MIRACL.ai

ESC 2025 : Péricardite et Myocardite

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Conflits d’intérêts

Je n’ai pas de conflit d’intérêt en rapport avec cette présentation.

FORUM EUROPÉEN, CŒUR, EXERCICE & PRÉVENTION

ESC European Society of Cardiology

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ESC GUIDELINES

2025 ESC Guidelines for the management of myocarditis and pericarditis

Developed by the task for ce for the management of myocarditis and pericarditis of the European Society of Cardiology (ESC)

Endorsed by the Association for European Paediatric and Congenital Cardiology (AEPC) and the European Association for Cardio-Thoracic Surgery (EACTS)

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Epidémiologie :

- **Myocardite :**
  - Incidence : 6.3–8.6 pour 100 000 habitants. Nette prépondérance d'hommes jeunes.
  - < 2 ans : équilibre du ration H/F
  - Adolescence nette prédominance d'hommes (rôle hormonal probable).

- **Péricardite :**
  - Incidence de péricardite aigue : 3–32 cas pour 100 000 personnes-années.
  - Nette prépondérance d'hommes jeunes.
  - Récurrence : 20%–30% des patients dans les 18 mois et 50% après une récurrence.

Viral (main causes)

More common: enteroviruses (including coxsackieviruses), parvovirus B19, human herpesvirus 6, Epstein–Barr virus, cytomegalovirus, herpes simplex virus 1/2, adenoviruses, influenza A and B viruses, coronaviruses, dengue virus

Less common: varicella-zoster virus, human immunodeficiency virus, hepatitis C virus, respiratory syncytial virus, mumps virus, measles virus, rubella virus, rabies virus

Bacterial

More common: *Mycobacterium tuberculosis* (pericarditis), *Coxiella burnetii*, *Borrelia* spp., *Campylobacter jejuni*

Less common: *Streptococcus* A, *Streptococcus pneumoniae* (pneumococcus), *Chlamydia pneumoniae*, *Corynebacterium diphtheriae*, *Legionella*, *Neisseria gonorrhoeae* (gonococcus), *Staphylococcus*, *Salmonella*, *Haemophilus influenzae*, *Brucella*, *Mycoplasma pneumoniae*, *Neisseria meningitidis* (meningococcus), *Leptospira* (Weil's disease), *Rickettsia rickettsii* (Rocky Mountain spotted fever)

Fungal

Histoplasma capsulatum, *Aspergillus* spp., *Blastomyces dermatitidis*, *Candida* spp., *Actinomyces*, *Cryptococcus*, *Nocardia* spp., *Coccidioides*, *Sporothrix*, mucormycosis

Parasitic/worms

Trypanosoma cruzi, *Toxoplasma gondii*, *Trichinella spiralis*, *Taenia solium*, *Entamoeba histolytica*, *Leishmania*, *Echinococcus*, *Toxocara canis*

Autoimmune diseases

Systemic:

Systemic lupus erythematosus, Sjögren's syndrome, rheumatoid arthritis, scleroderma, granulomatosis with polyangiitis, eosinophilic granulomatosis with polyangiitis, sarcoidosis, inflammatory bowel disease, allergic granulomatosis, Horton disease, Takayasu disease, Behçet syndrome, familial Mediterranean fever, tumour necrosis factor receptor-associated periodic syndrome, Kawasaki's disease, IgG4-related disease, antiphospholipid syndrome

Organ-specific (mainly myocarditis):

Lymphocytic myocarditis, giant-cell myocarditis, eosinophilic myocarditis, isolated cardiac sarcoidosis

Immune reactions to drugs or vaccines

Anthracyclines, procainamide, busulfan, hydralazine, methyldopa, isoniazid, phenytoin, immune checkpoint inhibitors (such as pembrolizumab and nivolumab ± ipilimumab), tyrosine kinase inhibitors, doxorubicin, daunorubicin, cytosine arabinoside, cytarabine, 5-fluorouracile, cyclophosphamide, penicillin, ampicillin, cephalosporins, tetracyclines, phenylbutazone, thiazides, *p*-amino salicylic acid, sulfa drugs, several vaccines, methysergide, mesalazine, clozapine, minoxidil, dantrolene, practolol, streptomycin, thiouracils, streptokinase, bromocriptine, GM-CSF, anti-TNF agents, minocycline and carbamazepine, CAR T-cell therapies

Viral (main causes)

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Specific for pericarditis
Post-cardiac injury syndromes:
Post pericardiectomy syndrome, post-myocardial infarction, post-traumatic (iatrogenic/non-iatrogenic)
Neoplastic (usually pericardial effusion without pericarditis):
Primary tumours (e.g. pericardial mesothelioma), secondary metastatic tumours
Metabolic:
Uraemia, cholesterol pericarditis
Miscellaneous:
Radiotherapy
Specific for myocarditis
Toxic:
Ethanol, cocaine, amphetamines
Miscellaneous:
Thyrotoxicosis, arsenic, copper, iron

Nouveautés

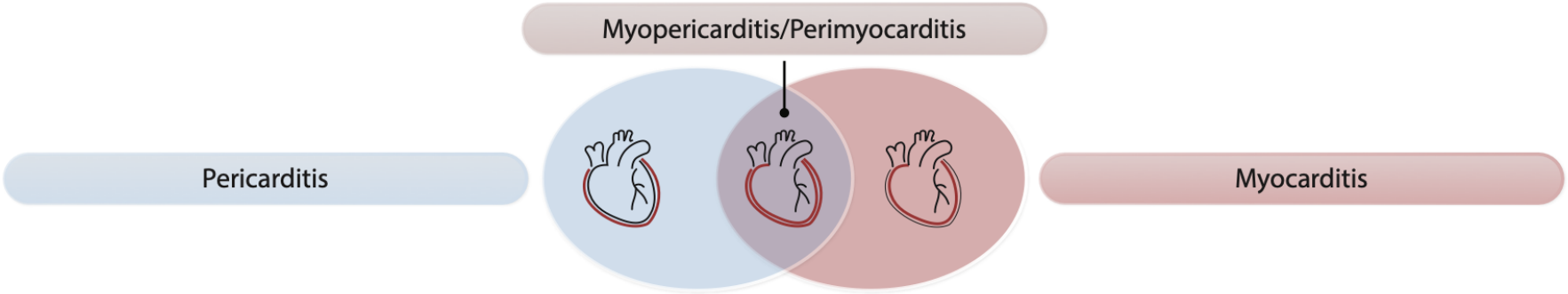
- 1ère recommandations ESC sur la Myocardite.
- 3ème recommantations ESC sur la Péricardite.
- Introduction du terme *inflammatory myopericardial syndrome* (IMPS)

→ Changement de paradigme : overlap entre myocardite et péricardite.

