MRI-guided Cardiovascular Interventions

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Cardiac MRI

• The basic cardiac sequences (since ~2000)
  – Black Blood TSE
  – Function Balanced FFE
  – Perfusion with IR-TFE
  – Viability imaging
  – 2D and 4D flow
  – Coronaries with navigators

• New mapping techniques in R5
  – T1-mapping (R5.2)
  – T2-mapping
  – T2*-mapping
Philips Interventional MRI Suite* (‘‘iSuite’’)

- Percutaneous (Liver, Kidney, Breast, Prostate, Shoulder biopsies, brachy, spinal pain injections, shoulder arthroscopy)
- Intravascular (EP ablations, cardiac biopsies, renal denervation, stemcell injection)

* Works in Progress
Philips Interventional MRI Suite* ("iSuite")

- InVivo SensaVue In-room display
- Standard Philips Cathlab foot pedal*
- Imricor Vision catheters + Advantage EP recorder
- Compatible with Intera/Achieva/Panorama/Ingenia
- 1.5T/3.0T

* Works in Progress
Interventional MRI Suite* features

- Real-time imaging in 3 viewports
  - Any sequence (balanced SSFP, black blood etc)
  - all 3 planes interleaved
  - Switching between sequences within seconds
  - Instantaneous sequence switching*

- 3D Roadmaps
  - Any 3D scan

- Automatic segmentation
  - Whole heart model (LV,RV,LA,RA etc)

- Active device visualization
  - Multiple micro coils, volume renderings

- Image overlays
  - e.g. temperature mapping

- Integration of 3rd party data (e.g. EP)
  - Voltage maps

* Works in Progress
Segmentation
EP mapping
EP mapping
Examples of Cardiovascular iSuite sites

MR-EP
Congenital

Renal denervation,
Myocardial biopsies

MR-EP

Stem cell injections,
(Oncology applications)
UMC Utrecht: MRI guided stemcell injection

How to improve the modest success of stem cell injections?
- Use MRI to locate the target
- Use MRI to guide the target
- Use exosomes
- Immobilize the stem cells with UPy gel