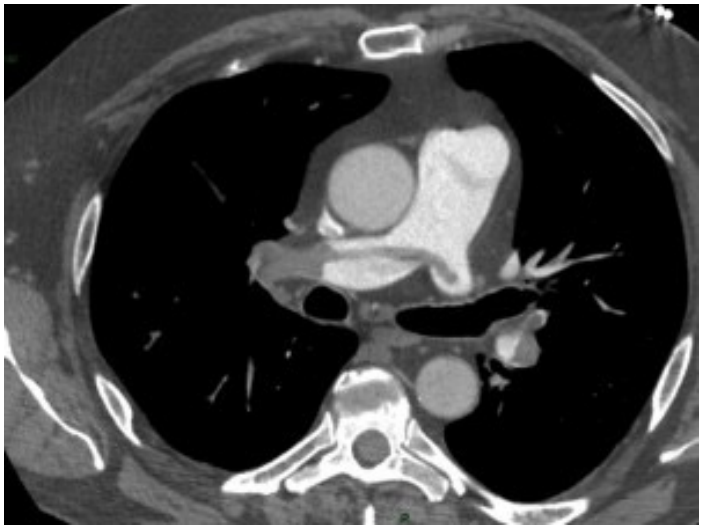
MTEV : ce qui peut se faire en ville



Congrès CardioRun 29/09 au 01/10 2021

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Liens d’intérêt

Consultant : Novartis

Honoraires : AstraZeneca, Lilly, Novartis, Novo, Servier

Quelques chiffres en France…

- Incidence MTEV : 180/100.000 habitants/an
- 1/3 d'EP et 2/3 de TVP
  - Soit 40.000 EP par an en France
  - EP 3ème cause de Sd CV aigu
- 10% de décès à 15 jours

ESC
European Society of Cardiology
European Heart Journal (2020) 41, 543–603
doi:10.1093/eurheartj/ehz405

ESC GUIDELINES

2019 ESC Guidelines for the diagnosis and management of acute pulmonary embolism developed in collaboration with the European Respiratory Society (ERS)

The Task Force for the diagnosis and management of acute pulmonary embolism of the European Society of Cardiology (ESC)

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Facteurs prédisposants la MTEV

Strong risk factors (OR > 10)

- Fracture of lower limb
- Hospitalization for HF or atrial fibrillation/flutter (within previous 3 months)
- Hip or knee replacement
- Major trauma
- Myocardial infarction (within previous 3 months)
- Previous VTE
- Spinal cord injury

Moderate risk factors (OR 2–9)

- Arthroscopic knee surgery
- Autoimmune diseases
- Blood transfusion
- Central venous lines
- Intravenous catheters and leads
- Chemotherapy
- Congestive HF or respiratory failure
- Erythropoiesis-stimulating agents
- Hormone replacement therapy (depends on formulation)
- *In vitro* fertilization
- Oral contraceptive therapy
- Post-partum period
- Infection (specifically pneumonia, urinary tract infection, and HIV)
- Inflammatory bowel disease
- Cancer (highest risk in metastatic disease)
- Paralytic stroke
- Superficial vein thrombosis
- Thrombophilia

Weak risk factors (OR < 2)

- Bed rest >3 days
- Diabetes mellitus
- Arterial hypertension
- Immobility due to sitting (e.g. prolonged car or air travel)
- Increasing age
- Laparoscopic surgery (e.g. cholecystectomy)
- Obesity
- Pregnancy
- Varicose veins

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Prédiction clinique de l'EP : score de Genève

Revised Geneva score	Original version[93]	Simplified version[108]
Previous PE or DVT	3	1
Heart rate		
75–94 b.p.m.	3	1
≥95 b.p.m.	5	2
Surgery or fracture within the past month	2	1
Haemoptysis	2	1
Active cancer	2	1
Unilateral lower limb pain	3	1
Pain on lower limb deep venous palpation and unilateral oedema	4	1
Age >65 years	1	1
Clinical probability		
Three-level score		
Low (10% EP)	0–3	0–1
Intermediate (30% EP)	4–10	2–4
High (65% EP)	≥11	≥5
Two-level score		
PE unlikely	0–5	0–2
PE likely	≥6	≥3

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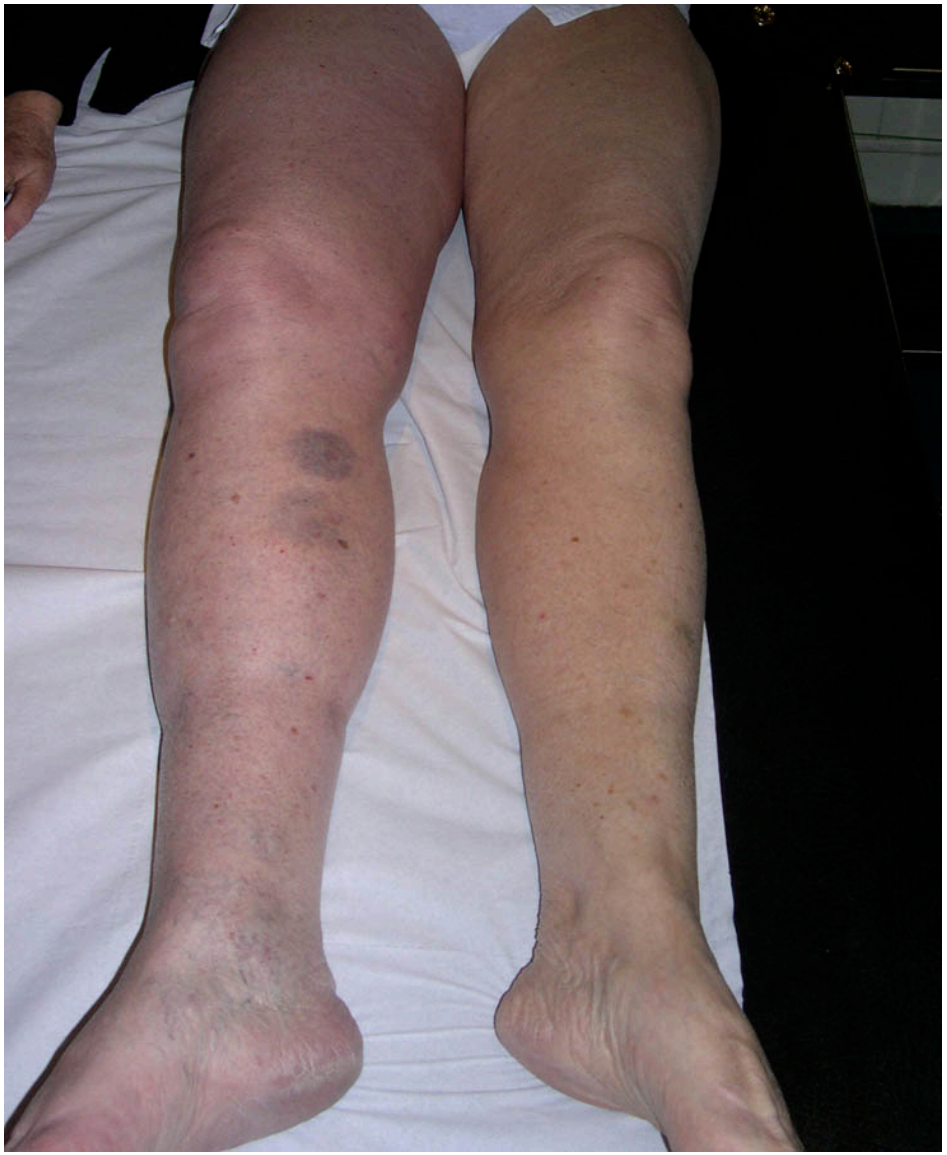
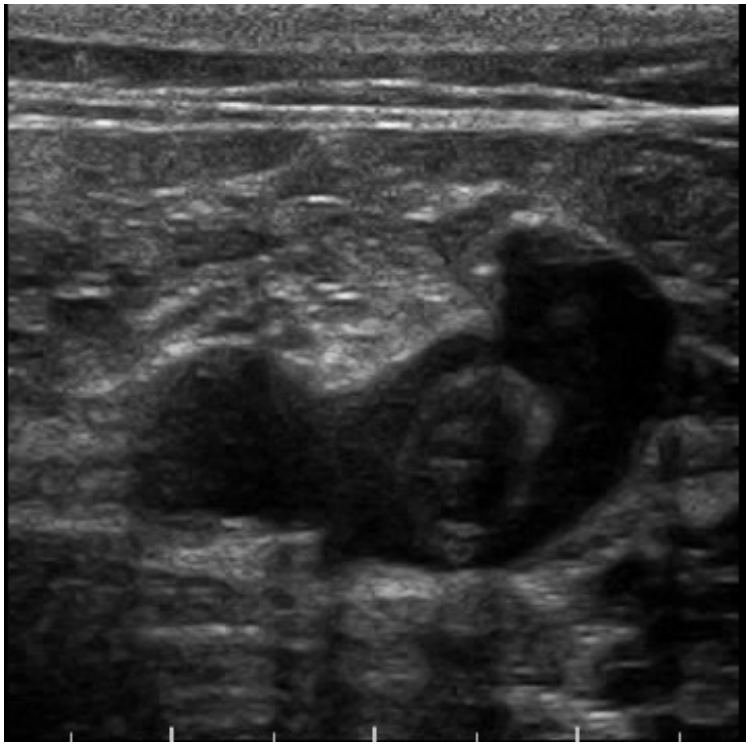
Symptômes présents chez les patients avec EP hospitalisés dans un service d'urgence

Feature	PE confirmed (n = 1880)
Dyspnoea	50%
Pleuritic chest pain	39%
Cough	23%
Substernal chest pain	15%
Fever	10%
Haemoptysis	8%
Syncope	6%
Unilateral leg pain	6%
Signs of DVT (unilateral extremity swelling)	24%

Pollack et al., J Am Coll Cardiol 2011





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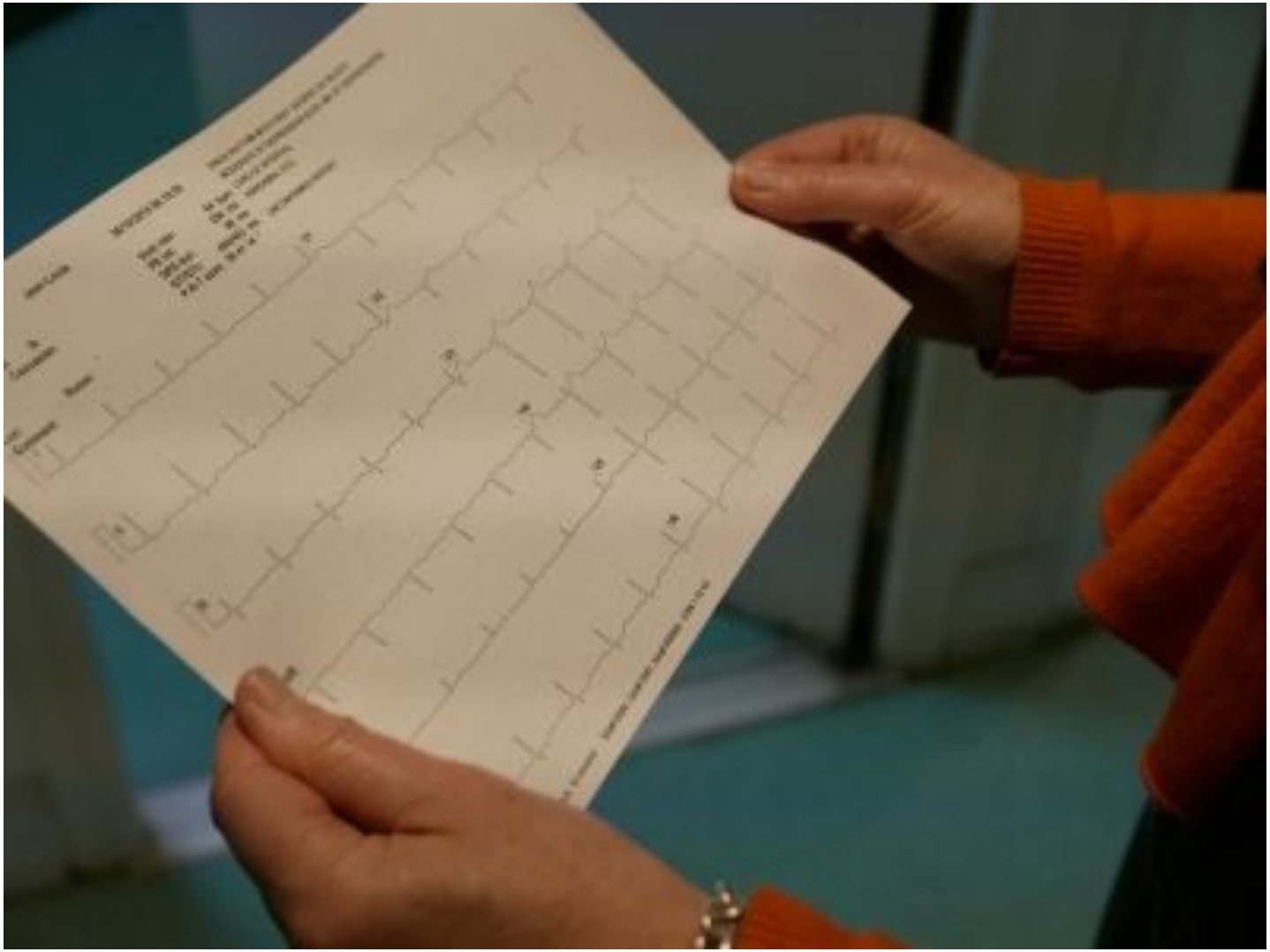
Pronostic : score de PESI (mortalité à 30 jours)

Parameter	Original version[214]	Simplified version[218]
Age	Age in years	1 point (if age >80 years)
Male sex	+10 points	–
Cancer	+30 points	1 point
Chronic heart failure	+10 points	1 point
Chronic pulmonary disease	+10 points	
Pulse rate ≥110 b.p.m.	+20 points	1 point
Systolic blood pressure <100 mm Hg	+30 points	1 point
Respiratory rate >30 breaths per minute	+20 points	–
Temperature <36 °C	+20 points	–
Altered mental status	+60 points	–
Arterial oxyhaemoglobin saturation <90%	+20 points	1 point
	Risk strata[a]	
	Class I:≤65 points very low 30-day mortality risk (0–1.6%) **Class II: 66–85 points** low mortality risk (1.7–3.5%) **Class III: 86–105 points** moderate mortality risk (3.2–7.1%) **Class IV: 106–125 points** high mortality risk (4.0–11.4%) **Class V: >125 points** very high mortality risk (10.0–24.5%)	**0 points**= 30-day mortality risk 1.0% (95% CI 0.0%–2.1%) **≥1 point(s)**= 30-day mortality risk 10.9% (95% CI 8.5%–13.2%)