- Staging : aigu/subaigu/chronique.
- Rôle prépondérant de l'imagerie multimodale et de la génétique.
- Importance de la création d'équipe multidisciplinaire.
- Evolution des critères diagnostiques.

Nouveautés : Concept IMPS inflammatory myopericardial syndrome

Umbrella: IMPS - The spectrum of the inflammatory myopericardial syndrome



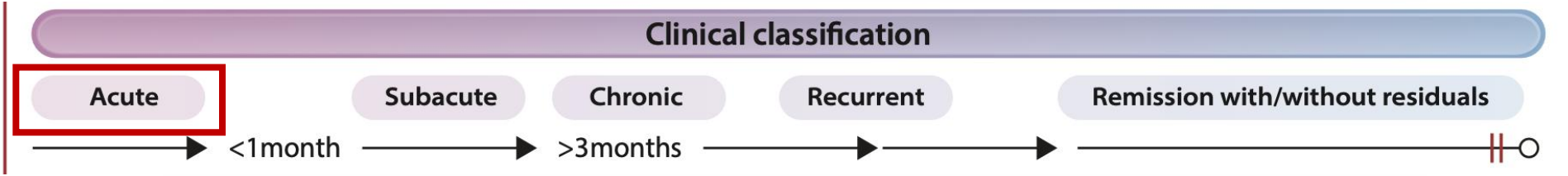
Myopericarditis	Predominant pericarditis[a]
Perimyocarditis	Predominant myocarditis[b]

[a]Patients with definite criteria for pericarditis and elevated biomarkers of myocardial injury (high-sensitivity troponin I or T, CK-MB fraction) without newly developed regional or global impairment of left ventricular function in echocardiography or CMR.

[b]Patients with definite criteria for pericarditis and elevated biomarkers of myocardial injury (high-sensitivity troponin I or T, CK-MB fraction) with newly developed regional or global impairment of left ventricular function in echocardiography or CMR.

Schulz-Menger J et al. Eur Heart J. 2025 Oct 22;46(40):3952-4041. doi: 10.1093/eurheartj/ehaf192. PMID: 40878297.

Nouveautés : Définition précise du caractère aigu/subaigu/chronique



Acute myocarditis	Duration of symptoms ≤4 weeks Fulminant if: • Acute onset[28] and haemodynamically unstable patients requiring inotropes or mechanical circulatory support
Acute pericarditis	Duration of symptoms ≤4 weeks

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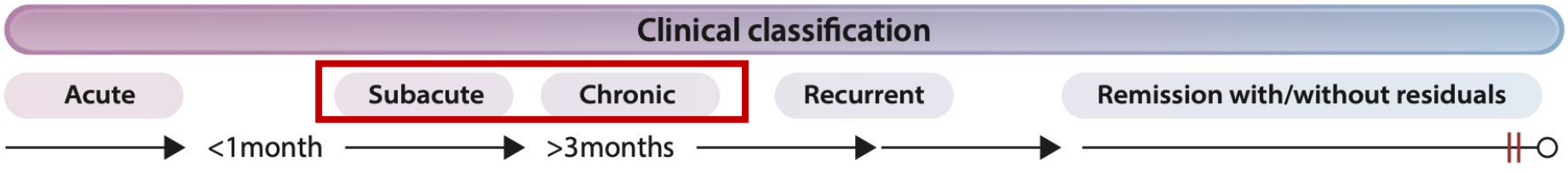

Subacute/ongoing myocarditis	Duration of symptoms >4 weeks to ≤3 months
Subacute/incessant pericarditis[c]	Duration of symptoms >4 weeks to ≤3 months
Chronic myocarditis/ pericarditis	Duration of symptoms >3 months

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Nouveautés : Définition précise du caractère aigu/subaigu/chronique

Recurrent myocarditis/ pericarditis	New symptoms or disease activity after clinical remission

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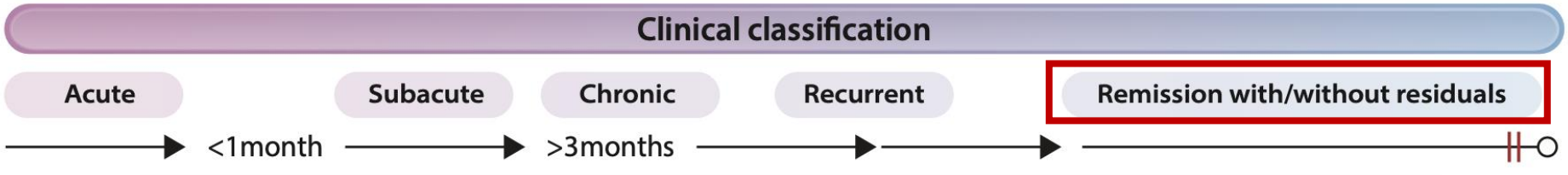
Nouveautés : Définition précise du caractère aigu/subaigu/chronique



Remission without residuals	Regression/absence of symptoms, normalization of ECG, biomarkers, imaging abnormalities (echocardiography and CMR)
Remission with residuals	Regression/absence of symptoms, persistence of abnormalities on ECG, biomarkers and/or imaging (functional and/or structural abnormalities in echocardiography or CMR)

