# Approche pratique de l'EP en 2015

- **DIAGNOSTIC** et algorithmes
  - Âge et D-Dimères pour EP
  - Carto VQ et angio-CT
  - EP sous-segmentaires ou fortuites
  - Grossesse
- **TRAITEMENT** et algorithmes
  - Thrombolyse, HBPM et HNF, warfarine et AOD

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Thrombosis Canada
Thrombose Canada

SSVQ
Société des sciences vasculaires du Québec

# André Roussin MD, FRCP

## Conflits d'intérêts potentiels 2015

**Comités aviseurs ou aviseur expert:**

Bayer, BI, BMS, Merck, Pfizer

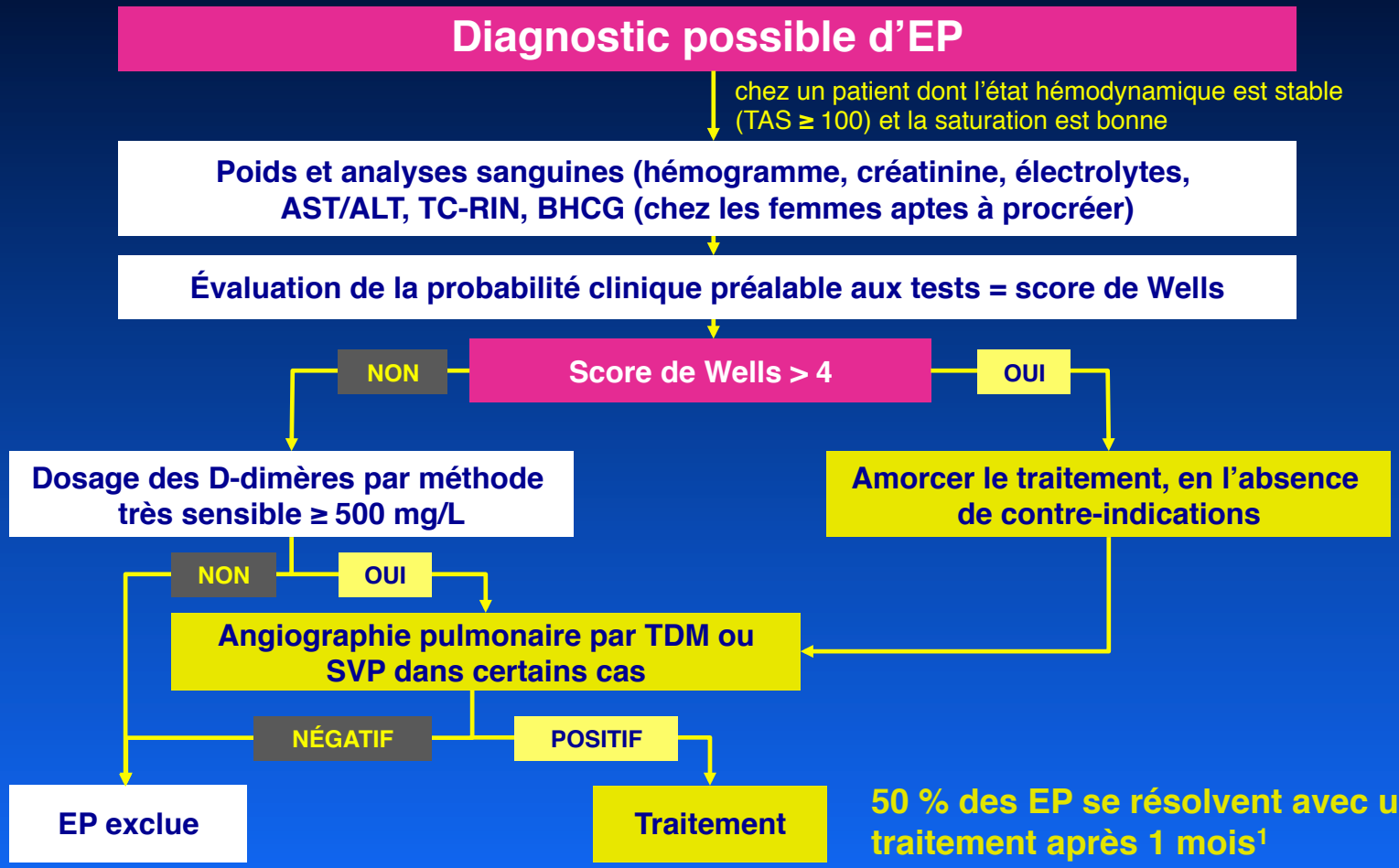
**Fonds de recherche:**

Astra-Zeneca, Bayer, Sanofi

**Conférencier:**

Bayer, BI, BMS, Leo, Pfizer et Sanofi

# Protocole de diagnostic de l'EP
## En utilisant le score de Wells et le D-dimères




**50 % des EP se résolvent avec un traitement après 1 mois[1]**

Kearon C. *Circulation* 2003;107:I22–30.

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# Score de Wells pour l'EP

**TABLE 1: WELLS SCORE* FOR PE**

| VARIABLE | POINTS |
|---|---|
| Clinical symptoms and signs of DVT | 3 |
| Previous DVT or PE | 1.5 |
| Immobilization for >3 days or surgery within 4 weeks | 1.5 |
| Heart rate >100 beats/minute | 1.5 |
| Hemoptysis | 1 |
| Malignancy | 1 |
| No alternative diagnosis more likely than PE | 3 |

*Total Score: Low Risk: 0 to 1.5; Intermediate Risk: 2 to 5.5; High Risk: ≥ 6

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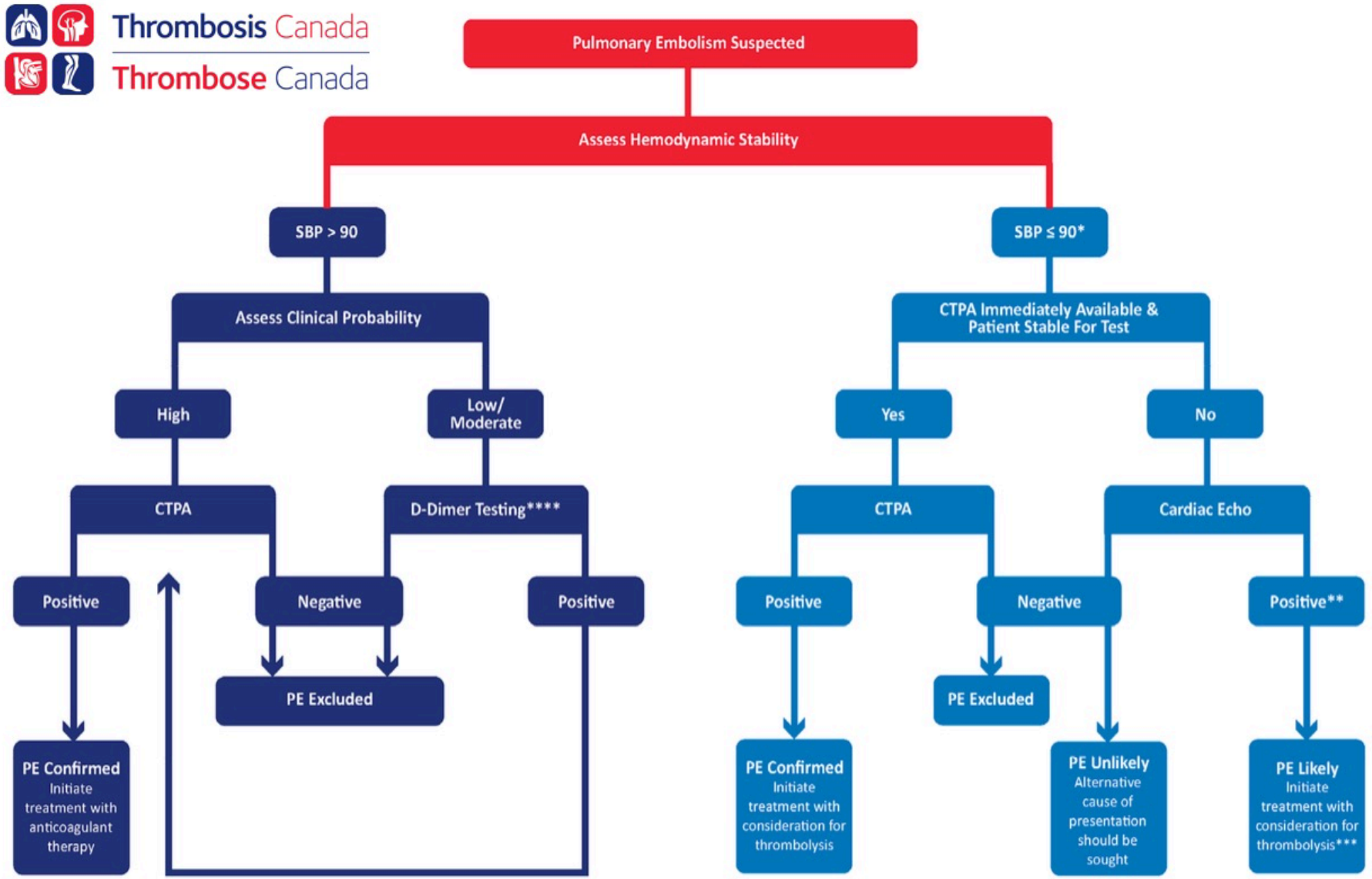
# FIGURE 1: SUGGESTED DIAGNOSTIC ALGORITHM FOR SUSPECTED PULMONARY EMBOLISM



