Insuffisance cardiaque à fraction d'éjection préservée (HFPEF)

Comment la diagnostiquer?
Les scores diagnostiques

MF SERONDE
Besançon

Liens d'intérêt

Au cours des 4 dernières années, j'ai eu une affiliation ou des intérêts (financiers ou de nature non-pécuniaire) avec la ou les société(s) suivante(s) :

Astra-Zeneca
Abbott
Bayer
BMS
Boehringer Ingelheim
Lilly
Novartis
Pfizer

Chère consœur,

J'ai revu en consultation Mme Ch. Cl. née le 15/10/1951 (**68 ans**) suivie pour une **HTA sous trithérapie associant énalapril 20mg, lercan 10 mg et indapamide.**

Elle me rapporte **une dyspnée d'effort de stade 2** qui s'est aggravée ces derniers mois. Il n'y a pas de douleur thoracique, pas de notion de perte de connaissance, pas de palpitations.

La TA est à **150/90 mmHg**. Il n'y a pas de signe congestif.

L'ECG est en rythme sinusal sans particularité,

L'échocardiographie retrouve un VG non dilaté, **discrètement hypertrophié**, la **FEVG est conservée**, il n'y a pas de trouble de cinétique segmentaire. IM minime. **OG modérément dilatée**. Les **pressions VG sont normales.** Le ventricule droit est un peu dilaté avec une IT permettant d'évaluer **les pressions pulmonaires à 47mmHg**. La VCI n'est pas dilatée et le péricarde libre.

Je dispose d'une analyse biologique qui montre **un LDL à 1,26g**/l, une créatinémie à 60µmol/l, une glycémie à jeun à 0.91g/l, **le NTproBNP est à 190 pg/ml**, la TSH est normale.

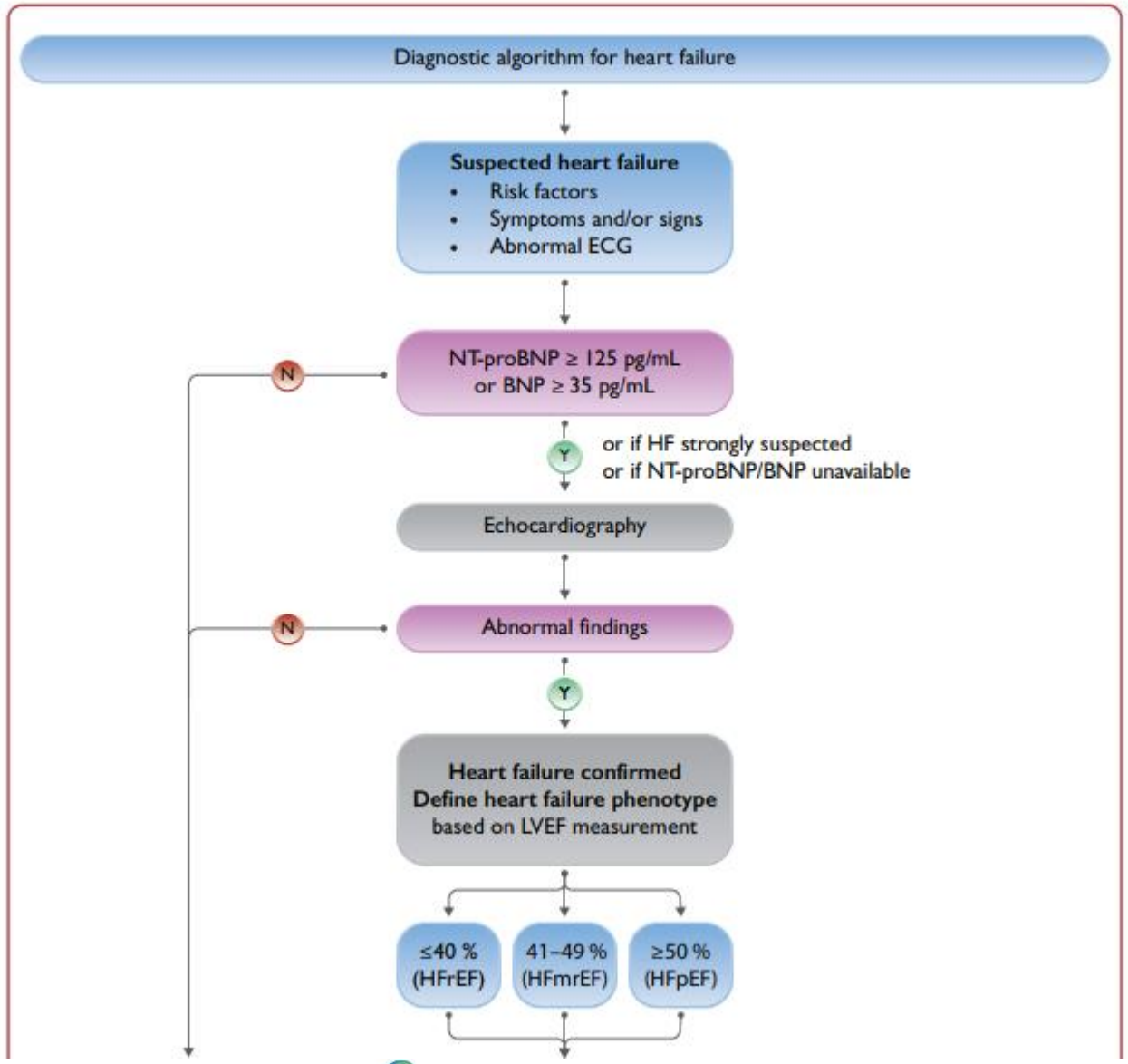
De ce fait, **je suspecte la présence d'une HTAP**, et je débute le bilan par la réalisation d'une scintigraphie pulmonaire, et je compléterai par un angioscanner thoracique et la réalisation d'EFR.

Sur le plan lipidique **je commence ce jour un traitement par rosuvastatine 5mg/j.**

Je vous confie la patiente **pour la réalisation d'un cathétérisme cardiaque afin d'évaluer cette hypertension pulmonaire.**

Bien confraternellement,

Est-ce de l'HTAp ou de l'insuffisance cardiaque?



