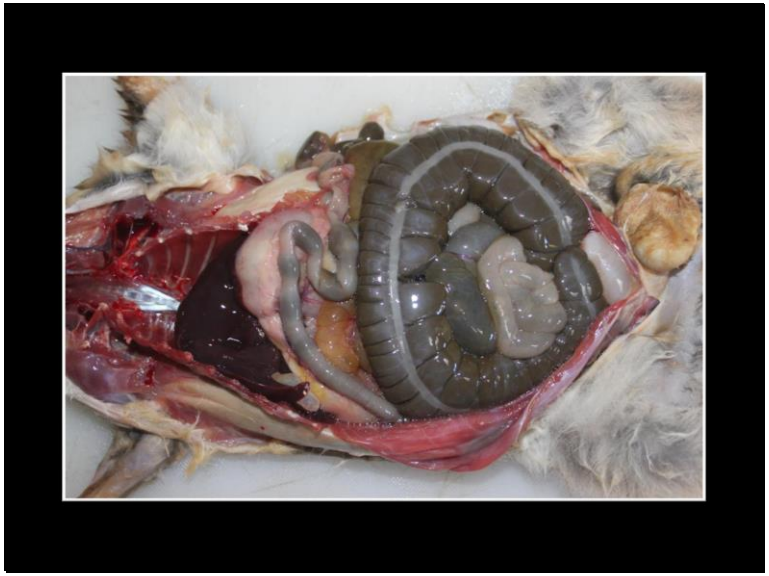
In the first image, the specimen is aligned from right to left. I bet you tilted your head to interpret it.

In the second image, the specimen is correctly aligned from left to right with the head to the left, and head to the right. You brain is able to interpret this image much more quickly.





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Depending on the specimen, correct orientation can be left to right or top to bottom.

Slide 1: Image 1: Thoracic pluck with tongue at the top extending in a liner alignment to the lungs.

Slide 1: Image 2: Cervical spine with first cervical vertebrae at the top.

Slide 2: Image 1: Gastrointestinal tract from stomach to colon allows for identification of a large, small intestinal/mesenteric granuloma.

Slide 2: Image 2: A formalin fixed bladder with the urethra at the bottom of the image.

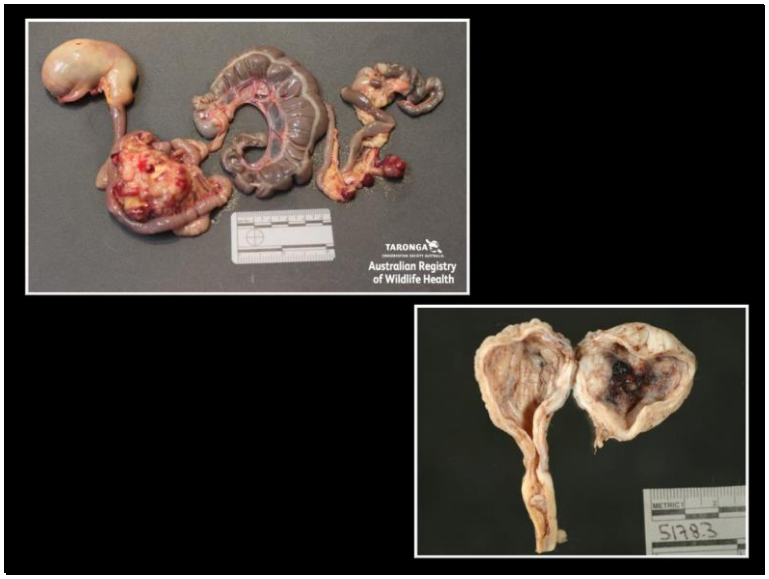

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Image 1: Multiple tissues should be placed close enough together to remain relevant or to aid in comparisons, but not so close that they are touching or distracting to the eye. Eyes in cross section.

Image 2: Just like getting things in focus, moving yourself, or the specimen, can greatly enhance your ability to take a good gross pathology image. For large animals, it may be easier to take a whole image by placing it on the floor (or alternatively climbing up on a step), rather than taking multiple images.

