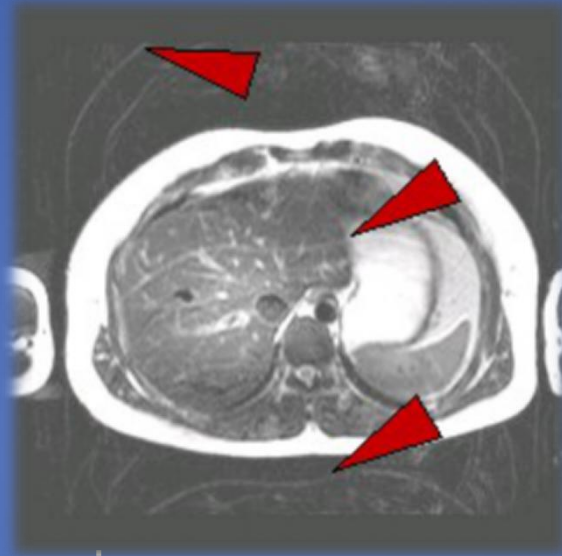


MRI artifacts'



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Phase
mismatching

Patient
motion

aliasing

Magnetic
susceptibility

Chemical
shift

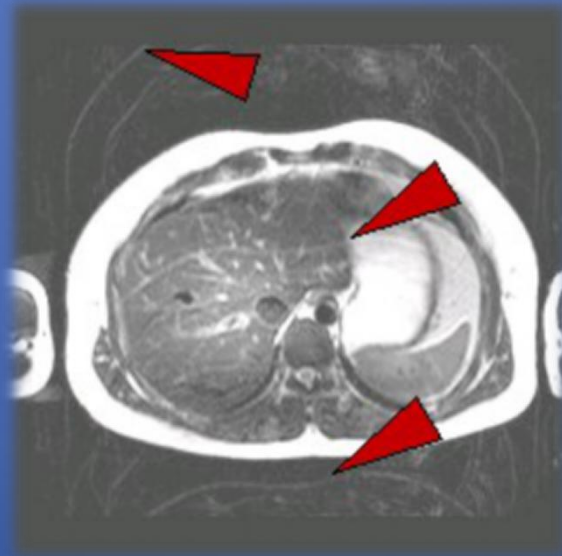


truncation

Chemical
misregistration

Phase mismatching (ghosting)

Caused by anatomy moving between each application of the phase encoding gradient, and by motion along the phase encoding gradient during the acquisition of data.



Main causes of this artefact

Pulsatile motion of the vessels

Movement of the chest wall during respiration

Cardiac motion

Phase mismatching is reduced by:

Swapping the phase axis so that the artefact does not interfere with area under examination.

Placement of spatial pre-saturation pulses between the origin of the artefact and FOV.

Using respiratory compensation (RC)

Using (ECG) gating or (PE) gating

Selecting GMN



aliasing

Occurs when anatomy that lies within the boundaries of the receiver exists outside the FOV.

Aliasing can occur along both the frequency encoding axis and phase encoding axis.