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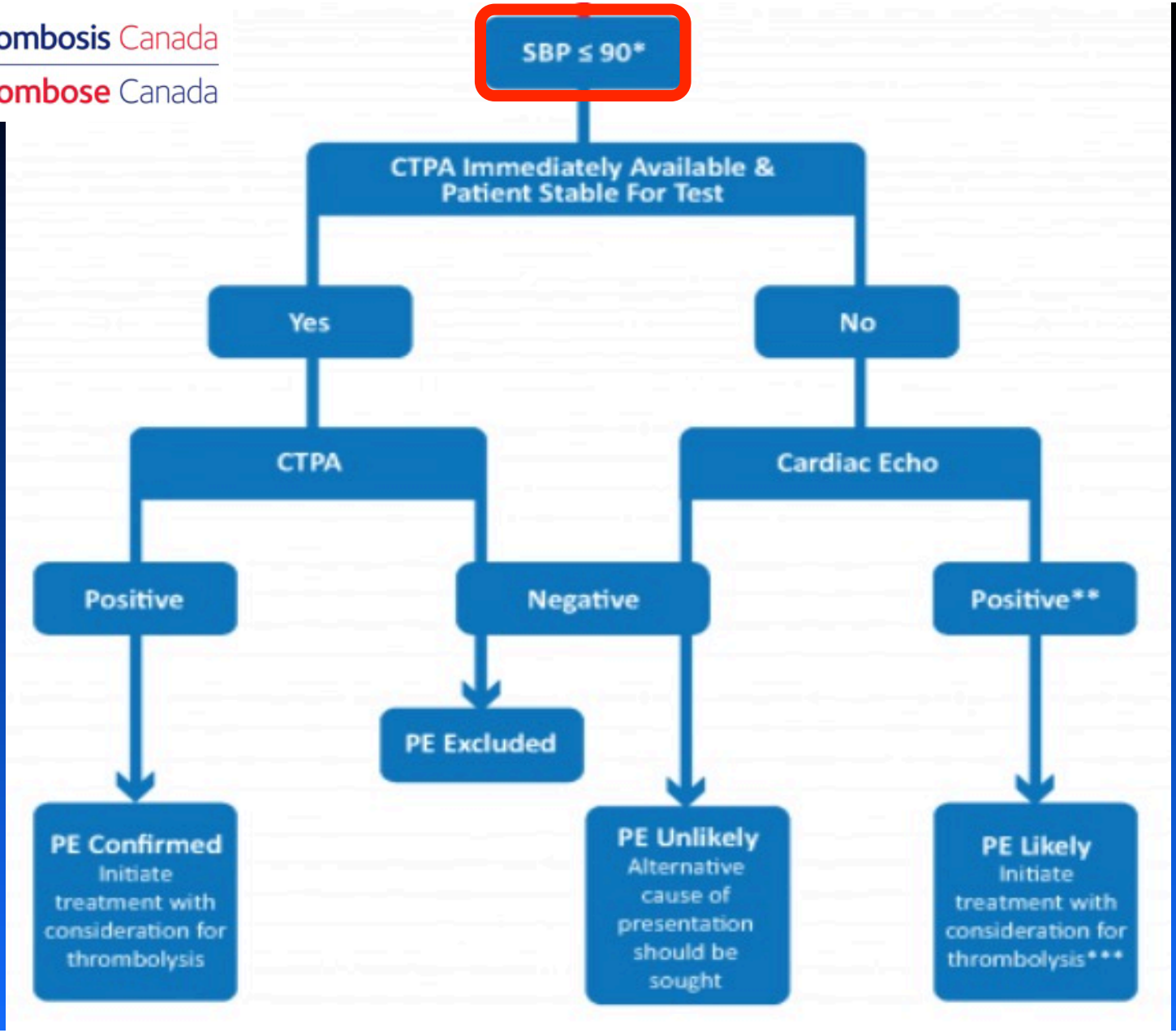


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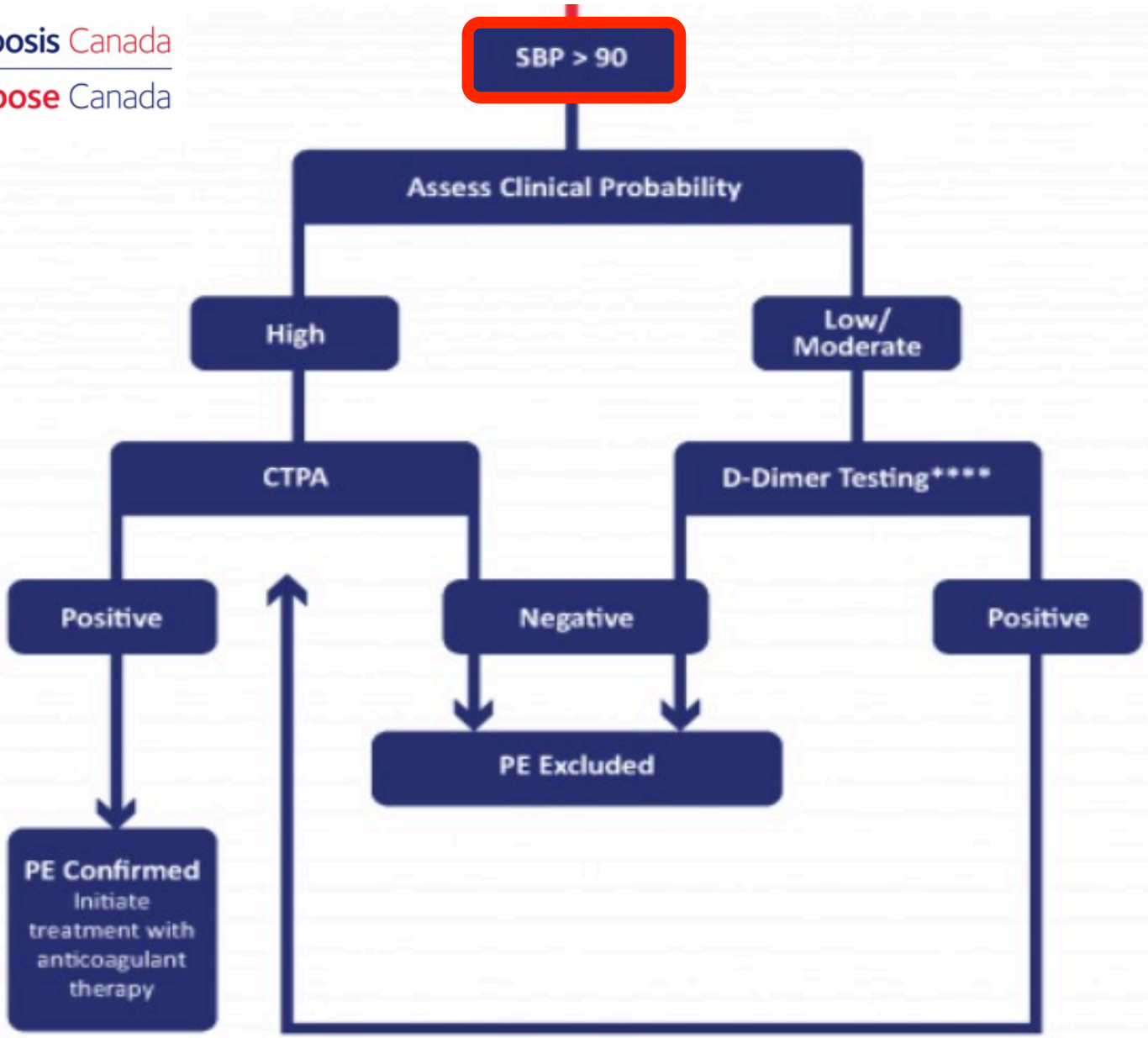


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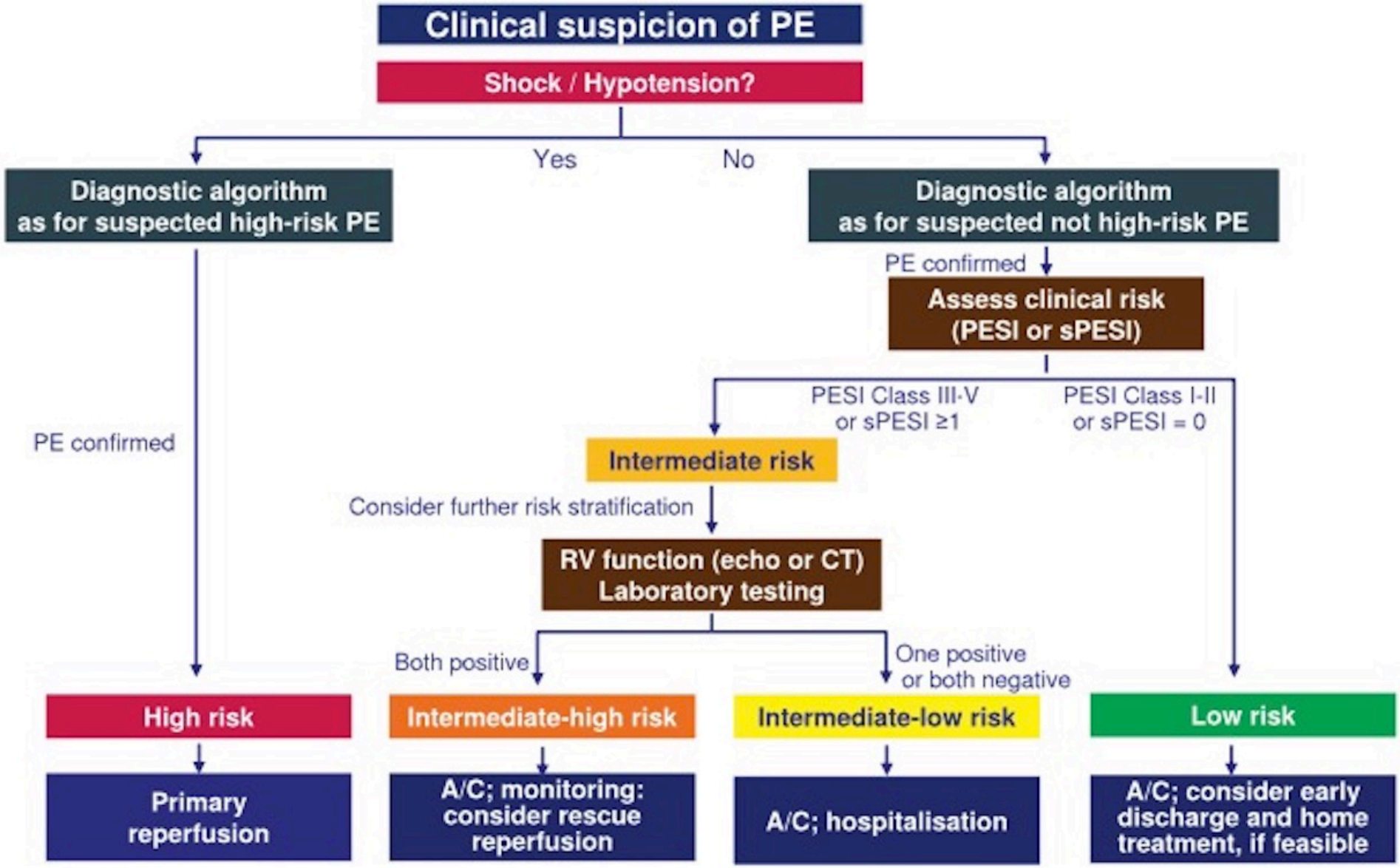
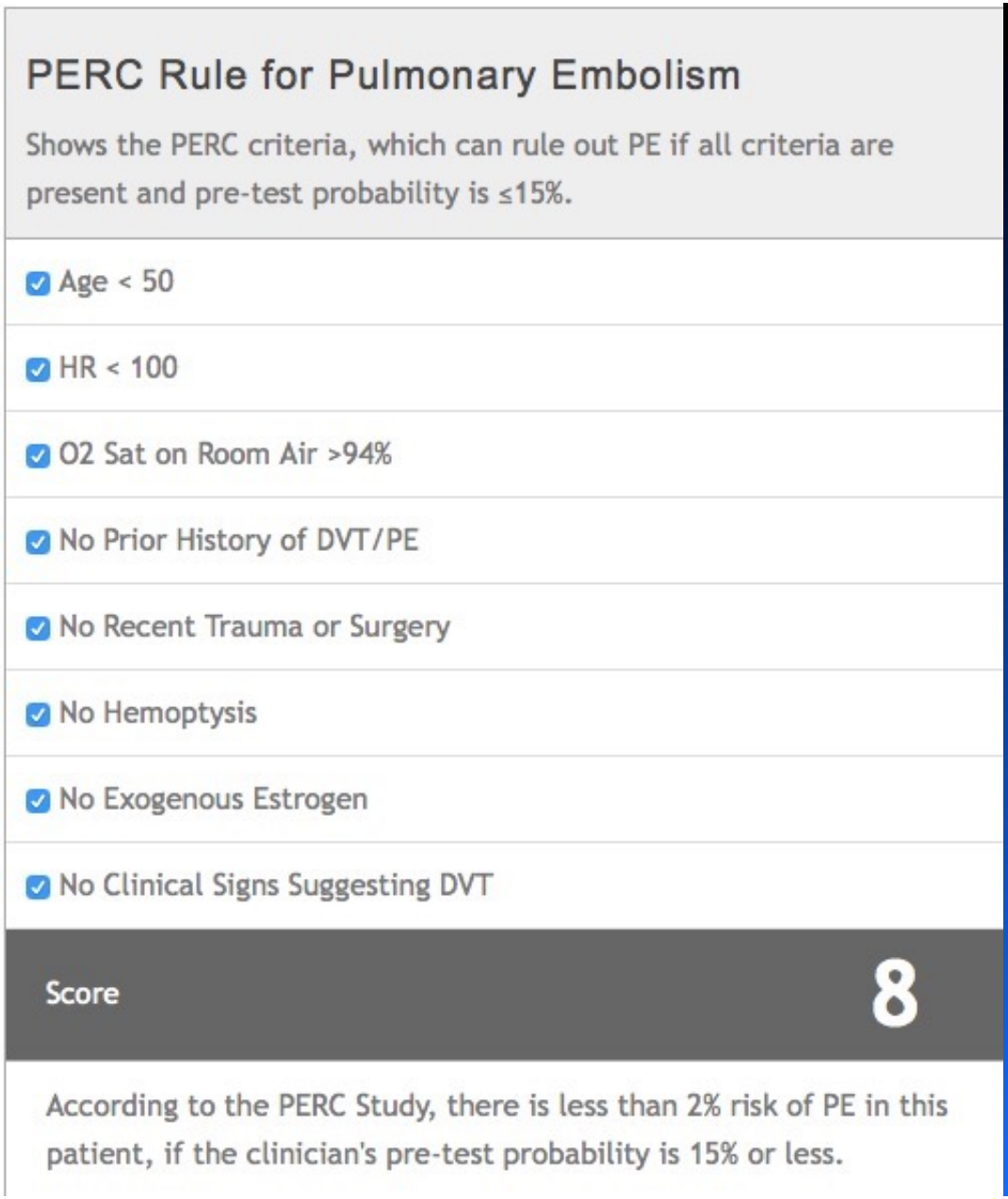
# ESC 2014