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Clutter is confusing and makes it difficult to focus or find the lesion of interest. Have a clean workspace, free from tissues, tools and instruments that are superfluous to the image. This includes feathers and fur on cut surfaces (but remember to take a sterile sample first!).

Present the lesion in a way that makes it clear to the viewer where their concentration is required. That way you don't need a big red arrow to communicate what you want them to see.

SPECIMEN PREPARATION

- No clutter!
- Consider presentation of the lesion
- Clean background (if possible)
- Remove extra tissue
  - fat and viscera from removed organs
  - Cut back ribs, muscle from whole carcases
  - No feathers or fur on tissues

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Slide 1: Take a minute to clean clutter away from your subject and lay the sample out in a presentable manner.

Slide 2: Clean your backgrounds (if you can). Both of these images are of gastric foreign bodies. If it is worth fishing out of the stomach content for a photograph, it is worth the extra effort to present it appropriately. Put it to the side and take the picture later when you've cleaned away if you have to. Dark samples or objects are going to get lost on a dirty background. The items in the top image could be rinsed so that they are more easily identifiable. Grouping by like-object can also help in comparative images like these – e.g. by plastic type in the bottom image.

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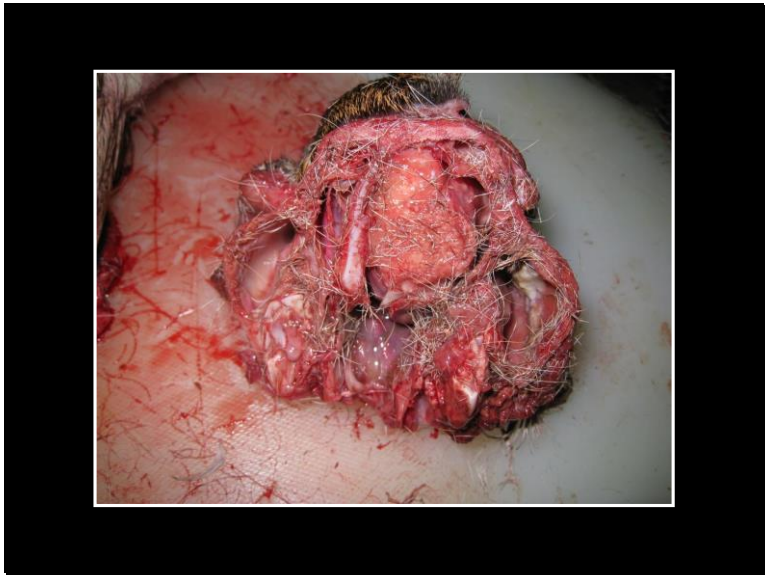
Slide 1: An image of a foreign body is great. An image of a foreign body in situ showing tissue origin and relative size is better – such as this bladder stone.

Slide 2: There is so much fur on this lesion that the lesion is difficult to make out. Collect a sterile sample for culture (if you can) and then clean off all that fur before you take a photo. Better yet, reflect the skin back before cutting through the bone to avoid contaminating your lesion surfaces with fur and dirt. Then take a sterile sample. Then take your photograph. Lao note the angle that this image is taken – it makes it hard to accurately assess the size of the ?sinus mass.



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Some backgrounds can cause view bias and distort the perception of the subject. Basically, your brain needs a neutral colour in order to accurately analyse the specimen.

An artificial background is not always necessary (e.g. a tissue in situ or a large carcass) but when one is required there are a few simple tricks for using one correctly.

The purpose of a background is to isolate the subject, so it should not distract with patterns, reflect or absorb light, or distort the colour of the specimen.

A black box, grey floor, or black boards are handy tools to have on the necropsy floor. There are certainly colours that should be avoided such as red, blue, and green.

BACKGROUND

- Unobtrusive (may cause view bias)
- Isolate subject – must not distract, reflect/absorb light
- Not always necessary
- Coloured backgrounds
  - Some distort perceptions of lesion colour, while others enhance perception
  - Brain needs neutral colours to 'set' perceptions
- See border of specimen
- Black box, uniformly grey floor, black boards are best

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Image 1: The reflected light off the specimen background is causing significant distraction and distortion in this image. It could be solved by an alternative light source, or, by placing the carcass on a neutral matte background. Although this is a medium sized macropod, it is not too large to easily manipulate onto a background for photography purposes.