Aujesky et al., Am J Respir Crit Care Med 2005



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Seuil de positivité des D-dimères

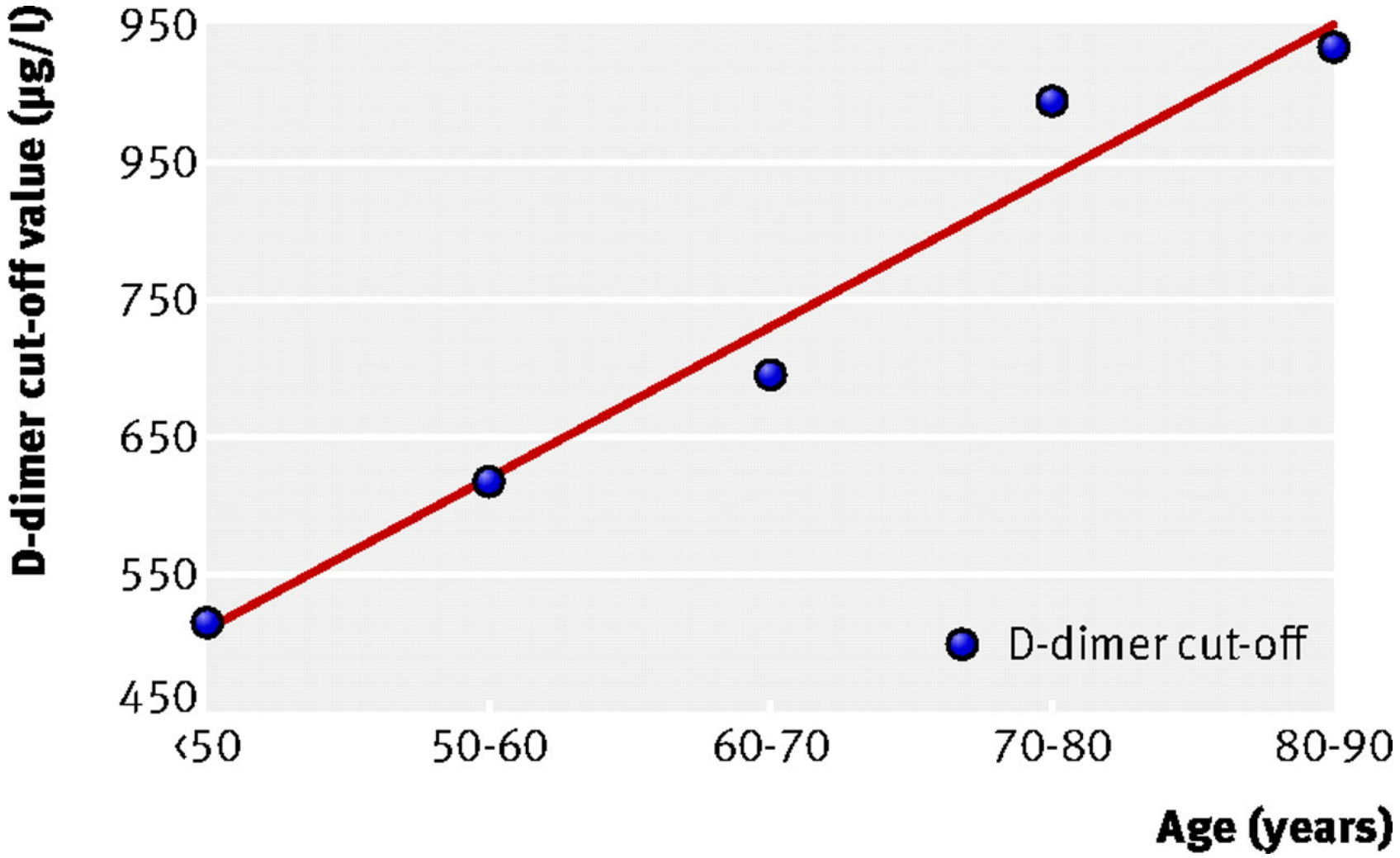
Age × 10 chez patients ≥ 50 ans

D-Dimer Assay	Low/Intermediate or Unlikely Clinical Probability, No. of Patients	D-Dimer <500 µg/L	3-mo Thromboembolism Risk		D-Dimer ≥500 µg/L and <Age-Adjusted Cutoff	3-mo Thromboembolism Risk	
			No. of Events/ Total Patients	% (95% CI)		No. of Events/ Total Patients	% (95% CI)
VIDAS D-Dimer Exclusion	1345	423	0/417	0.0 (0.0-0.9)	130	0/127	0.0 (0.0-2.9)
Innovance D-Dimer	838	202	1/202	0.5 (0.1-2.8)	103	1/103	1.0 (0.2-5.3)
STA-Liatest D-Dimer	389	132	0/132	0.0 (0.0-2.8)	49	0/47	0.0 (0.0-7.6)
D-Dimer HS 500	185	32	0/31	0.0 (0.0-11.0)	23	0/23	0.0 (0.0-14.3)
Second-generation Tina-quant	128	26	0/26	0.0 (0.0-12.9)	32	0/31	0.0 (0.0-11.0)
Cobas h 232	13	2	0/2	0.0 (0.0-65.8)	0		
Total	2898	817	1/818	0.1 (0.0-0.7)	337	1/331	0.3 (0.1-1.7)

Among the 766 patients 75 years or older, of whom 673 had a nonhigh clinical probability, using the age-adjusted cutoff instead of the 500 µg/L cutoff increased the proportion of patients in whom PE could be excluded on the basis of D-dimer from 43 of 673 patients (6.4% [95% CI, 4.8%-8.5%) to 200 of 673 patients (29.7% [95% CI, 26.4%-33.3%), without any additional false-negative findings.

Righini et al., JAMA 2014

Seuil de positivité des D-dimères



Douma et al., BMJ 2010

Situations associées à une élévation des D-dimères

- Maladies artérielles thromboemboliques
  - Infarctus du myocarde
  - ACV
  - Ischémie aigue d'un membre
  - FA
  - Thrombus intracardiaque
- Maladies thromboemboliques veineuses
  - TPP
  - Embolie pulmonaire
- CIVD
- Prééclampsie, éclampsie
- Fibrinolyse anormale ; agents fibrinolytiques
- Insuffisance cardiaque
- Infection, sepsis, inflammation,SIRS (systemic inflammatory response)
- Chirurgie, trauma
- Maladie hépatique sévère
- Cancer
- Maladie rénale
  - Syndrome néphrotique
  - IRA
  - IRC et maladie cardiaque sous-jacente
- Grossesse normale
- Malformations veineuses
- Âge plus de 75 ans

Baguet J-Philippe, Le Tampon

Table 6 **Imaging tests for diagnosis of pulmonary embolism**

	Strengths	Weaknesses/limitations	Radiation issues[a]

CTPA	• Readily available around the clock in most centres
	• Excellent accuracy
	• Strong validation in prospective management outcome studies
	• Low rate of inconclusive results (3–5%)
	• May provide alternative diagnosis if PE excluded
	• Short acquisition time
		• Radiation exposure
		• Exposure to iodine contrast:
		  ○ limited use in iodine allergy and hyperthyroidism
		  ○ risks in pregnant and breastfeeding women
		  ○ contraindicated in severe renal failure
		• Tendency to overuse because of easy accessibility
		• Clinical relevance of CTPA diagnosis of subsegmental PE unknown
			• Radiation effective dose 3–10 mSv[b]
			• Significant radiation exposure to young female breast tissue

Planar V/Q scan	• Almost no contraindications • Relatively inexpensive • Strong validation in prospective management outcome studies	• Not readily available in all centres • Interobserver variability in interpretation • Results reported as likelihood ratios • Inconclusive in 50% of cases • Cannot provide alternative diagnosis if PE excluded	• Lower radiation than CTPA, effective dose ~2 mSv[b]
V/Q SPECT	• Almost no contraindications • Lowest rate of non-diagnostic tests (<3%) • High accuracy according to available data • Binary interpretation ('PE' vs. 'no PE')	• Variability of techniques • Variability of diagnostic criteria • Cannot provide alternative diagnosis if PE excluded • No validation in prospective management outcome studies	• Lower radiation than CTPA, effective dose ~2 mSv[b]
Pulmonary angiography	• Historical gold standard	• Invasive procedure • Not readily available in all centres	• Highest radiation, effective dose 10–20 mSv[b]

CTPA = computed tomographic pulmonary angiography; mGy = milligray; mSv = millisieverts; PE = pulmonary embolism; SPECT = single-photon emission computed tomography; V/Q = ventilation/perfusion (lung scintigraphy).

[a]In this section, effective radiation dose is expressed in mSv [dose in mSv = absorbed dose in mGy × radiation weighting factor (1.0 for X-rays) × tissue weighting factor]. This reflects the effective doses of all organs that have been exposed, that is, the overall radiation dose to the body from the imaging test. Compare with *Table 12*, in which the absorbed radiation dose is expressed in mGy to reflect the radiation exposure to single organs or to the foetus.

[b]For comparison, the whole-body effective dose of a chest X-ray examination is 0.1 mSv.[141]

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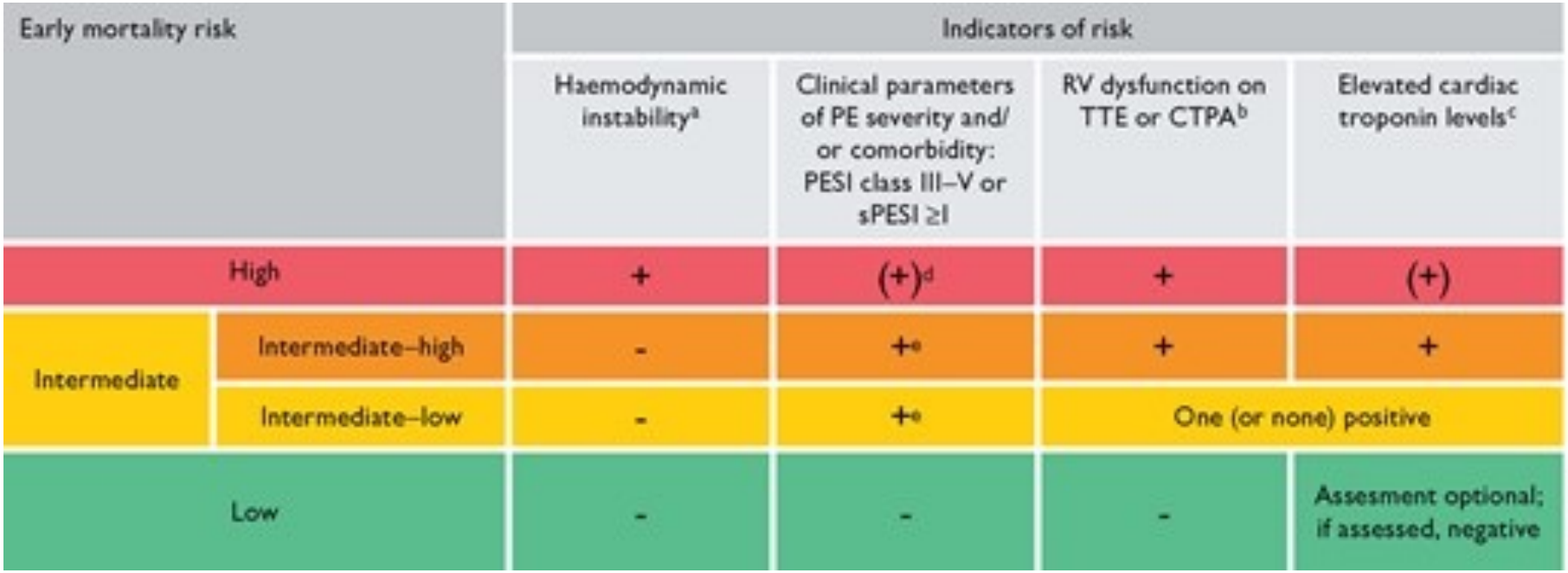

Early mortality risk		Indicators of risk			
		Haemodynamic instability[a]	Clinical parameters of PE severity and/or comorbidity: PESI class III–V or sPESI ≥1	RV dysfunction on TTE or CTPA[b]	Elevated cardiac troponin levels[c]
High		+	(+)[d]	+	(+)
Intermediate	Intermediate–high	-	+[e]	+	+
	Intermediate–low	-	+[e]	One (or none) positive	
Low		-	-	-	Assesment optional; if assessed, negative

