Έχει θέση το FFR στους ασθενείς με οξύ στεφανιαίο σύνδρομο;

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The role of FFR in intermediate lesion assessment

• Can be measured at the time of coronary angiography and identifies coronary lesions responsible for ischemia

• FFR-guided revascularization strategies are associated with favorable clinical outcomes in patients with single or multivessel disease

• FFR has been used for stable CAD assessment mostly
FFR and ACS: Clinical Settings

- FFR for the culprit assessment in acute setting
- FFR in Chronic MI
- FFR for the non culprit assessment
Impact of MI in the severity of an epicardial stenosis: Acute phase

- FFR=0.50 (significant) → Normal Myocardium (DS=75%)
- Non significant

- FFR=0.84 → Myocardial Infarction
  - DS=75%
  - Myocardial Infarction
  - Non-viable
  - Normal Myocardium
  - Stunning

- Microvascular Dysfunction, Thrombi
Impact of MI in the severity of an epicardial stenosis: Chronic phase

- **Normal Myocardium**
  - DS=75%
- **Myocardial Infarction**
  - FFR=0.50
  - Significant
- **Scar**
  - FFR=0.84
  - Non significant
- **Capillary density**
- **Microvascular Dysfunction**

70 ΧΡΟΝΙΑ ΚΑΡΔΙΟΛΟΓΙΑΣ (ΕΚΕ)
70 YEARS OF CARDIOLOGY (HSC)
PΑΝΕΛΛΗΝΙΟ ΚΑΡΔΙΟΛΟΓΙΚΟ ΣΥΝΕΔΡΙΟ
PАНΕΛΛΗΝΙΚΟΝ ΣΥΝΕΔΡΙΟ ΚΑΡΔΙΟΛΟΓΙΑΣ
WWW.HCS.GR
FFR and ACS: Clinical Settings

• FFR for the culprit assessment in acute setting

• FFR in Chronic MI

• FFR for the non culprit assessment
FFR in ACS/moderate stenosis-culprit

• 189 patients with moderate (50-70%) coronary lesions, 111 with FFR < 0.75
• 35% with ACS

Fischer et al. CCI 2006
FFR in ACS/moderate stenosis-culprit

- 201 patients with moderate coronary lesions, STEMI<24h excluded
- 62% UA/NSTEMI/STEMI

Proportion of Patients Free of Cardiac Event

Unstable angina or myocardial infarction
Stable angina

Months of Follow-up

No. at Risk
UA/MI  124  121  90  64  36  20  14  7  4
SA     61  56  44  29  23  12  8  6  5

p = 0.4723

Potvin et al. Am J Cardiol 2006
ACS patients in FAME

Sels et al, JACC Interv 2012
FAMOUS study

Oct. 2011 ↓ May 2013

n = 176

Randomise

n = 174

Possible obstructive CAD
≥ 1 stenosis ≥ 30% severity amenable to revascularization

Consent

Coronary arteriogram

Screened

n = 444

Registry

n = 503

Diagnosis of NSTEMI
Intermediate-high risk
Referred for coronary angiography

FFR disclosed

350

FFR not disclosed (Angio-guided)

Cath lab treatment decision
Medical therapy
PCI
Referral to MDT/CABG

FFR ≤ 0.80 ~ revascularization
FFR > 0.80 ~ medical therapy

Decision based on visual assessment of CAD severity (Angio-guided)

ESC Hotline 1 Sep 2014

Layland et al Eur Heart J. 2014
FAMOUS study

**Primary outcome**

The proportion of patients allocated to medical management only at baseline in each group.

![Bar chart showing comparison between FFR-guided and Angiography-guided groups post-randomisation. The FFR-guided group has a significantly higher proportion with 22.7% compared to 13.2% in the Angiography-guided group. The p-value is 0.022.]

Layland et al Eur Heart J. 2014
FAMOUS study

Type 4 MI
Procedure-related

$p = 0.12$

Cumulative Event Rate

Days

FFR - guided

FFR - guided

Types 1-3 MI
Spontaneous

$p = 0.56$

Cumulative Event Rate

Days

Angiography - guided

Angiography - guided

ESC Hotline 1 Sep 2014

Layland et al Eur Heart J. 2014
FFR for culprit in ACS

**Figure 1** Distribution of FFR Categories in the ACS and SIHD Groups

- **FFR > 0.90**: 31% ACS, 32.6% SIHD, 32% Entire Cohort
- **FFR 0.86-0.90**: 31.2% ACS, 28.6% SIHD, 29.4% Entire Cohort
- **FFR 0.81-0.85**: 32.4% ACS, 30.4% SIHD, 31.1% Entire Cohort
- **FFR < 0.80**: 4.4% ACS, 7.4% SIHD, 6.4% Entire Cohort