Image 2: Background colour choice can have a significant effect on perception of a subject. Each of these imaged were taken using the same camera settings. Only the backgrounds were changed. You need to choose a background that results in the most 'true to life' colour of the subject in order to minimise distortion, and distraction.

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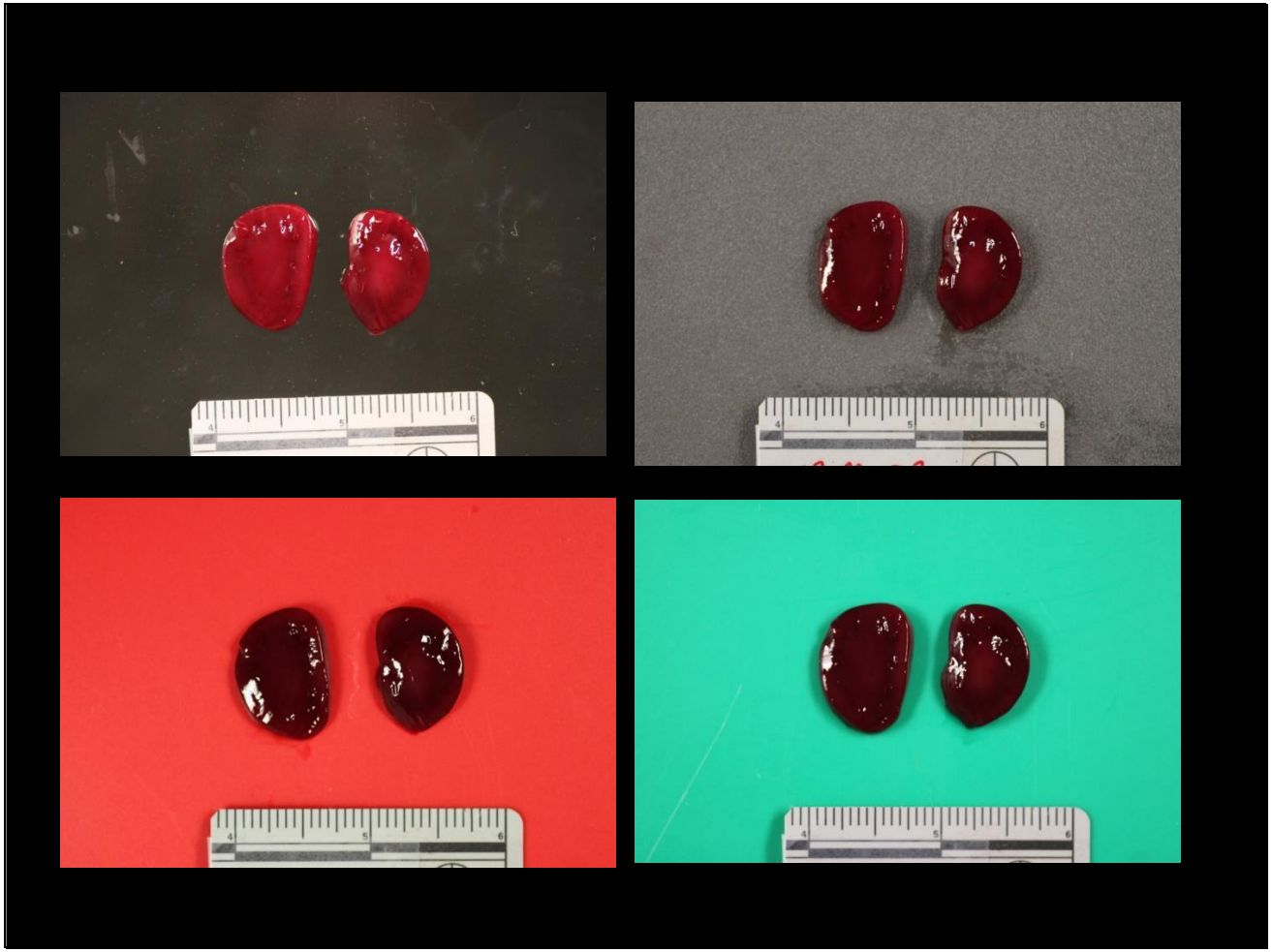
Background choice is especially important when photographing tissues. Again, in each instance, the same settings were used and only the backgrounds were changed. You can clearly see the difference between the different backgrounds used with some distorting perception, while others enhance it. Never use a red background to photograph gross pathology specimens. Green is also not recommended.