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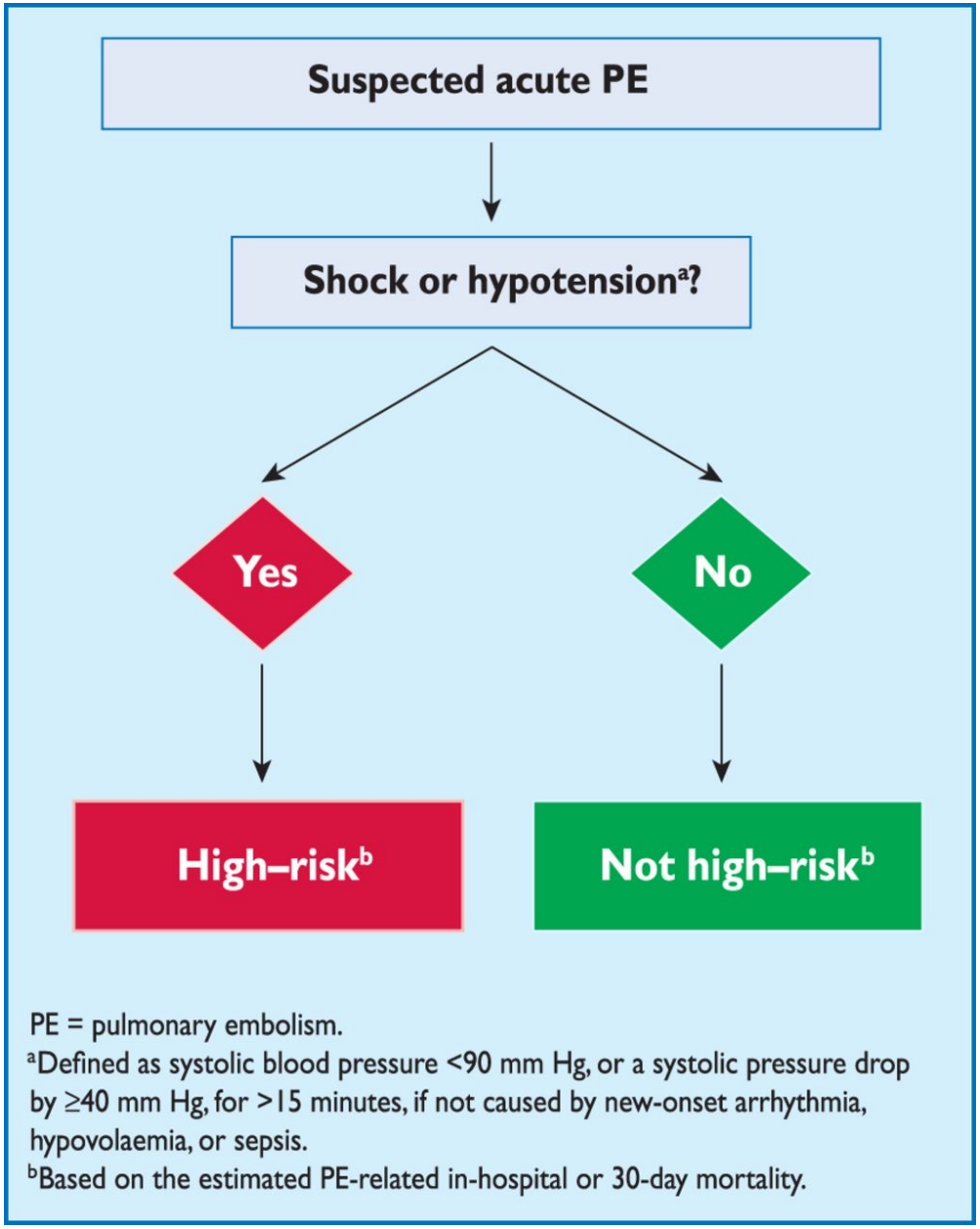
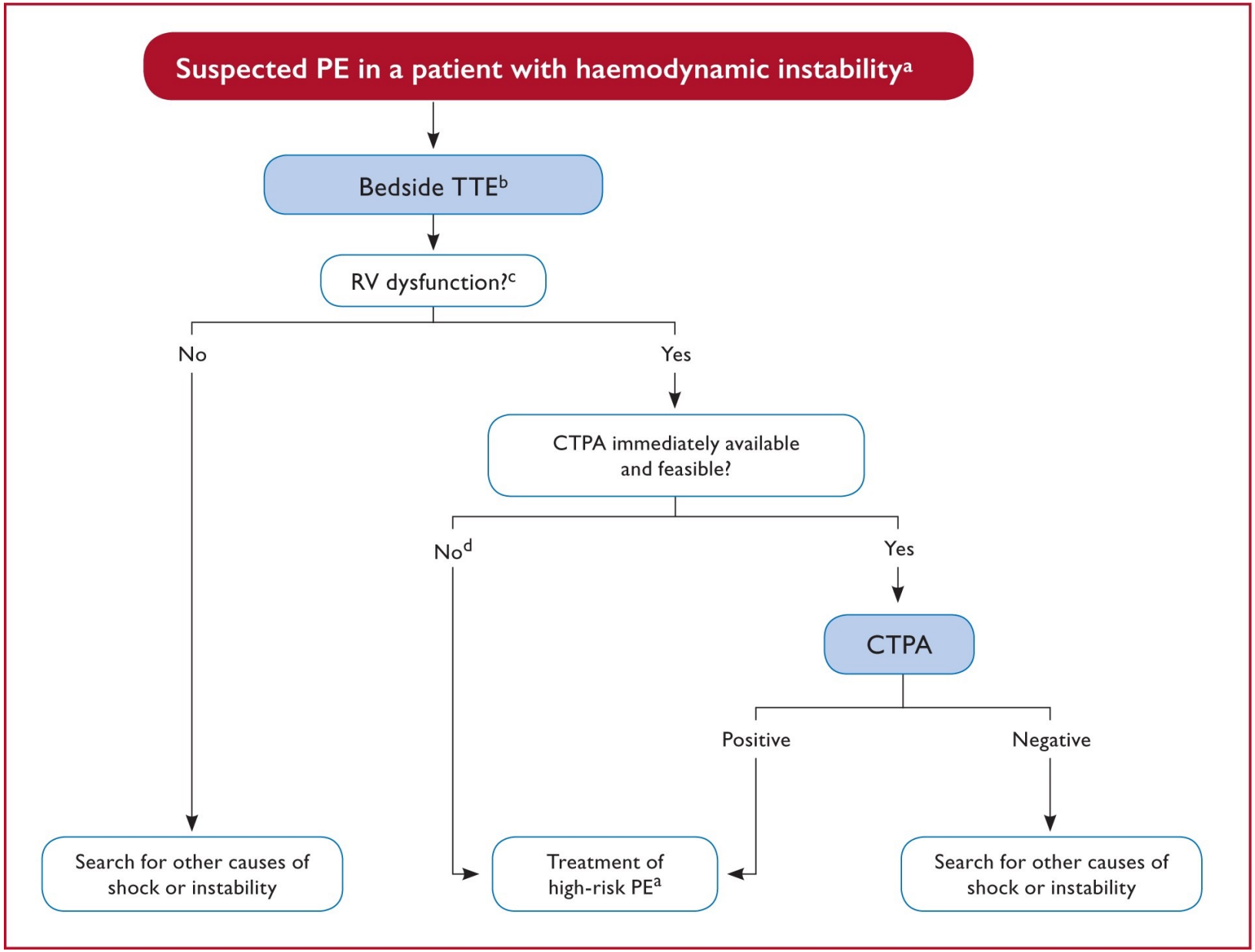


ESC guidelines, Eur Heart J 2014



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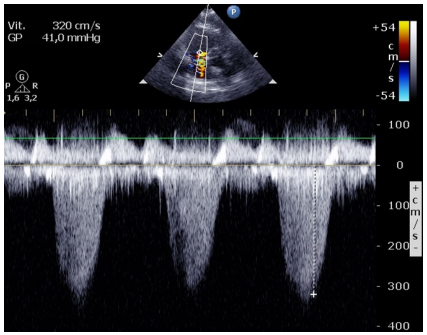
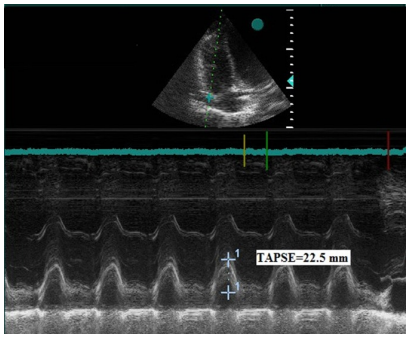
Echo-Doppler cardiaque versus Angio-TDM

Angio-TDM

- Embole
- Dilatation VD
  - Rapport DVD/DVG > 0,9 -1,0
- Dilatation AP





Echo-Doppler

- Non recommandée à visée diagnostique si suspicion d'EP « non grave »
- (Thrombus cœur droit, ETO)
- Dilatation VD
  - ↑ Rapport DVD/DVG (N < 0,6)
- Dysfonction VD
  - Hypocinésie latérale, septum paradoxal
  - ↓ TAPSE (N = 16 à 25 mm)
- HTAP (IT)
- VCI dilatée avec ↓ collapsus insp.

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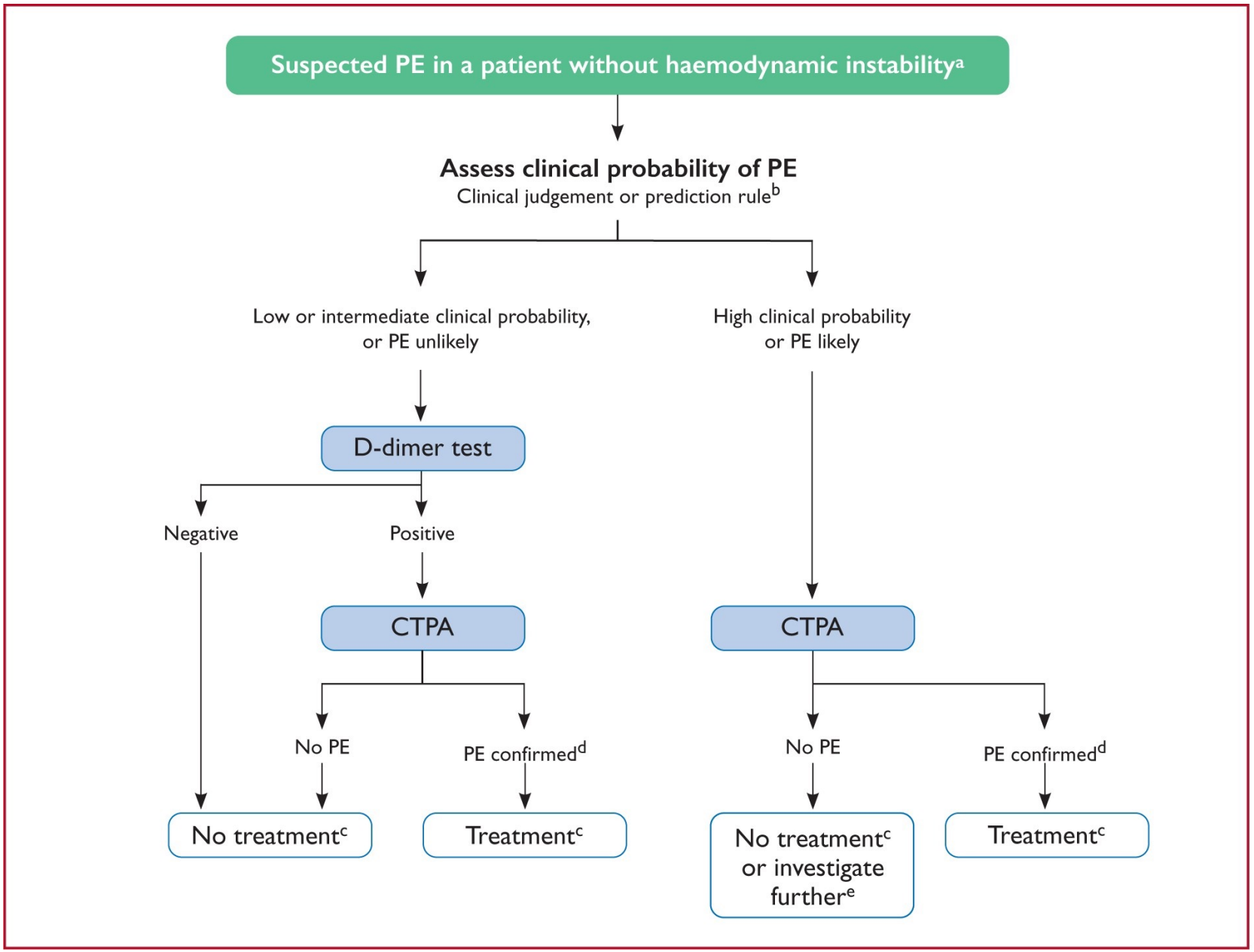

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Recommendations	Class[a]	Level[b]
Suspected PE with haemodynamic instability		
In suspected high-risk PE, as indicated by the presence of haemodynamic instability, bedside echocardiography or emergency CTPA (depending on availability and clinical circumstances) is recommended for diagnosis.[169]	I	C
It is recommended that i.v. anticoagulation with UFH, including a weight-adjusted bolus injection, be initiated without delay in patients with suspected high-risk PE.	I	C
Suspected PE without haemodynamic instability		
The use of validated criteria for diagnosing PE is recommended.[12]	I	B
Initiation of anticoagulation is recommended without delay in patients with high or intermediate clinical probability of PE while diagnostic workup is in progress.	I	C
Clinical evaluation		
It is recommended that the diagnostic strategy be based on clinical probability, assessed either by clinical judgement or by a validated prediction rule.[89,91,92,103,134,170–172]	I	A
D-dimer		
Plasma D-dimer measurement, preferably using a highly sensitive assay, is recommended in outpatients/emergency department patients with low or intermediate clinical probability, or those that are PE-unlikely, to reduce the need for unnecessary imaging and irradiation.[101–103,122,164,171,173,174]	I	A
As an alternative to the fixed D-dimer cut-off, a negative D-dimer test using an age-adjusted cut-off (age × 10 μg/L, in patients aged >50 years) should be considered for excluding PE in patients with low or intermediate clinical probability, or those that are PE-unlikely.[106]	IIa	B
As an alternative to the fixed or age-adjusted D-dimer cut-off, D-dimer levels adapted to clinical probability[c] should be considered to exclude PE.[107]	IIa	B
D-dimer measurement is not recommended in patients with high clinical probability, as a normal result does not safely exclude PE, even when using a highly sensitive assay.[175,176]	III	A
CTPA		
It is recommended to reject the diagnosis of PE (without further testing) if CTPA is normal in a patient with low or intermediate clinical probability, or who is PE-unlikely.[101,122,164,171]	I	A
It is recommended to accept the diagnosis of PE (without further testing) if CTPA shows a segmental or more proximal filling defect in a patient with intermediate or high clinical probability.[115]	I	B
It should be considered to reject the diagnosis of PE (without further testing) if CTPA is normal in a patient with high clinical probability or who is PE-likely.[171]	IIa	B
Further imaging tests to confirm PE may be considered in cases of isolated subsegmental filling defects.[115]	IIb	C
CT venography is not recommended as an adjunct to CTPA.[115,164]	III	B
V/Q scintigraphy		
It is recommended to reject the diagnosis of PE (without further testing) if the perfusion lung scan is normal.[75,122,134,174]	I	A
It should be considered to accept that the diagnosis of PE (without further testing) if the V/Q scan yields high probability for PE.[134]	IIa	B
A non-diagnostic V/Q scan should be considered as exclusion of PE when combined with a negative proximal CUS in patients with low clinical probability, or who are PE-unlikely.[75,122,174]	IIa	B

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Quid de la prise en charge ambulatoire de l'EP?