Femme 68ans
Dyspnée stade II
Hypertendue,
hypercholestérolémie

NT proBNP 190pg/ml

Echocardiographie est anormale

FEVG > 50%

ESC European Society of Cardiology

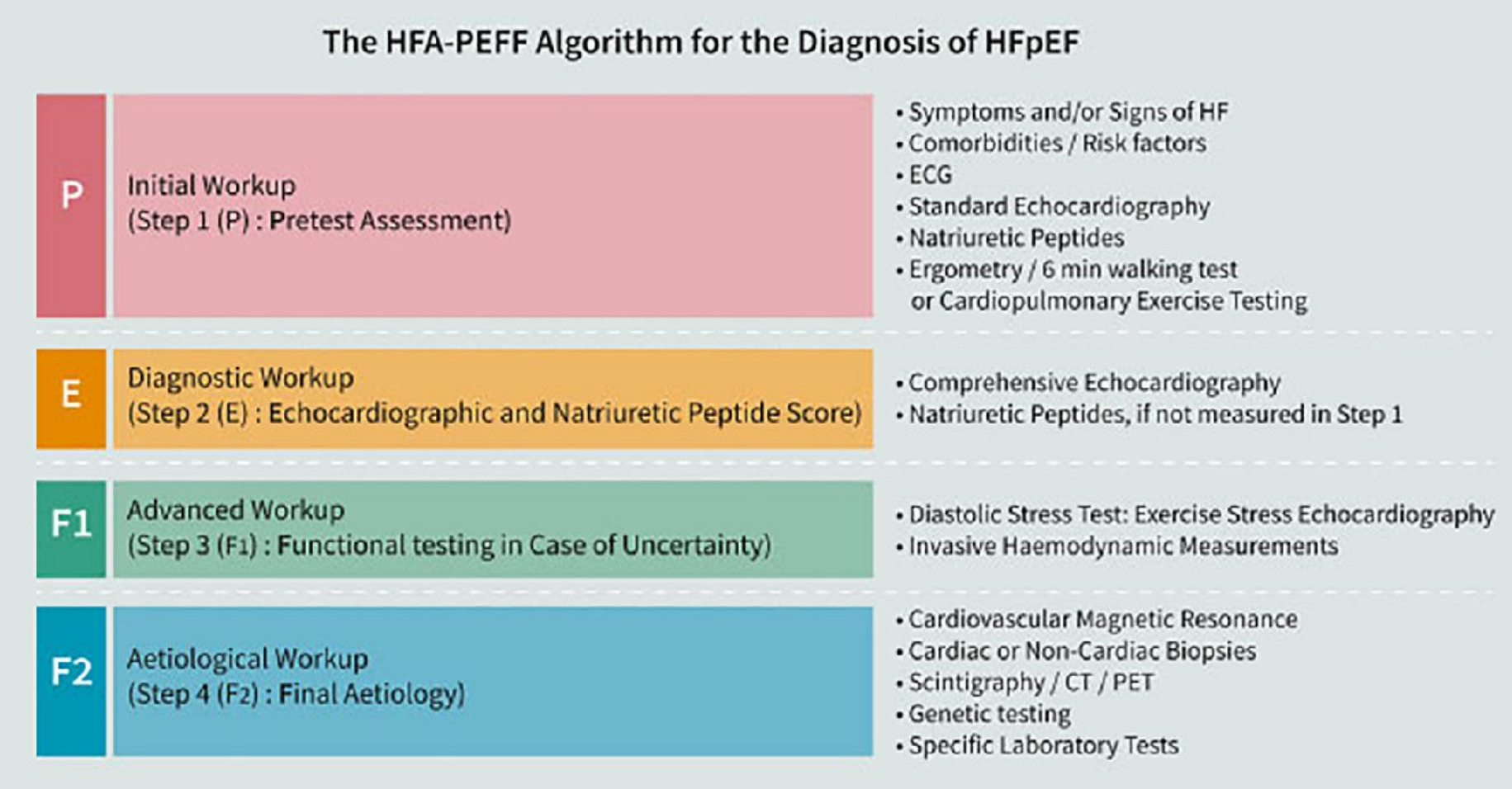
European Heart Journal (2019) **40**, 3297–3317
doi:10.1093/eurheartj/ehz641

FASTTRACK CLINICAL RESEARCH
Heart failure/cardiomyopathy

How to diagnose heart failure with preserved ejection fraction: the HFA–PEFF diagnostic algorithm: a consensus recommendation from the Heart Failure Association (HFA) of the European Society of Cardiology (ESC)

Burkert Pieske[1,2,3,4]*, Carsten Tschöpe[1,2,5], Rudolf A. de Boer [6], Alan G. Fraser[7], Stefan D. Anker[1,2,5,8], Erwan Donal[9], Frank Edelmann[1,2], Michael Fu[10], Marco Guazzi[11,12], Carolyn S.P. Lam[13,14], Patrizio Lancellotti[15], Vojtech Melenovsky[16], Daniel A. Morris[1], Eike Nagel [17,18], Elisabeth Pieske-Kraigher[1], Piotr Ponikowski[19], Scott D. Solomon[20], Ramachandran S. Vasan[21], Frans H. Rutten [22], Adriaan A. Voors[6], Frank Ruschitzka[23], Walter J. Paulus[24], Petar Seferovic[25], and Gerasimos Filippatos[26,27]

Quatre étapes diagnostiques HFA-PEFF:



European J of Heart Fail, Volume: 22, Issue: 3, Pages: 391-412, First published: 05 March 2020, DOI: (10.1002/ejhf.1741)

