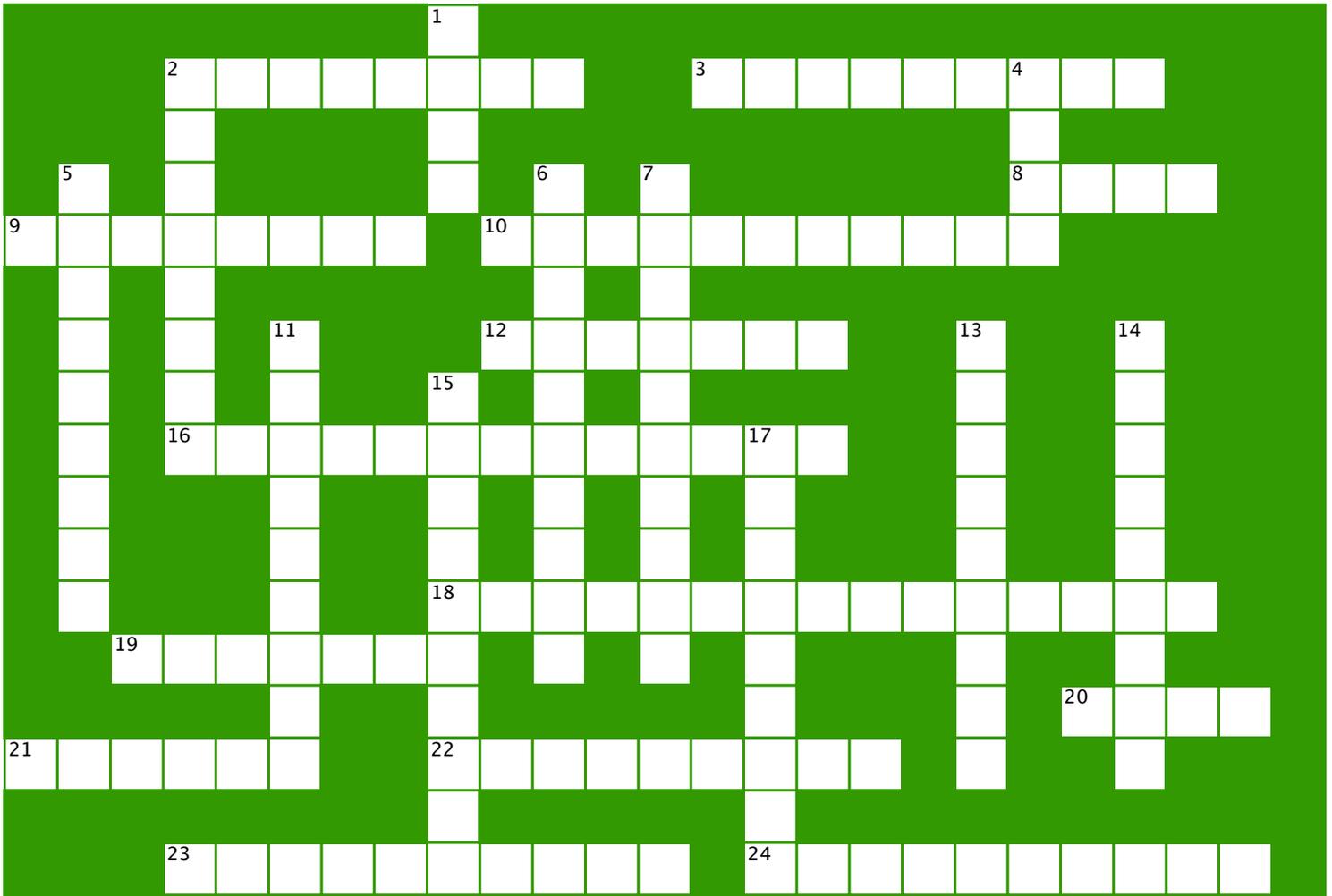


Puzzle 1



rarefaction wavelength scattering refraction bandwidth piezoelectric near sidelobes
 dynamic greyscale cineloop down sidelobe cosine wall autocorrelation wall increased
 resistance helical contrast biohazard decreases reasonably increases

Across

2. The ability to differentiate between two soft tissue areas with slightly different echogenicity is known as _____ resolution.
3. Overall range of frequencies in transmit pulse: pulse _____.
8. Doppler-shifted echoes caused by moving tissues are removed by the _____ filter.
9. Artifact causing multiple images of tissue displaced laterally from its true location.
10. Decrease of pressure in tissues caused by the ultrasound wave.
12. When blood flows around a sharp curve (e.g. the aortic arch) the flow pattern becomes _____.
16. The ultrasound transducer is made of one or more _____ material(s).
18. Colour Doppler uses a mathematical technique called _____ to determine the Doppler shift parameters for each small sample volume within the colour box.
19. The overall range of echo intensities is called the _____ range.