- Sélection +++ des patients
- Faible risque (PESIs I ou II)
- 13 à 51 % des EP

Author	Design	Inclusion criteria	Main exclusion criteria	Patients included	Treatment
Aujesky[217]	Open-label Randomized Non-inferiority 19 centres (ED) Discharge within 24 hours vs. inpatient therapy	Age ≥18 years Confirmed acute PE PESI Class I or II	BP <100 mm Hg Pain needing opioids Active bleeding or high risk Extreme obesity CrCl <30 ml/min HIT history Barriers to home treatment	344 (of 1557 screened)	*Both arms:* enoxaparin s.c. twice daily; overlap with VKA (starting 'early')
Otero[349]	Open-label Randomized 9 centres Discharge after 3–5 days vs. inpatient therapy	Age ≥18 years Confirmed acute PE Low-risk by Uresandi clinical prediction rule[350]	Haemodynamic instability Troponin T ≥0.1 ng/ml RV dysfunction (TTE) High bleeding risk Severe comorbidity O_2 saturation <93% COPD, asthma Extreme obesity	132 (of 1016 screened)	*Both arms:* LMWH s.c. overlap with VKA (starting day 10)
Zondag[347]	Prospective cohort 12 centres (ED) All treated as outpatients, discharge within 24 hours	Age ≥18 years Confirmed acute PE	Haemodynamic instability Active bleeding or high risk Oxygen requirement CrCl <30 mL/min Hepatic failure HIT history Barriers to home treatment	297 (of 581 screened)	Nadroparin s.c. once daily; overlap with VKA (starting day 1)
Agterof[237]	Prospective cohort 5 centres (ED) Discharge within 24 hours	Age ≥18 years Confirmed acute PE NT-proBNP <500 pg/mL	Haemodynamic instability Active bleeding or high risk Severe comorbidity Pain with i.v. analgesia Oxygen requirement Creatinine >150 µmol/L Barriers to home treatment	152 (of 351 screened)	LMWH s.c. once daily; overlap with VKA (starting 'early')

ESC guidelines, Eur Heart J 2014

Ne peut être traité en ambulatoire…

- Risque élevé : PESIs $\geq$ 3, voire PESIs $\geq$ 1
- Etat de choc, hypotension
- Dysfonction VD (TDM et/ou EDC)
- Troponine T $\geq$ 0,1 ng/ml, NtProBNP > 500 ng/
- SaO2 < 93%, O2 dépendance

- Douleurs nécessitant morphiniques
- Saignement actif ou risque hémorragique élevé
- Antécédent de thrombopénie induite par l'héparine

- Comorbidité sévère
- Obésité extrême
- Cl créatinine < 30 ml/min
- BPCO, asthme
- Insuffisance hépatique

- Thrombus flottant fémoro-ilio-cave
- EP sous anticoagulant

- Barrières à un traitement à domicile dont désaccord du patient et non organisation d'un parcours de soin dès le retour à domicile

Baguet J-Philippe, Le Tampon

Ne peut être traité en ambulatoire…

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¾ des EP

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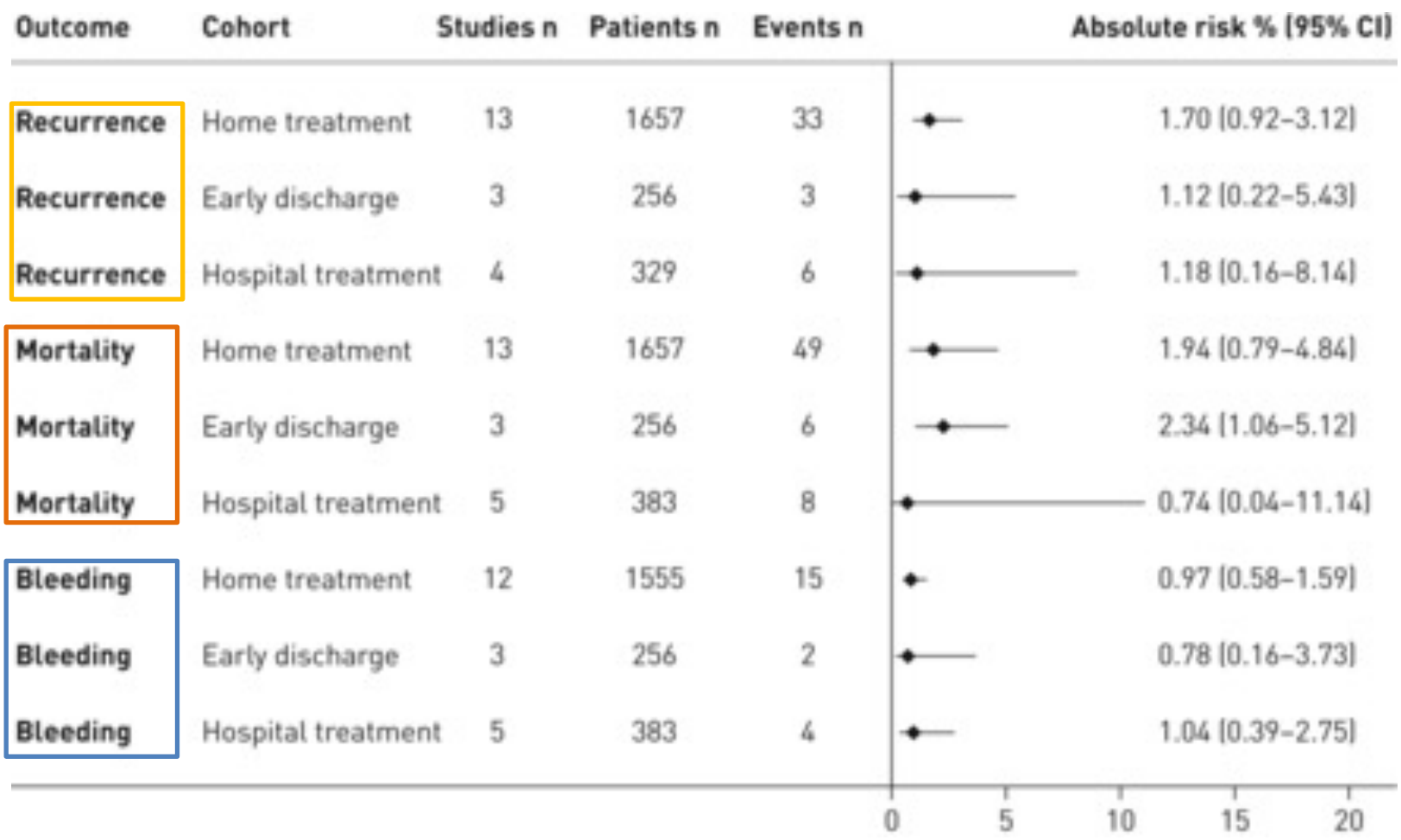
< 24 h

24-72 h

> 72 h



Zondag et al., Méta-analyse, Eur Respir J 2013

Critères HESTIA

Si tous les critères sont absents : un traitement ambulatoire est envisageable.
Si un critère est présent : le traitement ambulatoire n'est pas envisageable.

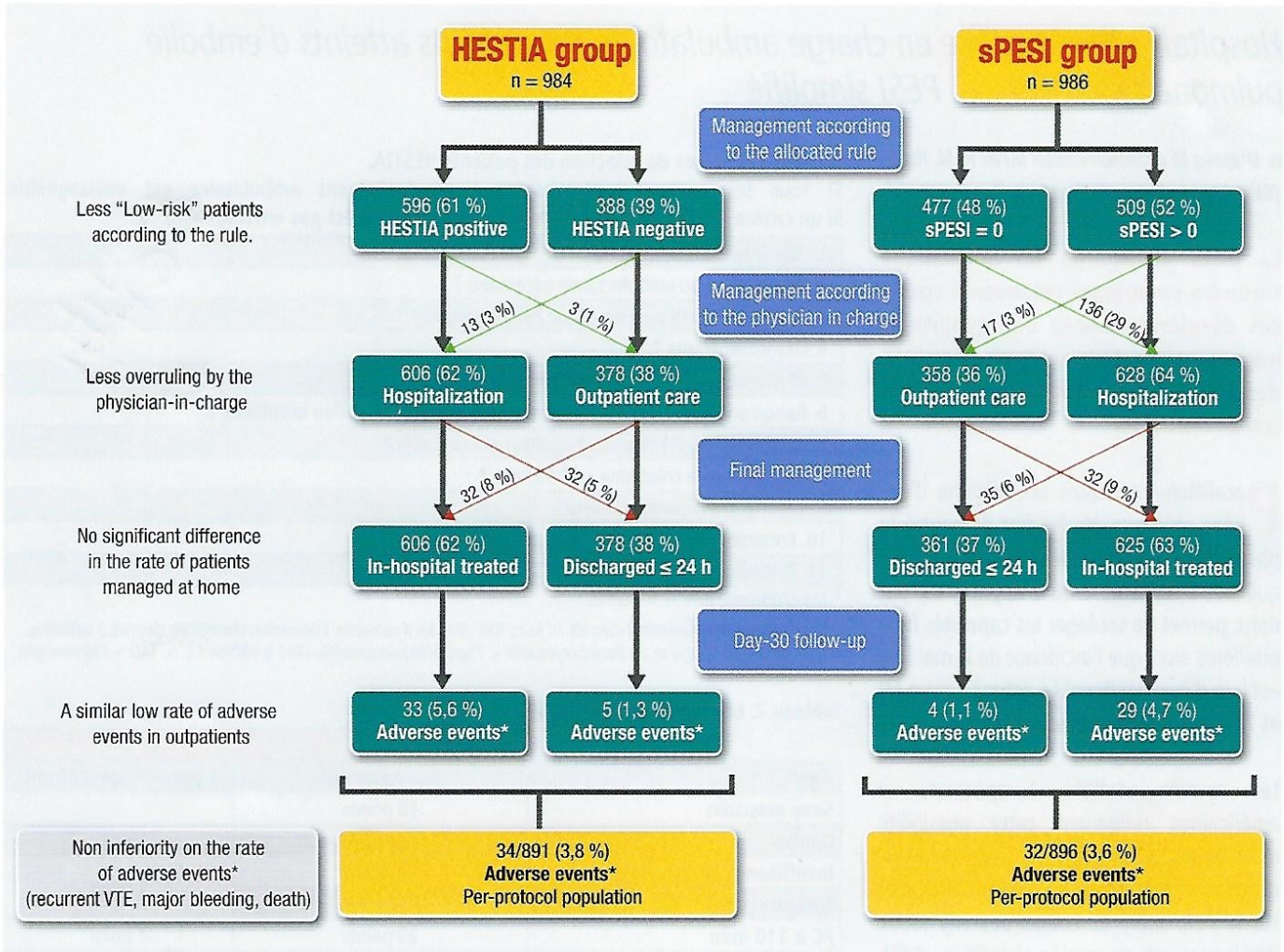
1. Hémodynamique instable ? *
2. Thrombolyse ou embolectomie nécessaire ?
3. Saignement actif ou haut risque hémorragique ? **
4. Oxygénothérapie ?
5. EP diagnostiquée durant un traitement anticoagulant ?
6. Raison sociale ou médicale justifiant un traitement en milieu hospitalier ?
7. Nécessité d'un traitement antalgique intraveineux ?
8. Clairance de la créatinine < 30mL/min ?
9. Insuffisance hépatique sévère ?
10. Enceinte ?
11. Thrombocytopénie ?

** TAS<100mmHg avec FC>100/min.*

*** Saignement gastro-intestinal dans les 14 jours, AVC dans les 4 semaines, intervention chirurgicale dans les 2 semaines, trouble de la crase sanguine, ou thrombocytopénie < 75g/L, HTA non contrôlée (TAS > 180 mmHg ou TAD > 110 mmHgH).*

Zondag et al., J Thromb Haemost 2011

HOME-PE trial



Roy et al., Eur Heart J 2021

Recommendation	Class[a]	Level[b]
Carefully selected patients with low-risk PE should be considered for early discharge and continuation of treatment at home, if proper outpatient care and anticoagulant treatment can be provided.[c] 178,206,317–319	IIa	A

Early mortality risk		Indicators of risk			
		Haemodynamic instability[a]	Clinical parameters of PE severity and/or comorbidity: PESI class III–V or sPESI ≥1	RV dysfunction on TTE or CTPA[b]	Elevated cardiac troponin levels[c]
High		+	(+)[d]	+	(+)
Intermediate	Intermediate–high	-	+[e]	+	+
	Intermediate–low	-	+[e]	One (or none) positive	
Low		-	-	-	Assesment optional; if assessed, negative

