Cardiac Magnetic Resonance Imaging Laboratory
Main contraindications of CMR

- Claustrophobia
- Brain aneurysm clips
- Ear/ocular implants
- Pacemaker and implantable cardioverter defibrillator (ICD)
- Mechanical heart valves (implantations before 1985)
- High-magnetic metal prostheses (prostheses implanted after 1995 are already MR conditional)
- Certain skin tattoos
MR environment, MR safety

**MR Safe** - an item that poses no known hazards in all MRI environments, “MR safe” items include non-conducting, non-metallic, non-magnetic items.

**MR Conditional** - an item that has been demonstrated to pose no known hazards in a specified MRI environment **with specified conditions of use**. Additional conditions, including specific configurations of the item (e.g., the routing of leads used for a neurostimulation system), may be required.

- There are hundreds of serious injuries (burns), published death
- **Nephrogenic systemic fibrosis** due to MR contrast agents
Bullet impact, flying objects

High magnetic field strength (permanent!)

Velocity of 50 km/h!
Top 6 indications

- Ischaemic heart disease
- Cardiomyopathies
- Myocarditis
- Congenital heart disease
- Tumours
- Pericardial diseases
Volumes, function
Left ventricular volumes and mass
Right ventricular volumes and mass
Right ventricular volumes and mass
Perfusion MRI and delayed contrast enhancement

Contrast

Normal Myocardium

Contrast

First-Pass

Delayed Enhancement

Infarction

time
Ischaemic heart disease

- Global and regional left ventricular function
- Viability „the bright is dead”
Contrast enhancement

**Figure 8.** Potential mechanisms of hyperenhancement in acute and chronic MI. See text for details. (Reprinted with permission from Cardiovascular MRI and MRA. Charles B. Higgins, editor. Lippincott Williams & Wilkins, 2002.)
Delayed contrast enhancement
17-segment model of the heart

LAD

RCA

LCX
Viable myocardium is myocardium which due to ischaemia does not contract normally at rest **but has the potential to recover its function**, either by itself over time or after revascularisation.
Dilated cardiomyopathy
Hypertrophic cardiomyopathy
Hypertrophic cardiomyopathy
Hypertrophic cardiomyopathy
Left ventricular non-compaction
Arrhythmogenic right ventricular cardiomyopathy/dysplasia (ARVD)
Arrhythmogenic right ventricular cardiomyopathy/dysplasia (ARVD)
Acute myocarditis

bSSFP

T2w

DE
Myocardial necrosis
Tako-tsubo cardiomyopathy
Acute pericarditis
Left atrial myxoma
Right atrial lipoma
Rectal tumor metastasis

Breast cancer metastasis
Thank you for your attention!
Take home message
Magnetic field in the MRI is permanent