Clinical suspicion of PE
Shock / Hypotension?
Yes
No
Diagnostic algorithm as for suspected high-risk PE
Diagnostic algorithm as for suspected not high-risk PE
PE confirmed
Assess clinical risk (PESI or sPESI)
PESI Class III-V or sPESI ≥1
PESI Class I-II or sPESI = 0
PE confirmed
Intermediate risk
Consider further risk stratification
RV function (echo or CT) Laboratory testing
Both positive
One positive or both negative
High risk
Intermediate-high risk
Intermediate-low risk
Low risk
Primary reperfusion
A/C; monitoring: consider rescue reperfusion
A/C; hospitalisation
A/C; consider early discharge and home treatment, if feasible

# "PERC" pour EP

**The combination of gestalt estimate of low suspicion for PE and PERC(-) reduces the probability of VTE to below 2% in about 20% of outpatients with suspected PE.**

Kline JA et al.
JTH 2008; 6(5): 772-80

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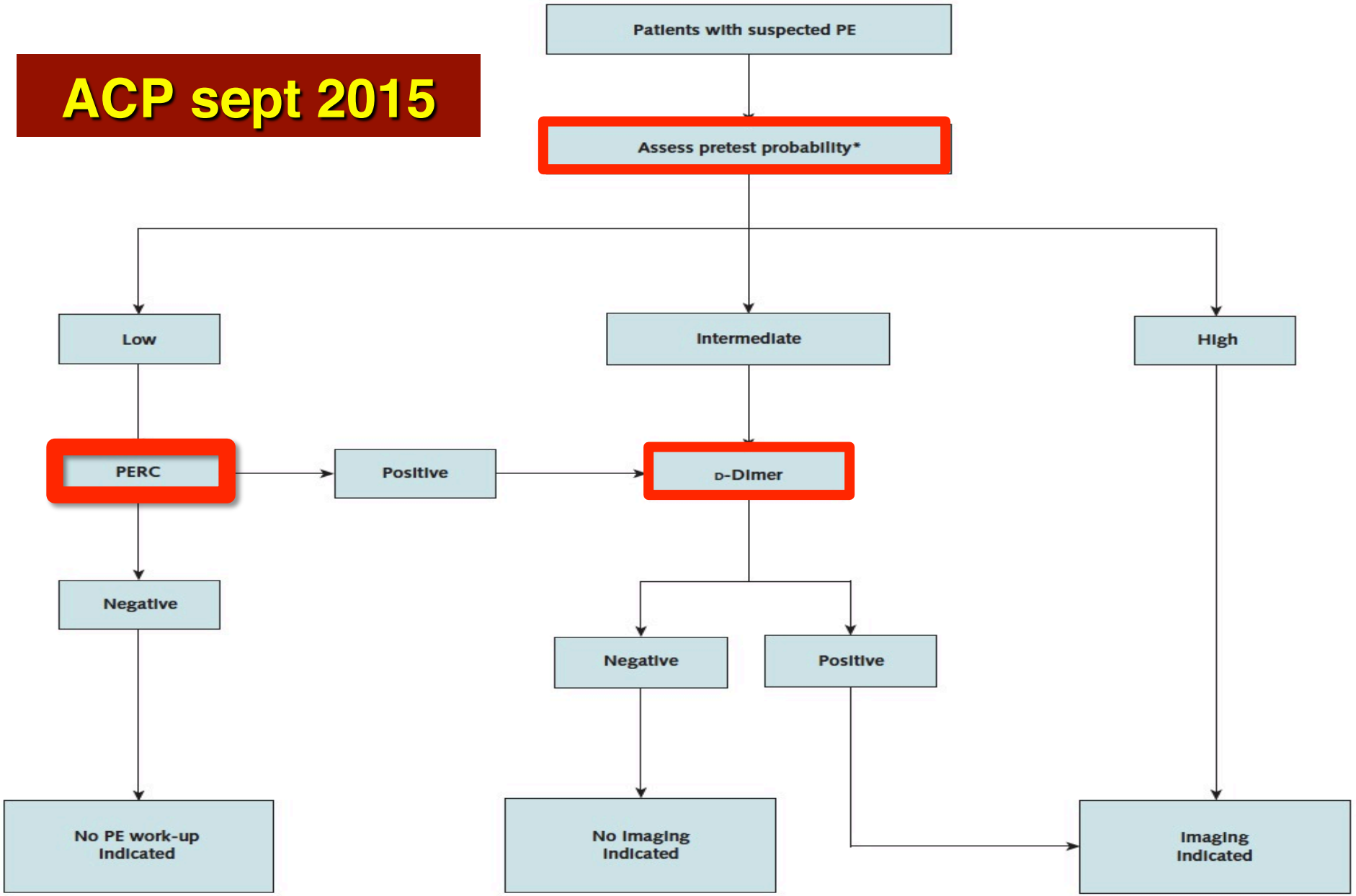
# ACP sept 2015



# D-Dimères ajustés pour l'âge: EP

## Utilité *possible* pour cas *faible probabilité* (2014)

### Assessment of the Safety and Efficiency of Using an Age-Adjusted D-dimer Threshold to Exclude Suspected Pulmonary Embolism

CONCLUSIONS: Use of an age-adjusted D-dimer threshold reduces imaging among patients aged > 50 years with an RGS ≤ 10. Although the adoption of an age-adjusted D-dimer threshold is probably safe, the CIs surrounding the additional 1.5% of PEs missed necessitate prospective study before this practice can be adopted into routine clinical care.

CHEST 2014; 146(6):1444-1451

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# D-Dimères ajustés pour l'âge: EP

## Utilité *possible* pour cas *faible probabilité* (2015)

**SEARCH STRATEGY**

Using Pubmed database 1966 to week 1 December 2014. ("pulmonary embolism"

**BET 2: SHOULD WE USE AN AGE ADJUSTED D-DIMER THRESHOLD IN MANAGING LOW RISK PATIENTS WITH SUSPECTED PULMONARY EMBOLISM?**

**Authors** Tom Jaconelli, Steven Crane

**Affiliation:** York District Hospital, York, UK

**OUTCOME**

Twenty-nine unique papers of which 13 included data on patients relevant to the clinical question (12 in English and 1 in German).

**Clinical bottom line**

In older patients suspected of having a PE, with a low pretest possibility, an age-adjusted D-dimer increases specificity with minimal change in the sensitivity, thereby increasing the number of patients who can be safely discharged without further investigations.

*Emerg Med J* April 2015 Vol 32 No 4

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# D-Dimères ajustés pour l'âge: EP
## ACP septembre 2015

ACP American College of Physicians℠
Leading Internal Medicine, Improving Lives

CLINICAL GUIDELINE

**Evaluation of Patients With Suspected Acute Pulmonary Embolism: Best Practice Advice From the Clinical Guidelines Committee of the American College of Physicians**

**Best Practice Advice 4:** Clinicians should use age-adjusted D-dimer thresholds (age × 10 ng/mL rather than a generic 500 ng/mL) in patients older than 50 years to determine whether imaging is warranted.