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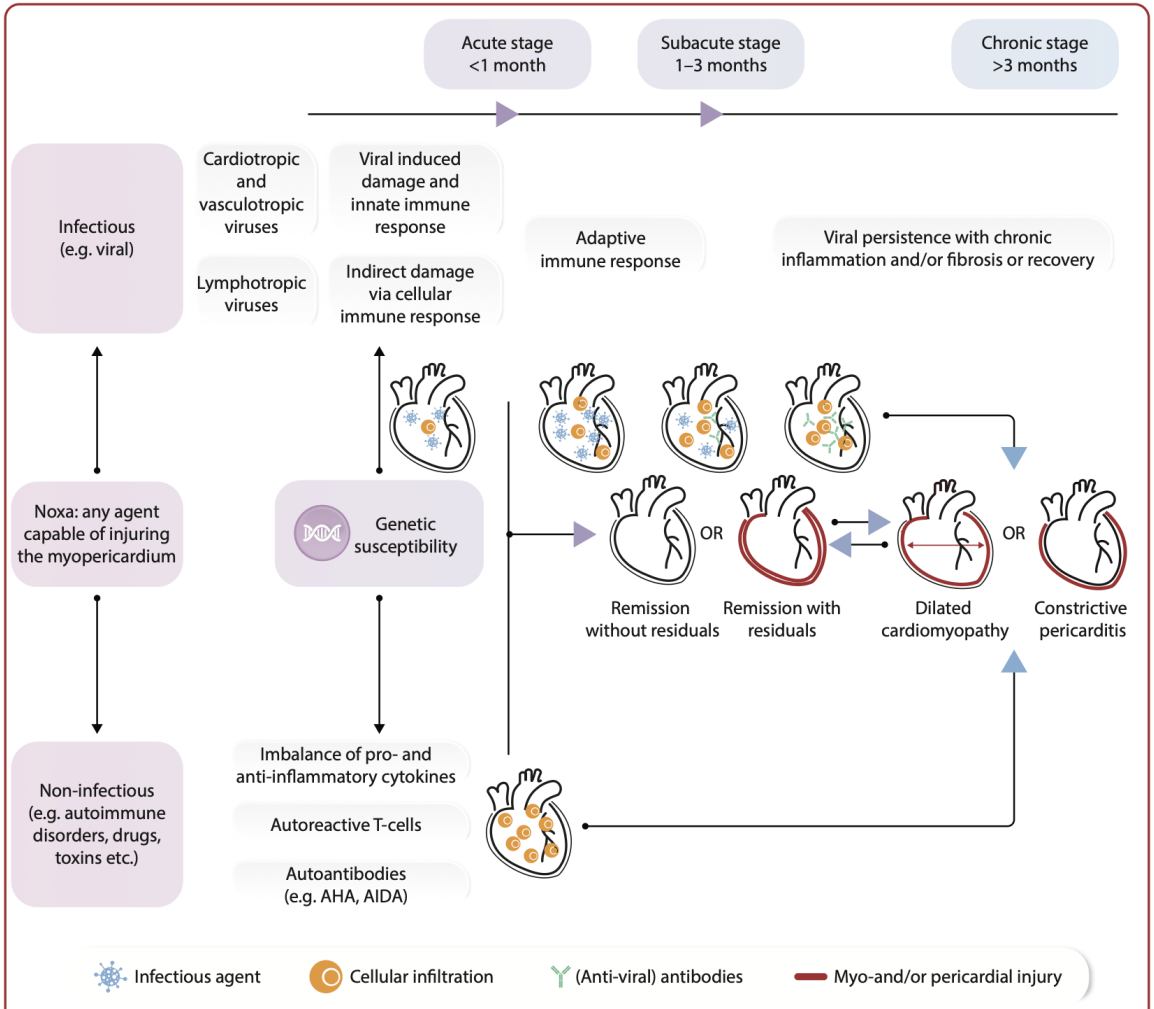
Nouveautés : Définition précise du caractère aigu/subaigu/chronique

Définition clinique sous-tendue par des mécanismes physiopathologiques.



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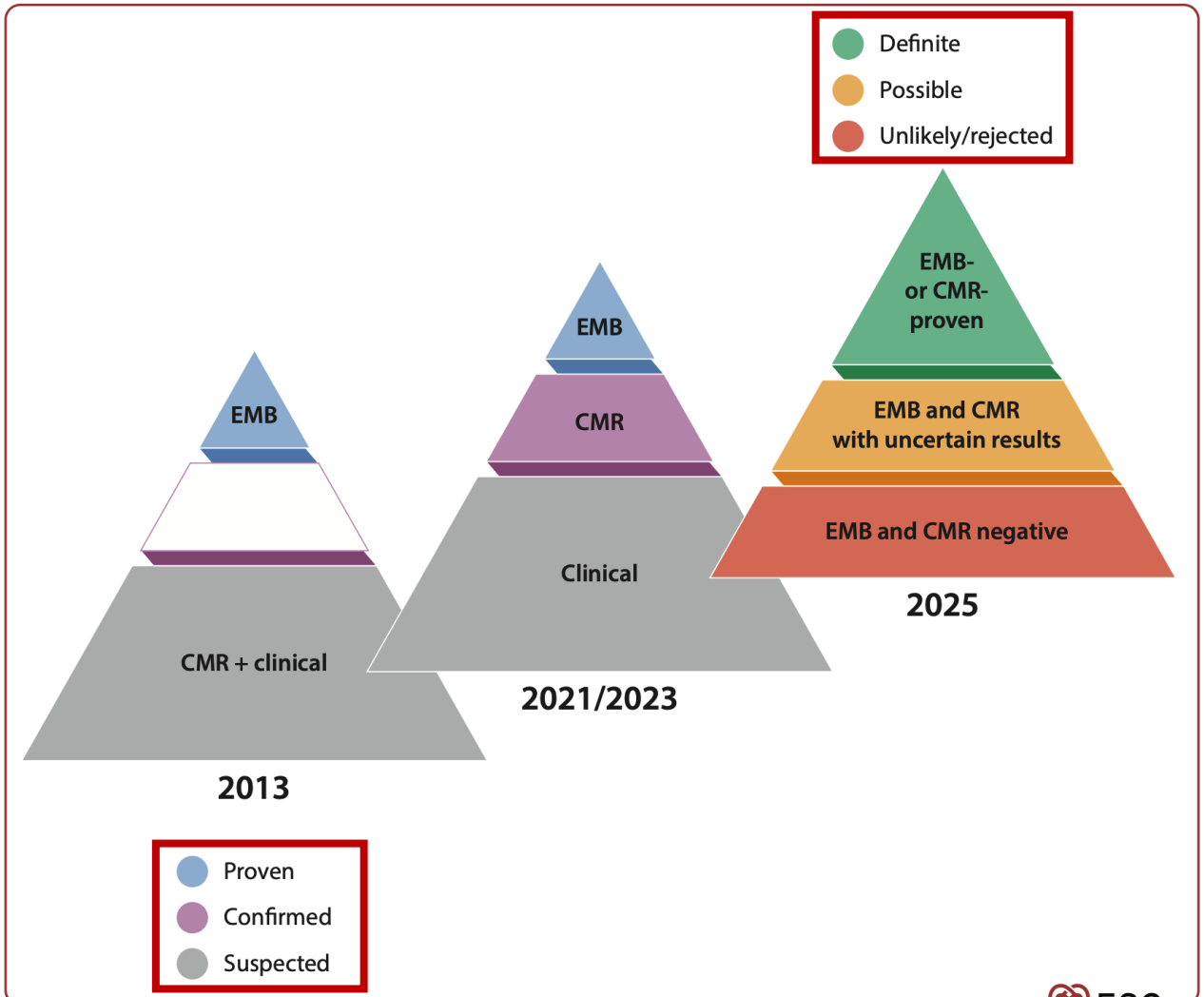
Nouveautés : Evolution des critères diagnostiques, Myocardite