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A ruler is used in a gross pathology photograph to give the viewer a reference for size. This will only be accurate if the ruler is placed on the same plane as the lesion. This is especially important in forensic cases.

A ruler or label should not distract from the subject. As such, it should be free from busy brands, patterns or colours, should not be placed on top of or too close to the point of interest/lesion, and should not contain too much case information.

Some thought should also be given to whether, if the image was to be published, the label will need to be removed. If this is likely, the label should be placed in the corner of the image where it can later be removed or cropped out.

Avoid placing hands, fingers, and probes in a photograph. An arrow or indicator can always be added post production.

RULERS AND LABELS

- Avoid fingers or hands in photographs!
- Do not place labels on or over the subject/lesion
- Place label where it can easily be cropped
- Brands and colours should be unobtrusive
- Same plane of focus as subject – for focus AND accuracy (especially important in forensic cases)
- Don't put too much information on a label – case number or animal ID/date should be sufficient

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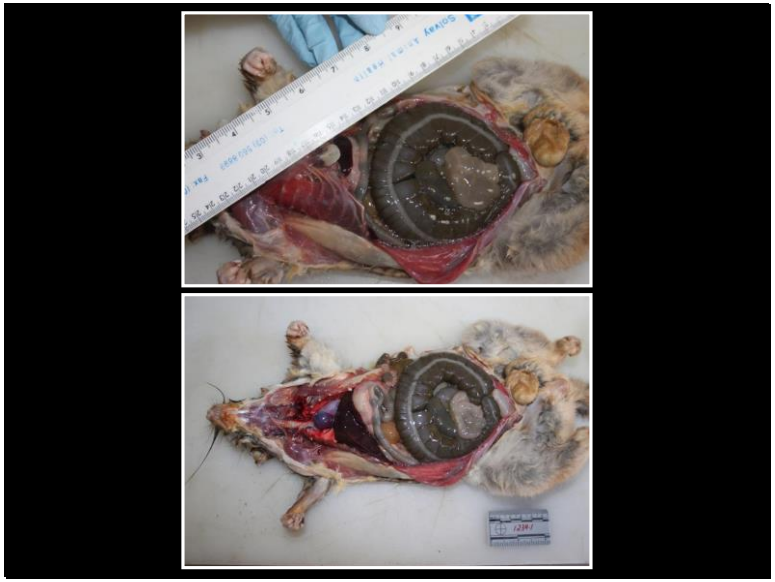
Slide 1: Image 1: Placing a ruler over the top of your subject does a number of things; it is distracting, it distorts perception, and if it is not parallel to the subject like this it makes it difficult to make any comparative measurements. In addition to this, the image is too closely cropped, it is in shadow, and there are unnecessary hands in the image.

Slide 1: Image 2: This image is much improved by placing a small, unobtrusive, label and ruler combo in the bottom right of the image. The image still has some issues relating to light and angle, and the label is perhaps too close to the subject, but it is clearly much improved from the original image.

Slide 2: Much as for slide 1, these images are much improved simply by removing hands and clutter, adding a neutral background, and using a less obtrusive ruler.