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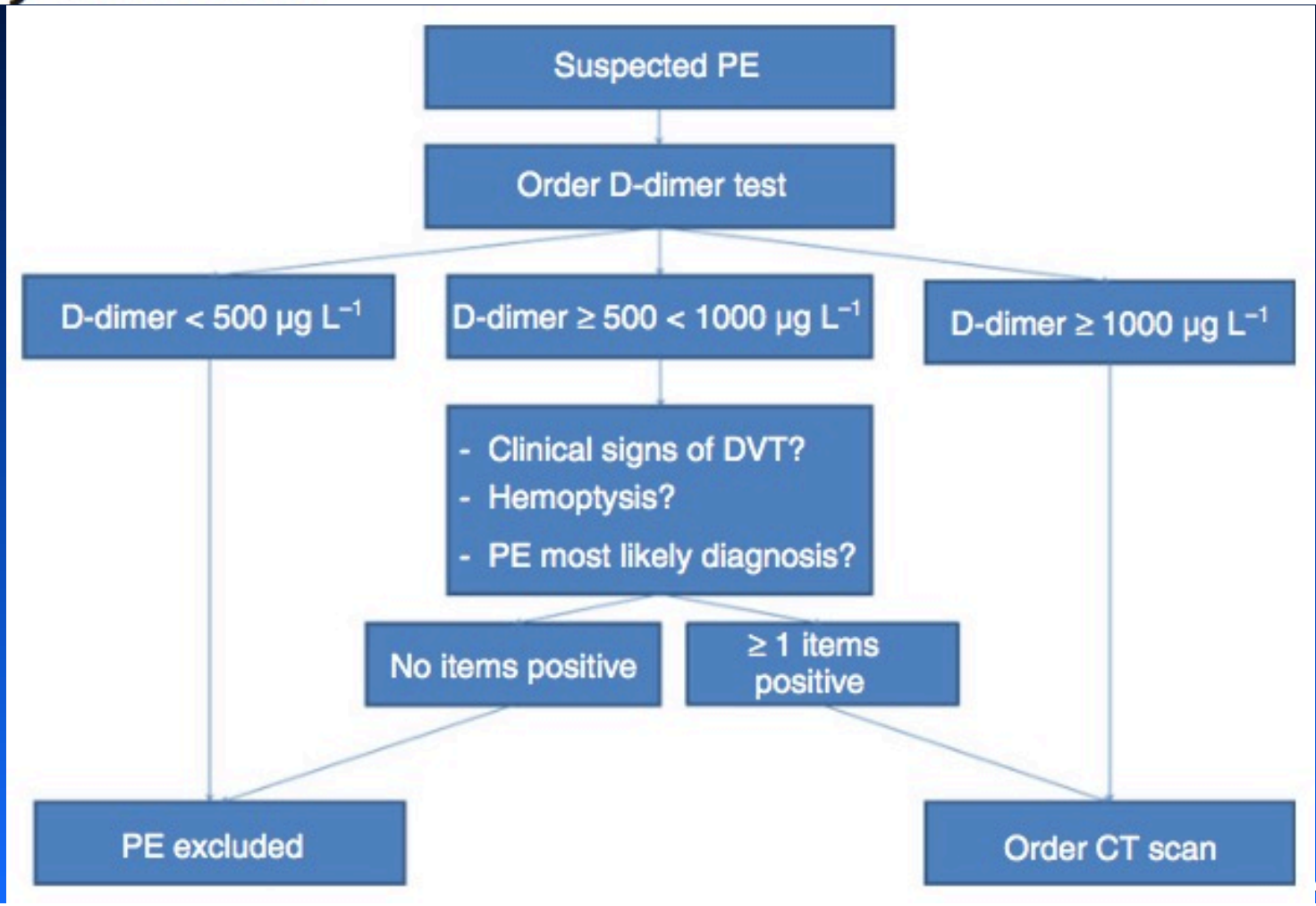
ORIGINAL ARTICLE

# A simple decision rule including D-dimer to reduce the need for computed tomography scanning in patients with suspected pulmonary embolism




Van Es J et al. JTH 2015; 13: 1428-35

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| | New CDR including D-dimer cut-off levels 1000/500 μg $L^{-1}$ | Wells score 'unlikely' (≤ 4) and D-dimer < 500 μg $L^{-1}$ |
|---|---|---|
| Derivation set, *n* = 723 | | |
| Number (%) of patients in whom PE can be excluded | 259 (36) | 160 (22) |
| Sensitivity (95% CI) | 0.981 (0.946–0.994) | 0.994 (0.965–0.999) |
| Specificity (95% CI) | 0.452 (0.411–0.493) | 0.280 (0.245–0.319) |
| PPV (95% CI) | 0.330 (0.289–0.374) | 0.275 (0.240–0.314) |
| NPV (95% CI) | 0.988 (0.967–0.997) | 0.994 (0.966–0.999) |
| Validation set, *n* = 2785 | | |
| Number (%) of patients in whom PE can be excluded | 1295 (46) | 989 (36) |
| Sensitivity (95% CI) | 0.951 (0.929–0.967) | 0.990 (0.977–0.996) |
| Specificity (95% CI) | 0.555 (0.535–0.575) | 0.430 (0.409–0.450) |
| PPV (95% CI) | 0.315 (0.292–0.339) | 0.272 (0.252–0.294) |
| NPV (95% CI) | 0.982 (0.973–0.986) | 0.995 (0.988–0.998) |

Van Es J et al. JTH 2015; 13: 1428-35

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# Incidence d'embolie pulmonaire
## Selon la carto V/Q et la probabilité clinique

| | *Probabilité clinique d'embolie pulmonaire* | | |
|---|---|---|---|
| ***SCAN V/Q Catégorie*** | **Élevée** | **Intermédiaire** | **Faible** |
| **Élevée** | 95 | 86 | 56 |
| **Intermédiaire** | 66 | 28 | 15 |
| **Faible** | 40 | 15 | 4 |
| **Normal** | 0 | 6 | 2 |

PIOPED, JAMA 1990; 263: 2753

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# EMBOLIE PULMONAIRE
## Angio-CT

### Points forts

- Accessible
- Peu invasif
- Coût (.8 X V/Q)
- Rapide
- Permet diagnostics alternatifs

### Points faibles

- Non concluant: 4%
- Faux négatifs: 5%
- Radiation (2 - 3 X angio)
- Produit de contraste
- Problèmes des embolies sous-segmentaires

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# EMBOLIE PULMONAIRE
## Angiographie RMN

### Points forts

- Pas de produit de contraste autre que gadolinium
- Pas de radiation
- Non invasif

### Points faibles

- 9% impossible
- 6% non Dx
- Coût 2 X CT
- ± Accessible

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# Embolie pulmonaire sous-segmentaire
## Impact des angio-scan modernes

REVIEW ARTICLE

### Symptomatic subsegmental pulmonary embolism: what is the next step?

M. CARRIER,*† M. RIGHINI‡ and G. LE GAL§

*Thrombosis Program, Division of Hematology, Department of Medicine, University of Ottawa, Ottawa; †Clinical Epidemiology Program, The Ottawa Hospital Research Institute, Ottawa, Canada; ‡Division of Angiology and Hemostasis, Geneva University Hospital and Faculty of Medicine, Geneva, Switzerland; and §Brest University Hospital, Brest, France

**Table 1** Rate of SSPE diagnosis and 3-month risk of VTE in patients with and without PE according to the number of CTPA detectors

| | SDCT | All MDCT | MDCT 4 detectors | MDCT 16 detectors | MDCT 64 detectors |
|---|---|---|---|---|---|
| Rate of SSPE diagnosis | | | | | |
| No. of patients with PE | 1123 | 1534 | 461 | 207 | 100 |
| Proportion of SSPE, % (95% CI) | 4.7 (2.5–7.6) | 9.4 (5.5–14.2) | 7.1 (3.8–11.3) | 6.9 (0.7–23.3) | 15.0 (7.7–24.1) |
| 3-month risk of VTE | | | | | |
| No. of patients without PE | 1943 | 2982 | 547 | 424 | 239 |
| 3-month risk, % (95% CI) | 0.9 (0.4–1.4) | 1.1 (0.7–1.4) | 1.4 (0.7–2.7) | 0.6 (0.1–1.6) | 0.8 (0.1–3.0) |

Carrier M et al. JTH 2012; 10: 1486-90

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# Embolie pulmonaire sous-segmentaire
## Ce qu'il faut momentanément conclure

Perhaps more recent multiple-detector CTPAs are too sensitive for the diagnosis of PE and their interpretation should be restricted to the more proximal vessels (lobar to segmental pulmonary vessels) and combined with the results of other diagnostic modalities (PTP, d-dimer, compression ultrasonography) to avoid unnecessary initiation of anticoagulant therapy. At this stage, a firm recommendation of withholding anticoagulation treatment for patients with SSPE diagnosed on CTPA cannot be made. The risks of recurrent VTE (e.g. active cancer, previous VTE) and of anticoagulant therapy (e.g. active bleeding) need to be considered before making a clinical decision. Hopefully, on-going studies will help to solve this important clinical issue.

- Sensibilité trop grande? Autres tests utiles
- Recommandation incertaine
- Risque de récidive et de saignement

Carrier M et al. JTH 2012; 10: 1486-90

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# "DASH" pour prédire la récidive de TEV

| | |
|---|---|
| D-dimer Abnormal | +2 |
| Age <50 yrs | +1 |
| Sex - Male | +1 |
| Hormone use at time of initial VTE | -2 |

| DASH Score | Annualized Recurrence Rate |
|---|---|
| -2 | 1.8%* |
| -1 | 1.0% |
| 0 | 2.4% |
| 1 | 3.9% |
| 2 | 6.3% |
| 3 | 10.8% |
| 4 | 19.9% |

*A very small sample had DASH Score of -2 in the derivation study

Tosetto A et al. JTH 2012; 10: 1019-25

ssin

# Gravité de l'EP

## Score PESI simplifié: traitement ambulatoire si 0

### Score PESI (*Pulmonary Embolism Severity Index*) simplifié
### Prédiction de l'issue à 30 jours chez les patients atteints d'EP

| Tableau clinique | Points | Score du patient |
|---|---|---|
| Âge du patient > 80 ans | 1 | 0 |
| Antécédents de cancer | 1 | 0 |
| Antécédents de maladie cardiopulmonaire chronique | 1 | 0 |
| Fréquence cardiaque ≥ 110 | 1 | 0 |
| Tension artérielle systolique < 100 mmHg | 1 | 0 |
| Saturation en $O_2$ < 90 % en air ambiant | 1 | 0 |
| Total | | |

| Score PESI | Risque de décès |
|---|---|
| 1 ou plus | Élevé (8,9 %) |
| 0 | Faible (1,1 %) |

Thrombosis Canada
Thrombose Canada

Calculateur accessible en ligne à : ThrombosisCanada.ca

Jimenez D *et al. Chest* 2007;132(1):24-30.