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If diagnostic criteria for myocarditis and/or pericarditis are fulfilled[a]	
	Myocarditis
Definite	Clinical presentation[b] and CMR- or EMB-proven
Possible	Clinical presentation[b] with at least 1 additional criterion CMR- or EMB-uncertain or not available
Unlikely/rejected	Only clinical presentation[b] without additional criteria
Additional criteria beyond clinical presentations[b]	
	Myocarditis
Clinical[b]	Non-specific findings
ECG[c]	ST-T changes
Biomarkers	Troponin elevation
Imaging[d]	Abnormal strain, wall motion, reduced EF Myocardial oedema and/or LGE (CMR findings)

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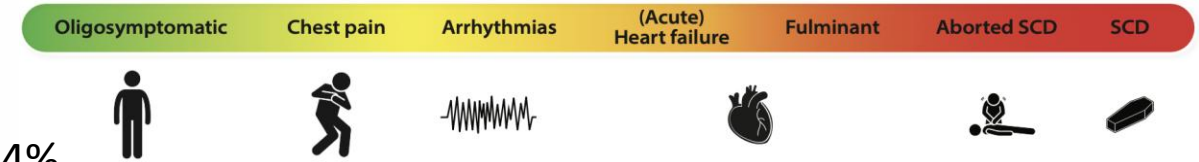
Présentation clinique :

- **Symptômes :**
  - Douleur thoracique > 80%
  - Dyspnée 20-50%
  - Asthénie, palpitations, syncope < 5%
- **Prodromes :**
  - Fièvre 60%
  - Symptomatologie digestive 30%
  - Symptomatologie respiratoire 25%
- **ECG :**
  - Normal 15%
  - Sus ST 58%
  - Autres anomalies du ST/T 24%
  - BAV 10%



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Critères diagnostiques de la Myocardite : histopathologie

- **Critères histologiques de Dallas :**
  - ≥14 leucocytes/mm2 dont ≥7 CD3+ T/mm2

→ Remis en question actuellement.

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Table 5 Histopathological criteria for myocarditis

Term	Predominant inflammatory cells	Myocyte necrosis	Infections PCR positive (viruses, etc.)
Active lymphocytic myocarditis	$CD3^+$ T lymphocytes >7/mm^2, $CD68^+$ macrophages	yes	yes/no
Persistent lymphocytic myocarditis	$CD3^+$ T lymphocytes >7/mm^2, $CD68^+$ macrophages	yes	yes/no
Resolved lymphocytic myocarditis	–	no	yes/no
Eosinophilic myocarditis (acute stage)	Eosinophils, $CD3^+$ T lymphocytes, $CD68^+$ macrophages	yes	yes/no
Giant-cell myocarditis (acute stage)	Eosinophils, $CD68^+$ giant cells, $CD3^+$ T lymphocytes, $CD68^+$ macrophages	yes	no
Sarcoidosis	$CD68^+$ giant cells, granuloma, $CD3^+$ T lymphocytes, $CD68^+$ macrophages	yes/no	no

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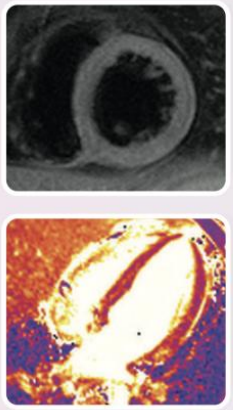
Critères diagnostiques de la Myocardite : CMR

T2-based criterion	T2-weighted imaging or T2 mapping	**Myocardial oedema** 	• Presence, extent, and location of oedema (T2 weighted) • Regional high T2 SI or global high T2 SI (T2-weighted) • Regional or global increase of myocardial T2 times

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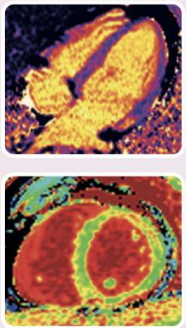
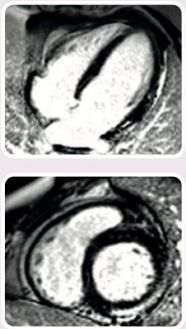
T1-based criterion	Native T1 mapping/ post-contrast T1 mapping (ECV)/ T1-weighted imaging	**Myocardial oedema/ diffuse fibrosis** 	• Description of focal increases • Regional or global increase of native myocardial T1 times • Regional or global increase ECV values
	Late gadolinium enhancement	**Focal myocardial fibrosis/scar** 	• Presence, pattern, extent, and location of LGE (positive if areas with high SI in a nonischaemic distribution pattern) • Thrombi (if present) • Total LGE/LV mass (%) (no routine)

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Critères diagnostiques de la Myocardite : CMR

Updated Lake Louise Criteria (LLC) for myocarditis

CMR-proven myocarditis=
2 out of 2 updated LLC main criteria fulfilled

CMR-uncertain myocarditis=
only 1 out of 2 updated LLC main criteria fulfilled

Main criteria

T2-based criterion
Myocardial oedema

Abnormal T2-mapping or T2-weighted imaging

T1-based criterion
Non-ischaemic myocardial injury

Abnormal T1-mapping, ECV or LGE

Supportive criteria

Pericardial abnormalities

Systolic LV-dysfunction

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Critères diagnostiques de la Myocardite : Stratification du risque

Risk	High risk	Intermediate risk	Low risk
Myocarditis	• Acute HF/cardiogenic shock • Dyspnoea NYHA III–IV refractory to medical therapy • Cardiac arrest/syncope[a] • Ventricular fibrillation/sustained ventricular tachycardia[a] • High-level AV block[a]	• New/progressive dyspnoea • Non-sustained ventricular arrhythmias • Persistent release or relapsing troponin	Stable symptoms or oligosymptomatic
	Imaging criteria:	**Imaging criteria:**	**Imaging criteria:**
	• Newly reduced LVEF (<40%)[a] • Extensive LGE on CMR[a]	• Newly mildly reduced LVEF (41%–49%) and/or WMA • Preserved LVEF (≥50%) and LGE ≥2 segments on CMR	• Preserved LVEF (≥50%) without LGE or limited LGE (<2 segments) on CMR

[a]*These criteria do not lead directly towards endomyocardial biopsy; in these scenarios it is a case-by-case decision depending on the suspected underlying cause.*