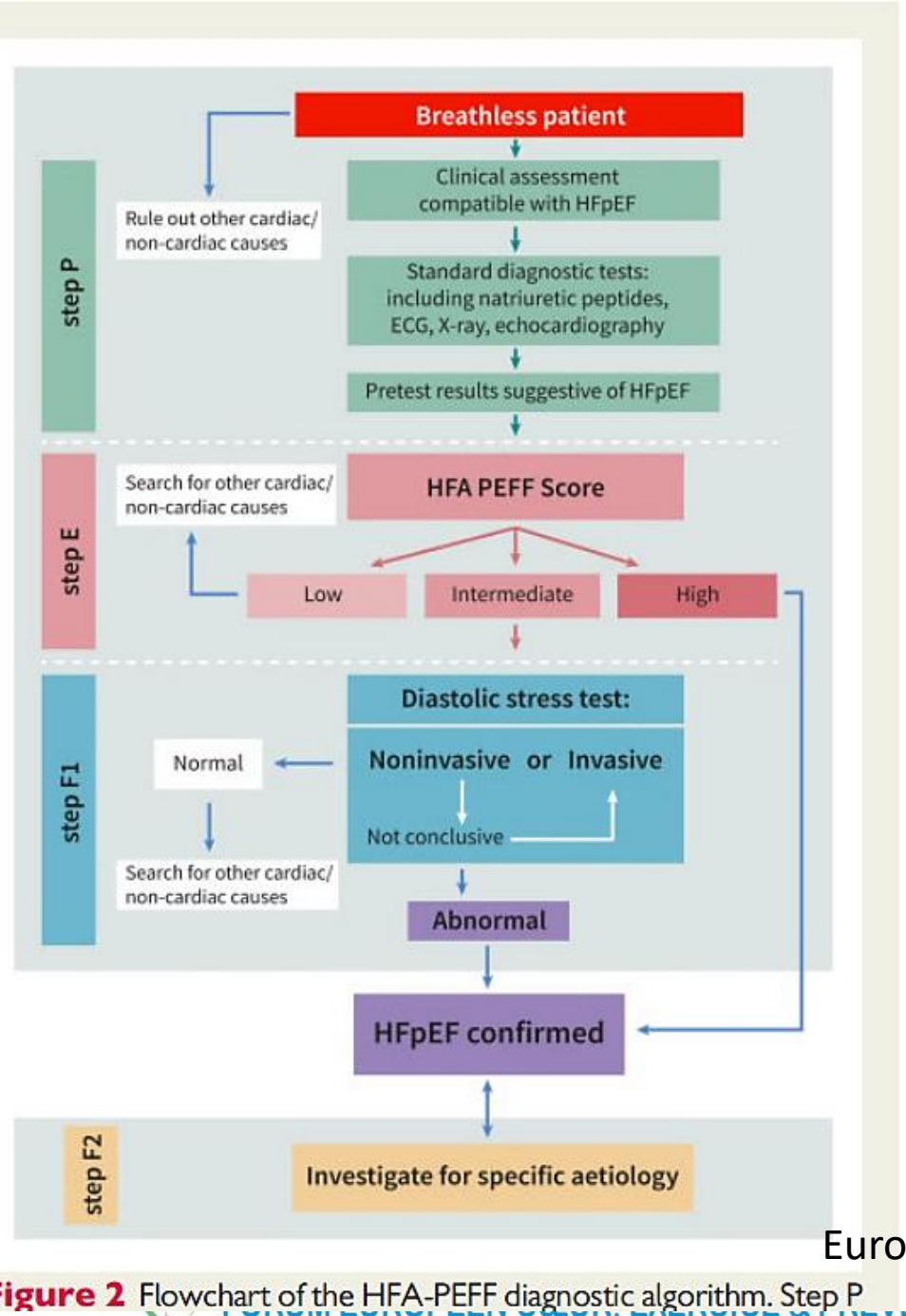


Figure 2 Flowchart of the HFA-PEFF diagnostic algorithm. Step P

European Heart Journal (2021) 00, 1128

Step 1(P): *Pre-test assessment*

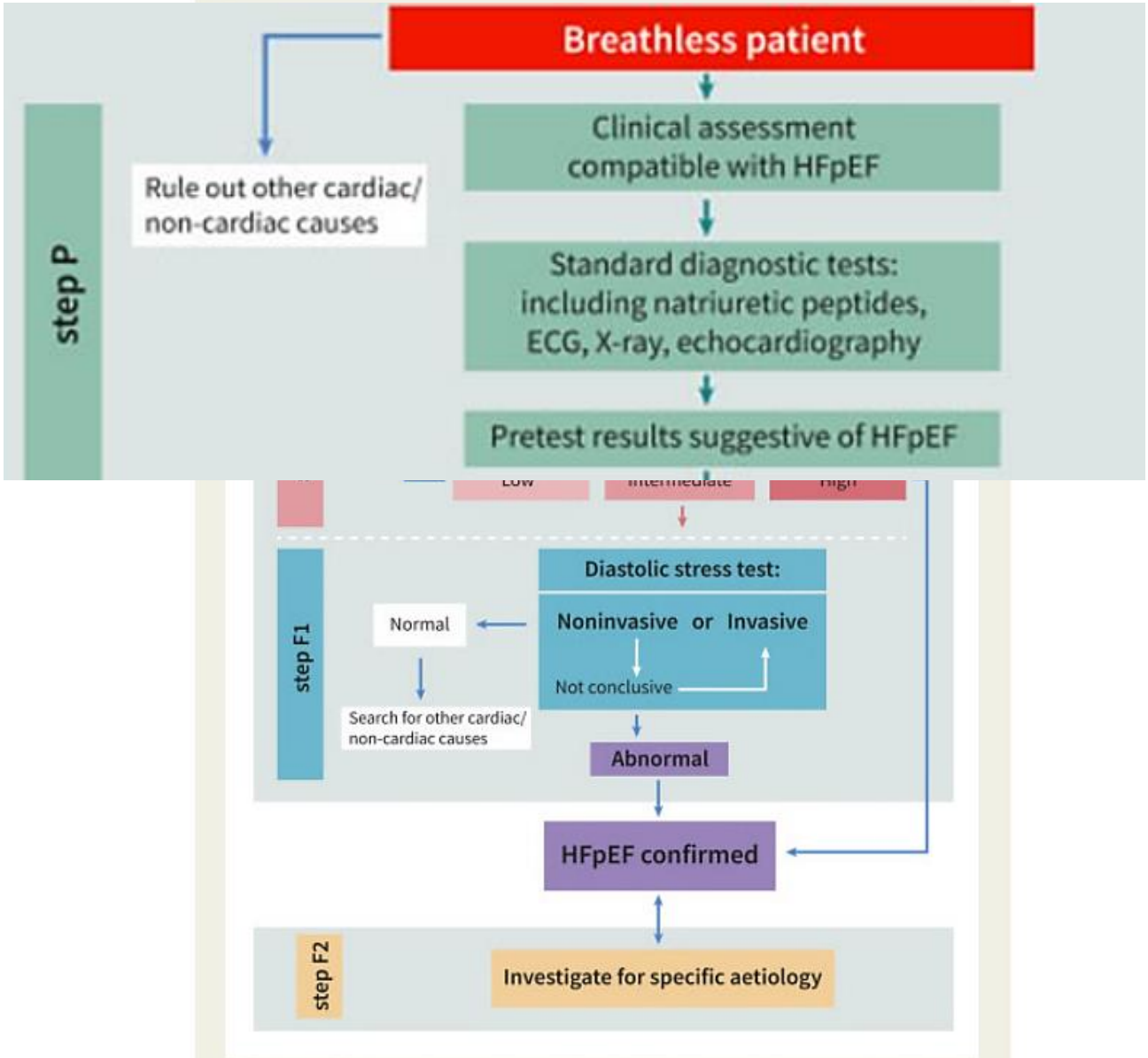


Figure 2 Flowchart of the HFA-PEFF diagnostic algorithm. Step P

Step 1(P): *Pre-test assessment*

Table I Risk factors and findings consistent with heart failure with preserved ejection fraction in a symptomatic patient

Early (age ≥ 70 in men or ≥ in women)
Overweight/obesity
Metabolic syndrome/diabetes mellitus
Physical inactivity/deconditioning
Arterial hypertension
Atrial fibrillation
ECG abnormalities (beyond atrial fibrillation)
Elevated natriuretic peptide levels (if available, BNP ≥ 35 pg/mL or NT-proBNP ≥ 125 pg/mL)

Notre patiente:

- Femme
- Agée de 68 ans
- HTA sous trithérapie
- NTproBNP 190 pg/ml

Step 2(E): *Echocardiographic* and natriuretic peptide heart failure with preserved ejection fraction diagnostic score

	Biomarker (SR)	Biomarker (AF)
Major	NT-proBNP > 220 pg/ml or BNP > 80 pg/ml	NT-proBNP > 660 pg/ml or BNP > 240 pg/ml
Minor	NT-proBNP 125-220 pg/ml or BNP 35-80 pg/ml	NT-proBNP 365-660 pg/ml or BNP 105-240 pg/ml

Step 2(E): *Echocardiographic and* natriuretic peptide heart failure with preserved ejection fraction diagnostic score

Evaluation de la fraction d'éjection VG FEVG ≥ 50%

ANOMALIES MORPHOLOGIQUES **ET** **ANOMALIES FONCTIONNELLES**

Volume indexé de l'OG

Masse VG indexée ou épaisseur des parois du VG ou RWT

RWT= épaisseur relative du VG
= Epaisseur paroi post/ 2 DTDVG

Evaluation de la fonction diastolique

Septal and lateral mitral annular peak early diastolic velocity (*e'*)