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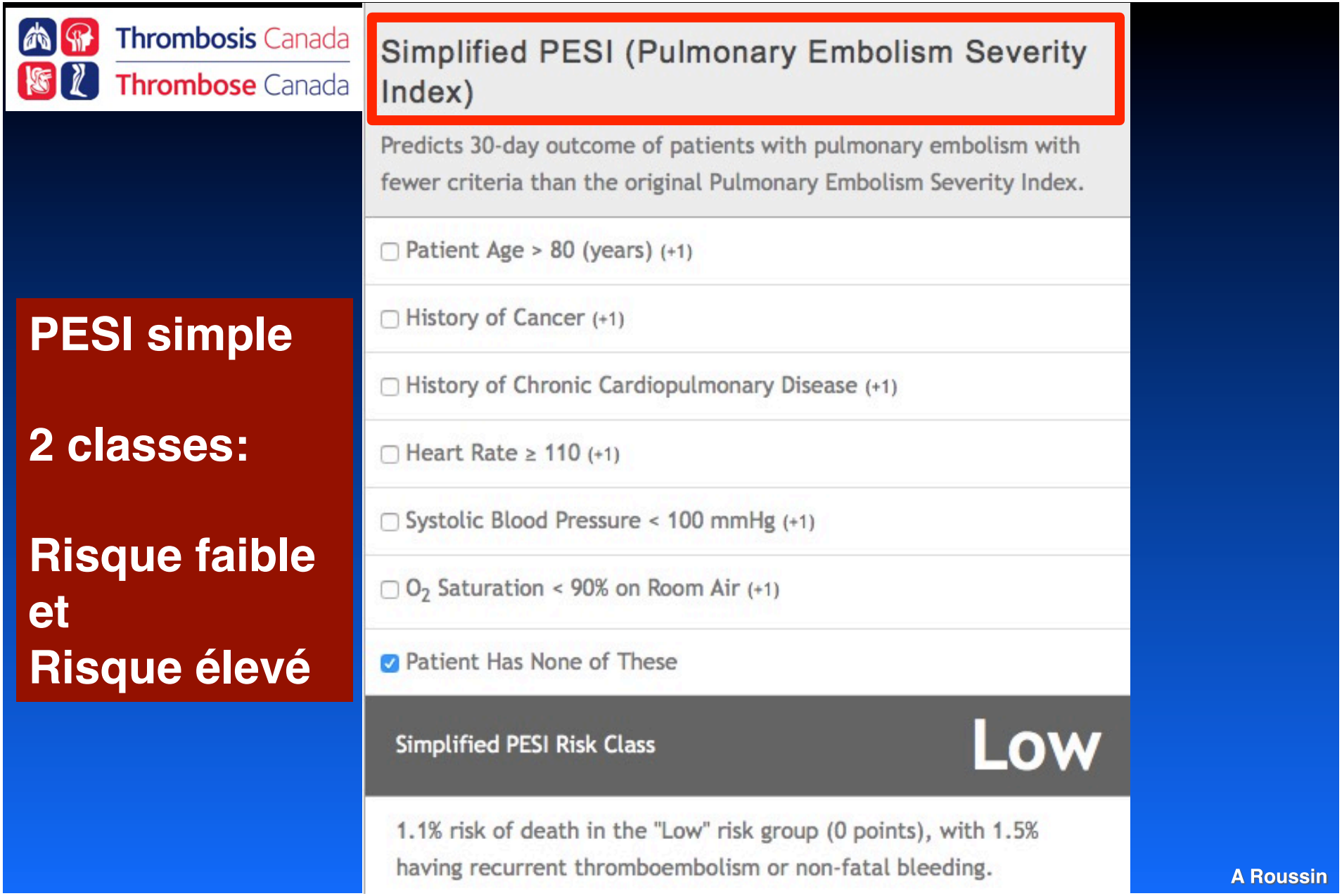
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PESI simple
2 classes:
Risque faible
et
Risque élevé
Simplified PESI (Pulmonary Embolism Severity Index)
Predicts 30-day outcome of patients with pulmonary embolism with fewer criteria than the original Pulmonary Embolism Severity Index.
Patient Age > 80 (years) (+1)
History of Cancer (+1)
History of Chronic Cardiopulmonary Disease (+1)
Heart Rate ≥ 110 (+1)
Systolic Blood Pressure < 100 mmHg (+1)
$O_2$ Saturation < 90% on Room Air (+1)
Patient Has None of These
Simplified PESI Risk Class
Low
1.1% risk of death in the "Low" risk group (0 points), with 1.5% having recurrent thromboembolism or non-fatal bleeding.
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**PESI**

**5 classes:**

**Risque de faible I à très élevé V**

## Pulmonary Embolism Severity Index (PESI)

Predicts 30-day outcome of patients with pulmonary embolism using 11 clinical criteria.

| | |
|---|---|
| Age (years) (+1 per year) | 65 |
| ☐ Male Patient (+10) | |
| ☐ History of Cancer (+30) | |
| ☐ History of heart failure (+10) | |
| ☐ History of chronic lung disease (+10) | |
| ☐ Heart Rate ≥ 110 (+20) | |
| ☐ Systolic Blood Pressure < 100 mmHg (+30) | |
| ☐ Respiratory Rate ≥ 30/min (+20) | |
| ☐ Temperature < 36° C (96.8° F) (+20) | |
| ☐ Altered Mental Status (disorientation, lethargy, stupor, or coma) (+60) | |
| ☐ $O_2$ Saturation < 90% on Room Air (+20) | |
| **Score** | **65** |

Class I, Very Low Risk: 0-1.6% 30-day mortality in this group.

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# Fibrinolysis for Patients with Intermediate-Risk Pulmonary Embolism

**PEITHO**
**Meyer G et al. NEJM 2014**
**370: 1402-11**

**Table 3. Efficacy Outcomes.***

| Outcome | Tenecteplase (N=506) | Placebo (N=499) | Odds Ratio (95% CI) | P Value |
|---|---|---|---|---|
| Primary outcome — no. (%) | 13 (2.6) | 28 (5.6) | 0.44 (0.23–0.87) | 0.02 |
| Death from any cause | 6 (1.2) | 9 (1.8) | 0.65 (0.23–1.85) | 0.42 |
| Hemodynamic decompensation | 8 (1.6) | 25 (5.0) | 0.30 (0.14–0.68) | 0.002 |

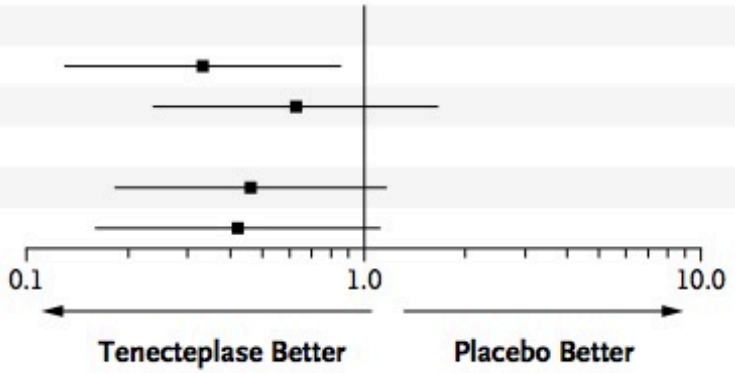
**Table 4. Safety Outcomes in the Intention-to-Treat Population.***

| Outcome | Tenecteplase (N=506) | Placebo (N=499) | Odds Ratio (95% CI) | P Value |
|---|---|---|---|---|
| | *no. (%)* | | | |
| Bleeding between randomization and day 7 | | | | |
| Major extracranial bleeding | 32 (6.3) | 6 (1.2) | 5.55 (2.3–13.39) | <0.001 |
| Minor bleeding | 165 (32.6) | 43 (8.6) | | |
| Major bleeding† | 58 (11.5) | 12 (2.4) | | |
| Stroke between randomization and day 7 | 12 (2.4) | 1 (0.2) | 12.10 (1.57–93.39) | 0.003 |
| Ischemic stroke | 2 (0.4) | 0 | | |
| Hemorrhagic stroke‡ | 10 (2.0) | 1 (0.2) | | |

# PEITHO: âge et sexe

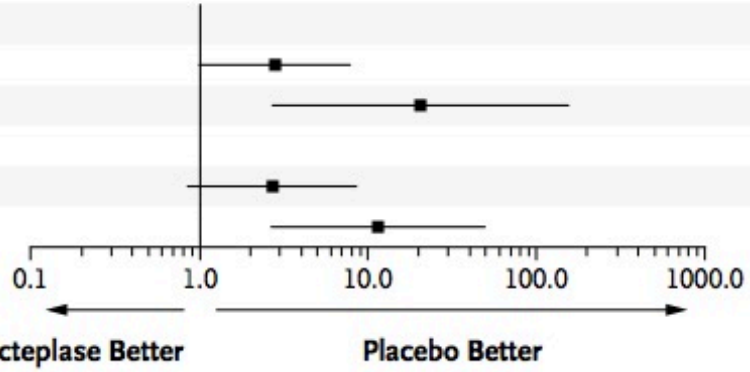
**A Death or Hemodynamic Decompensation**

| Subgroup | Tenecteplase (N=506) | Placebo (N=499) | Odds Ratio (95% CI) | P Value for Interaction |
|---|---|---|---|---|
| | *no. of events/total no. (%)* | | | |
| Age | | | | 0.36 |
| ≤75 yr | 6/344 (1.7) | 17/335 (5.1) | 0.33 (0.13–0.85) | |
| >75 yr | 7/162 (4.3) | 11/164 (6.7) | 0.63 (0.24–1.66) | |
| Sex | | | | 0.90 |
| Male | 7/242 (2.9) | 14/231 (6.1) | 0.46 (0.18–1.16) | |
| Female | 6/264 (2.3) | 14/268 (5.2) | 0.42 (0.16–1.12) | |




**B Major Extracranial Bleeding**

| Subgroup | Tenecteplase (N=506) | Placebo (N=499) | Odds Ratio (95% CI) | P Value for Interaction |
|---|---|---|---|---|
| | *no. of events/total no. (%)* | | | |
| Age | | | | 0.09 |
| ≤75 yr | 14/344 (4.1) | 5/335 (1.5) | 2.80 (1.00–7.86) | |
| >75 yr | 18/162 (11.1) | 1/164 (0.6) | 20.38 (2.69–154.53) | |
| Sex | | | | 0.13 |
| Male | 11/242 (4.5) | 4/231 (1.7) | 2.70 (0.85–8.61) | |
| Female | 21/264 (8.0) | 2/268 (0.7) | 11.49 (2.67–49.53) | |



# Review: In pulmonary embolism, thrombolytic therapy reduces all-cause mortality but increases major bleeding

*Chatterjee S, Chakraborty A, Weinberg I, et al.* ***Thrombolysis for pulmonary embolism and risk of all-cause mortality, major bleeding, and intracranial hemorrhage: a meta-analysis.*** *JAMA. 2014;311: 2414-21.*

**Thrombolytic therapy (thrombo) vs anticoagulant (anticoag) therapy in patients with pulmonary embolism***

| Outcomes | Group | Number of trials (*n*) | Weighted event rates | | At a mean 82 d | |
|---|---|---|---|---|---|---|
| | | | Thrombo | Anticoag | RRR (95% CI) | NNT (CI) |
| All-cause mortality | All | 16 (2115) | 2.1% | 3.9% | 46% (12 to 67) | 56 (39 to 222) |
| | Intermediate risk† | 8 (1755) | 1.4% | 2.9% | 51% (8 to 74) | 67 (46 to 440) |
| | Age > 65 y | 5 (1331) | 2.0% | 3.6% | 44% (–5 to 70) | NS |
| | Age ≤ 65 y‡ | 11 (784) | 2.3% | 4.3% | 46% (–17 to 75) | NS |
| | | | | | RRI (CI) | NNH (CI) |
| Major bleeding§ | All | 16 (2115) | 8.8% | 3.4% | 158% (85 to 256) | 19 (12 to 35) |
| | Intermediate risk | 8 (1755) | 6.8% | 2.2% | 204% (102 to 352) | 22 (13 to 44) |
| | Age > 65 y | 5 (1331) | 12% | 4.1% | 185% (101 to 298) | 14 (9 to 25) |
| | Age ≤ 65 y | 11 (784) | 2.8% | 2.3% | 24% (–50 to 199) | NS |

