THE SONOGRAPHER'S

QUICK REFERENCE GUIDE TO NORMAL SPECTRAL WAVEFORMS

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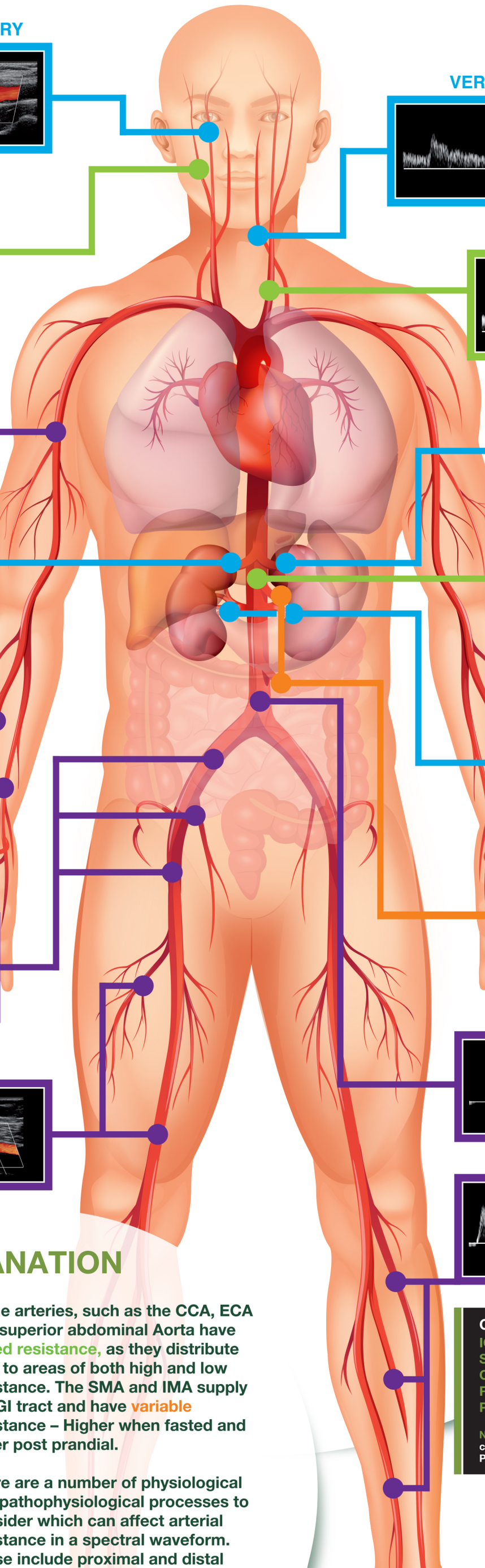
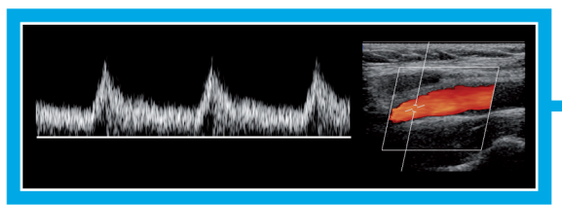
ARTERIAL DOPPLER



INTERNAL CAROTID ARTERY



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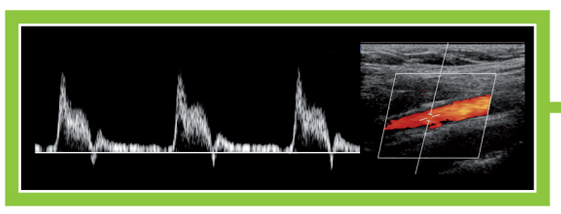
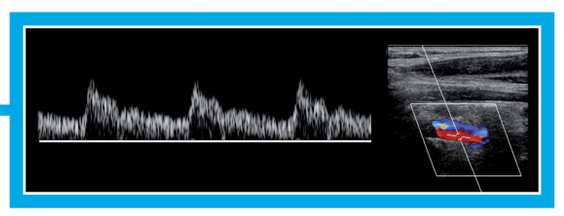
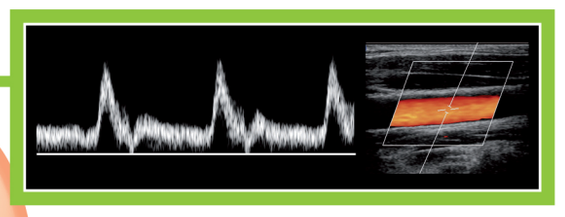


VERTEBRAL ARTERY



COMMON CAROTID ARTERY



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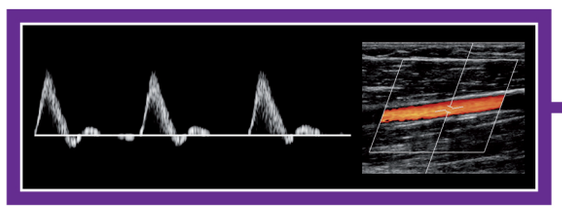
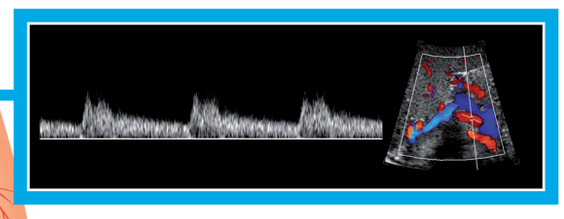
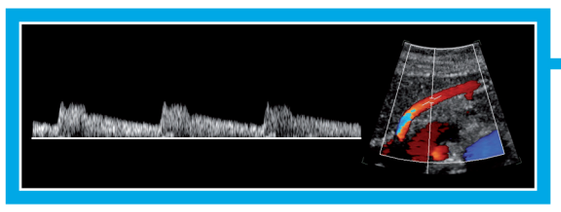