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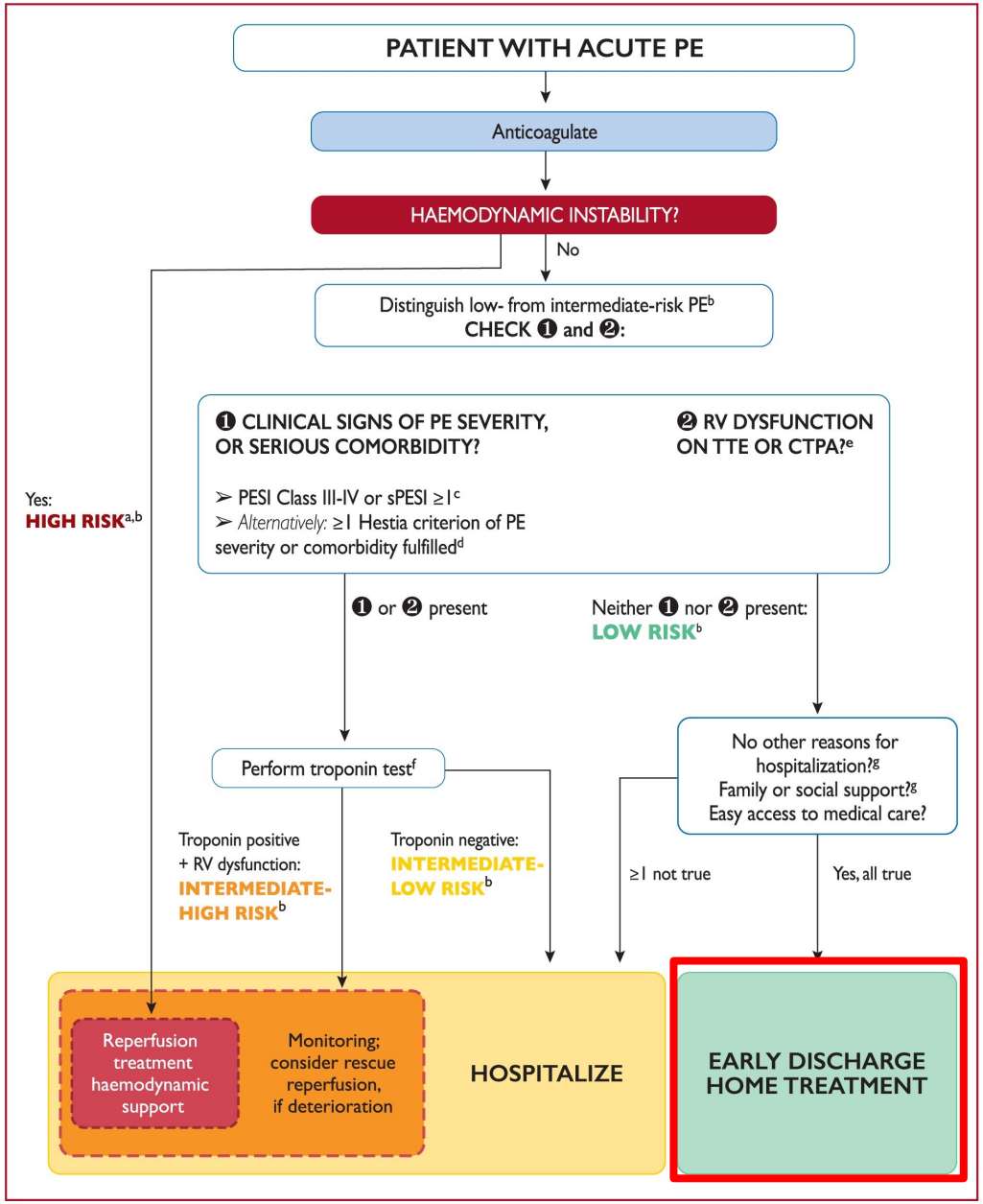

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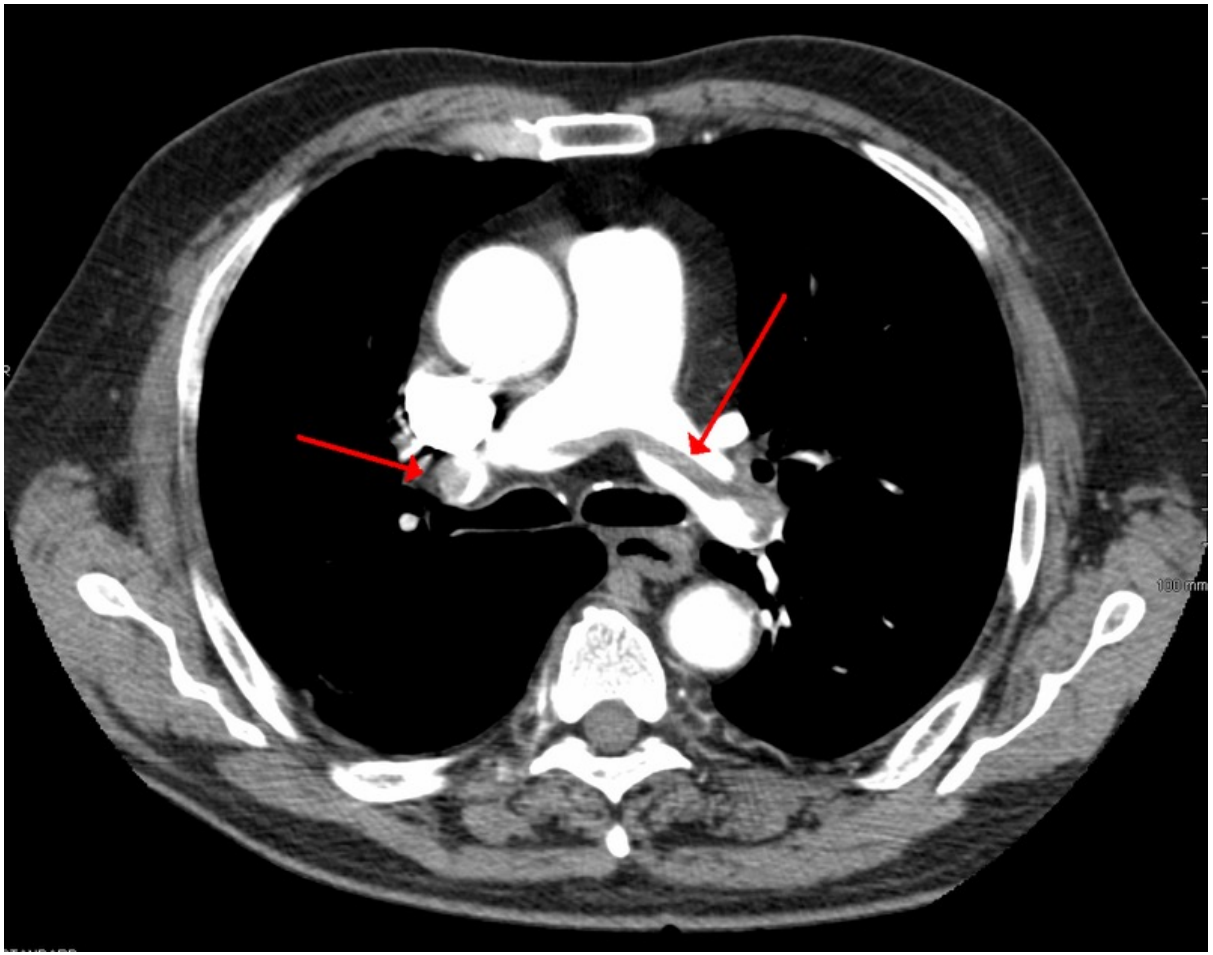
Merci!



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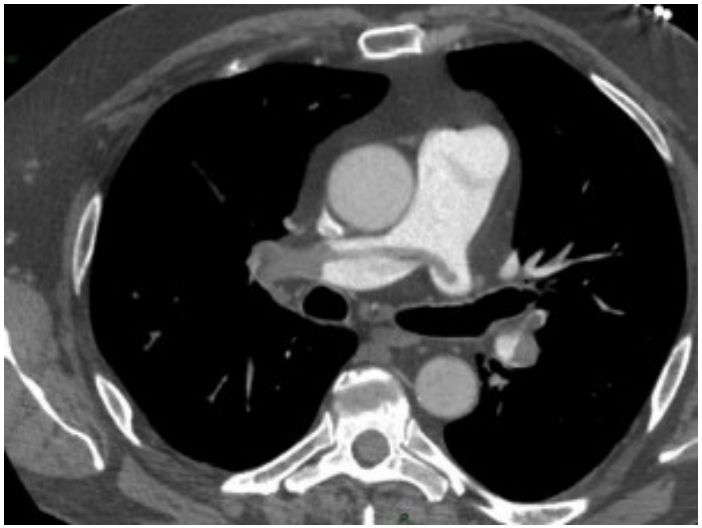
EP : Traitement médical optimal, recommandations, thrombectomie



Congrès CardioRun 29/09 au 01/10 2021

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Liens d’intérêt

Consultant : Novartis

Honoraires : AstraZeneca, Lilly, Novartis, Novo, Servier

ESC
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ESC GUIDELINES

2019 ESC Guidelines for the diagnosis and management of acute pulmonary embolism developed in collaboration with the European Respiratory Society (ERS)

The Task Force for the diagnosis and management of acute pulmonary embolism of the European Society of Cardiology (ESC)

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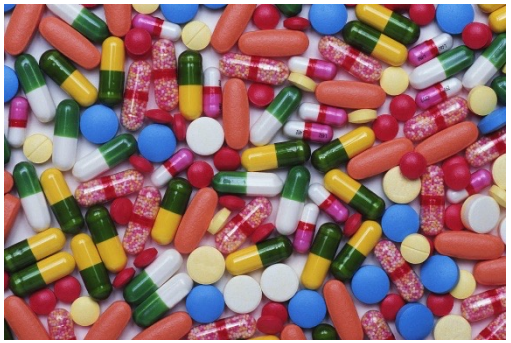
Traitement anticoagulant de l'EP

- ≥ 3 mois, 6 mois, à vie, …

- Phase aiguë :
  - HNF (hémodynamique instable, IR sévère, obésité sévère), HBPM ++, Fondaparinux ++
  - Relais AVK précoce
  - AOD ± précoce



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	Dosage	Interval
Enoxaparin (Lovenox®)	1.0 mg/kg or 1.5 mg/kg[a]	Every 12 hours Once daily[a]
Tinzaparin (Innohep®)	175 U/kg	Once daily
Dalteparin (Fragmine®)	100 IU/kg[b] or 200 IU/kg[b]	Every 12 hours[b] Once daily[b]
Nadroparin[c] (Fraxiparine®, Fraxodi®)	86 IU/kg or 171 IU/kg	Every 12 hours Once daily
Fondaparinux (Arixtra®)	5 mg (body weight <50 kg); 7.5 mg (body weight 50–100 kg); 10 mg (body weight >100 kg)	Once daily

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Pradaxa® après 5 jours ACP

Xarelto® d'emblée ou après 1-2 jours d'ACP

Eliquis® d'emblée ou après 1-2 jours d'ACP

Lixiana® après ≥ 5 jours ACP

Drug	Trial	Design	Treatments and dosage	Duration	Patients	Efficacy outcome (results)	Safety outcome (results)
Dabigatran	RE-COVER[293]	Double-blind, double-dummy	Enoxaparin/dabigatran (150 mg b.i.d.)[a] vs. enoxaparin/warfarin	6 months	2539 patients with acute VTE	Recurrent VTE or fatal PE: 2.4% under dabigatran vs. 2.1% under warfarin	Major bleeding: 1.6% under dabigatran vs. 1.9% under warfarin
	RE-COVER II[294]	Double-blind, double-dummy	Enoxaparin/dabigatran (150 mg b.i.d.)[a] vs. enoxaparin/warfarin	6 months	2589 patients with acute VTE	Recurrent VTE or fatal PE: 2.3% under dabigatran vs. 2.2% under warfarin	Major bleeding: 15 patients under dabigatran vs. 22 patients under warfarin
Rivaroxaban	EINSTEIN-DVT[295]	Open-label	Rivaroxaban (15 mg b.i.d. for 3 weeks, then 20 mg o.d.) vs. enoxaparin/warfarin	3, 6, or 12 months	3449 patients with acute DVT	Recurrent VTE or fatal PE: 2.1% under rivaroxaban vs. 3.0% under warfarin	Major or CRNM bleeding 8.1% under rivaroxaban vs. 8.1% under warfarin
	EINSTEIN-PE[296]	Open-label	Rivaroxaban (15 mg b.i.d. for 3 weeks, then 20 mg o.d.) vs. enoxaparin/warfarin	3, 6, or 12 months	4832 patients with acute PE	Recurrent VTE or fatal PE: 2.1% under rivaroxaban vs. 1.8% under warfarin	Major or CRNM bleeding: 10.3% under rivaroxaban vs. 11.4% under warfarin
Apixaban	AMPLIFY[297]	Double-blind, double-dummy	Apixaban (10 mg b.i.d. for 7 days, then 5 mg b.i.d.) vs. enoxaparin/warfarin	6 months	5395 patients with acute DVT and/or PE	Recurrent VTE or fatal PE: 2.3% under apixaban vs. 2.7% under warfarin	Major bleeding: 0.6% under apixaban vs. 1.8% under warfarin
Edoxaban	Hokusai-VTE[298]	Double-blind, double-dummy	LMWH/edoxaban (60 mg o.d.; 30 mg o.d. if creatinine clearance 30–50 ml/min or body weight <60 kg) vs. UFH or LMWH/warfarin	Variable, 3–12 months	8240 patients with acute DVT and/or PE	Recurrent VTE or fatal PE: 3.2% under edoxaban vs. 3.5% under warfarin	Major or CRNM bleeding: 8.5% under edoxaban vs. 10.3% under warfarin

ESC guidelines, Eur Heart J 2014

Traitement de l'EP aiguë à risque faible ou intermédiaire

Recommendations	Class[a]	Level[b]
Initiation of anticoagulation		
Initiation of anticoagulation is recommended without delay in patients with high or intermediate clinical probability of PE,[c] while diagnostic workup is in progress.	I	C
If anticoagulation is initiated parenterally, LMWH or fondaparinux is recommended (over UFH) for most patients.[262,309–311]	I	A
When oral anticoagulation is started in a patient with PE who is eligible for a NOAC (apixaban, dabigatran, edoxaban, or rivaroxaban), a NOAC is recommended in preference to a VKA.[260,261,312–314]	I	A
When patients are treated with a VKA, overlapping with parenteral anticoagulation is recommended until an INR of 2.5 (range 2.0–3.0) is reached.[315,316]	I	A
NOACs are not recommended in patients with severe renal impairment,[d] during pregnancy and lactation, and in patients with antiphospholipid antibody syndrome.[260,261,312–314]	III	C
Reperfusion treatment		
Rescue thrombolytic therapy is recommended for patients with haemodynamic deterioration on anticoagulation treatment.[282]	I	B
As an alternative to rescue thrombolytic therapy, surgical embolectomy[e] or percutaneous catheter-directed treatment[e] should be considered for patients with haemodynamic deterioration on anticoagulation treatment.	IIa	C
Routine use of primary systemic thrombolysis is not recommended in patients with intermediate- or low-risk PE.[c,f 179]	III	B

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Traitement de l'EP aiguë à haut risque

Recommendations	Class[b]	Level[c]
It is recommended that anticoagulation with UFH, including a weight-adjusted bolus injection, be initiated without delay in patients with high-risk PE.	I	C
Systemic thrombolytic therapy is recommended for high-risk PE. [282]	I	B
Surgical pulmonary embolectomy is recommended for patients with high-risk PE, in whom thrombolysis is contraindicated or has failed.[d] [281]	I	C
Percutaneous catheter-directed treatment should be considered for patients with high-risk PE, in whom thrombolysis is contraindicated or has failed.[d]	IIa	C
Norepinephrine and/or dobutamine should be considered in patients with high-risk PE.	IIa	C
ECMO may be considered, in combination with surgical embolectomy or catheter-directed treatment, in patients with PE and refractory circulatory collapse or cardiac arrest.[d] [252]	IIb	C

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Fibrinolyse

- Systémique +++
  - Streptokinase/Urokinase
  - rt-PA ++
  - < 48 heures (sinon < 14 jours)
  - 90% répondeurs
  - 2% d'hémorragies graves
- In situ
- Altéplase en pratique
  - 10 mg en bolus IV de 1 à 2 minutes, puis 90 mg en perfusion IV sur 2 heures (sans dépasser 1,5 mg/kg chez le sujet < 65 kg)
  - Après le traitement par ACTILYSE®, héparinothérapie instaurée (ou reprise) si TCA < 2 X N. Perfusion ajustée pour obtenir un TCA de 50 à 70 secondes (1,5 à 2,5 fois la valeur de référence).