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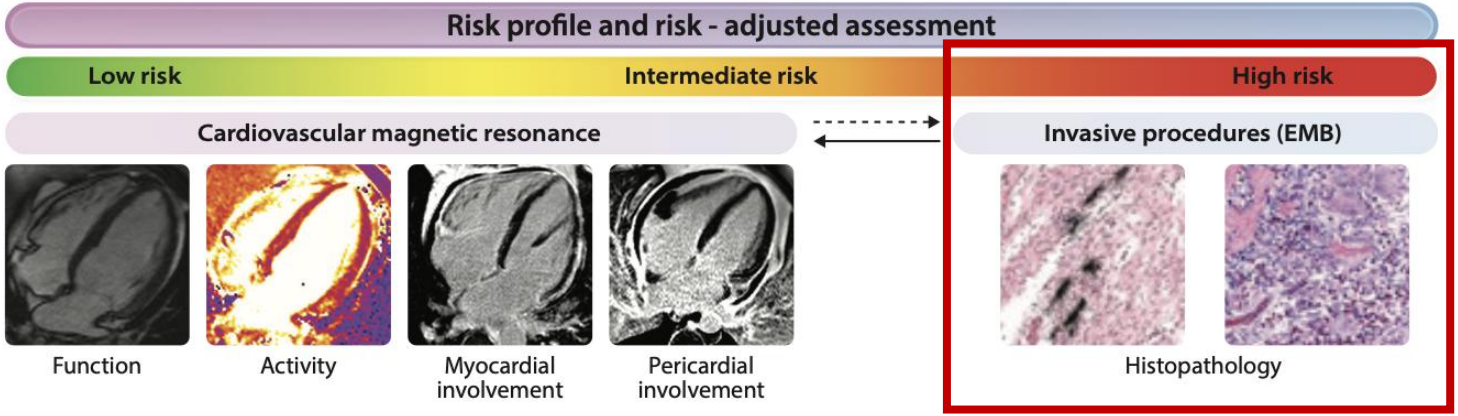
Critères diagnostiques de la Myocardite : indication à l'EBM



Recommendations	Class[a]	Level[b]
EMB[c] is recommended in patients with high-risk myocarditis[d], and/or haemodynamic instability, and/or in patients with intermediate-risk myocarditis not responding to conventional therapy in order to detect a specific histologic subtype and to assess the presence of viral genome for treatment.[34,63,73,131]	I	C

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Nouveautés : Critères diagnostiques de la Péricardite

	Pericarditis
Definite	Clinical presentation[b] with >1 additional criterion
Possible	Clinical presentation[b] with 1 additional criterion
Unlikely/rejected	Only clinical presentation[b] without additional criteria
Additional criteria beyond clinical	
	Pericarditis
Clinical[b]	Pericardial rubs
ECG[c]	PR depression, widespread ST-segment elevation
Biomarkers	C-reactive protein elevation
Imaging[d]	New or worsening pericardial effusion Pericardial oedema and/or LGE (CMR findings)

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Présentation clinique :

- **Symptômes :**
  - Douleur thoracique 85% - 90% péricarditique.
  - Fièvre > 38°C 70%
  - Dyspnée
  - Palpitations exceptionnelles

- **ETT :** Epanchement 60% (péricardite sèche 40 à 50% des cas).
- **Auscultation :** Frottement < 33%
- **Biologie :**
  - Elévation de CRP 79%–90%
  - Troponinémie élevée dans 20%–30% (myopéricardite)
- **ECG :** Anomalie ECG DOIT faire rechercher atteinte myocardique associée (60% des cas).

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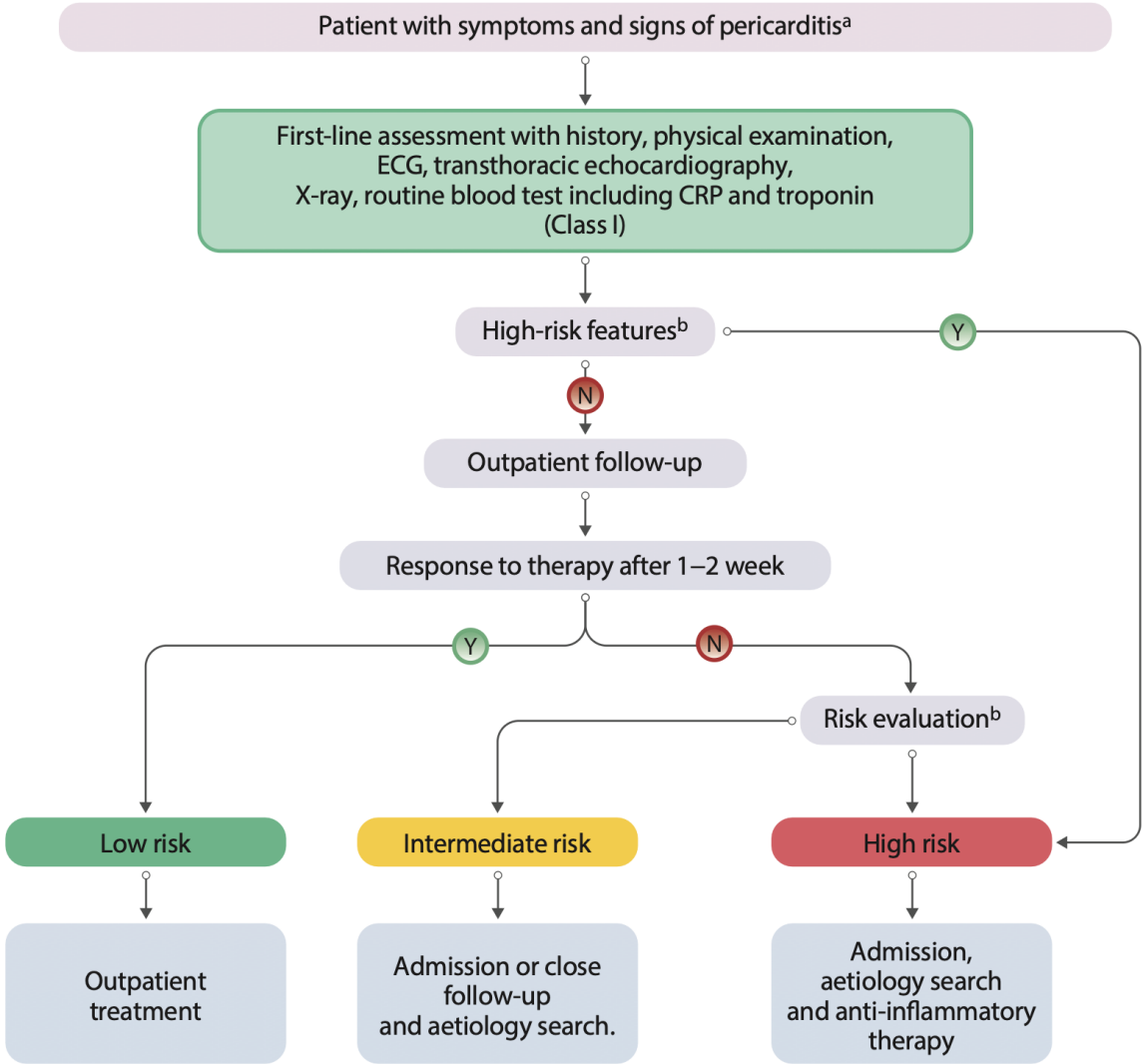
Nouveautés : Raisonnement diagnostique dans la péricardite