Average septal-lateral *E*/*e'* ratio

ou

Evaluation des pressions pulmonaires

Tricuspid regurgitation peak velocity or pulmonary arterial systolic pressure

Left ventricular global longitudinal systolic strain

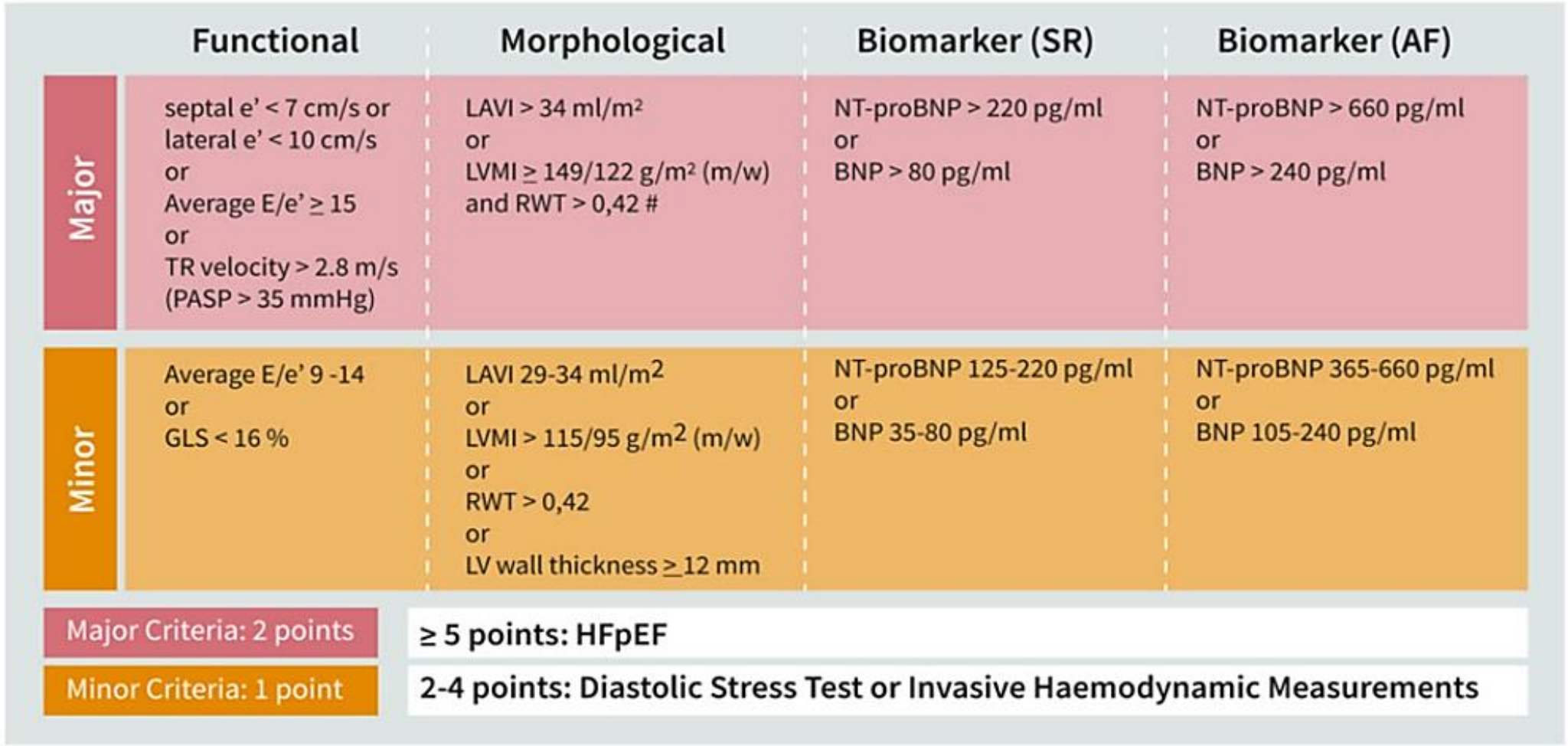
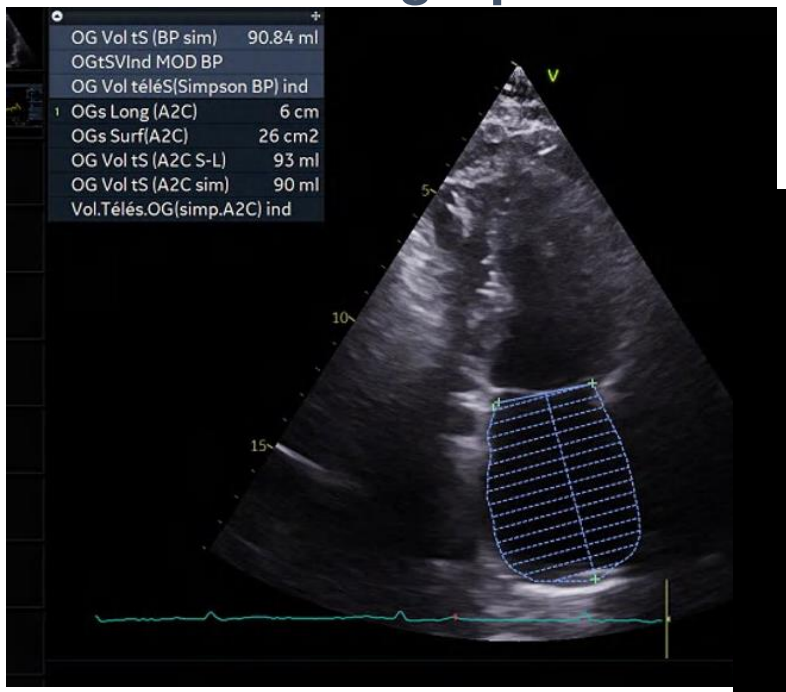
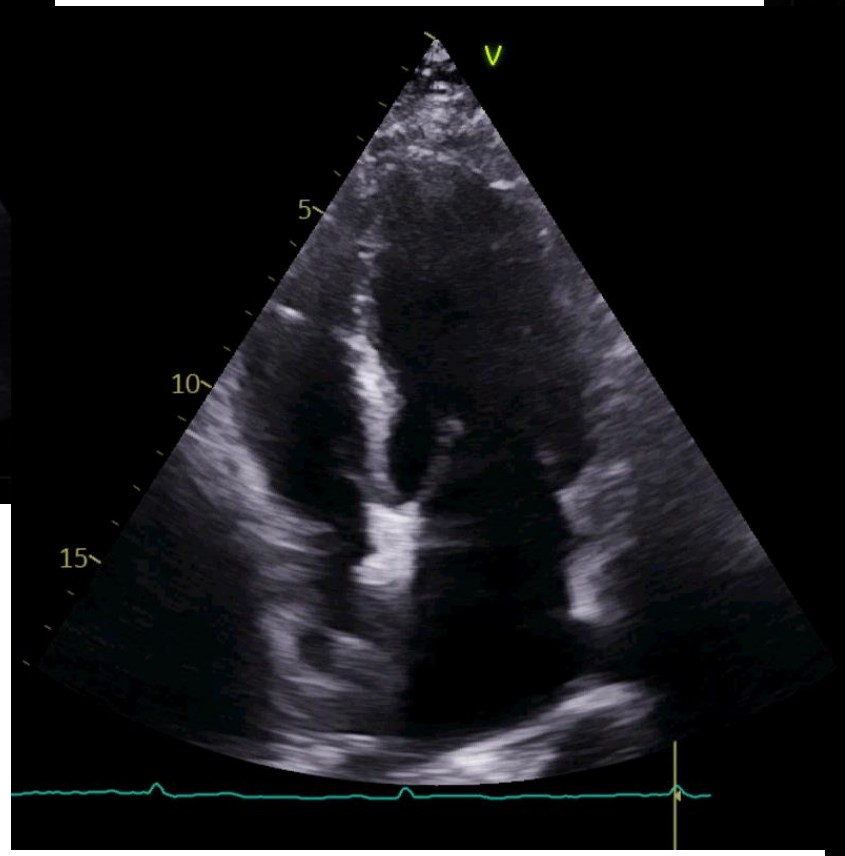
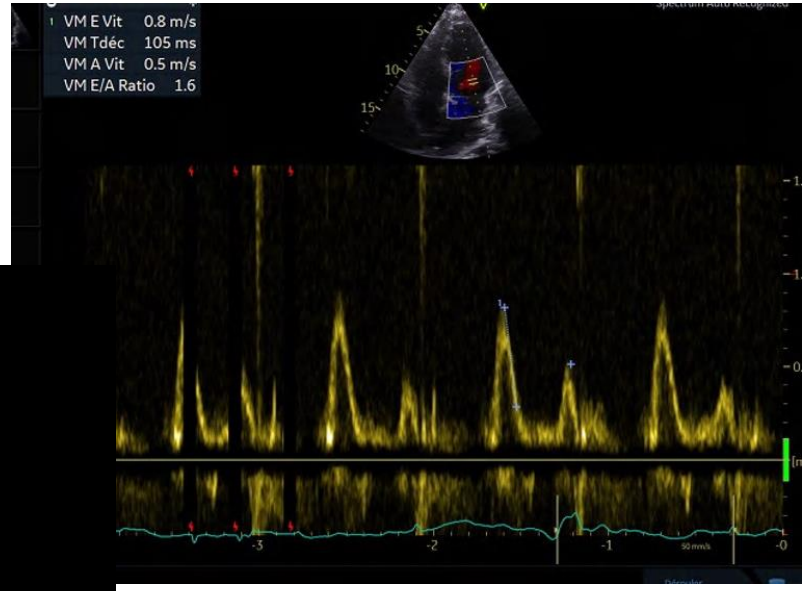


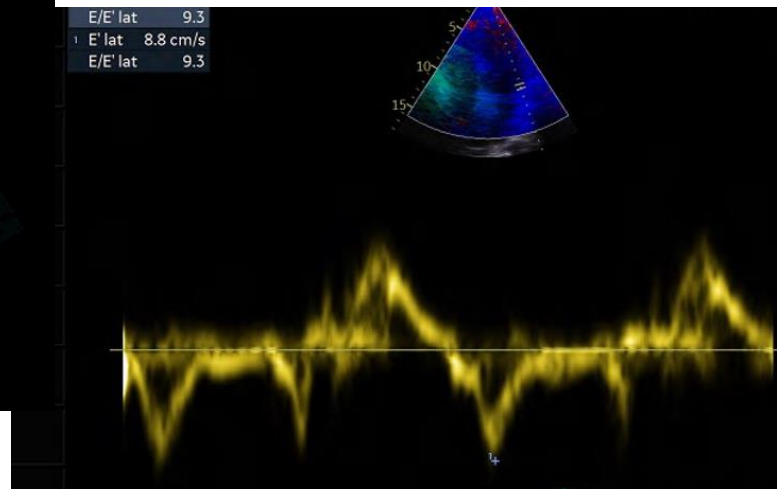
Figure 3 Step 2 (E): Echocardiographic and natriuretic peptide heart failure with preserved ejection fraction workup and scoring system (diagnostic workup).