INVITED REVIEW

# Pulmonary embolism: whom to discharge and whom to thrombolyze?

"Although thrombolytic therapy has a favorable benefit to risk profile in patients with high-risk pulmonary embolism, the risk of major and especially intracranial bleeding outweighs the benefits in terms of hemodynamic decompensation in patients with intermediate-risk pulmonary embolism"

Meyer G et al. JTH 2015; 13 (1) S252

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INVITED REVIEW

# Pulmonary embolism: whom to discharge and whom to thrombolyze?

**Table 3** Outcomes according to different risk-stratification models based on the combination of clinical data and biomarkers

| Study | Clinical rule | Outcome* (%) |
|---|---|---|
| Lankeit 2014 [16] | sPESI = 0 ($n$ = 258) | 2 (0.8) |
| | sPESI = 0, NT-proBNP < 600 pg $mL^{-1}$ ($n$ = 172) | 0 (0) |
| | sPESI = 0, NT-proBNP > 600 pg $mL^{-1}$ ($n$ = 86) | 2 (2.3) |
| Jimenez 2014 [17] | sPESI = 0 ($n$ = 313) | 5 (1.6) |
| | sPESI = 0, BNP ≤ 100 pg $mL^{-1}$ ($n$ = 216) | 2 (0.9) |
| | sPESI = 0, BNP > 100 pg $mL^{-1}$ ($n$ = 97) | 3 (3.1) |
| Sanchez 2013 [23] | PESI I-II ($n$ = 324) | 7 (2.2) |
| | PESI I-II, BNP ≤ 100 pg $mL^{-1}$ ($n$ = 218) | 2 (0.9) |
| | PESI I-II, BNP > 100 pg $mL^{-1}$ ($n$ = 106) | 5 (4.7) |
| Moores 2010 [25] | PESI I-II ($n$ = 192) | 2 (1.0) |
| | PESI I-II, TnI ≤ 0.1 ng $mL^{-1}$ ($n$ = 149) | 2 (1.3) |
| | PESI I-II TnI > 0.1 ng $mL^{-1}$ ($n$ = 43) | 0 (0) |

European Heart Journal (2015) 36, 605–614
doi:10.1093/eurheartj/ehu218



# Systemic thrombolytic therapy for acute pulmonary embolism: a systematic review and meta-analysis

**Christophe Marti[1]*, Gregor John[1], Stavros Konstantinides[2], Christophe Combescure[3], Olivier Sanchez[4], Mareike Lankeit[2], Guy Meyer[4], and Arnaud Perrier[1]**

**Table 2** Efficacy outcomes, subgroup analyses

| | All studies | | | Studies including[a] High-risk PE | Intermediate-risk PE | Low and intermediate-risk PE | Group difference |
|---|---|---|---|---|---|---|---|
| | OR (95% CI) | *P*-value | $I^2$ (%) | OR (95% CI) | OR (95% CI) | OR (95% CI) | *P*-value |
| Mortality | 0.59 (0.36 to 0.96) | 0.034 | 0 | 0.48 (0.20 to 1.15) | 0.42 (0.17 to 1.03) | 0.96 (0.41 to 2.24) | 0.36 |
| PE mortality | 0.29 (0.14 to 0.60) | <0.001 | 0 | 0.15 (0.03 to 0.78) | 0.17 (0.05 to 0.67) | 0.63 (0.20 to 1.97) | 0.23 |
| Death or treatment escalation | 0.34 (0.22 to 0.52) | <0.001 | 0 | 0.18 (0.04 to 0.79) | 0.37 (0.20 to 0.69) | 0.35 (0.18 to 0.66) | 0.67 |
| PE recurrence | 0.50 (0.27 to 0.94) | 0.031 | 0 | 0.97 (0.31 to 2.98) | 0.25 (0.06 to 1.03) | 0.46 (0.17 to 1.21) | 0.33 |

**Table 3** Safety outcomes, subgroup analyses

| | All studies | | | Alteplase | Tenecteplase | Other thrombolytics | Group difference |
|---|---|---|---|---|---|---|---|
| | OR (95% CI) | *P*-value | $I^2$ (%) | OR (95% CI) | OR (95% CI) | OR (95% CI) | *P*-value |
| Major bleeding | 2.91 (1.95 to 4.36) | <0.001 | 25 | 1.07 (0.43 to 2.62) | 5.02 (2.72 to 9.26) | 2.16 (1.03 to 4.54) | 0.02 |
| Fatal/intracranial haemorrhage | 3.18 (1.25 to 8.11) | 0.008 | 0 | 1.09 (0.27 to 4.40) | 7.32 (1.64 to 32.63) | NA | 0.07 |

# Diagnostic de l'EP pendant la grossesse

Seminar

## Pulmonary embolism

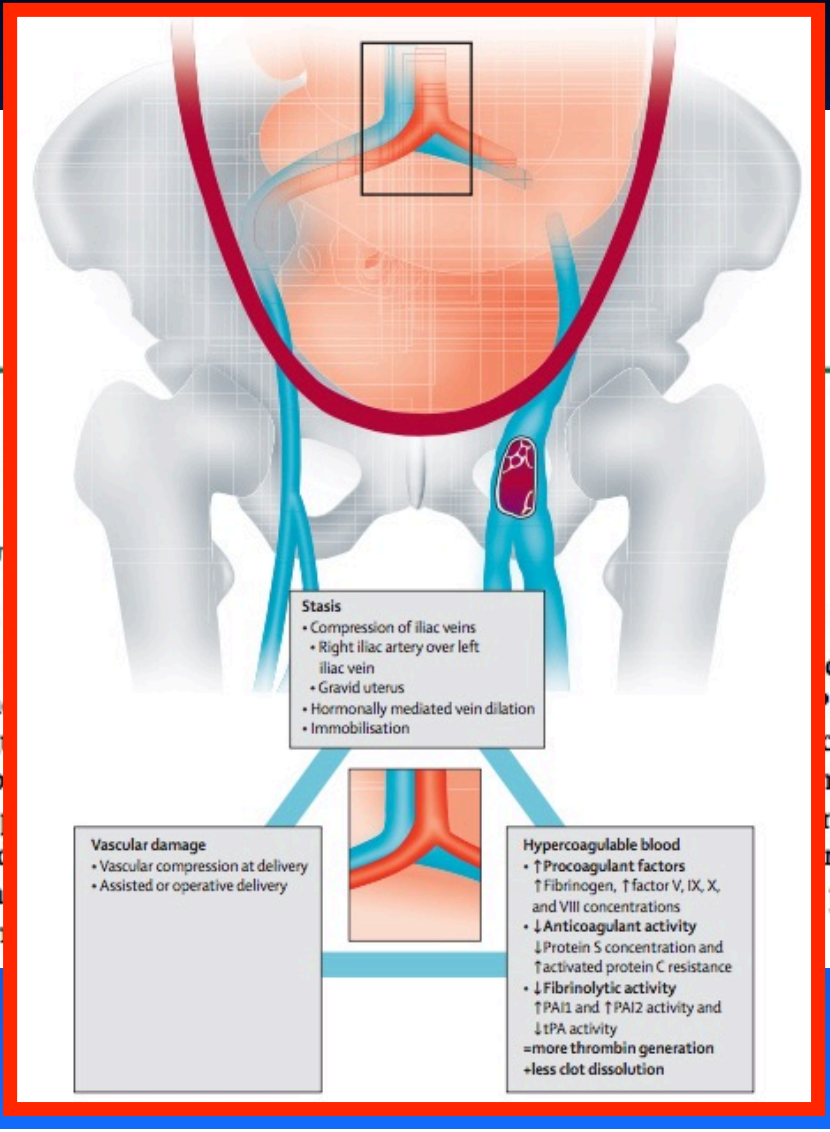
Ghada Bourjeily, Michael Paidas, Hanan Khalil, Karen

Lancet 2010; 375: 500–12
Published Online November 3, 2009
DOI:10.1016/S0140-6736(09)60996-X

Department of Medicine, (G Bourjeily MD, Prof K Rosene-Montella MD), and Department of Diagnostic Imaging (H Khalil MD), The Warren Alpert Medical School

Pulmonary embolism (PE) is the leading
pregnancy might be related to challenges
suspected and adequately investigated, an
an example of Virchow's triad: hypercoag
an increased incidence of venous thromb
some of the physiological changes of
teratogenicity and oncogenicity associate
treatment, an accurate diagnosis of PE a
should be weighed against the risk of com

from PE in
diagnosis is
Pregnancy is
ctors lead to
nen because
ns for fetal
rmacological
prophylaxis

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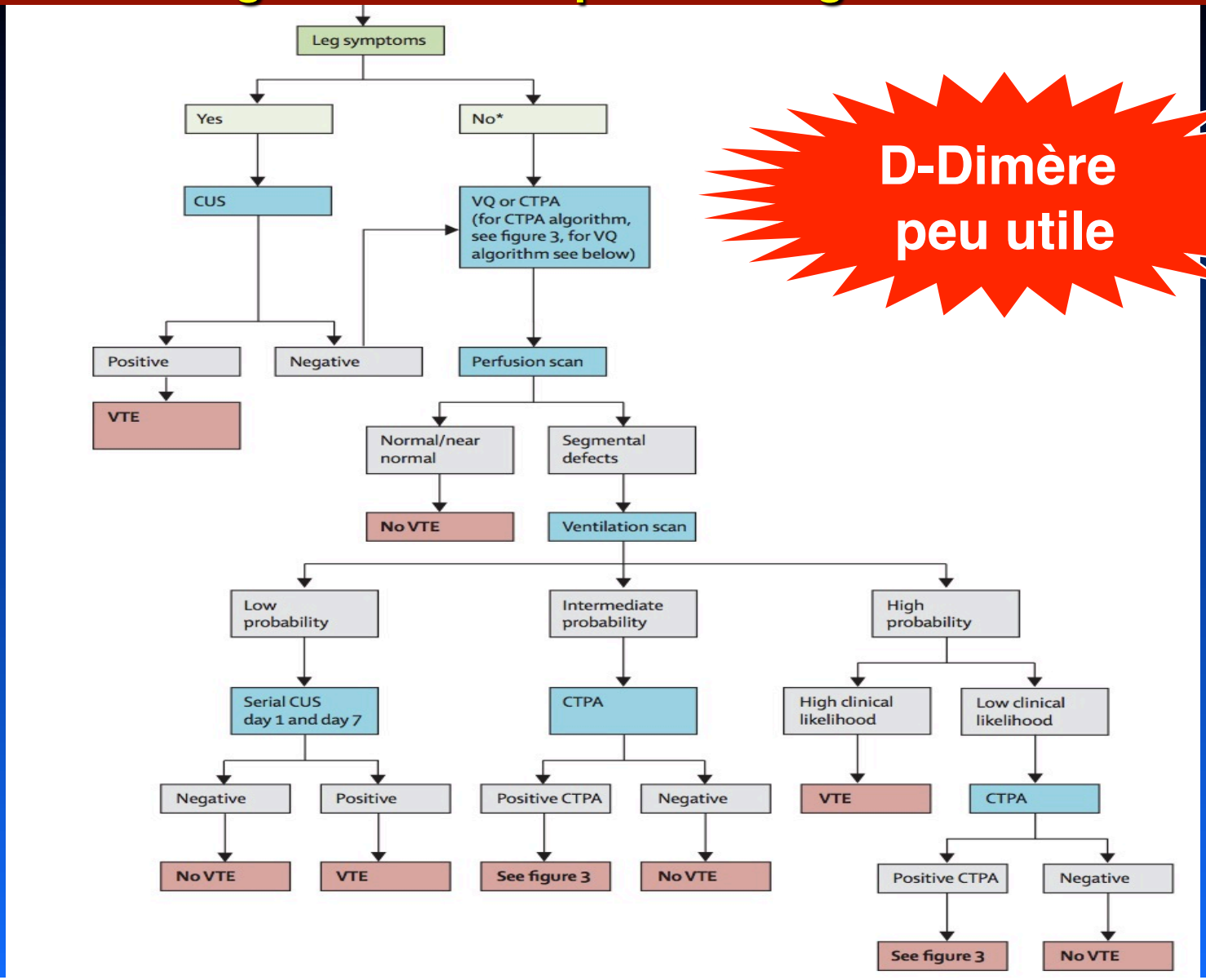
# Diagnostic de l'EP pendant la grossesse