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Critères diagnostiques de la Péricardite : Stratification du risque

Risk	High risk	Intermediate risk	Low risk
Pericarditis	• Signs and symptoms of cardiac tamponade • Fever (temperature >38°C) • Effusive–constrictive pericarditis • Failure of NSAID therapy • Incessant pericarditis	• Signs and symptoms of right HF	• Response to adequate therapy within 1–2 weeks
	Imaging criteria:	**Imaging criteria:**	**Imaging criteria:**
	• Large PEff (>20 mm end-diastole) • Cardiac tamponade • Extensive pericardial LGE on CMR	• Moderate–large PEff (10–20 mm end-diastole) • Constrictive physiology regardless of the size of the effusion	• Absence or mild PEff • Absence of pericardial LGE on CMR

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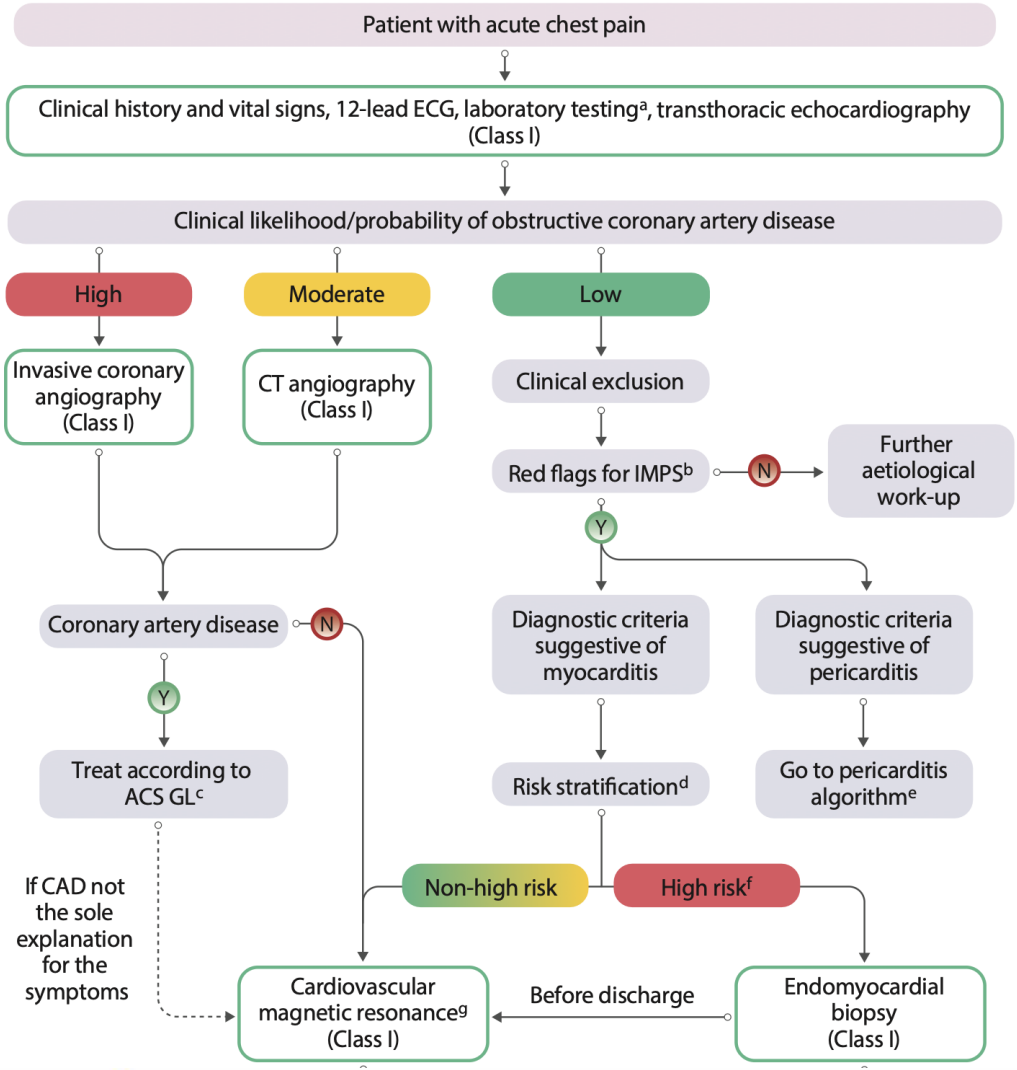
Critères diagnostiques IMPS : Evaluation coronaire



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Nouveautés : Bilan étiologique

Recommendations	Class[a]	Level[b]
Complete clinical evaluation, including history, physical examination, chest X-ray, biomarkers[c], ECG, and echocardiography is recommended in all patients with a suspicion of myocarditis and/or pericarditis for the initial diagnostic assessment.	I	C
Routine serology is not recommended in patients with myocarditis and/or pericarditis for the evaluation of viral aetiology except for hepatitis C, HIV, and Lyme disease.	III	C

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Nouveautés : Bilan étiologique, CMR

Myocarditis		
CMR is recommended in patients with suspected myocarditis to reach a clinical diagnosis and to determine the cause of acute myocardial injury, including assessment of oedema, ischaemia, and necrosis/fibrosis/scarring.[115,164,169–183]	I	B
CMR is recommended for follow-up at least within the first 6 months in patients with myocarditis to identify a healed or ongoing process, for risk stratification and personalized therapy, and to enable a return to exercise.[10,62,184–186]	I	C

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Nouveautés : Bilan étiologique, CMR

Pericarditis		
CMR is recommended in patients with suspected pericarditis when a diagnosis cannot be made using clinical criteria to assess evidence of pericardial thickening, oedema, LGE, and to assess the persistence of disease during follow-up in selected cases.[110,129,165,187–194]	I	B