Echocardiographie







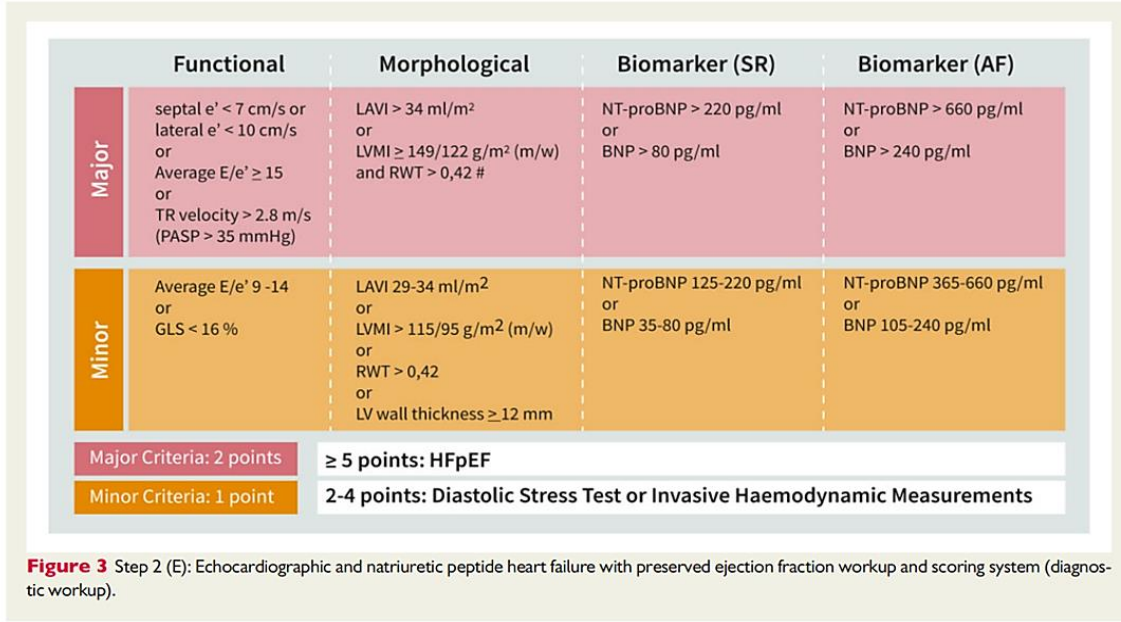


FEVG 57%
Volume OG 45 ml/m²
Masse VG 120g/m²,
Epaisseur PP, Septum à 11 mm
E’ latérale 8cm/s, E/E’ moyen 9,
PAPs 40mmHg

Mme Ch. Cl

ETT
Volume OG 45 ml/m² 2 POINTS
Masse VG 120g/m², 1 POINT
épaisseur paroi post et septum à 11 mm
E' latérale 8cm/s, E/E' moyen 9, 1POINT
PAPs 40mmHg 2 POINTS

NT proBNP 190 pg/ml 1 POINT



	Functional	Morphological	Biomarker (SR)	Biomarker (AF)
Major	septal e' < 7 cm/s or lateral e' < 10 cm/s or Average E/e' ≥ 15 or TR velocity > 2.8 m/s (PASP > 35 mmHg)	LAVI > 34 ml/m² or LVMI ≥ 149/122 g/m² (m/w) and RWT > 0,42 #	NT-proBNP > 220 pg/ml or BNP > 80 pg/ml	NT-proBNP > 660 pg/ml or BNP > 240 pg/ml
Minor	Average E/e' 9 -14 or GLS < 16 %	LAVI 29-34 ml/m² or LVMI > 115/95 g/m² (m/w) or RWT > 0,42 or LV wall thickness ≥ 12 mm	NT-proBNP 125-220 pg/ml or BNP 35-80 pg/ml	NT-proBNP 365-660 pg/ml or BNP 105-240 pg/ml

Major Criteria: 2 points	≥ 5 points: HFpEF
Minor Criteria: 1 point	2-4 points: Diastolic Stress Test or Invasive Haemodynamic Measurements

Figure 3 Step 2 (E): Echocardiographic and natriuretic peptide heart failure with preserved ejection fraction workup and scoring system (diagnostic workup).

