KNOBOLOGY & machine care

Emergency Ultrasound Course

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Why bother?

Best possible image

Most accurate image (artifacts)
Every machine is different!
Standard controls

Transducer selection (curved, linear…)
Preset selection (abdo, cardiac, OG…)
Frequency selection (high, low…)
TGC (time gain compensation)
Gain (overall amplification)
Focal zone
Depth
Dynamic range
Tissue harmonics
Auto optimise!
Which transducer?
CURVED

Range approx. 3.5 – 5 MHz

Big things
Torsos
EFAST
AAA
Pregnancy…
SECTOR

Range approx. 2-4 MHz

Ribcage

(Torsos too)
LINEAR

Approx 8-15 MHz

Small things
Vessels
Nerves
Foreign bodies
Abscesses
How to hold a probe
How to orient the probe
Torso transverse: marker to patient’s right
Torso transverse: marker to patient’s right
Torso longit: marker to patient’s head
Torso longit: marker to patient’s head
Procedural: marker on your left
And machine in front of you
Which preset?
Which preset?

- Easy to forget

- Correct preset maximises many of the features you would otherwise need to change manually
  - Dynamic range
  - Frequency
  - Focal zone
  - Depth
  - Frame rate
RUQ (cardiac preset)
RUQ (abdo preset)
Which frequency?
As frequency increases, waves get smaller

Resolution increases

Penetration decreases
Golden rule

Turn up the frequency!
Overall gain
OVERALL GAIN

Signal amplification

Makes whole image brighter / darker

Over-used!!
OVERALL GAIN

Left KNEE NEEDLED
OVERALL GAIN
Time gain compensation

A better control
TGC : TIME GAIN COMPENSATION

‘Graphic equaliser!’

Aim: uniform echo brightness in the display
Focal zone
Best image resolution occurs in the section of tissue through which the focal zone passes.

Always place the focal zone at the area of major interest in the image.
Lateral Resolution

Would be seem as one structures

Would be seem as two structures

Would be seem as one structures
Depth
Set depth just deep to area of interest

Too shallow = miss stuff

Too deep = wasted space

…and too slow
Dynamic range

How many Derwent colour pencils are in your box?
DYNAMIC RANGE
DYNAMIC RANGE

= the range of echo amplitudes displayed

Maximum setting = full range
Reducing dynamic range

“Cleans up” an image… eg good for looking at heart

Pitfall: can remove “real” echoes from the display…

eg bad for looking at the liver!
Know your keyboard!
Machine care
Vernacare

tuffie

225 large detergent wipes

Alcohol free multi surface general cleaning wipes
Machine care

Probe: don’t drop

Cord: don’t run over

Blood

Vomit
Ground rules for scanning
Ground rules

1. Explain (focused scan, not formal)
2. Enter patient data
3. Document image (R / L etc)
4. Save images
5. Clean the patient afterwards (bath towel)
6. Clean the probe, cord & keyboard
7. Document in the patient record
8. Log scan in log book
COMMON PROBLEMS
The obese patient

Increase depth
Decrease frequency
Lower the focus
Decrease dynamic range
Turn off harmonics
The machine

Unfamiliar

Insufficient for the task
The operator

Idiot
Can’t scan
Can’t interpret
Combination of the above
IDIOT

“NORMAL AORTA”
SUMMARY

Know your machine
Be nice to it
Follow the ground rules
Refs / thanks

- http://www.minnesotasocietyofanesthesiologists.com/
- Dr Maggie Chung
- Dr Steve Clenaghan
- Dr Niall Collum