IMAGING

N. Ajmone Marsan (Leiden, NL)

Conflicts of Interest
None
IMAGING

- **Coronary artery disease and ischemic heart disease**
  - Douglas (US) «PLATFORM trial»
  - Stirrat (UK) «USPIO-enhanced MRI after STEMI»
  - Teunissen (NL) «PTI PET after STEMI»

- **Heart failure**
  - Gorcsan III (US) «EchoCRT substudy»
  - García-González (ES) «Scar and Innervation imaging for ICD»

- **Technological innovations**
  - Vilades (ES) «Calcium subtraction in MDCT»
  - «Fusion imaging»
  - Muraru (IT) «3D printing»
CORONARY ARTERY DISEASE AND ISCHEMIC HEART DISEASE
CLINICAL OUTCOMES OF FFR_{CT}-GUIDED DIAGNOSTIC STRATEGIES VERSUS USUAL CARE IN PATIENTS WITH SUSPECTED CAD
Stable symptoms suspicious for CAD
Planned non-emergent noninvasive test or catheterization

**Planned NI test**
- Sequential cohorts
- **Standard NI test**
- Exercise ECG
  - Stress nuclear
  - Stress echo
  - Stress MRI
  - CTA
- CTA + FFR_{CT}
  - FFR_{CT}
  - No FFR_{CT}

**Planned ICA**
- Sequential cohorts
- **Standard ICA**
- CTA + FFR_{CT}
  - FFR_{CT}
  - No FFR_{CT}

Clinical results available to care team within 24-48 hrs;
Subsequent testing/mgmt per care team per best practises

1° - Cath w/o obstructive CAD (QCA) or FFR ≤ 0.80 at 90 days
2° - MACE: death, MI, UA; vascular events; costs; QOL; rad exposure
Invasive Catheterization w/o Obstructive CAD Primary Endpoint

**Planned NI Test**
- Usual Care: N (%) = 6 (6.0), P = 0.95
- FFRCT: N (%) = 13 (12.5)

**Planned ICA**
- Usual Care: N (%) = 137 (73.3), P < 0.0001
- FFRCT: N (%) = 24 (12.4)

P. Douglas (US), 5995
CMR PATHOPHYSIOLOGICAL INSIGHTS INTO MYOCARDIAL INFARCTION

- Myocardial macrophage activity detected with USPIO-enhanced MRI within the infarct core in the first two weeks following acute MI
- Assessment and monitoring myocardial cellular inflammation

- Diagnosis
- Risk stratification
- Novel anti-inflammatory therapeutic interventions

Inflammation After Myocardial Infarction

USPIO-enhanced T2* MRI

LGE – inferior MI

T2 mapping MRI

CG. Stirrat (UK), P2127
### Baseline PTI (2ch-longaxis)

![Image 1]

### Baseline PTI (polarmap)

![Image 2]

### Baseline DCE (2ch-longaxis)

![Image 3]

### Follow-up end-systole (2ch-longaxis; cine)

![Image 4]

A cut-off value of ≥ 0.85 for PTI was optimal for accurately predicting regional functional recovery

Teunissen (NL), P426
HEART FAILURE
PERSISTENT LV DYSSYNCHRONY AND OUTCOMES OF CRT IN NARROW QRS

All Patients, No Significant Dyssynchrony at 6 mo

All Patients, Significant Dyssynchrony at 6 mo

n = 614

Freedom from Death or Heart Failure Hospitalization (%)

HR=1.54, 95%CI 1.03-2.30, *p=0.034

<table>
<thead>
<tr>
<th>Time (years)</th>
<th>Freedom from Death or Heart Failure Hospitalization (%)</th>
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<tbody>
<tr>
<td>0</td>
<td>100</td>
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<tr>
<td>0.5</td>
<td>80</td>
</tr>
<tr>
<td>1</td>
<td>60</td>
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<tr>
<td>1.5</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>2.5</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
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<tr>
<td>3.5</td>
<td>5</td>
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No Dyssynchrony

145 132 115 77 50 25 15 6

Dyssynchrony

469 416 307 216 153 97 62 24

J. Gorcsan (US), 1951
COMBINATION OF LGE-MRI AND MIBG SPECT TO IMPROVE RISK STRATIFICATION OF HF PATIENTS

$n = 86$
Follow-up 21.5 months
22% met primary endpoint: ICD shocks/VT/cardiac death

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<thead>
<tr>
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<th>HR</th>
<th>CI 95%</th>
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<tbody>
<tr>
<td>Late HMR ≤ 1.32</td>
<td>3.16</td>
<td>1.01-9.12</td>
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<tr>
<td>Atrial fibrillation</td>
<td>3.27</td>
<td>1.8-9.11</td>
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<tr>
<td>LGE ≥ 9.13</td>
<td>9.96</td>
<td>1.40-11.15</td>
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</tbody>
</table>

Late HMR > 1.32 & LGE < 9.13%  
Late HMR ≤ 1.32 & LGE < 9.13% or Late HMR > 1.32 & LGE ≥ 9.13%

P. Garcia-Gonzalez (ES), P181
T1 MAPPING IN DCM TO QUANTIFY DIFFUSE MYOCARDIAL FINROSIS: COMPARISON WITH ENDOMYOCARDIAL BIOPSY

Fabian aus dem Siepen et al, EHJ CVI 2015
TECHNOLOGICAL ADVANCES
ADVANCES IN MDCT POST-PROCESSING: CORONARY ARTERY CALCIUM AND METAL STENT SUBTRACTION BY 320-ROW MDCT

Adquisition methodology

Voltage: 100 K
0.5 mm slice thickness

Precontrast CTA
Contrast CTA

Single breath-hold

0''
SureStart
30''

Precontrast CTA
Contrast CTA
Subtraction CTA

D. Vilades (ES), P745
Conventional CTA  Subtraction CTA  Invasive coronary angiography

D. Vilades (ES), P745
SMART FUSION IMAGING

Clinical application in cardiovascular medicine (proto-type)

Magnetic sensor system

Position sensor

Smart Fusion probe (PST-25BT/PST-30BT)

H. Oe (JP), P4503
Clinical application in cardiovascular medicine (proto-type)
Fusing information from MDCT and Doppler echocardiography: aortic stenosis

Kamperidis et al, Eur Heart J 2015
Hybrid imaging with MDCT and 3D speckle tracking stress echocardiography

Zamorano et al, EHJ CVI 2015
3D PRINTING

- Tricuspid geometry challenging with 2D imaging
- Feasibility of 3D printing of TV from transthoracic 3D echocardiography

D. Muraru (IT), P2550
- Combination of anatomical and functional data with FFRCT on CAD improves referral of patients for invasive CAG
- Novel pathophysiological aspects of myocardial infarction
- LV dyssynchrony after CRT is associated with worse prognosis
- Integration of myocardial scar and innervation imaging refines the risk stratification of HF patients
- Fusion imaging and 3D printing growing fields