Down

1. Wall thump is an artifact of cw and pulsed Doppler that can occur when the _____ filter is set too low.
2. When the "freeze" button is activated the machine retains images from the previous few seconds for the user to review using the _____ function.
4. Artifact commonly caused by gas bubbles: ring _____.
5. The term used for a potentially harmful bioeffect.
6. Physical distance occupied by one cycle of the ultrasound wave.
7. The ratio $(S - D) / S$ [where S is the peak systolic Doppler shift and D is the minimum diastolic Doppler shift] is known as the _____ index.
11. If the number of bits for each pixel in the image memory is inadequate the _____ resolution of the image will be degraded.
13. The Mechanical Index increases as the ultrasound frequency _____.

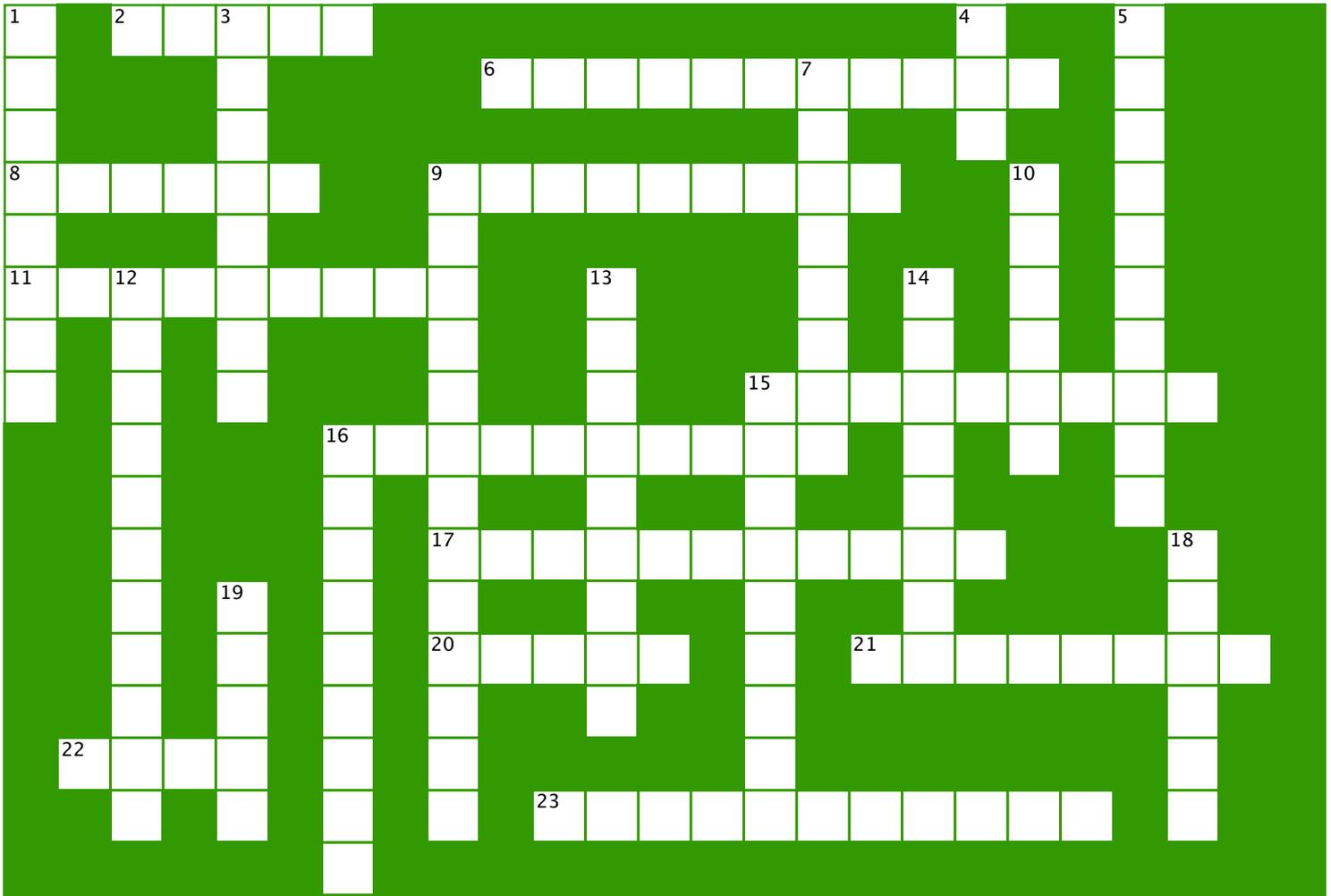
Across

20. A transducer can only be focussed at distances that fall within its _____ zone.
21. The echo from a moving scatterer has a Doppler shift that is determined by the speed of movement of the scatterer and the _____ of the Doppler angle.
22. The blood velocity in and immediately distal to an arterial stenosis is _____ relative to the velocity in other parts of the vessel.
23. The term "ALARA" stands for "As Low As _____ Achievable".
24. Mechanism by which a small tissue structure creates an ultrasound echo.