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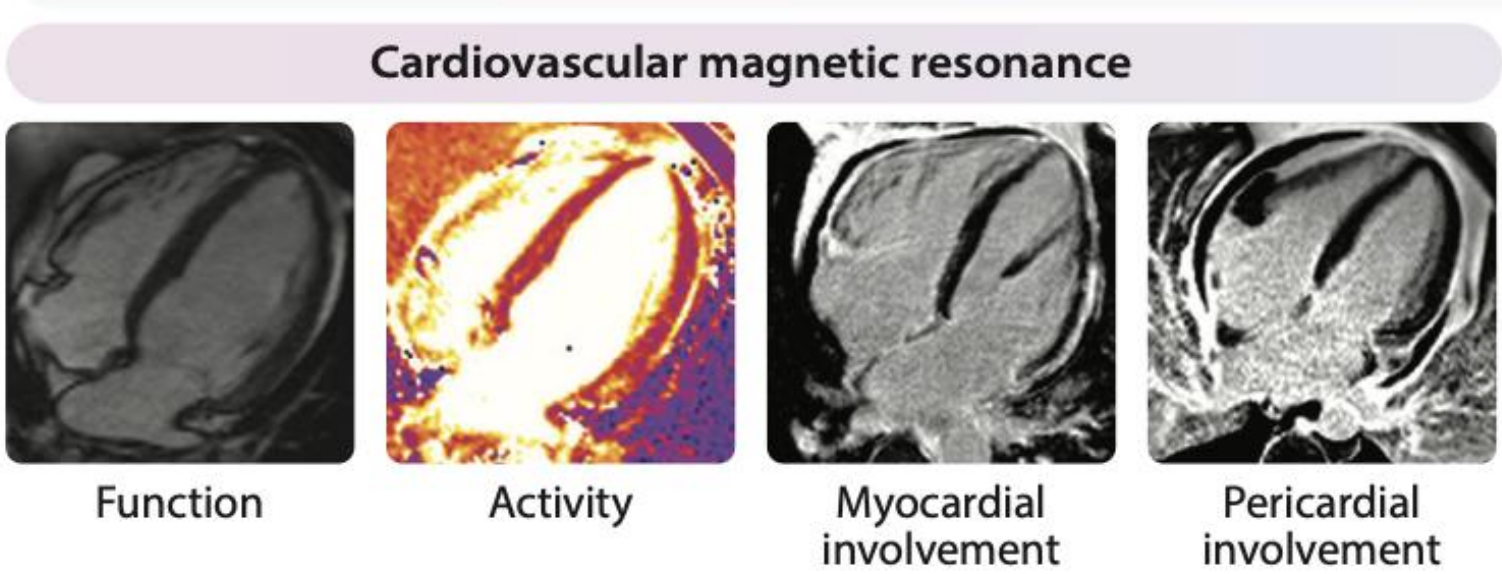
Nouveautés : Bilan étiologique, CMR dans la péricardite



Schulz-Menger J et al. Eur Heart J. 2025 Oct 22;46(40):3952-4041. doi: 10.1093/eurheartj/ehaf192. PMID: 40878297.

Nouveautés : Bilan génétique dans la myocardite

- **Prévalence de mutations classe IV ou V dans la myocardite :**
  - 4.2% des myocardites non compliquées
  - 22% des myocardites à haut risque chez l'adulte
  - 45% des myocardites à haut risque chez l'enfant

- **Prédominance du type de mutation selon la gravité :**
  - Variants pour les gènes du desmosome dans les myocardites non compliquées (64%)
  - Variants pour les gènes du sarcomère pour les myocardites à haut risque (58% chez l'adulte et 71% chez l'enfant)

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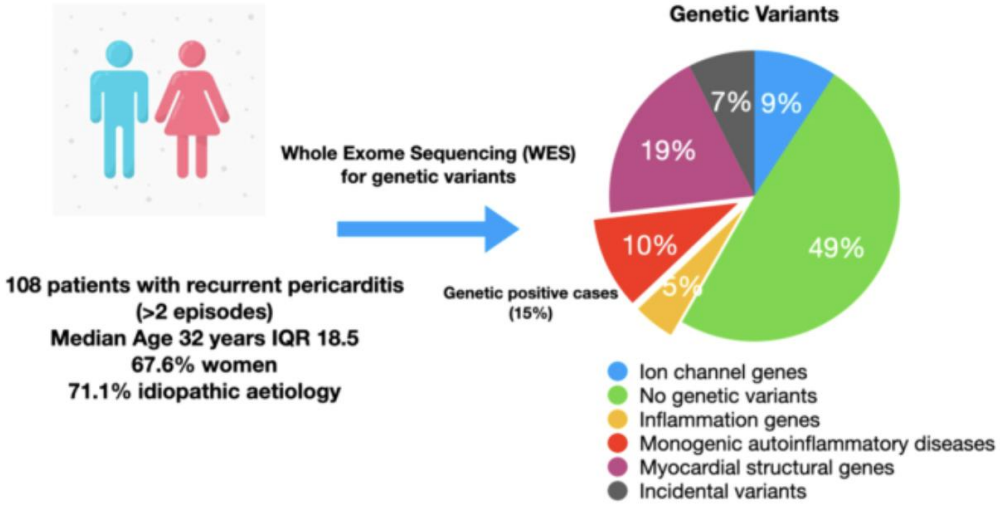
Nouveautés : Bilan génétique dans la péricardite

- **Mutations génétiques dans les péricardites récurrentes :**
  - Association avec des variants monogéniques dans les maladies auto-inflammatoires (FMF, TRAPS)
  - Mais aussi avec gènes relatifs à l'inflammation

- **Cohorte de 108 patients avec péricardites récurrentes :**
  - 15% de variants en rapport avec gènes relatifs à l'inflammation
  - 30% de porteurs de variants en rapport avec cardiomyopathies



Imazio M et al. J Cardiovasc Med (Hagerstown). 2024 Nov 1;25(11):799-804. doi: 10.2459/JCM.0000000000001669.
Schulz-Menger J et al. Eur Heart J. 2025 Oct 22;46(40):3952-4041. doi: 10.1093/eurheartj/ehaf192. PMID: 40878297.