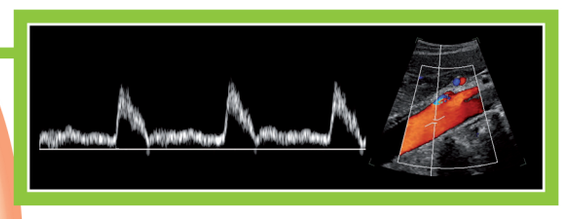
SPLENIC ARTERY



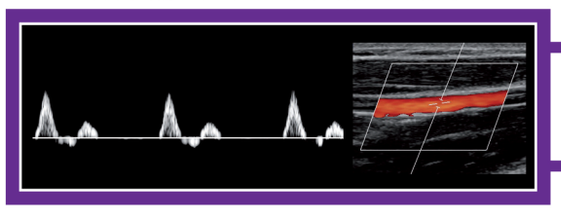
HEPATIC ARTERY



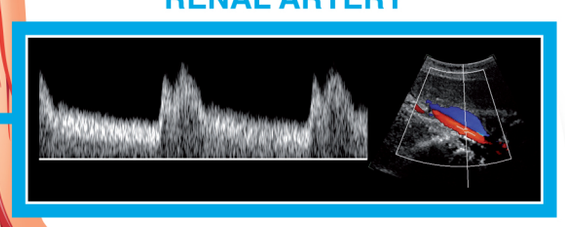
SUP. ABDOMINAL AORTA



RADIAL & ULNA ARTERY



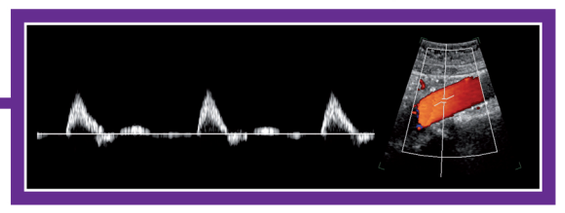
RENAL ARTERY



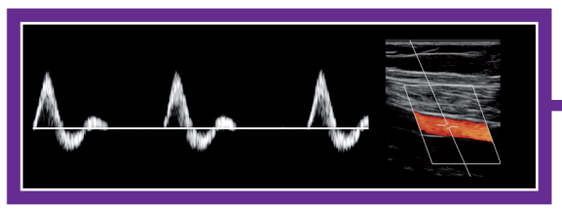
SMA / IMA

ILIAC ARTERY

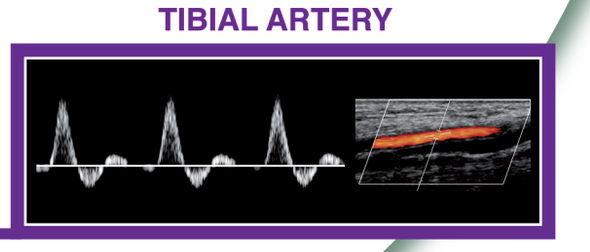
INF. ABDOMINAL AORTA



FEMORAL ARTERY



TIBIAL ARTERY



WAVEFORM EXPLANATION

The shape of a normal spectral waveform is determined by the cardiac output, the compliance of the vessel and the resistance in the vascular bed that the artery is supplying. In a normal healthy person the formative feature is the distal vascular bed.

Arteries providing flow to the limbs and peripheries have **high resistance** compared with those supplying organs with **low resistance** beds (such as the brain, thyroid, kidneys, liver and spleen).

Some arteries, such as the CCA, ECA and superior abdominal Aorta have **mixed resistance,** as they distribute flow to areas of both high and low resistance. The SMA and IMA supply the GI tract and have **variable** resistance – Higher when fasted and lower post prandial.

There are a number of physiological and pathophysiological processes to consider which can affect arterial resistance in a spectral waveform. These include proximal and distal stenoses, inflammation, eating, exercise and organ disease.

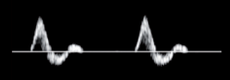
Common Criteria for identifying stenosis

ICA: **>125cm/s** (>50%)
SMA: **>275cm/s** (>75%)
Coeliac Axis: **>200cm/s** (>75%)
Renal Arteries: **>200cm/s and RAR >3.5:1** (>60%)
Peripheral Arteries: **Velocity Ratio >2:1** (>50%)

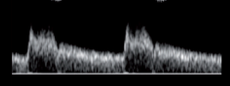
Note: Velocity and ratio criteria should be used along with b-mode and colour findings. Criteria may vary between institutions. Please refer to your local protocols.

KEY

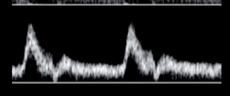
HIGH RESISTANCE



LOW RESISTANCE



MIXED RESISTANCE



VARIABLE

References:

1) Wood MM et al (2010). *Spectral Doppler signature waveforms in ultrasonography: a review of normal and abnormal waveforms.* Ultrasound Quarterly Jun; 26 (2): 83-99
2) Necas M (2006). *Arterial spectral Doppler waveforms: haemodynamic principles and clinical observations.* ASUM Ultrasound Bulletin Feb; 9 (1): 13–22
3) Meyers K and Clough A (2014). *Practical Vascular Ultrasound: An Illustrated Guide.* 1 Edition. CRC Press.

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