Down

14. Unwanted extra beams either side of the ultrasound beam.
15. Alteration of the direction of travel of ultrasound caused by a difference in propagation speed between two tissues.
17. Harmonic imaging in the presence of ultrasound contrast bubbles _____ the echogenicity of the bubbles relative to soft tissue.

Puzzle 2



amplitude attenuation impedance penetration phased repetition matching timing
 attenuation reduce preprocessing enhancement comet slice increase aliasing variance
 intrinsic low broadening parabolic beamwidth temporal bone power inversion

Across

2. Artifact commonly caused by calcifications: _____ tail .
6. Progressive reduction of ultrasound energy as it travels through tissues.
8. Reducing the dynamic range setting will _____ the number of artifact echoes displayed in liquid filled regions such as blood vessels.
9. In smooth laminar blood flow the velocity profile (the velocity distribution across the lumen of the vessel) is _____ .
11. Measure of how much the pressure in tissues is increased and decreased due to ultrasound wave.
15. The use of a relatively large aperture to create the ultrasound beam leads to a Doppler artifact known as _____ spectral broadening.
16. The spectrum obtained from a vessel just distal to a stenosis usually shows spectral _____ .
17. Attenuation artifacts include shadowing and _____ .

Down

1. When the ultrasound frequency is increased the Doppler shift will _____ .
3. Reflection of ultrasound at the tissue-transducer interface is minimised by using a _____ layer.
4. If a circulation has high resistance then the blood flow in it is relatively _____ .
5. Number of pulses transmitted each second: pulse _____ frequency.
7. If the maximum Doppler shift exceeds one half of the PRF then frequency _____ occurs.
9. The preferred zoom function is write or _____ zoom since this maximises image resolution and frame rate.
10. Array transducers focus and steer the transmitted ultrasound by altering the relative _____ of the transmit pulses from each element.
12. The maximum number of pulses that the machine can transmit each second is limited by the _____ of the ultrasound.