Nouveautés : Bilan génétique

It is recommended to obtain family history including pedigrees in cases of recurrent IMPS to provide clues to the underlying aetiology, determine inheritance pattern, and identify relatives at risk.	I	C
Genetic testing should be considered in patients with definite myocarditis/pericarditis in cases of:[50,51,64,94,150] • family history of IMPS, inherited or suspected cardiomyopathy • severe ventricular arrhythmia[c] • significant left/right LGE (e.g. ring-like pattern or septal LGE) or persistent LVEF systolic dysfunction • recurrent myocarditis or persistent troponin elevation • recurrent pericarditis with an inflammatory phenotype, refractory to conventional treatment[d], with the aim to detect an underlying genetic cause.	IIa	B

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Thérapeutique :

Recommendation Table 9 — Recommendations for medical therapy in myocarditis (see Evidence Table 9)

Recommendations	Class[a]	Level[b]
Management of symptoms		
NSAIDs (together with proton pump inhibition) should be considered in patients with associated symptoms of pericarditis to reduce symptoms.	IIa	C
Colchicine should be considered in patients with myopericarditis to reduce recurrences.[263]	IIa	B
Management of arrhythmias		
β-Blockers, with a continuation for at least 6 months, should be considered in patients with acute myocarditis, especially those with troponin elevation, to control symptoms and prevent arrhythmias.	IIa	C

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Thérapeutique :

Table 13 **Specific initial dosing and duration of therapy for acute and recurrent pericarditis**

Therapy	Dosing	Duration[a]	Tapering[a]
Aspirin[b]	750–1000 mg 3 times daily	1–2 weeks	Decrease by 250 mg every 1–2 weeks
Ibuprofen[b]	600–800 mg 3 times daily	1–2 weeks	Decrease by 200 mg every 1–2 weeks
Indomethacin	25–50 mg 3 times daily	1–2 weeks	Decrease by 25 mg every 1–2 weeks
Colchicine[b]	0.5 mg once daily (<70 kg or severe renal impairment) or 0.5 mg twice daily	3–6 months	Not required
Prednisone	0.2–0.5 mg/kg/day	2–4 weeks	Several months
Treatment for recurrences only:			
Azathioprine	Starting with 1 mg/kg/day then gradually increased to 2–3 mg/kg/day	Several months	Several months
IVIG	400–500 mg/kg i.v. daily for 5 days	5 days	Not required
Anakinra	1–2 mg/kg/day up to 100 mg/day in adults	At least 6 months/ >12 months	Needed (at least 3–6 months)/ unknown
Rilonacept[c]	320 mg once daily followed by 160 mg weekly		

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Suivi :

Follow-up with clinical assessment, biomarkers[c], ECG, exercise test, Holter-ECG monitoring, echocardiography, and CMR at least within 6 months after the index hospitalization is recommended in all patients with myocarditis to identify a potential progression or new risk factors.[62]	I	C
Long-term follow-up is recommended for patients with complicated myocarditis[d] to identify a potential progression or new complications.[28,74]	I	C
Long-term follow-up is recommended for patients with incessant or recurrent pericarditis to identify a potential progression and new complications.[104,347]	I	C

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Suivi :

		Within 1 month	Within 3–6 months	12 months	>1 year and long-term FU[a]
Clinical evaluation and ECG	Myocarditis	X	X	X	X
	Pericarditis	X	X	X	X
Biomarkers (TnI, C-reactive protein)	Myocarditis	X	X	(X)	(X)
	Pericarditis	X	X	(X)	(X)
Rhythm (stress and/or Holter-ECG)	Myocarditis	–	X	(X)	(X)
	Pericarditis	–	–	–	–
Imaging myocarditis	TTE	X[b]		X[c]	X[c]
	CMR	X[b]		X[c]	X[c]
Imaging pericarditis	TTE	X[b]		X[c]	X
	CMR	(X)[b]		(X)[d]	(X)[d]

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Sport :

Recommendation	Class[a]	Level[b]
Restriction of physical exercise until remission, for at least 1 month, is recommended in athletes and non-athletes after IMPS using an individualized approach to accelerate recovery.	I	C

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ICI

Diagnostic triage within 24 h is recommended[c] in patients with suspected myocarditis induced by ICI to initiate treatment rapidly.[495,496,501,504]	I	C
Immediate disruption of ICI and administration of high-dosage corticosteroids are recommended in patients with ICI-associated myocarditis in order to stop the inflammatory reaction and stabilize the patient.[504]	I	C
Second-line immunosuppression treatment should be considered in patients with steroid-refractory ICI-associated myocarditis.[501,504]	IIa	C
Second-line immunosuppression treatment may be considered in patients with fulminant/severe ICI-associated myocarditis.[501,504]	IIb	C

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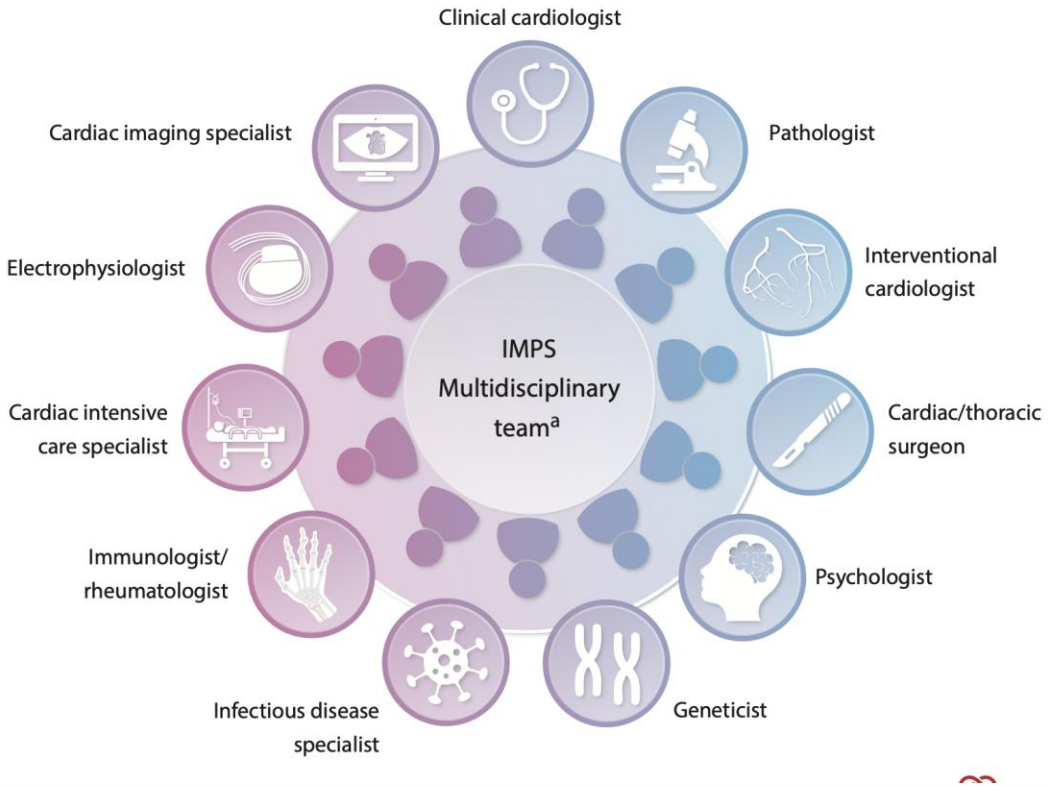

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