**D-Dimère peu utile**

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# Diagnostic de l'EP pendant la grossesse

## Pour le foetus

| | Radiation dose (Gy) |
|---|---|
| Chest radiography | 0·000001 |
| Ventilation scintigraphy[58] | 0·00028–0·00051* |
| Perfusion scintigraphy (half dose)[58] | 0·00014–0·00025 |
| CT pulmonary angiography[59] | 0·000003–0·000131† |
| Conventional pulmonary angiography | <0·0005 via brachial route; 0·002–0·003 via femoral route |
| CT venography | >0·05 |
| Conventional venography | 0·006 |

*Dependent on agent used. †These doses might be higher depending on the imaging protocol, type of scanner, gestational age, and method used to estimate radiation exposure (Monte-Carlo technique [used by Winer-Muram][59] and phantom study [Hurwitz[60] and Doshi[61]]).

***Table 2:*** **Radiation exposure to the fetus associated with various diagnostic procedures**

**ATTENTION:**

**150 X plus d'irradiation pour les seins avec angio CT comparativement au Scan VQ**

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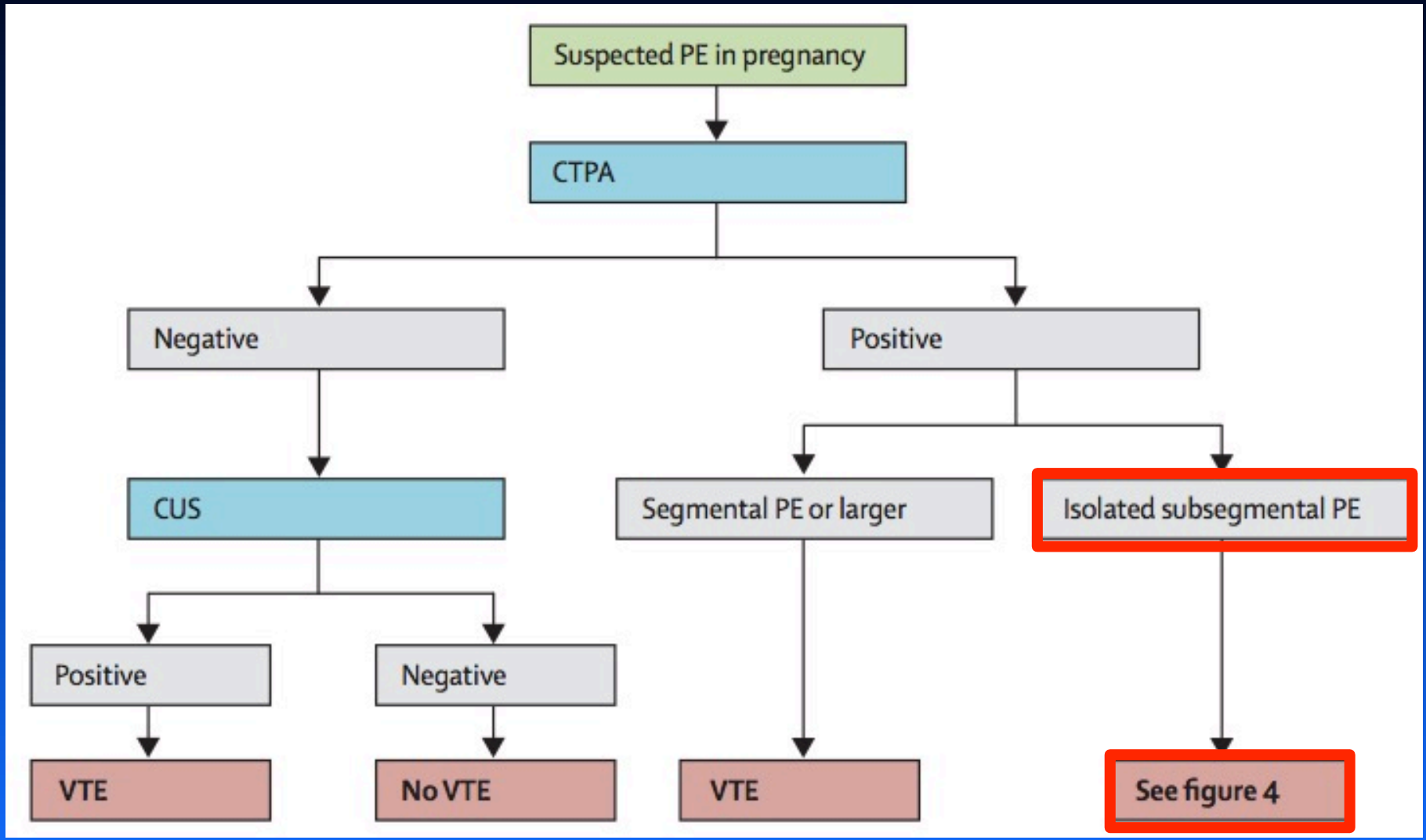
# Diagnostic de l'EP pendant la grossesse

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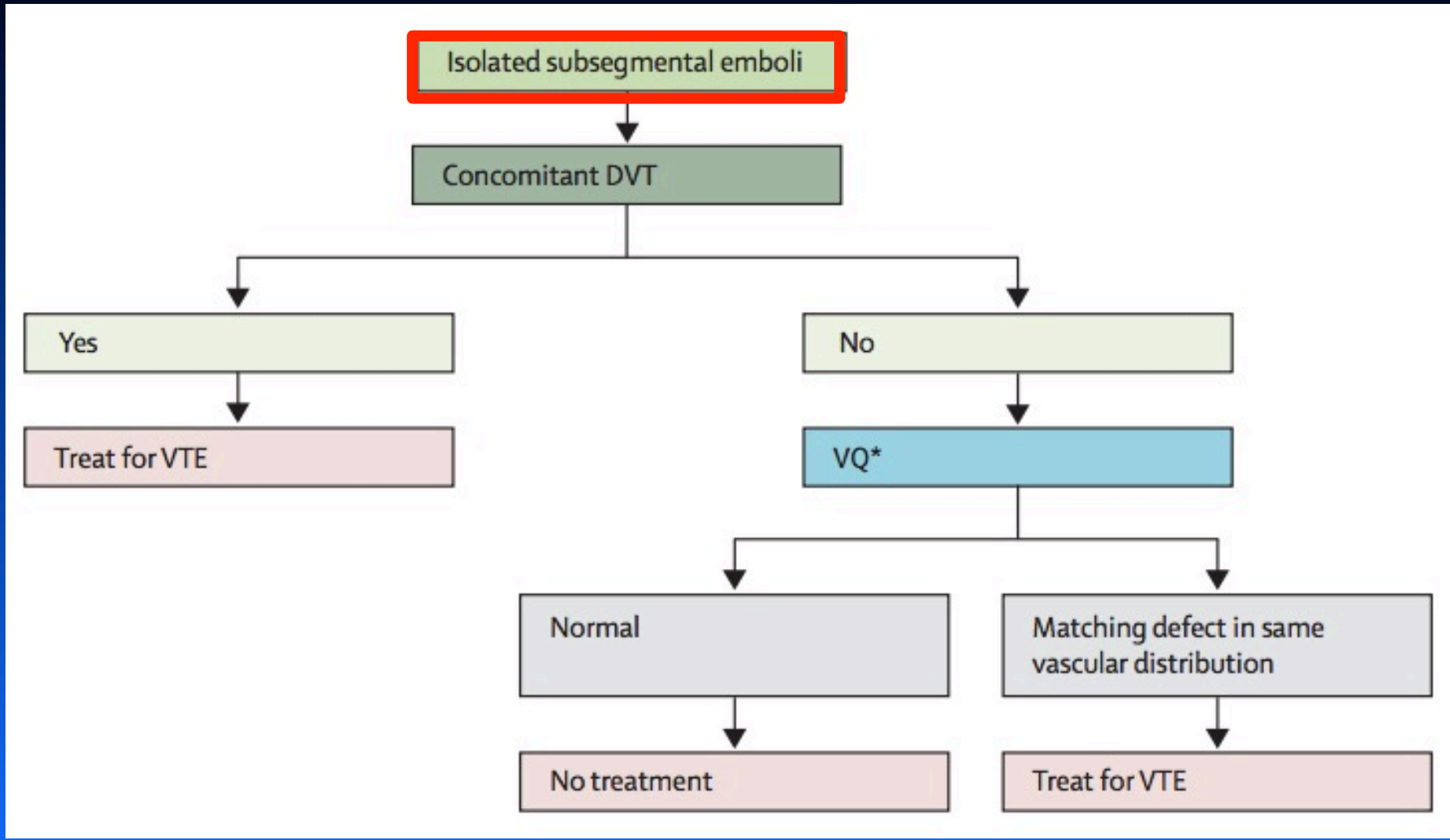
# Diagnostic de l'EP pendant la grossesse

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# Diagnostic de l'EP pendant la grossesse
## Echographie

**Compression ultrasonography**

*Advantages*

- No exposure to radiation
- Non-invasive

*Disadvantages*

- Possible low sensitivity in patients without signs and symptoms of deep vein thrombosis

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During pregnancy, DVT is found in the left leg in 80% of cases and there is a high frequency of iliofemoral (64%) and isolated iliac vein (17%) thrombosis among pregnant women with confirmed DVT. Standard DUS strategies may be less sensitive in pregnant women because they do not consider the increased frequency of pelvic and iliac vein thrombosis seen during pregnancy and because of the lack of sensitivity of standard