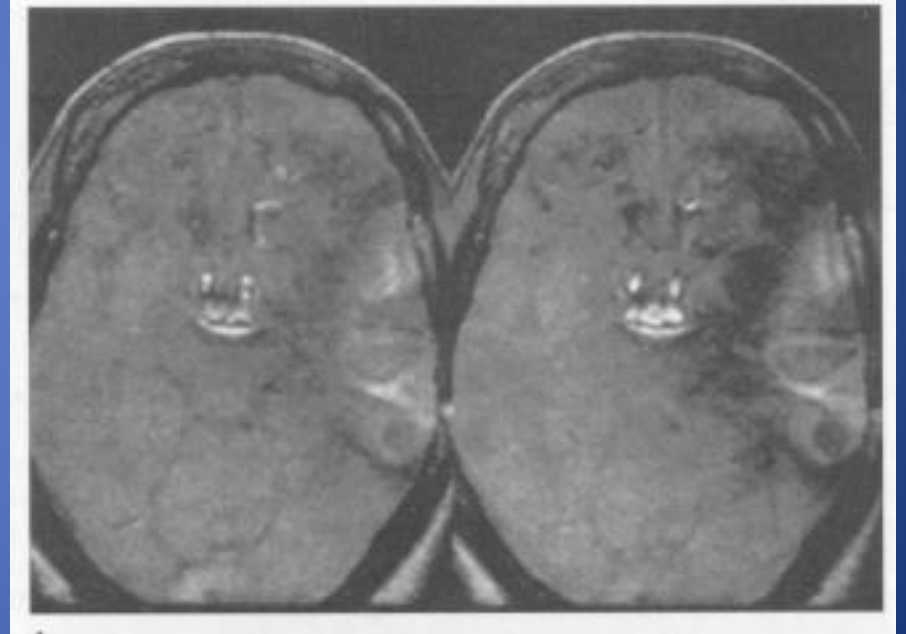
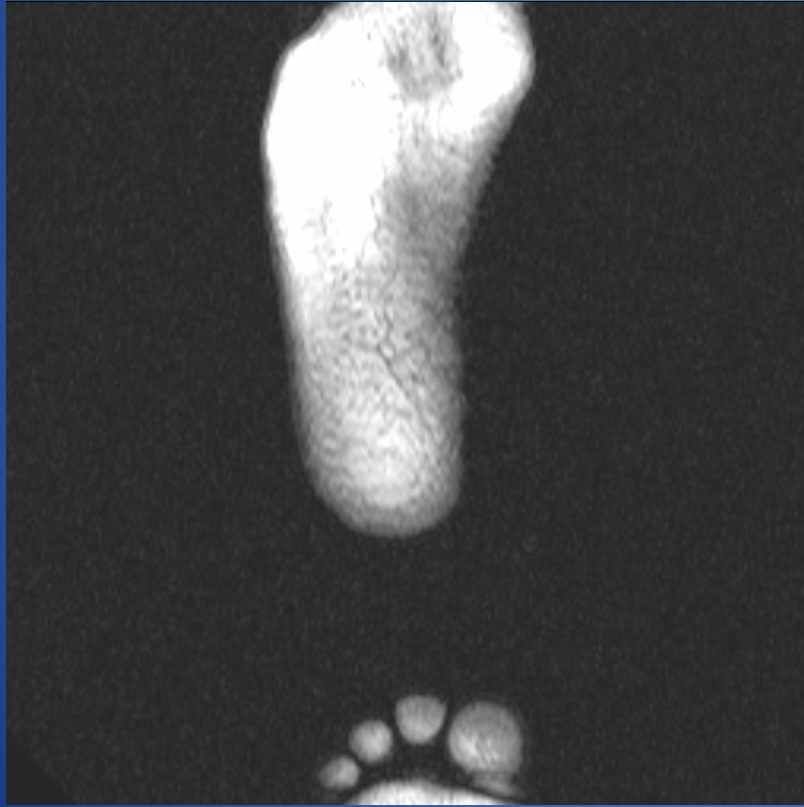
Frequency wrap is largely eliminated with use of digital filters that filter out signal originating outside the FOV.

Phase wrap is reduced by:

Increasing the FOV to the boundaries of the coil.

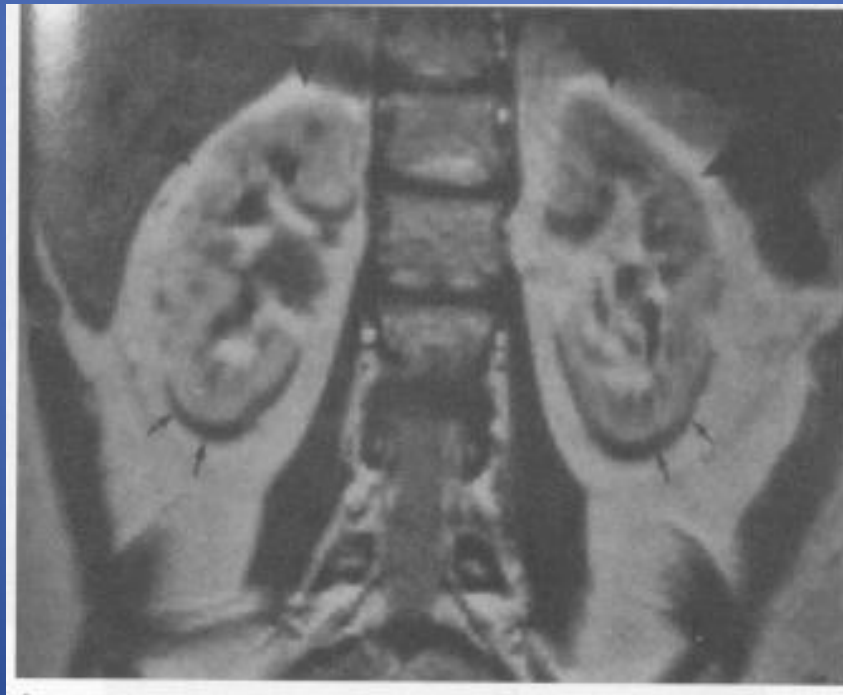
Oversampling in the phase direction.

Place spatial pre-saturation pulse over signal-producing anatomy.



Chemical shift

Caused by dissimilar chemical environments between water and fats causing displacement of signal between fat and water.