Table 10 Thrombolytic regimens, doses, and contraindications

Molecule	Regimen	Contraindications to fibrinolysis
rtPA	100 mg over 2 h	**Absolute**
	0.6 mg/kg over 15 min (maximum dose 50 mg)[a]	History of haemorrhagic stroke or stroke of unknown origin
Streptokinase	250 000 IU as a loading dose over 30 min, followed by 100 000 IU/h over 12–24 h	Ischaemic stroke in previous 6 months
	Accelerated regimen: 1.5 million IU over 2 h	Central nervous system neoplasm
Urokinase	4400 IU/kg as a loading dose over 10 min, followed by 4400 IU/kg/h over 12–24 h	Major trauma, surgery, or head injury in previous 3 weeks
	Accelerated regimen: 3 million IU over 2 h	Bleeding diathesis
		Active bleeding
		Relative
		Transient ischaemic attack in previous 6 months
		Oral anticoagulation
		Pregnancy or first post-partum week
		Non-compressible puncture sites
		Traumatic resuscitation
		Refractory hypertension (systolic BP >180 mmHg)
		Advanced liver disease
		Infective endocarditis
		Active peptic ulcer

BP = blood pressure; IU = international units; rtPA, recombinant tissue-type plasminogen activator.
[a]This is the accelerated regimen for rtPA in pulmonary embolism; it is not officially approved, but it is sometimes used in extreme haemodynamic instability such as cardiac arrest.

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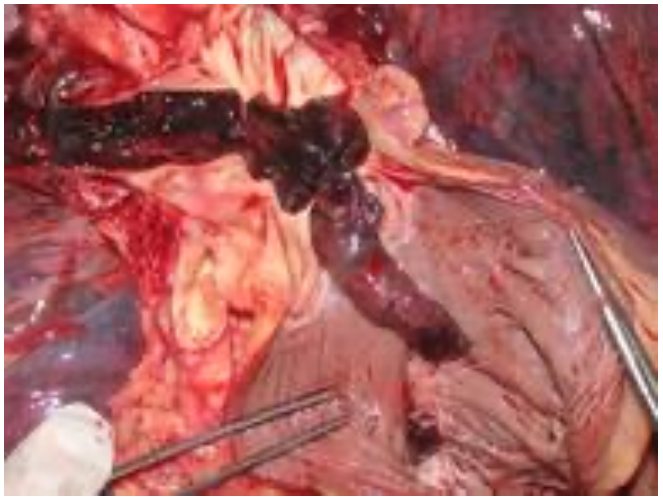
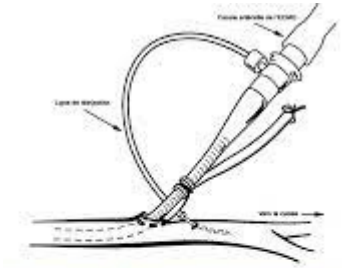
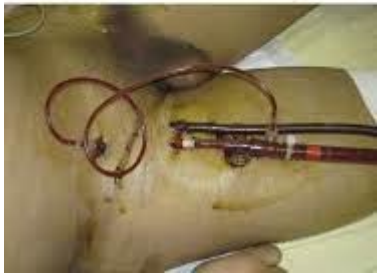
Thrombectomie chirurgicale







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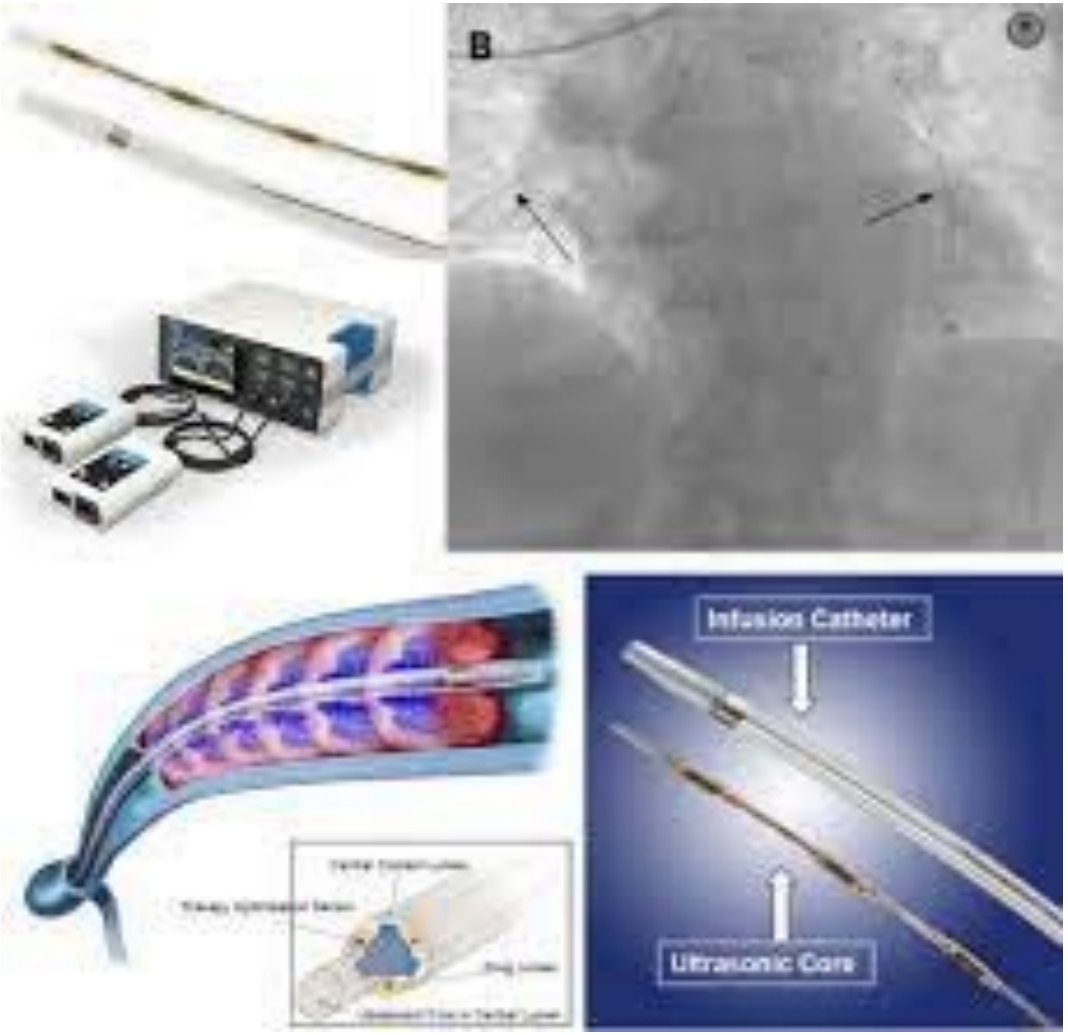
Traitement percutané

Fibrinolyse in situ, aspiration, fragmentation (mécanique, US)



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Type d'anticoagulation et durée

Recommendations	Class[a]	Level[b]
Therapeutic anticoagulation for ≥ 3 months is recommended for all patients with PE.[347]	I	A
Patients in whom discontinuation of anticoagulation after 3 months is recommended		
For patients with first PE/VTE secondary to a major transient/reversible risk factor, discontinuation of therapeutic oral anticoagulation is recommended after 3 months.[331,340,341]	I	B
Patients in whom extension of anticoagulation beyond 3 months is recommended		
Oral anticoagulant treatment of indefinite duration is recommended for patients presenting with recurrent VTE (that is, with at least one previous episode of PE or DVT) not related to a major transient or reversible risk factor.[358]	I	B
Oral anticoagulant treatment with a VKA for an indefinite period is recommended for patients with antiphospholipid antibody syndrome.[359]	I	B
Patients in whom extension of anticoagulation beyond 3 months should be considered[c,d]		
Extended oral anticoagulation of indefinite duration should be considered for patients with a first episode of PE and no identifiable risk factor.[330,331,347,351–353]	IIa	A
Extended oral anticoagulation of indefinite duration should be considered for patients with a first episode of PE associated with a persistent risk factor other than antiphospholipid antibody syndrome.[330,352,353]	IIa	C
Extended oral anticoagulation of indefinite duration should be considered for patients with a first episode of PE associated with a minor transient or reversible risk factor.[330,331,352]	IIa	C
NOAC dose in extended anticoagulation[e]		
If extended oral anticoagulation is decided after PE in a patient without cancer, a reduced dose of the NOACs apixaban (2.5 mg b.i.d.) or rivaroxaban (10 mg o.d.) should be considered after 6 months of therapeutic anticoagulation.[352,353]	IIa	A
Extended treatment with alternative antithrombotic agents		
In patients who refuse to take or are unable to tolerate any form of oral anticoagulants, aspirin or sulodexide may be considered for extended VTE prophylaxis.[355–357]	IIb	B
Follow-up of the patient under anticoagulation		
In patients who receive extended anticoagulation, it is recommended that their drug tolerance and adherence, hepatic and renal[f] function, and bleeding risk be reassessed at regular intervals.[259]	I	C

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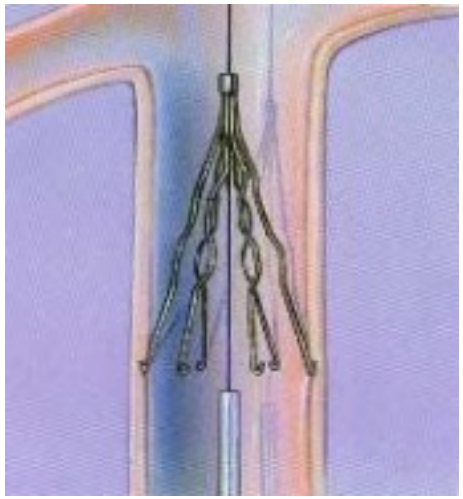
Recommendations	Class[a]	Level[b]
IVC filters should be considered in patients with acute PE and absolute contraindications to anticoagulation.	IIa	C
IVC filters should be considered in cases of PE recurrence despite therapeutic anticoagulation.	IIa	C
Routine use of IVC filters is not recommended.[302–304]	III	A



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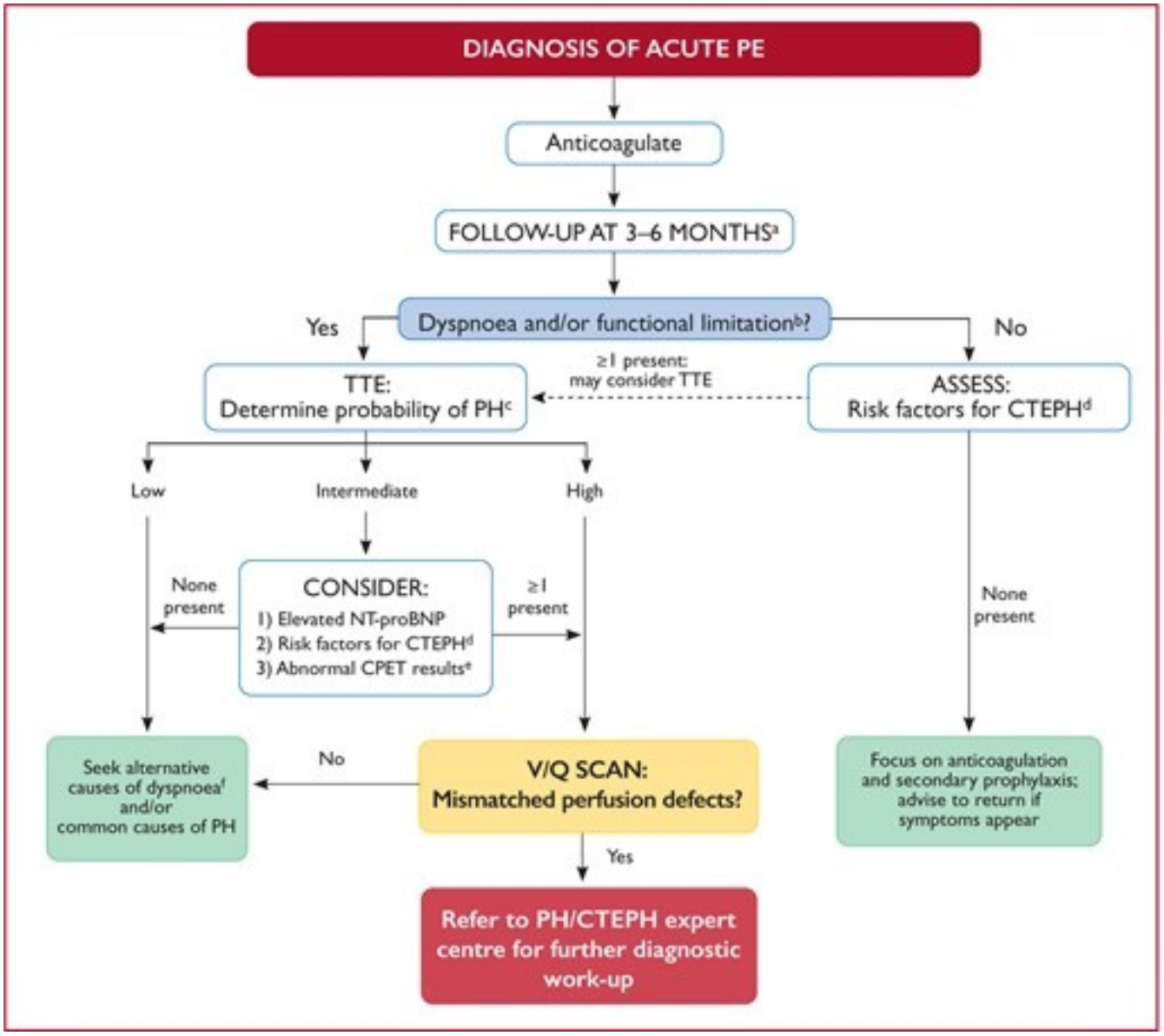