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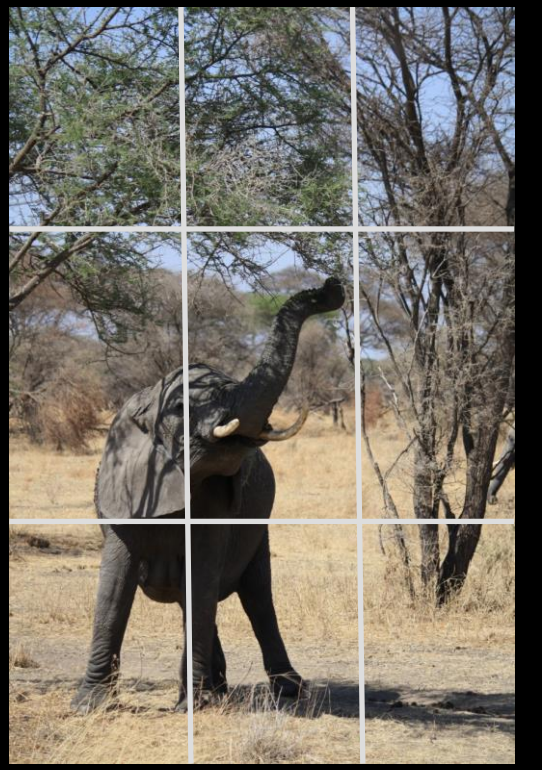
In every day photography there is something called the 'rule of thirds'. This rule is based on the idea that your eye is naturally trained to find points of interest along the aspect which fall into the thirds like this grid, rather than the centre of an image. This is where we find subjects more aesthetically pleasing. However, in gross pathology imaging, this may not be achieved nor practical.

In gross pathology photography, aesthetic is important, but accuracy is more so. This can be achieved through:

- Correct anatomical orientation, and providing anatomical landmarks
- Filling the frame (without touching the edges)
- Removing clutter
- Maintaining plane of focus
- Using neutral backgrounds where appropriate

COMPOSITION, FRAMING AND AESTHETICS

- Rule of 3rds may not apply
  - Correct anatomical orientation
  - Include anatomical landmarks
  - Margins fill frames but don't touch edges
  - Same plane – use a step or move the subject
  - Arrows and probes can be added later – if necessary



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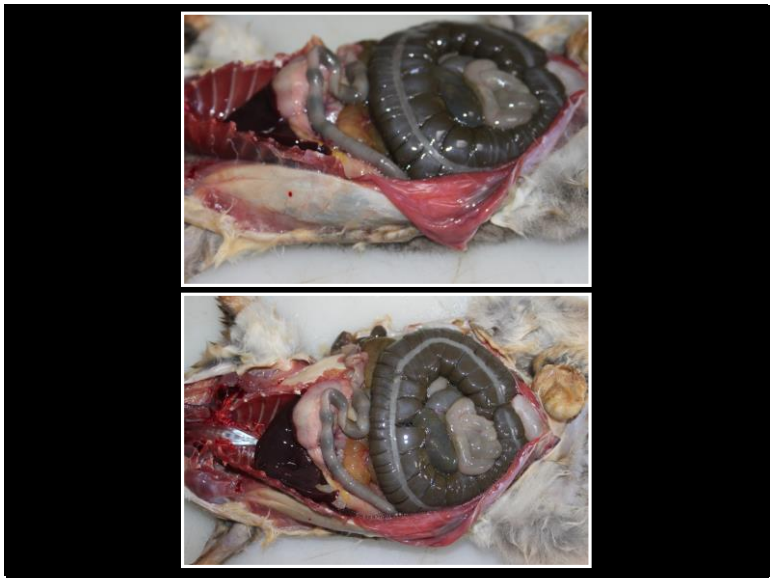
Slide 1: Achieve an aesthetically pleasing AND accurate image of a whole carcass by removing clutter, maintaining a parallel plane of focus by moving the subject to the floor or getting a step, using an unobtrusive label, and by capturing the whole carcass.

Slide 2: Achieve an aesthetically pleasing AND accurate image of tissues by maintaining a parallel plane of focus, and capturing the whole tissue. The head and legs/tail of this possum are not important to the image so they can be cropped out but rather than taking the photograph from the side of the animal at an angle, move the camera over the subject to get a clear image of the organs in situ. Everything is in focus. Much better.