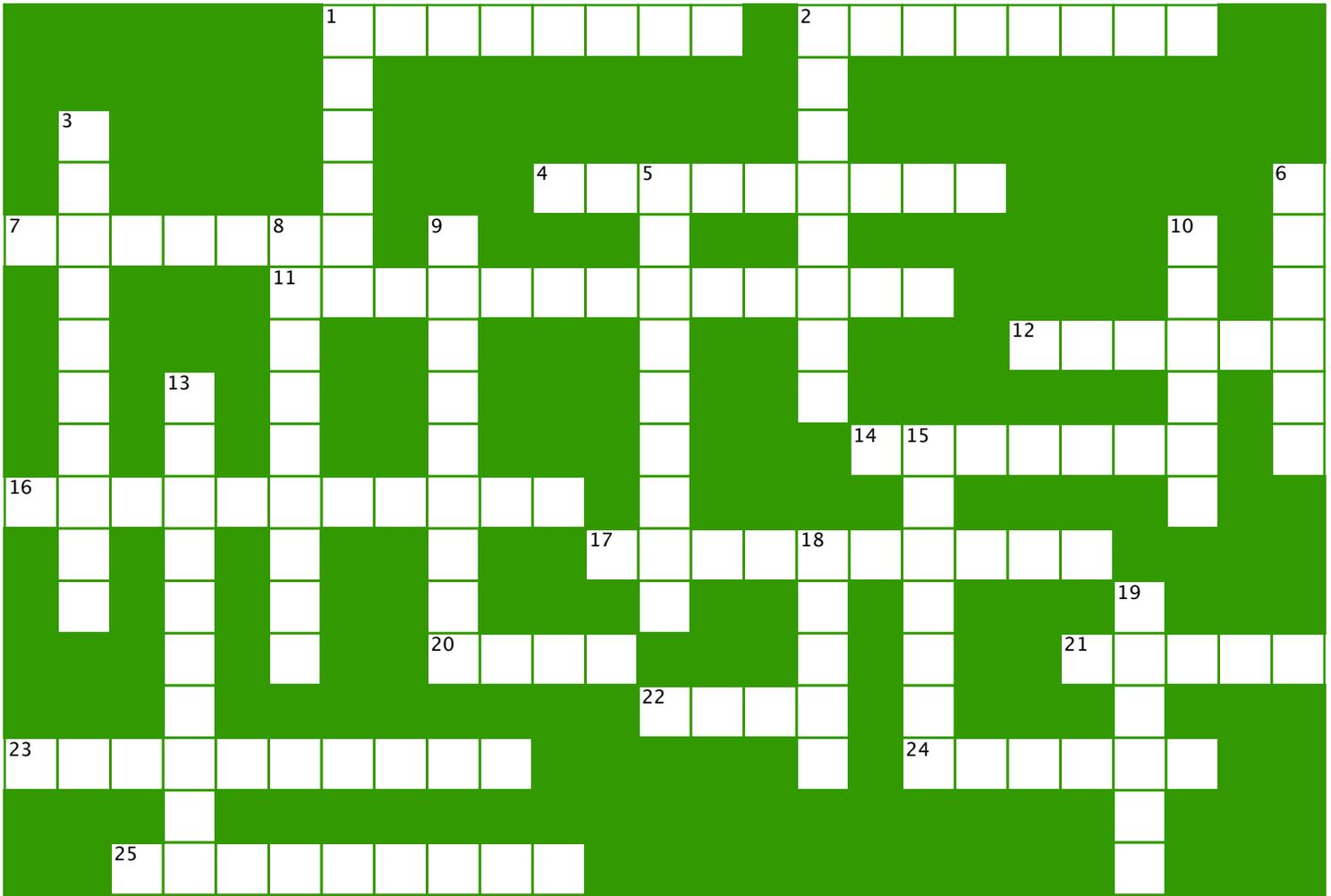
Across

20. Artifact that commonly causes small liquid-filled structures to appear to contain tissue echoes: _____ thickness.
21. The persistence function of the machine smoothes speckle but it degrades the _____ resolution.
22. Tissue heating is increased in the presence of a tissue- _____ interface.
23. The Time Gain Compensation (TGC) function of the machine allows the user to adjust for variations in the _____ of the ultrasound.

Down

13. The fraction of ultrasound energy reflected at a tissue interface is determined by the difference in the acoustic _____ of the tissues either side of the interface.
14. Colour Doppler processing determines the following parameters for each sample volume: the mean Doppler shift, the _____ and the Doppler signal power.
15. Broadband harmonic imaging is achieved by the machine using the pulse _____ technique.
16. The lateral resolution in an ultrasound image is determined by the ultrasound _____ .
18. Cardiac ultrasound is generally performed using a _____ array probe.
19. The energy delivered to the patient's tissues per second is termed the ultrasound _____ .

Puzzle 3



period reflection speckle curved duration depth diffraction matrix double spatial artifacts
 reverberation beamwidth mirror decrease range repetition mirror half turbulent plug
 duration phantom cavitation intensity interfaces artifacts

Across

1. Time taken for one transmit pulse: pulse _____.
2. When the Doppler angle is increased the Doppler shift will _____.
4. The accuracy of measurements in ultrasound images is degraded by the presence of image _____.
7. If the number of pixels in the image memory is inadequate the _____ resolution of the image will be degraded.
11. Artifact that causes tissues to appear in the image as multiple echoes equally spaced in depth.
12. When the Doppler angle is 90 degrees an artifact known as spectral _____ artifact may occur.
14. Appearance in image caused by summation of a large number of scattered echoes.
16. The narrowest achievable beamwidth at each depth is defined by the _____ limit of the transducer.

Down

1. Digitisation of the ultrasound signal does not degrade the echo information as long as the rate at which the machine samples the echo signal is at least _____ the ultrasound frequency.
2. The axial resolution in an ultrasound image is determined by the ultrasound pulse _____.
3. Altering the velocity scale of the Doppler spectral display alters the machine's pulse _____ frequency.
5. If a Doppler signal has higher than normal variance, this is likely to be a sign that the blood flow is _____.
6. Artifact caused by reflection of ultrasound by a strongly reflective tissue interface: _____ image artifact.
8. Compared with conventional images, tissue harmonic images demonstrate improved resolution and reduced image _____.
9. Artifact causing lateral smearing of tissues in image.
10. Abdominal ultrasound is generally performed using a _____ array probe.

Across

17. Compared with conventional images, spatial compound images have improved visualisation of tissue _____.
20. If two identical vessels are in parallel the resistance is _____ the resistance of each individual vessel.
21. The time delay between the transmission of a pulse and the reception of an echo allows the machine to calculate the _____ of the tissues that caused the echo.
22. When the blood in a vessel is strongly accelerated the velocity profile (the velocity distribution across the lumen of the vessel) is flattened and this is referred to as _____ flow.
23. The main mechanical (i.e. non-thermal) biohazard associated with ultrasound.
24. A two-dimensional array transducer is called a _____ transducer.
25. The energy delivered to the patient's tissues per square centimetre per second is termed the ultrasound _____.

Down

13. Mechanism by which smooth tissue interfaces cause an ultrasound echo.
15. A device designed to mimic human tissues and used to test equipment performance is called an ultrasound _____.
18. Pulsed Doppler detects the Doppler shift relating to blood in a defined volume by using a _____ gate.
19. Time interval between one cycle of the ultrasound wave and the next.