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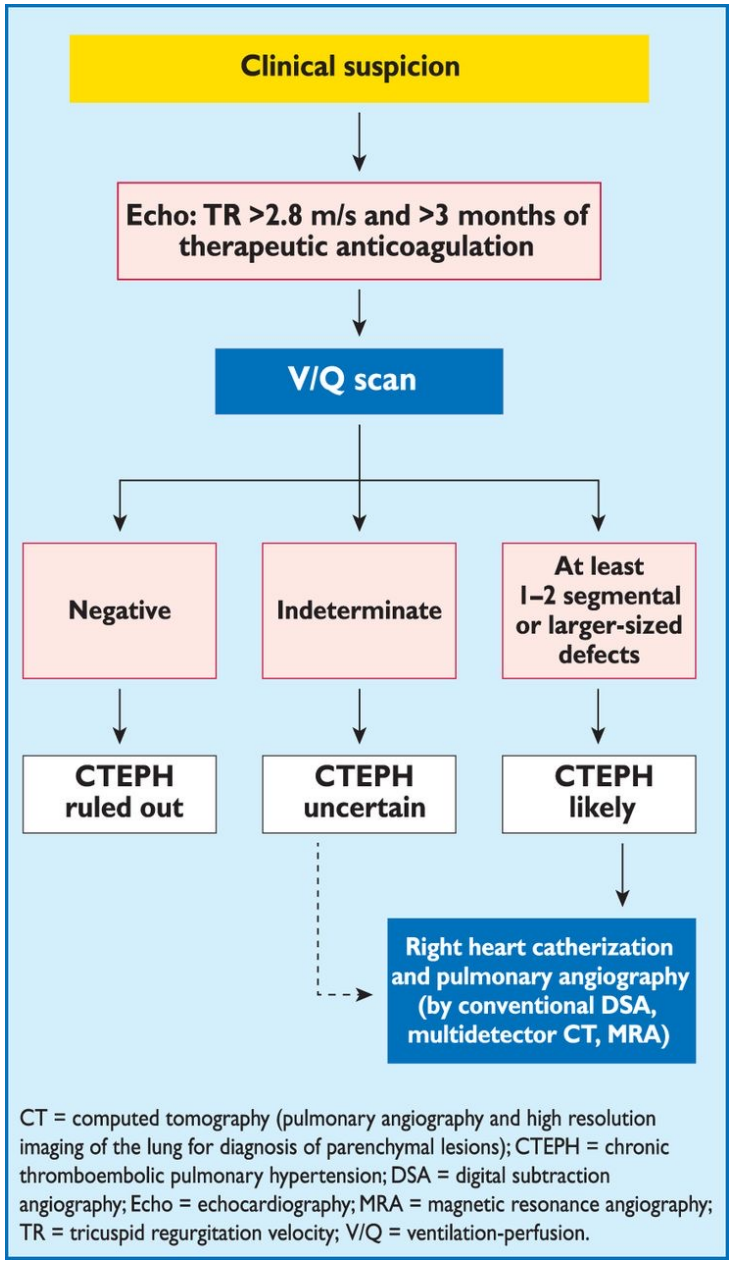
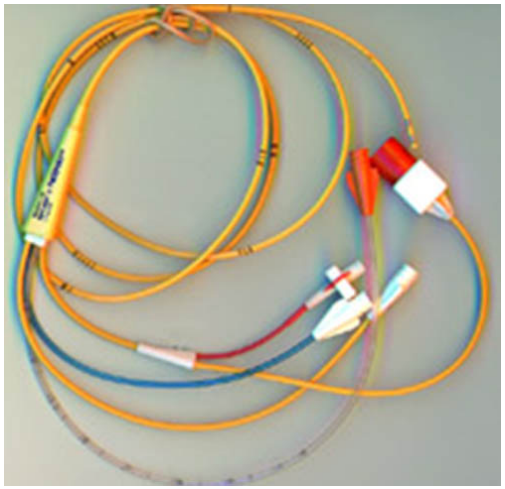
HTAP post-embolique





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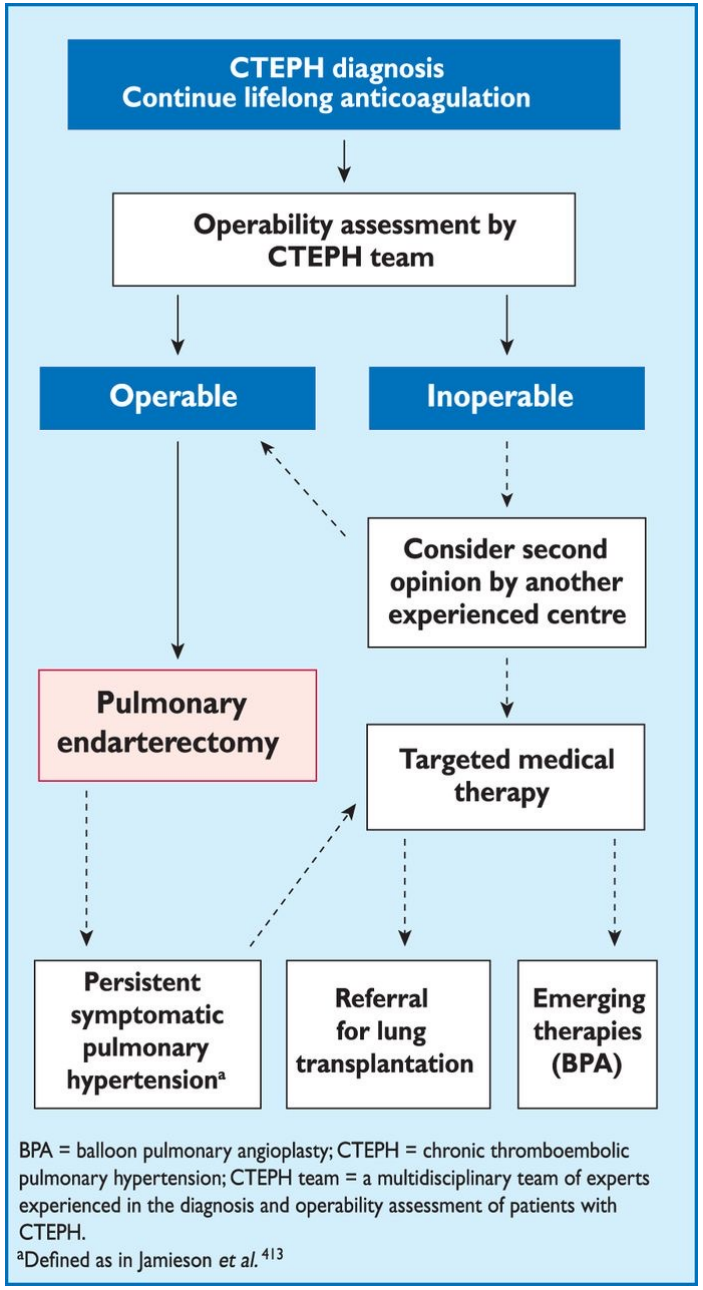

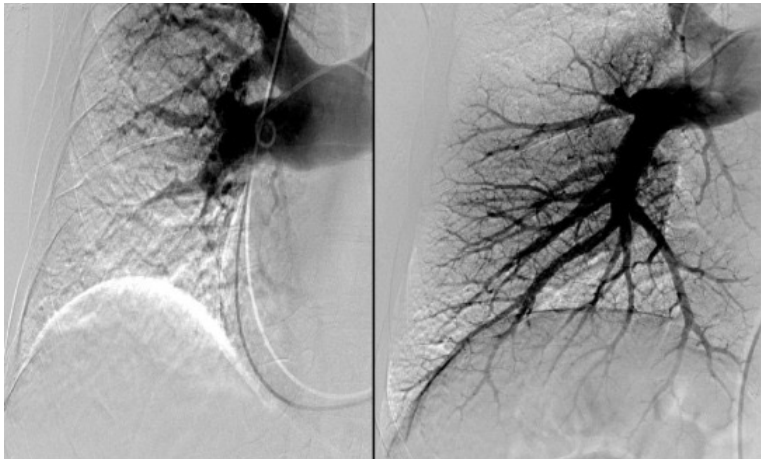

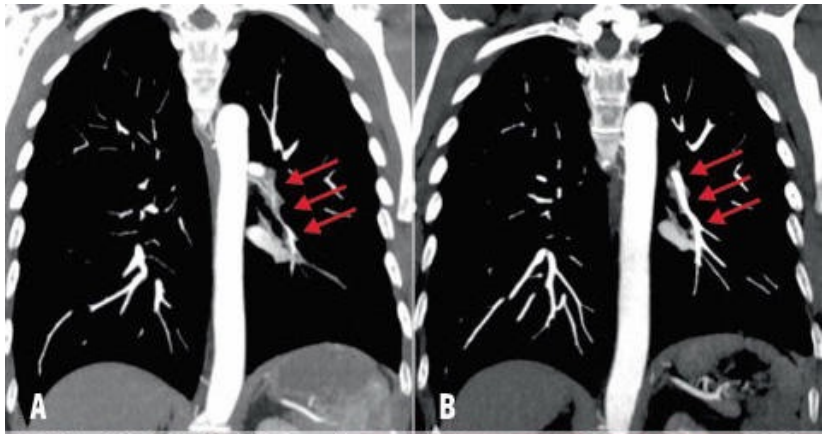

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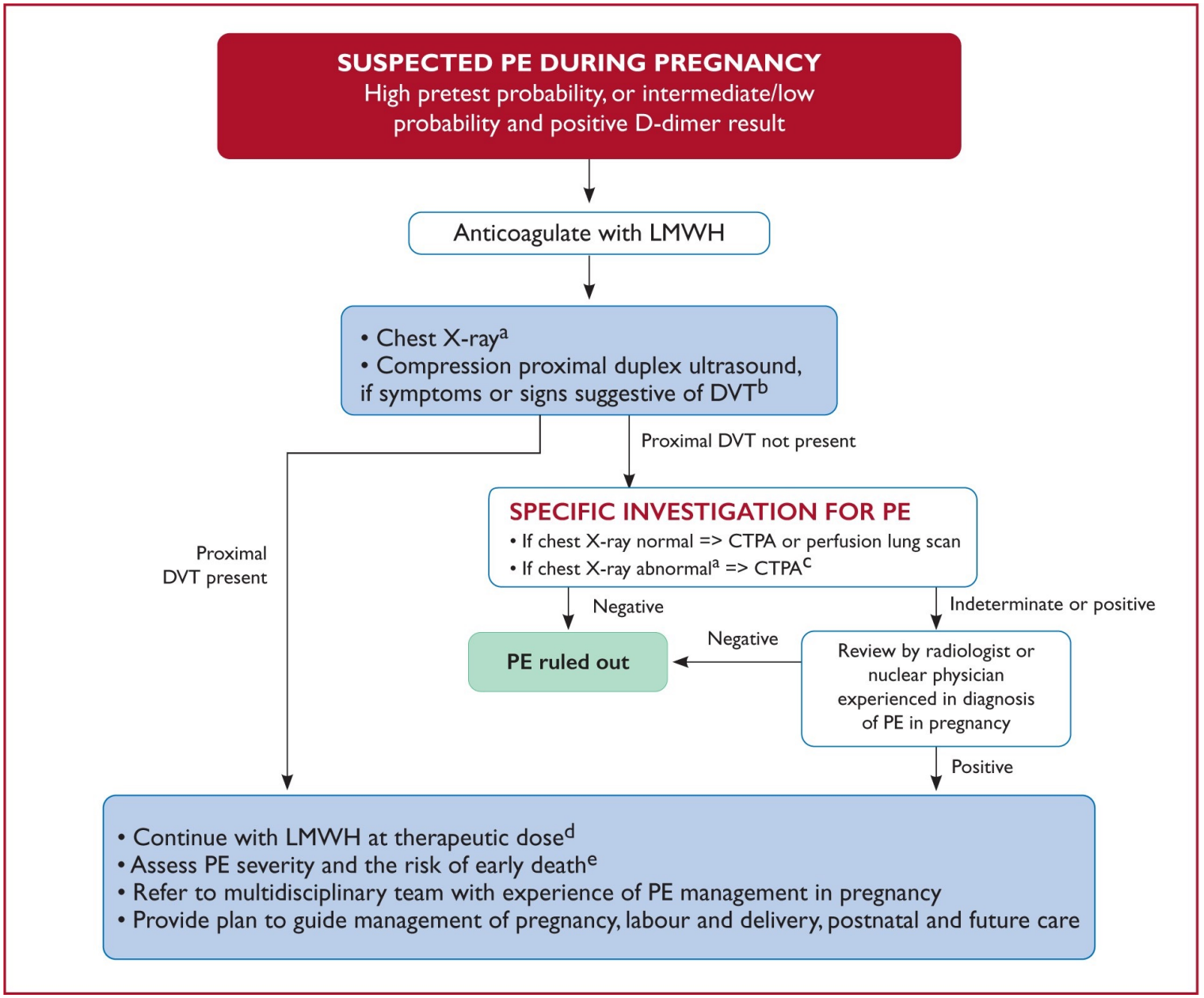

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EP et grossesse

Recommendations	Class[a]	Level[b]
Diagnosis		
Formal diagnostic assessment with validated methods is recommended if PE is suspected during pregnancy or in the post-partum period.[388,391]	I	B
D-dimer measurement and clinical prediction rules should be considered to rule out PE during pregnancy or the post-partum period.[388,391]	IIa	B
In a pregnant patient with suspected PE (particularly if she has symptoms of DVT), venous CUS should be considered to avoid unnecessary irradiation.[388]	IIa	B
Perfusion scintigraphy or CTPA (with a low-radiation dose protocol) should be considered to rule out suspected PE in pregnant women; CTPA should be considered as the first-line option if the chest X-ray is abnormal.[385,386]	IIa	C
Treatment		
A therapeutic, fixed dose of LMWH based on early pregnancy body weight is the recommended therapy for PE in the majority of pregnant women without haemodynamic instability.[408,410]	I	B
Thrombolysis or surgical embolectomy should be considered for pregnant women with high-risk PE.[421]	IIa	C
Insertion of a spinal or epidural needle is not recommended, unless ≥24 h have passed since the last therapeutic dose of LMWH.	III	C
Administration of LMWH is not recommended within 4 h of removal of an epidural catheter.	III	C
NOACs are not recommended during pregnancy or lactation.	III	C

