Diagnosis and new classification
Prof. Dr. Adriaan Voors
University Medical Center Groningen
the Netherlands
Disclosures

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2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC)

Developed with the special contribution of the Heart Failure Association (HFA) of the ESC

Authors/Task Force Members: Piotr Ponikowski* (Chairperson) (Poland), Adriaan A. Voors* (Co-Chairperson) (The Netherlands), Stefan D. Anker (Germany), Héctor Bueno (Spain), John G. F. Cleland (UK), Andrew J. S. Coats (UK), Volkmar Falk (Germany), José Ramón González-Juanatey (Spain), Veli-Pekka Harjola (Finland), Ewa A. Jankowska (Poland), Mariell Jessup (USA), Cecilia Linde (Sweden), Petros Nihoyannopoulos (UK), John T. Parissis (Greece), Burkert Pieske (Germany), Jillian P. Riley (UK), Giuseppe M. C. Rosano (UK/Italy), Luis M. Ruilope (Spain), Frank Ruschitzka (Switzerland), Frans H. Rutten (The Netherlands), Peter van der Meer (The Netherlands)
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http://www.escardio.org/Guidelines-&-Education/Clinical-Practice-Guidelines/Acute-and-Chronic-Heart-Failure
Key Points

- Definition
- New Classification HFrEF/HFpEF
- Diagnosis of Heart Failure (general)
  - (NT-pro)BNP cut-offs
- Diagnosis of HFpEF
  - Assessment of Diastolic Dysfunction
Definition

- HF is a clinical syndrome characterized by **typical symptoms** (e.g. breathlessness, ankle swelling and fatigue) that **may be accompanied by signs** (e.g. elevated jugular venous pressure, pulmonary crackles and peripheral oedema) **caused by a structural and/or functional cardiac abnormality**, resulting in a reduced cardiac output and/or elevated intracardiac pressures at rest or during stress.
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Hands-up Question 1

- Which LVEF cut-off to use for HFrEF?
  - A) ≤ 35%
  - B) ≤ 40%
  - C) ≤ 45%
  - D) ≤ 50%
Hands-up Question 2

- Which LVEF cut-off to use for HFpEF?
  - A) ≥ 35%
  - B) ≥ 40%
  - C) ≥ 45%
  - C) ≥ 50%
“The middle child of HF deserves attention: available data suggest that it constitutes a sizeable proportion (10–20%) of the HF population, has a unique clinical, echocardiographic, haemodynamic, and biomarker profile compared with HFrEF and HFpEF, and carries a poor prognosis. Large gaps in evidence regarding its treatment warrant further study.”
Influence of ejection fraction on outcomes and efficacy of spironolactone in patients with heart failure with preserved ejection fraction

Scott D. Solomon\textsuperscript{1*}, Brian Claggett\textsuperscript{1}, Eldrin F. Lewis\textsuperscript{1}, Akshay Desai\textsuperscript{1}, Inder Anand\textsuperscript{2}, Nancy K. Sweitzer\textsuperscript{3}, Eileen O’Meara\textsuperscript{4}, Sanjiv J. Shah\textsuperscript{5}, Sonja McKinlay\textsuperscript{6}, Jerome L. Fleg\textsuperscript{7}, George Sopko\textsuperscript{7}, Bertram Pitt\textsuperscript{8} and Marc A. Pfeffer\textsuperscript{1}, for the TOPCAT Investigators

- **TOPCAT:** \(n=3444; \) EF\(\geq 45\%\);  
- spironolactone vs. placebo  
- Primary outcome: neutral  
- HFmrEF greater treatment effect than HFpEF
Heart Failure with mid-range Ejection Fraction (HFmrEF)

Justification for the introduction of HFmrEF

- Grey area between 40-50 %; HFpEF or HFrEF?
- EF 40-49% different phenotype compared with EF>50%
- Potentially differential treatment effects
- “Identifying HFmrEF as a separate group will stimulate research into the underlying characteristics, pathophysiology and treatment of this group of patients”
## New Classification of Heart Failure

<table>
<thead>
<tr>
<th>HFmrEF</th>
<th>HFpEF</th>
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<tbody>
<tr>
<td>Symptoms ± Signs(^a)</td>
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<tr>
<td>LVEF 40–49%</td>
<td>LVEF ≥50%</td>
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<tr>
<td>1. Elevated levels of natriuretic peptides(^b);</td>
<td></td>
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<td>2. At least one additional criterion:</td>
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PATIENT WITH SUSPECTED HF
(non-acute onset)