HFA PEFF score à 7
HFPEF

STEP 4 BILAN ETIOLOGIQUE

Si HFPEFF SCORE <5

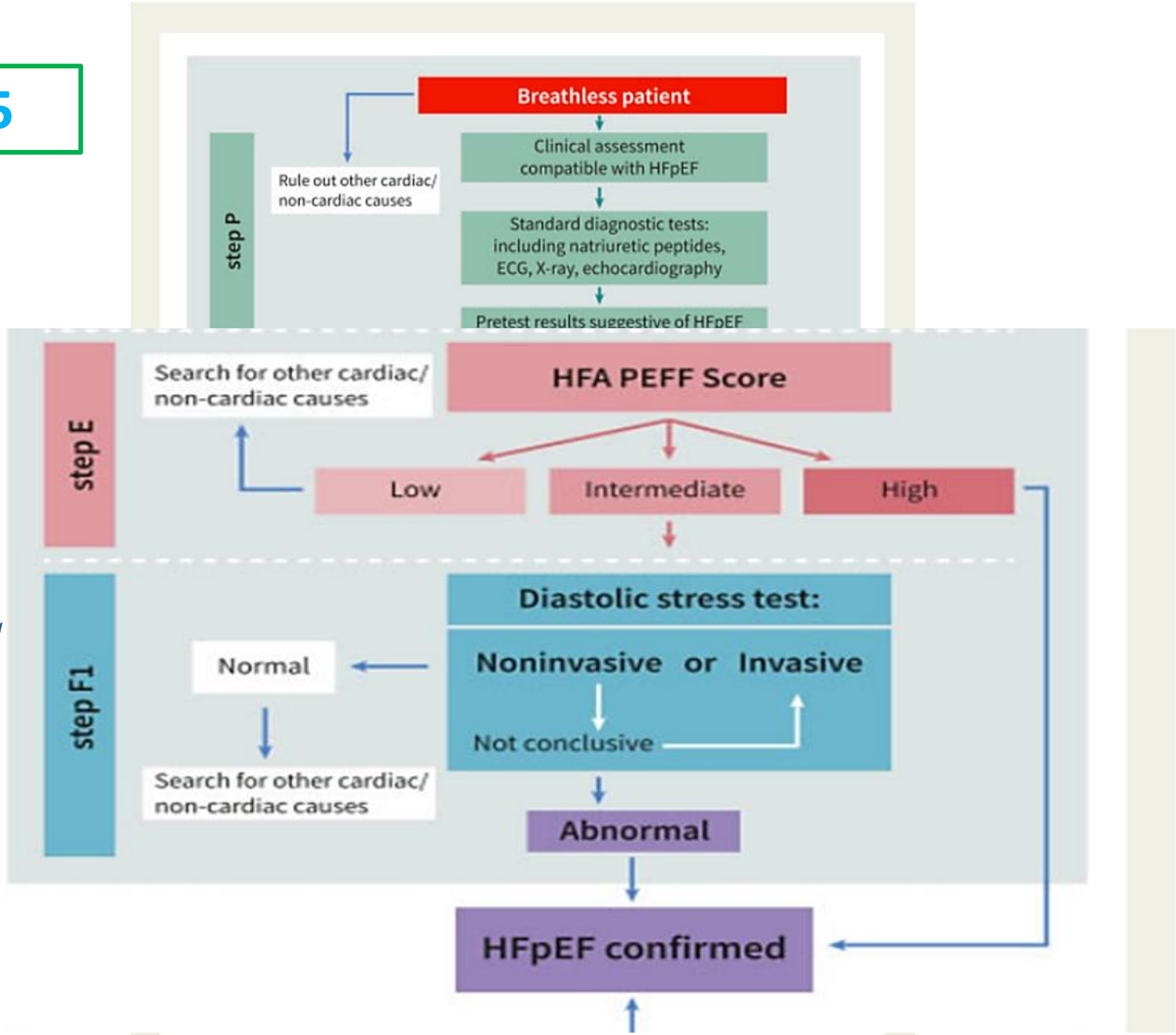


Figure 2 Flowchart of the HFA-PEFF diagnostic algorithm. Step P

Step 3 (F1): *Functional testing*

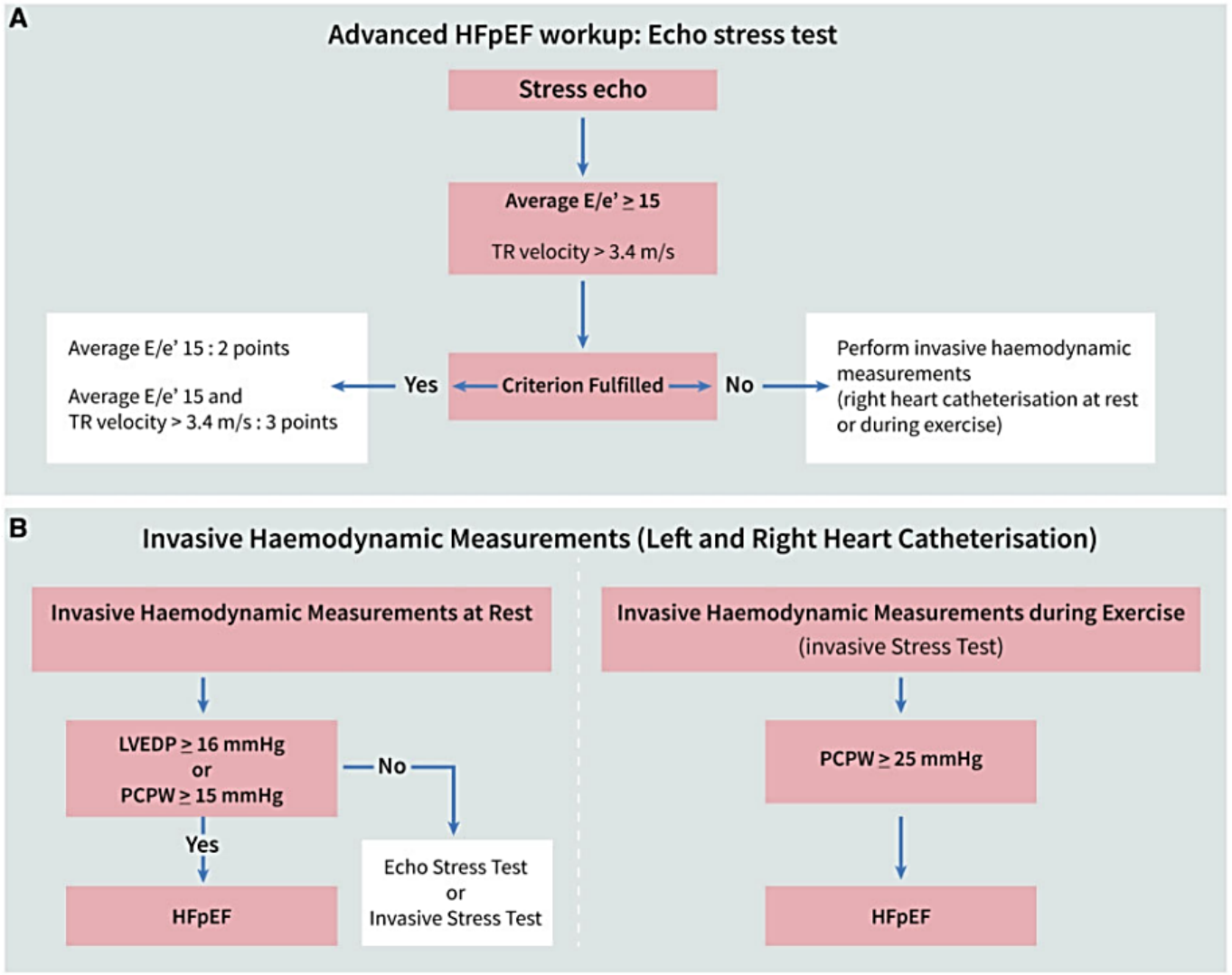
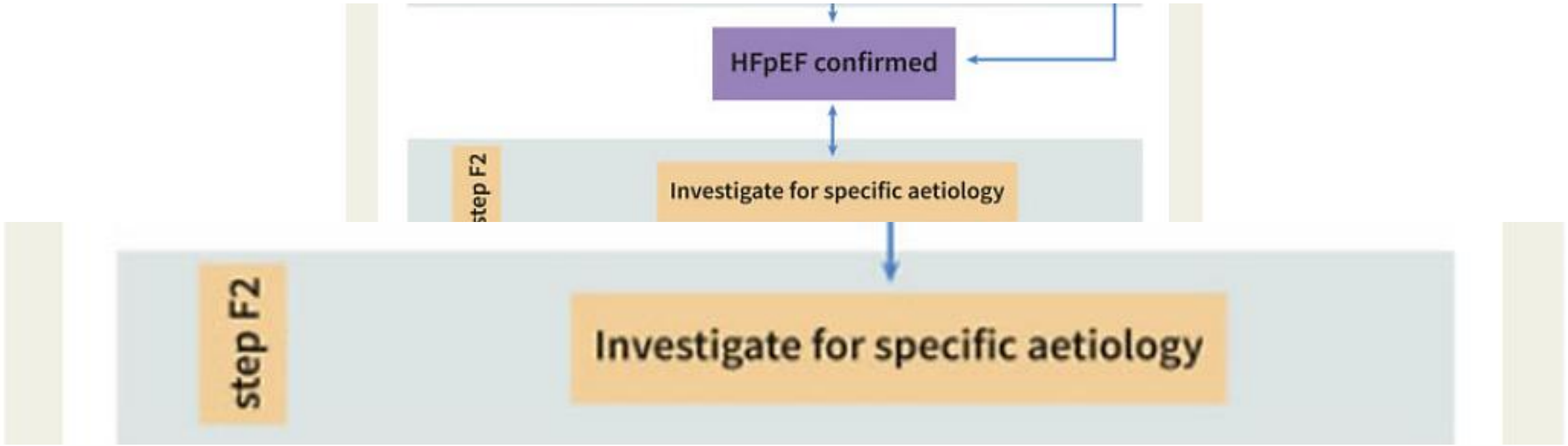


Figure 4 Step 3 (F): Functional tests in cases of diagnostic uncertainty. (*A*, upper panel) It shows the diastolic stress test workup with exercise echocardiography is shown. If key haemodynamic abnormalities are identified, a definite heart failure with preserved ejection fraction diagnosis can be made. (*B*, lower panel) It shows the invasive haemodynamic measurements at rest (left) or during exercise (right) that may complement stress echocardiography and are recommended in cases with remaining diagnostic uncertainty.


HFpEF confirmed
step F2
Investigate for specific aetiology
step F2
Investigate for specific aetiology