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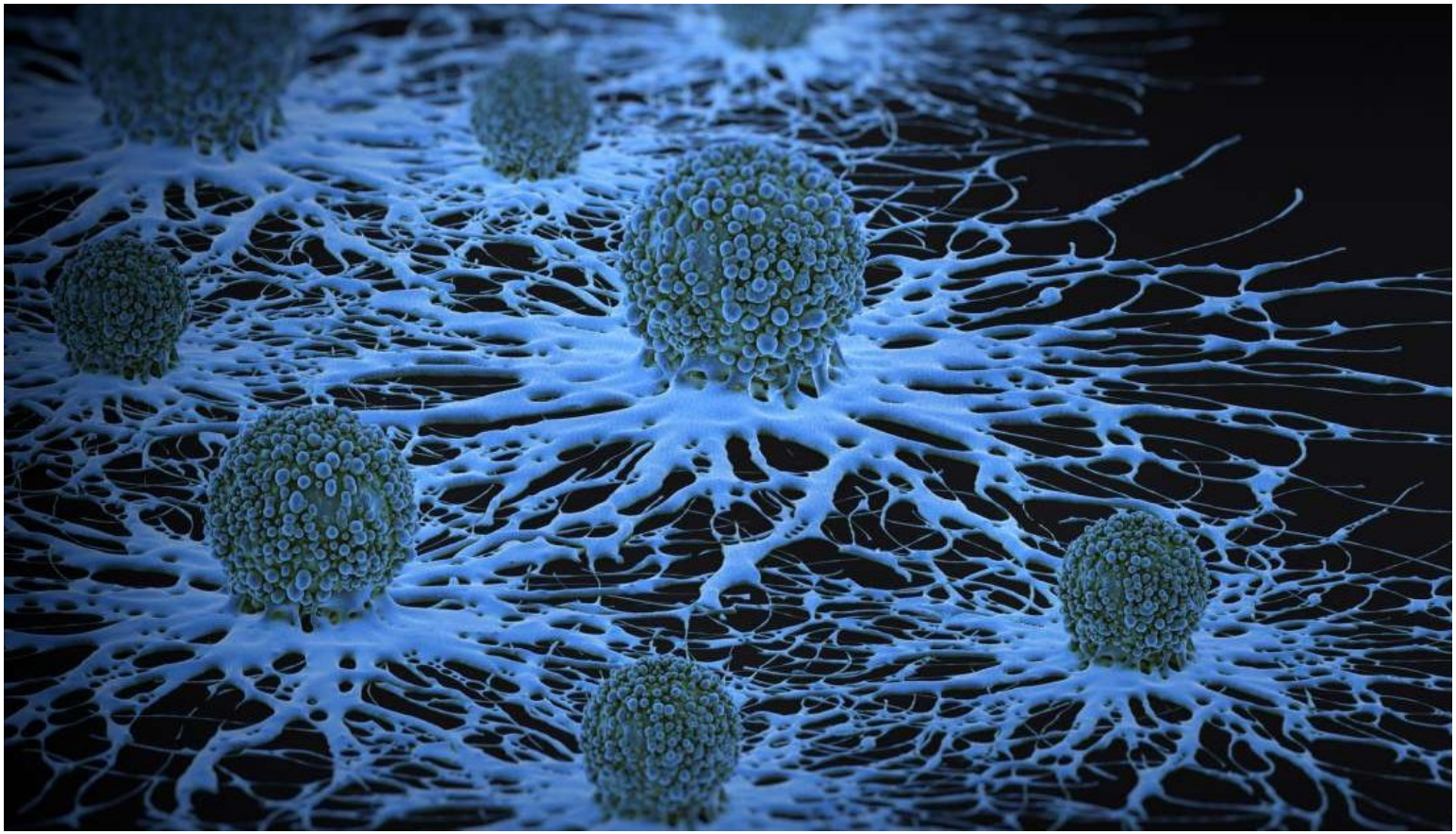

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EP et cancer

Recommendations	Class[a]	Level[b]
For patients with PE and cancer, weight-adjusted subcutaneous LMWH should be considered for the first 6 months over VKAs.[360–363]	IIa	A
Edoxaban should be considered as an alternative to weight-adjusted subcutaneous LMWH in patients without gastrointestinal cancer.[366]	IIa	B
Rivaroxaban should be considered as an alternative to weight-adjusted subcutaneous LMWH in patients without gastrointestinal cancer.[367]	IIa	C
For patients with PE and cancer, extended anticoagulation (beyond the first 6 months)[c] should be considered for an indefinite period or until the cancer is cured.[378]	IIa	B
In patients with cancer, management of incidental PE in the same manner as symptomatic PE should be considered, if it involves segmental or more proximal branches, multiple subsegmental vessels, or a single subsegmental vessel in association with proven DVT.[376,377]	IIa	B

Kc Poumon, colon, prostate

Myélome, T. cérébrale, Kc pancréas

Risque x 4 (x 6 si chimioT)

- Si Cl créat $\geq$ 30 ml/min
- AOD si pas de risque élevé de saignement GI ou génito-urinaire
- AVK si Cl créat < 20 ml/min

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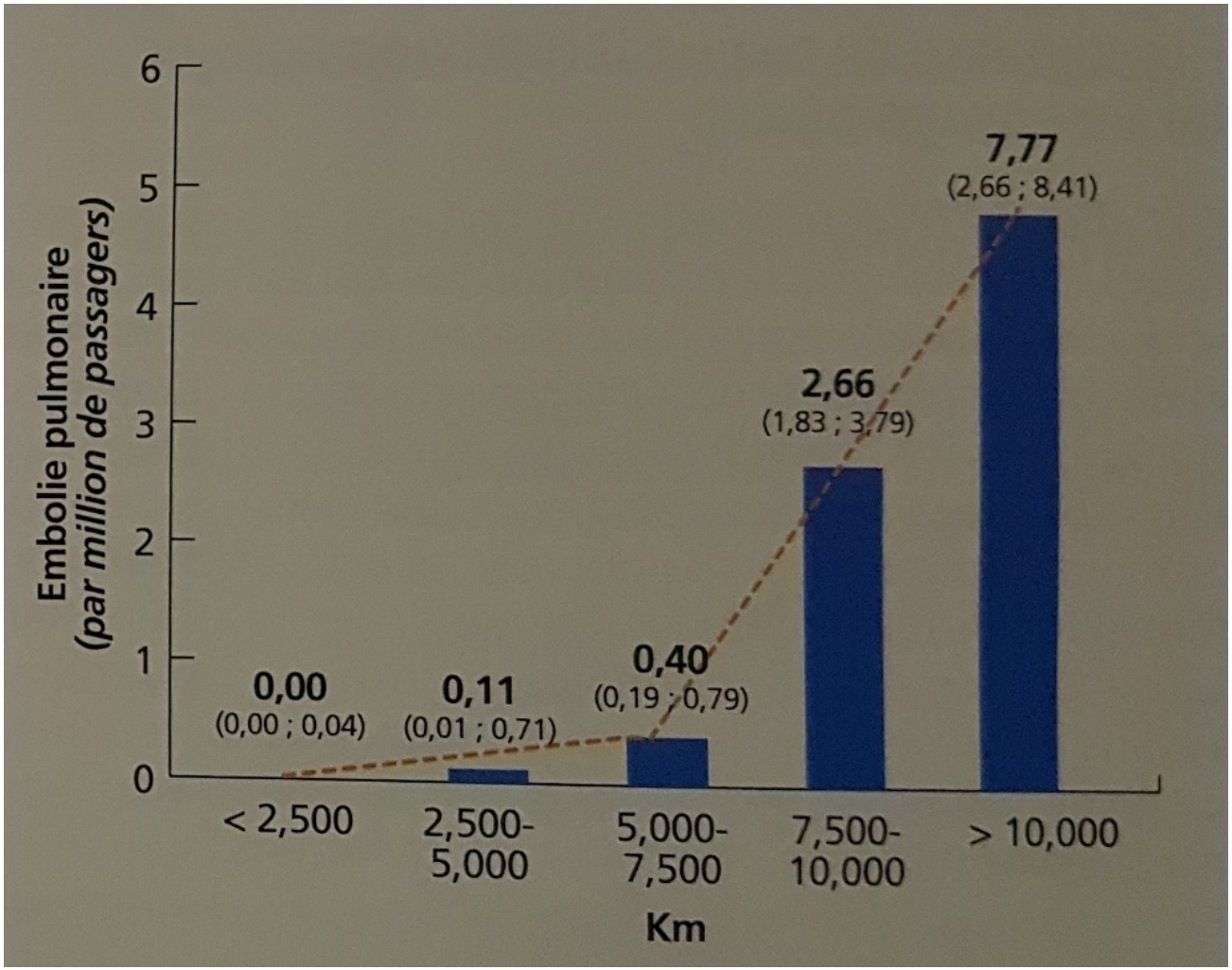
Incidence de l'EP en fonction de la distance du vol parmi les passagers arrivant à l'aéroport de Roissy CDG



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Bilan étiologique MTEV

Interrogatoire, examen clinique ++

MTEV provoquée	Pas d'exploration complémentaire
1er épisode non provoqué de TVP proximale ou d'EP < 50 ans	SAPL (ACC lupique, anticardiolipine, anti-β2-glycoprotéine 1)
1er épisode non provoqué de TVP proximale ou d'EP < 50 ans + ATCD MTEV familial 1er degré	Thrombophilie constitutionnelle (TC)
MTEV récidivante (dont 1 épisode non provoqué < 50 ans)	TC, SAPL
MTEV non provoquée < 40 ans femme	TC si désir grossesse
MTEV non provoquée > 50 ans	NFS, B coag, BH, Rx thorax, hémogramme, dépistage cancer (Hemoccult, frottis CV, mammographie, PSA) Si point d'appel cancer : cibler Si récidive dans l'année ou sous traitement ou EP bilatérale : dépistage cancer par TDM
Hémolyse intravasculaire	Hémoglobinurie paroxystique nocturne
Thrombocytose ou polyglobulie	Sd MP (mutation JAK2, progéniteurs hématopoïétiques)

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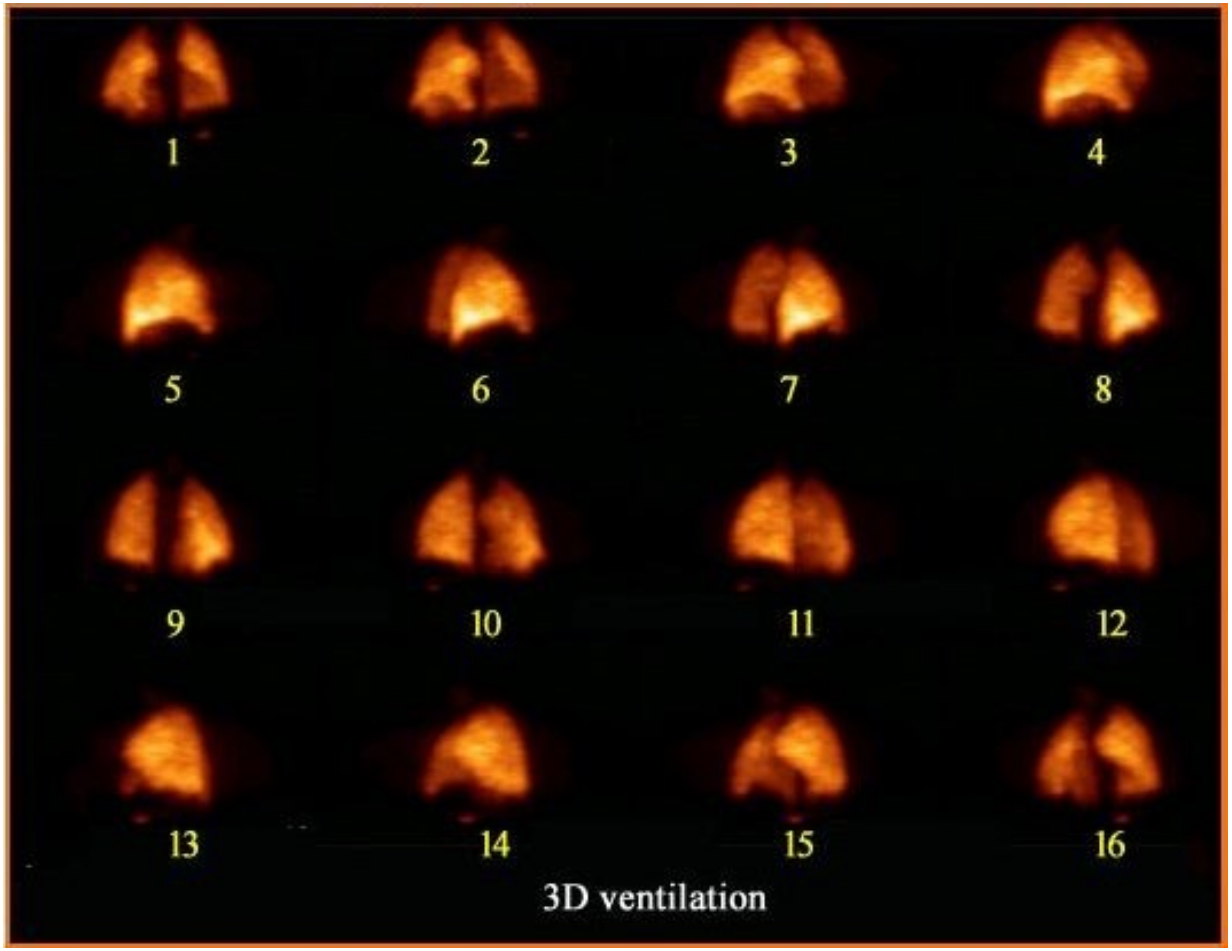
Quel bilan de thrombophilie constitutionnelle?

- Déficit en antithrombine
- Déficit en Protéine C et S
- Mutations Leiden du facteur V
- Entre 3 et 6 mois après MTEV
- Si +, recherche suggérée chez apparentés 1er degré asymptomatiques

Merci!



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