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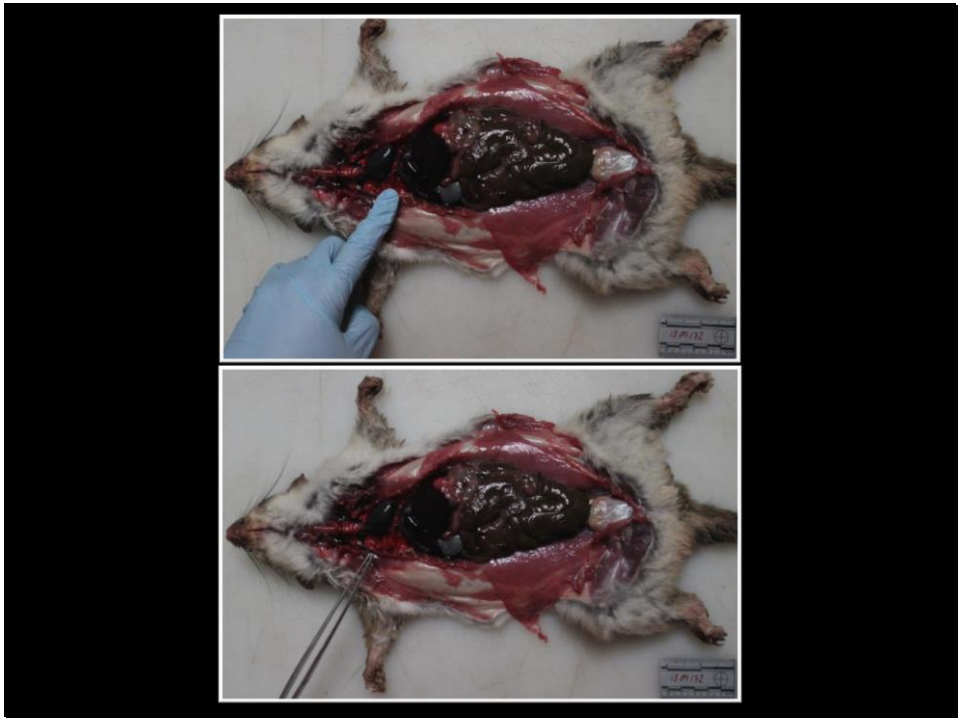
When I see a photograph with a hand in it, I spend more time looking at the hand than I do at what the hand is pointing to. They are large, often at the front of field thus affecting focus, and usually completely unnecessary. If there is a lesion present a good photograph should depict that without the need of a pointer. If a pointer is needed, it is better to use a small probe, or add one post production for publication purposes.

Clear tape can be a useful tool for pinning down wings or limbs in some instances. And pin boards/blocks can be useful for staking out small specimens for both dissection and photography.



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At the registry we have a fairly simple set-up consisting of a wide angle, and macro lens. A photography box with a non-reflective glass cover and matte black interior, and a copy stand to hold the camera steady on a parallel plane.

Often we hand hold the camera for everyday images on the fly, but the more sophisticated camera set up is useful for small specimens, or important images that may be useful for publication. The photo box requires you to take more time in setting up your image, but used correctly, the results are worth the time.

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A GOOD PICTURE IS WORTH A THOUSAND WORDS

Perhaps the most important part of taking gross pathology images, is correct storage. If you are not able to easily retrieve your images, there isn't much point in taking them in the first place.

Images should be filed into separate folders according to date, subject, event, client, host – or by whatever filing system your organisation requires - for easy retrieval and to maximise on storage space.

Delete any images that are not relevant, out of focus, or replications. You don't need 5 copies of the same shot so choose the best image and delete the rest. The only exception to this may be legal/forensic cases where image continuity may be called into question.

HAPPY SNAPPING!

SAVING FILES

- File your images for easy retrieval in case you get hit by a bus
  - Keep in separate folders labelled with case/animal ID, date or event

  OR
  - Label individual images so link them with case reports or animal records
- Filing systems will differ depending on institution needs

Hall, J and Rose, K. (2013) A Practical Guide to Effective Gross Pathology Photography. Wildlife Disease Association (Australasia), Grampians, Victoria. October 2013.