ASSESSMENT OF HF PROBABILITY

1. Clinical history:
   History of CAD (MI, revascularization)
   History of arterial hypertension
   Exposition to cardiotoxic drug/radiation
   Use of diuretics
   Orthopnoea / paroxysmal nocturnal dyspnœa

2. Physical examination:
   Rales
   Bilateral ankle oedema
   Heart murmur
   Jugular venous dilatation
   Laterally displaced/broadened apical beat

3. ECG:
   Any abnormality

Diagnostic algorithm for a diagnosis of heart failure of non-acute onset
Diagnostic algorithm for a diagnosis of heart failure of non-acute onset

Any abnormality

≥1 present

Assessment of natriuretic peptides not routinely done in clinical practice

NATRIURETIC PEPTIDES
- NT-proBNP ≥125 pg/mL
- BNP ≥35 pg/mL

HF unlikely: consider other diagnosis

ECHOCARDIOGRAPHY

Yes

Normal

If HF confirmed (based on all available data): determine aetiology and start appropriate treatment
Natriuretic Peptides: cut-offs for EXCLUSION


NATRIURETIC PEPTIDES

- NT-proBNP ≥ 125 pg/mL
- BNP ≥ 35 pg/mL
### NT-proBNP cut-off in Non-Acute Setting

<table>
<thead>
<tr>
<th>Study</th>
<th>Patients (n)</th>
<th>Prevalence (prior chance) of HF or LV systolic dysfunction (%)</th>
<th>‘Optimal’ cut-point (pg/mL)</th>
<th>NPV (%)</th>
<th>PPV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zaphiriou et al⁴¹</td>
<td>306</td>
<td>34</td>
<td>125</td>
<td>97</td>
<td>44</td>
</tr>
<tr>
<td>Nielsen et al⁵⁰</td>
<td>345</td>
<td>24</td>
<td>93 men</td>
<td>97</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>144 women</td>
<td>97</td>
<td>48</td>
</tr>
<tr>
<td>Gustafsson et al⁴⁹</td>
<td>367</td>
<td>9</td>
<td>125</td>
<td>99</td>
<td>15</td>
</tr>
<tr>
<td>Fuat et al⁴³</td>
<td>279</td>
<td>38</td>
<td>150</td>
<td>92</td>
<td>48</td>
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Natriuretic Peptides: cut-offs for EXCLUSION

• “At the mentioned exclusionary cut-points, the negative predictive values are very similar and high (0.94–0.98) in both the non-acute and acute setting, but the positive predictive values are lower both in the non-acute setting (0.44–0.57) and in the acute setting (0.66–0.67). Therefore, the use of NPs is recommended for ruling-out HF, but not to establish the diagnosis.”
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2. At least one additional criterion:
   a. relevant structural heart disease (LVH and/or LAE),
   b. diastolic dysfunction (for details see Section 4.3.2).
Echocardiographic HFpEF/HFmrEF criteria for “structural and/or functional cardiac abnormality”

• How? Which parameters? Which cut-offs?

Diagnosis of HFpEF/HFmrEF

- Limited data (Unmet Need!)
- Cut-offs arbitrary
- More criteria; greater certainty of diagnosis
- Diastolic stress test?
- Invasive hemodynamic measurements?

**HFpEF:** EF ≥ 50%

**HFmrEF:** EF 40-49%

**Signs (± symptoms) of HF**

**Structural abnormalities**
- LAVI: > 34 ml/m²
- LVMI: > 115 g/m² (m), > 95 g/m² (f)

**Functional abnormalities**
- E/e' _avg_ ≥ 13
- e' _average_ (lateral-septal) < 9 cm/s
Conclusions: Diagnosis and new classification

- **Definition:** No symptoms, no heart failure
- **New Classification:** Addition of HFmrEF
- **Diagnosis of Heart Failure:** New diagnostic algorithm
  - (NT-pro)BNP cut-offs for exclusion
- **Diagnosis of HFpEF:** structural (LAVI $>34$ mL/m$^2$ or LVMI $\geq 115$ g/m$^2$ (m) $\geq 95$ g/m$^2$ (f)) or functional ($E/e’ \geq 13$ mean $e’ < 9$ cm/s) abnormalities