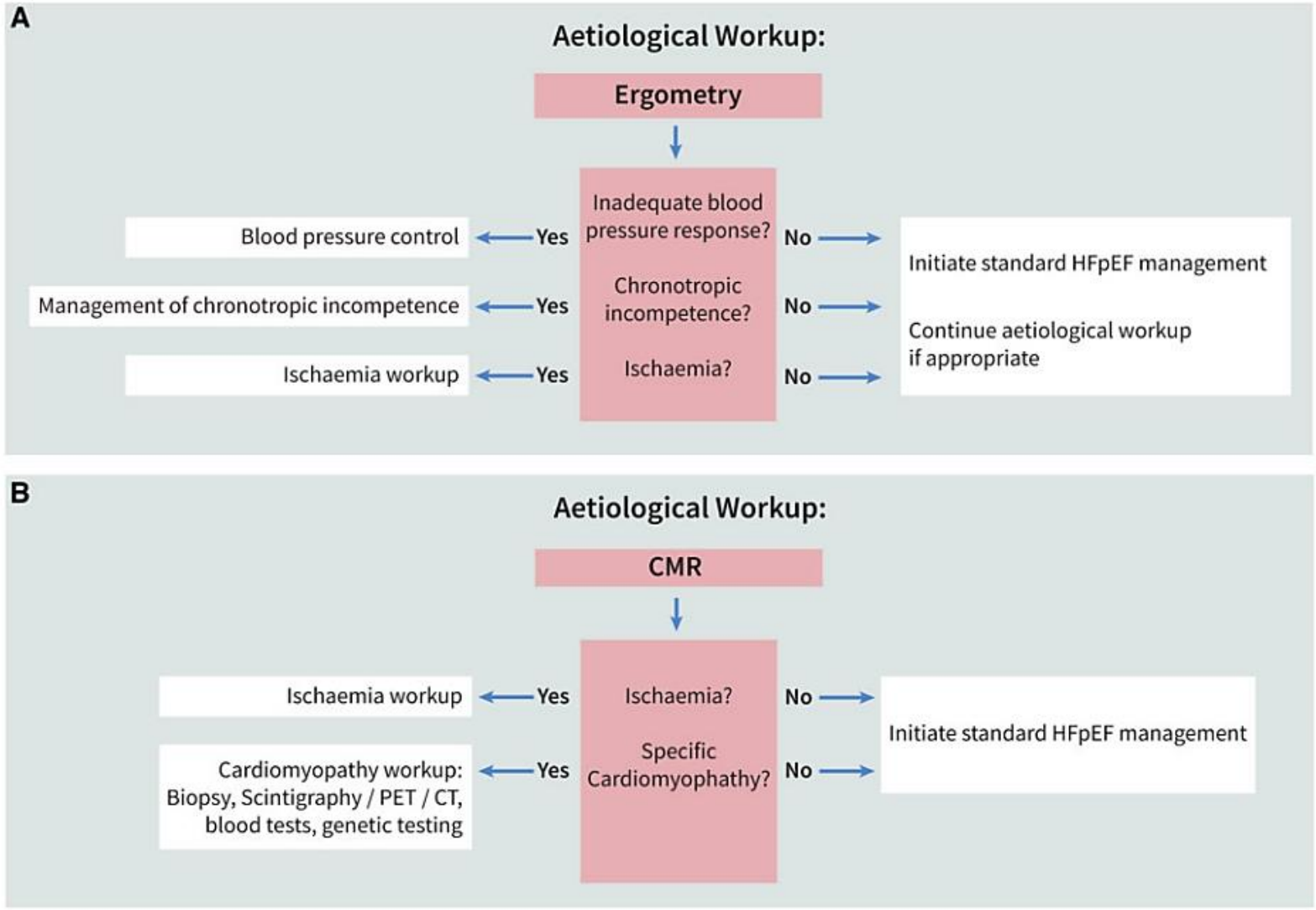


Figure 5 Step 4 (F_2): Final aetiological workup. (*A*) It shows the role of ergometry to detect underlying causes such as inadequate blood pressure response, chronotropic incompetence, or myocardial ischaemia during exercise. (*B*) It shows the aetiological workup using cardiac magnetic resonance (CMR). CT, computed tomography; PET, positron emission tomography.

Table 2 **Potential specific aetiologies underlying heart failure with preserved ejection fraction-like syndromes in Step 4 (F_2)**

Abnormalities of the myocardium		
Ischaemic		Myocardial post-infarction/scar[49] Myocardial stunning[50] Epicardial coronary artery disease[51] Microvascular and endothelial dysfunction[52,53–55]
Toxic	Recreational substance abuse	Such as alcohol,[56] cocaine,[57] and anabolic steroids[58]
	Heavy metals	Such as iron,[59] lead,[60] cadmium,[60] cobalt,[61] copper (M. Wilson)[62]
	Medications	Such as chloroquine,[63] ergotamine,[64] cytostatic drugs (e.g. anthracyclines),[64] immunomodulating drugs (e.g. interferons monoclonal antibodies such as trastuzumab, cetuximab)[64]
	Radiation	Mean cardiac radiation doses > 3 Gy[65,66]
Immune and inflammatory	Related to infection	Such as cardiotropic viruses,[67,68] HIV,[69–71] hepatitis,[72] helminths,[73] parasites (e.g. Chagas' disease[74])
	Not related to infection	Lymphocytic myocarditis,[75–79] autoimmune diseases (e.g. rheumatoid arthritis,[80] connective tissue disorders like scleroderma,[81] M. Raynaud,[55] systemic lupus erythematosus,[82] dermato/polymyositis,[83] and hypersensitivity and eosinophilic myocarditis[73,84–87]
Infiltrative	Related to malignancy	Direct infiltrations and metastases[88–90]
	Not related to malignancy	Amyloidosis,[19,91] sarcoidosis,[92,93] primarily and secondary haemochromatosis,[94–96] storage diseases[97] (e.g. Fabry disease,[98,99] Danon disease,[100–102] Pompe disease,[99,102] PRKAG2 deficiency,[99] Gaucher's disease[99])[103,104,105,106]
Metabolic	Hormonal	Such as thyroid diseases,[107,108] parathyroid diseases,[109] acromegaly,[110] GH deficiency,[111] Cushing disease,[112] Conn's disease,[113] Addison disease,[114] phaeochromocytoma,[115] pathologies related to pregnancy and peripartum[116,117]
	Nutritional	Such as deficiencies in thiamine,[118] L-carnitine,[119] selenium,[120] (functional) iron,[121,122] complex malnutrition (e.g. AIDS, infections,[73] anorexia nervosa[73,123,124])
Genetic	Diverse forms	Such as HCM,[97,125,126] restrictive cardiomyopathies,[103,104,106] hypertrophic form of non-compaction cardiomyopathy,[127,128] early forms of muscular dystrophies (Duchenne/Becker disease[129]).
Endomyocardial		HES,[84] EMF,[71,127] endocardial fibroelastosis,[128] carcinoid,[130,131] endocardial calcification (Paget's disease[132])
Abnormalities of loading conditions		
Hypertension		Primary and secondary forms of hypertension[112,113,115,130,131]
Valvular and structural defects	Acquired	Heart valve diseases[133,134]
Valvular and structural defects	Congenital	Septal defects[132,135,136]
Pericardial and endomyocardial pathologies	Pericardial	Constrictive pericarditis and pericardial effusion[137,138]
	Endomyocardial	HES,[86] EMF,[73,139] endocardial fibroelastosis,[140] carcinoid,[141,142] endocardial calcification (Paget's disease[143])
High output states		Severe anaemia,[144] sepsis,[145] thyrotoxicosis,[105] arteriovenous fistula,[146] and pregnancy[147]
Volume overload		Renal failure and fluid overload[148,149,150]
Abnormalities of the cardiac rhythm		
Rhythm disorders		Atrial/ventricular arrhythmias, pacing, conduction disorders[38,151–153]

EMF, endomyocardial fibrosis; GH, growth hormone; HCM, hypertrophic cardiomyopathy; HES, hypereosinophilic syndrome (formerly known as Löffler's endocarditis); HIV/AIDS, human immunodeficiency virus/acquired immune deficiency; LV, left ventricular; PRKAG2, protein kinase AMP-activated non-catalytic subunit gamma 2.