Chemical shift is reduced by:

Scanning with low field strength magnet.

Removing either fat or water signal by using STIR/ spectral pre-saturation/ dixon technique.

Broadening the received bandwidth.

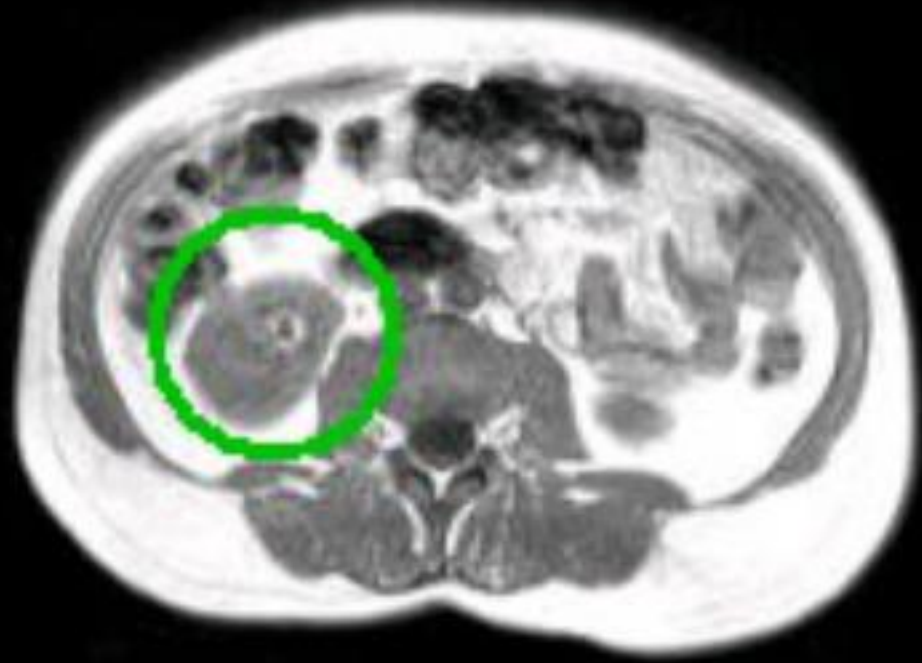
Chemical misregistration:

Occurs when water and fat are out of phase causing cancelling out of their signal.

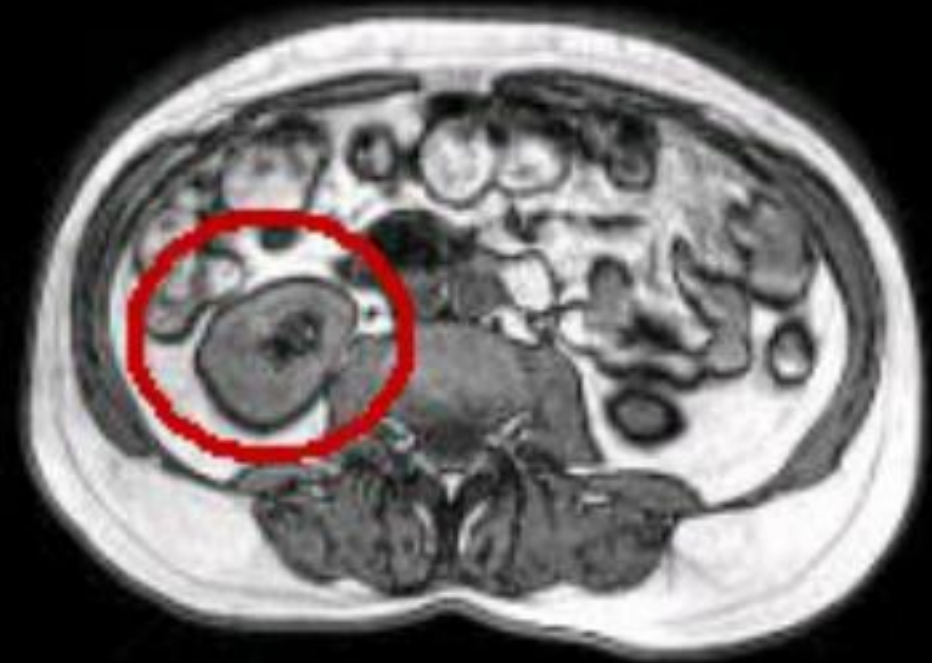
it's most prevalent in GRE.

Could used positively to reduce the signal from fat (Dixon technique).

In-
phase



Out-of-
phase



To reduce chemical misregistration:

Use SE or FSE pulse sequence.

Use TE that matches the periodicity of fat and water so echo generated when the water and fat in phase.

Truncation

Caused by under sampling of data at the interface of high and low signal, it produce a dark band running through a high signal area.

