

## MRI Sequences

### T1 and T2 weighted

- T1 vs T2 difference:

On **T2**, H<sub>2</sub>O (including CSF) = bright  
Includes oedema which signifies disease

- **Bright on both** = fat
- **Grey on both** = soft tissues
- **Black on both** = bone, air, flowing blood

### Gadolinium-enhanced

Same as **T1** but...

- Gadolinium, a contrast agent, is given
- **Enhances areas of leaky blood vessels** (pathological tissues e.g. tumours, areas of inflammation/infection)

### Fluid-attenuated (FLAIR)

Same as **T2** but...

- Flowing water (like CSF) is suppressed, so appears black
- Only **non-flowing water appears bright**
- Helps differentiate pathologic oedematous lesions from normal flowing water (like CSF)

### Fat-suppressed

- Fat suppressed T1 or T2
- Used to make fat appear dark
- Often used when giving gadolinium contrast on T1, or on T2 to allow fluid to stand out

### Diffusion-weighted image (DWI)

- Shows passive diffusion of water
- Consists of two main images:
  - DWI – combination of actual diffusion and T2 (restricted diffusion = bright)
  - ADC – represents actual diffusion without T2 effects (restricted diffusion = dark)
- Cytotoxic oedema = bright on DWI and dark on ADC
- Most useful when looking for ischaemic brain tissue in stroke
- Note, DWI is derived from T2; therefore, some tissues that are bright on T2 also appear bright on DWI (T2 shine through effect)