Etiologies

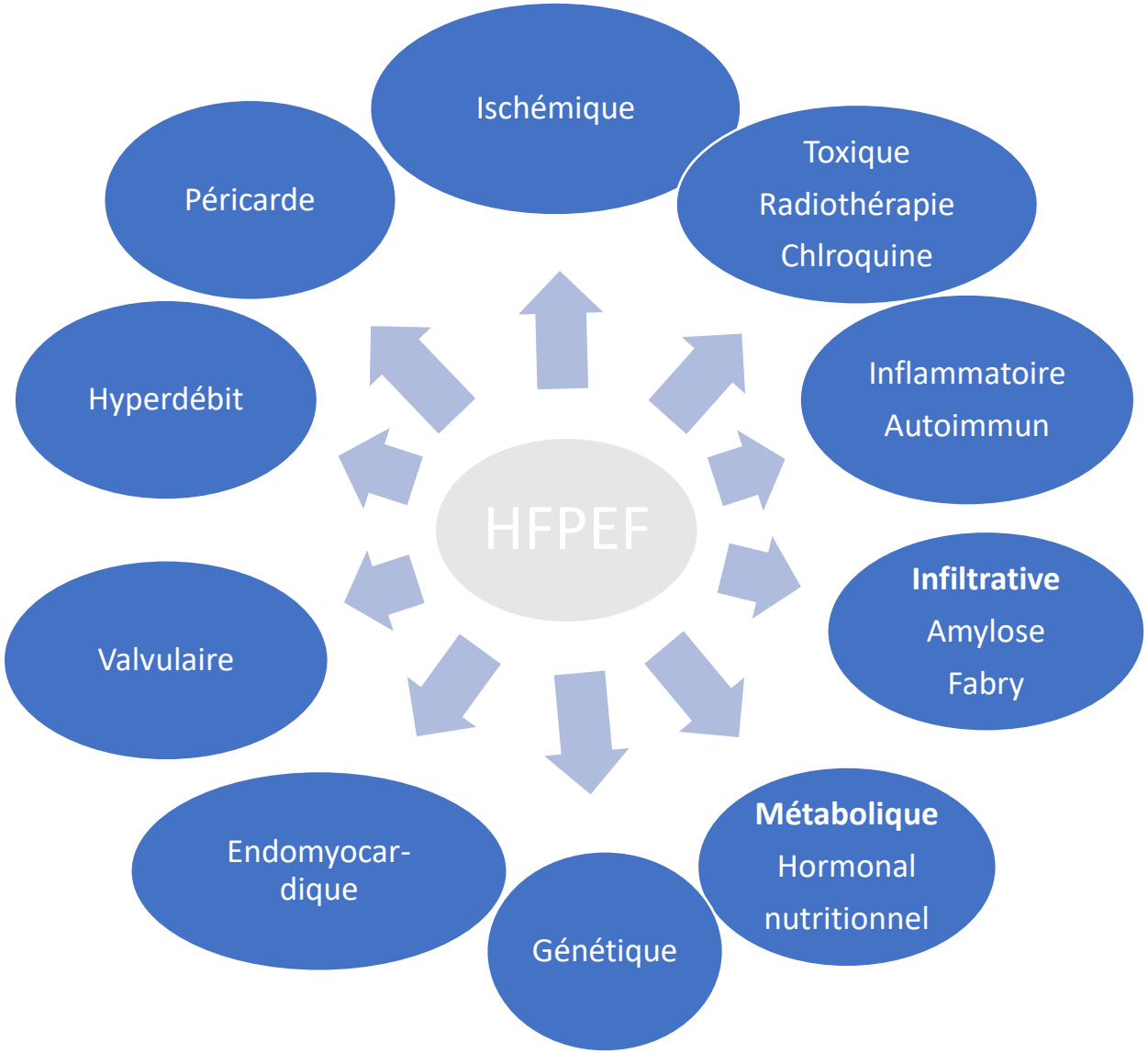
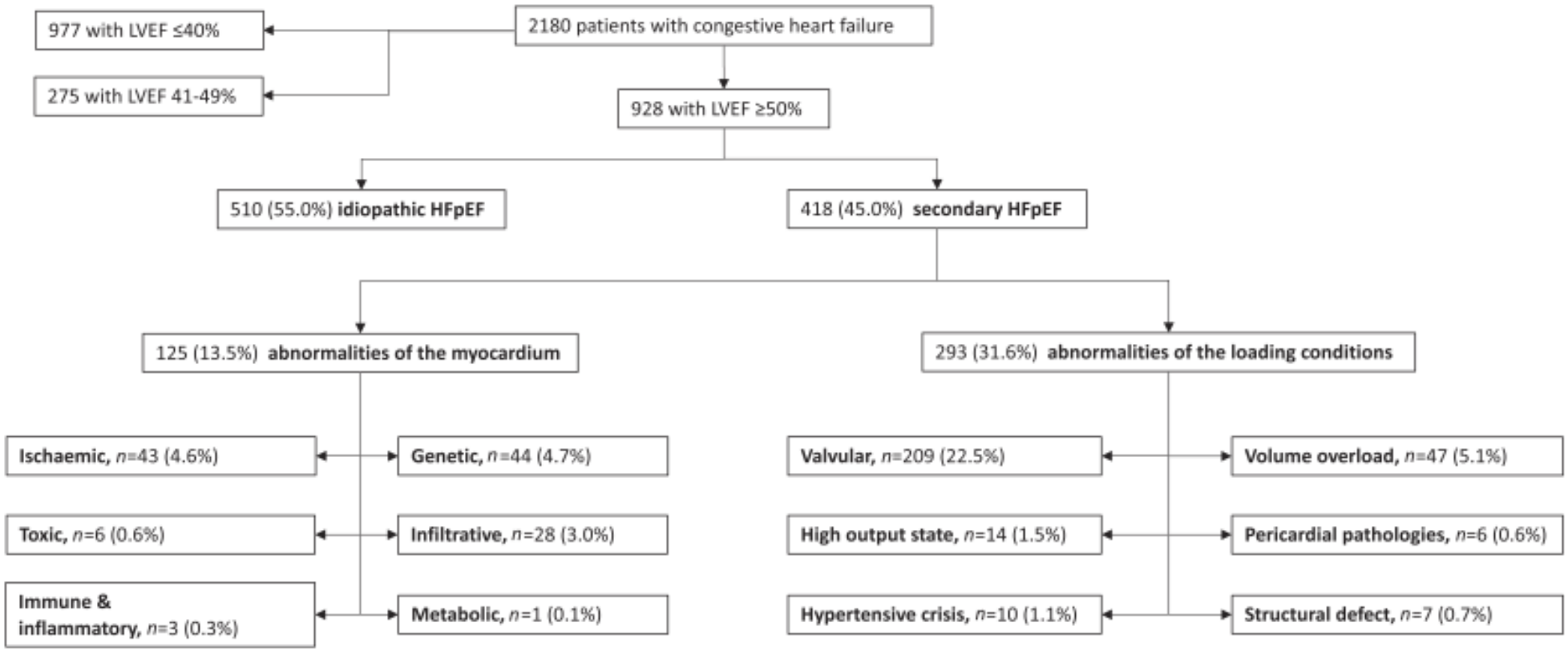

Ischémique
Toxique
Radiothérapie
Chlroquine
Inflammatoire
Autoimmun
Infiltrative
Amylose
Fabry
Métabolique
Hormonal
nutritionnel
Génétique
Endomyocar-
dique
Valvulaire
Hyperdébit
Péricarde
HFPEF

Figure 1 Classification by left ventricular ejection fraction (LVEF) and by aetiologies of identified heart failure patients. Secondary heart failure with preserved ejection fraction (HFpEF) patients are grouped into two distinct categories with aetiologies related to abnormalities of the myocardium vs. abnormalities of the loading conditions. Patients for whom none of these causes were identified were classified as having idiopathic HFpEF.



ESC Heart Failure (2021)
DOI: 10.1002/ehf2.13717

H2FPEF Score for Heart Failure with Preserved Ejection Fraction ☆

https://www.mdcalc.com/calc/10105/h2fpef-score-for-heart-failure-with-preserved-ejection-fraction

Estimates probability of underlying heart failure in patients with preserved ejection fraction on echo.

When to Use ⌄ | Why Use ⌄

Age	68	years
BMI	24	kg/m²
Early mitral inflow velocity/mitral annular early diastolic velocity (E/e') ratio	9	
Pulmonary artery systolic pressure As estimated from echo	40	mm Hg
Atrial fibrillation From clinical history and EKG	No / Yes	

46.6 %

Probability of heart failure with preserved EF

Copy Results | Next Steps »

» Next Steps | Evidence | Creator Insights

ADVICE

Consider alternate causes of dyspnea if low probability, and consider emperic treatment for HFpEF if high probability. For intermediate probability patients additional testing.

Borlaug. Circulation. 2018;138:861–870

CE & PRÉVENTION

Take Home messages

- L'IC à fraction d'éjection préservée est fréquente environ 50% de la population des patients atteints d'IC
- Le diagnostic doit être évoqué devant des symptômes et la présence de comorbidités
- Le dosage des peptiques natriurétiques est très utile et son interprétation doit tenir compte de la présence ou non d'un trouble du rythme auriculaire
- L'ETT diagnostique doit comprendre une analyse structurelle du cœur (volume OG, masse VG) et une analyse fonctionnelle (fonction diastolique VG, pressions pulmonaires)
- L'échographie d'effort doit être envisagée dés que le diagnostic est incertain
- En dernière recours une approche hémodynamique peut être envisager
- Enfin penser au diagnostic étiologique

Je vous remercie pour votre attention !