Gibbs artefact is an example.

Truncation is reduced by:

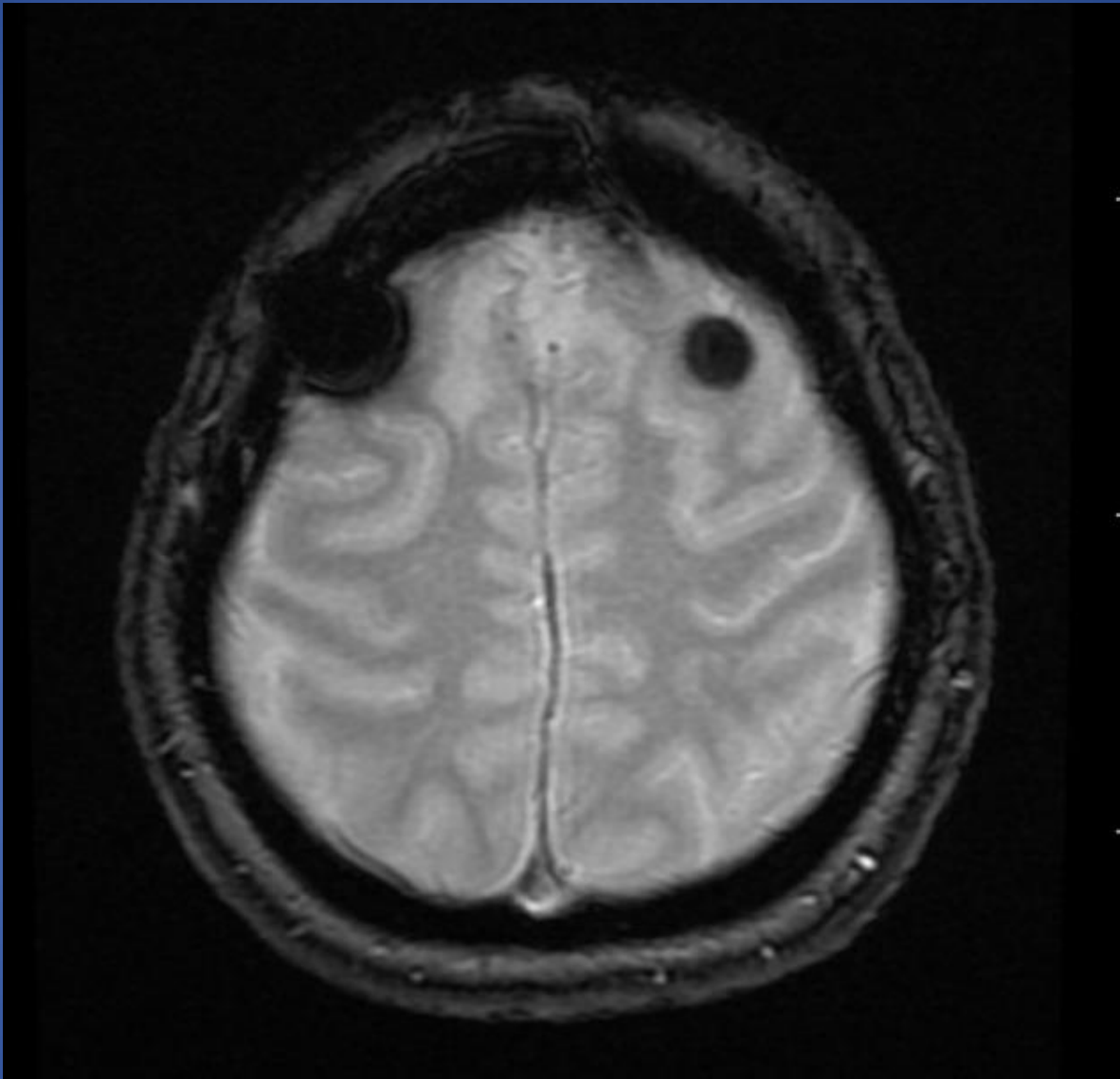
Increasing the number of phase encoding steps.

Magnetic susceptibility:

Occur because all tissues magnetize to a different degree depending on their magnetic characteristics, it occurs at boundaries of structure of a very different Magnetic susceptibility causing a loss in signal.

It's occurs in GRE when patient has a metal prosthesis in situ.

This artefact is used positively to investigate haemorrhage and blood products, it's presence suggest recent bleeding.



Magnetic susceptibility is reduced
by:

Using SE and FSE.

Removing all metal items from the patient
before examination.

Patient motion:

For reducing involuntary motion is RC and Gating techniques.

For reducing voluntary motion good explanation of the procedure to the patient and using immobilization device,