Hakeem et al, JACC 2016
FFR for culprit in ACS

Hakeem et al, JACC 2016
FFR for culprit in ACS

Hakeem et al, JACC 2016
FFR in ACS/moderate stenosis-culprit
FFR and ACS: Clinical Settings

- FFR for the culprit assessment in acute setting
- FFR in Chronic MI
- FFR for the non-culprit assessment
FFR post chronic MI

- 57 patients with MI>6 days
- Preserved EF (58±12), no akinetic segment on LV angio
- FFR + SPECT pre and post PCI

De Bruyne et al. Circulation 2001
FFR can detect residual ischemia after MI

92% concordance for SPECT

93% concordance for Contrast Echo
FFR can detect residual ischemia after MI

- Sensitivity 91%, Specificity 93% when SPECT+MCE used
- FFR ≤0.78 best discriminates reversible ischemia

Samady et al. JACC 2006
FFR of the culprit and myocardial recovery

Beleslin et al. Eur Heart J 2008
FFR and ACS: Clinical Settings

- FFR for the culprit assessment in acute setting
- FFR in Chronic MI
- FFR for the non-culprit assessment
CFR in Infarcted & Remote area

Uren et al. NEJM 1994
FFR in non-culprit lesions

- 101 pts, 75 STEMI, 36 NSTEMI,
- FFR in 112 lesions at time of PCI and 35 days later

FFR = 0.77 ± 13

Ntalianis et al. JACC Cardiovasc Intervent 2010
DANAMI3-PRIMULTI

Engstrom et al, NEJM 2015

Composite

Revascularisation

Non fatal MI

All cause death
## COMPARE ACUTE Trial

<table>
<thead>
<tr>
<th>Event</th>
<th>FFR guided Complete Revascularization (n=295)</th>
<th>Infarct Artery Only treatment (n=590)</th>
<th>HR</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary endpoint</td>
<td>Number of events (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em><em>MACCE</em> (any first event)</em>*</td>
<td>23 (7.8%)</td>
<td>121 (20.5%)</td>
<td>0.35</td>
<td>0.22 – 0.55</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Death, all cause</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiac</td>
<td>4 (1.3%)</td>
<td>10 (1.7%)</td>
<td>0.80</td>
<td>0.25 – 2.56</td>
<td>0.70</td>
</tr>
<tr>
<td>Myocardial infarction (MI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spontaneous</td>
<td>7 (2.4%)</td>
<td>28 (4.7%)</td>
<td>0.50</td>
<td>0.22 - 1.13</td>
<td>0.10</td>
</tr>
<tr>
<td>Peri-procedural</td>
<td>5 (1.6%)</td>
<td>17 (2.9%)</td>
<td>0.59</td>
<td>0.22 – 1.59</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td>2 (0.6%)</td>
<td>11 (1.9%)</td>
<td>0.36</td>
<td>0.08 – 1.64</td>
<td>0.19</td>
</tr>
<tr>
<td>Revascularization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCI</td>
<td>18 (6.1%)</td>
<td>103 (17.5%)</td>
<td>0.32</td>
<td>0.20 – 0.54</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CABG</td>
<td>15 (5.1%)</td>
<td>98 (16.6%)</td>
<td>0.37</td>
<td>0.24 – 0.57</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>3 (1.0%)</td>
<td>5 (0.8%)</td>
<td>1.20</td>
<td>0.29 – 5.02</td>
<td>0.80</td>
</tr>
<tr>
<td>Cerebrovascular event</td>
<td>0 (0.0%)</td>
<td>4 (0.7%)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

*MACCE: Major Adverse Cardiovascular and Neurologic Events*
Prognosis of the non-culprit lesions in ACS

Lee et al, Eurointervention 2017

HR 2.768, 95% CI 1.320-5.790, p=0.007
HR_{adj} 2.966, 95% CI 1.226-7.172, p=0.016
Log-rank P value = 0.001
Prognosis of the non-culprit lesions in ACS

Van Belle et al, Circulation CI2017
Conclusions

- No FFR in acute STEMI for culprit assessment
- No FFR in NSTEMI culprit if it is obvious
- FFR in NSTEMI after 5 days if culprit not obvious
- In patients with acute STEMI / NSTEMI, non-culprit can be reliably estimated in most cases