# Diagnostic de l'EP pendant la grossesse
## Scintigraphie VQ

***Panel 1*: Advantages and disadvantages of imaging techniques in pregnancy**

**Ventilation perfusion scintigraphy**

*Advantages*

- Low radiation exposure to breast
- Low radiation exposure to fetus[76]
- High rate of normal scans in pregnancy 70%[62]

*Disadvantages*

- Interpretation of test strongly linked to clinical pretest probability. No clinical decision rules validated in pregnancy
- Does not offer alternative diagnosis
- No accuracy studies in pregnancy available

# Diagnostic de l'EP pendant la grossesse
## Angio CT

**CT pulmonary angiography**

*Advantages*

- Could offer an alternative diagnosis
- Low radiation exposure to fetus[59-61]
- Better availability than ventilation perfusion scintigraphy
- More cost effective than other approaches[77]

*Disadvantages*

- Radiation exposure to breast (can be reduced with breast shields)[65]
- Technical limitations in pregnancy. Need to modify imaging and injection protocol[64]
- No accuracy or outcome studies available
- High rate of detection of subsegmental emboli (the clinical significance of subsegmental emboli is unclear, so the rate of detection needs to be low)
- Theoretical concern about the effect of iodinated contrast on fetal thyroid

# Diagnostic de l'EP pendant la grossesse
## Angio RMN

**MRI**

*Advantages*

- No ionising radiation involved
- Misses subsegmental emboli

*Disadvantages*

- Insufficient accuracy or outcome data
- Most widely used protocols involve gadolinium (which crosses the placenta), for which insufficient fetal safety data are available

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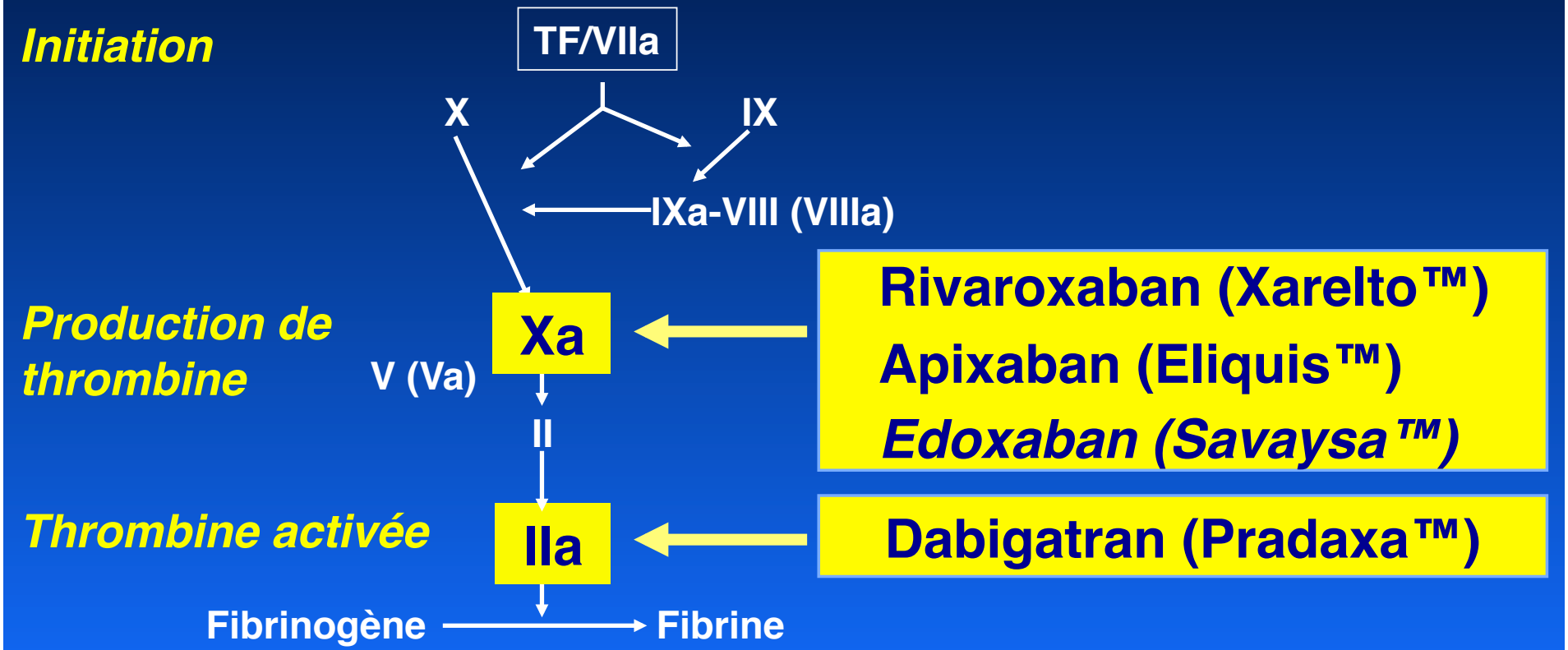
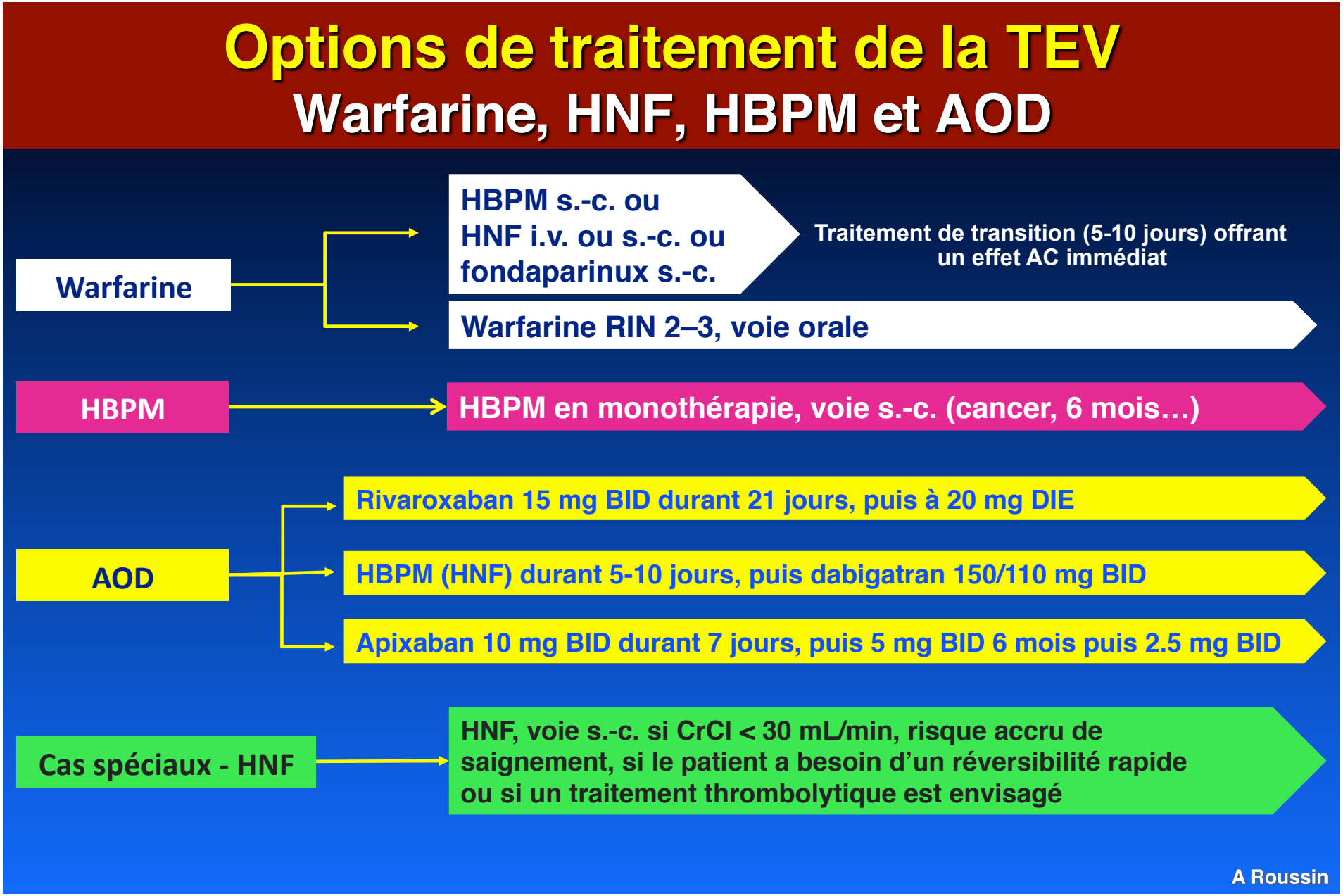
# AOD pour la TEV en 2015

## Cascade de coagulation



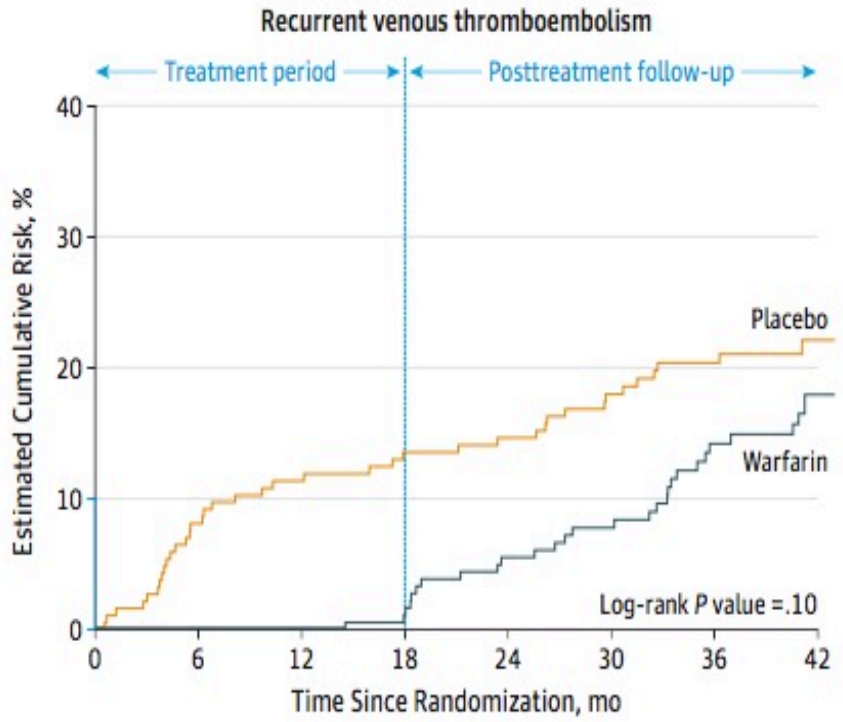
# Options de traitement de la TEV
## Warfarine, HNF, HBPM et AOD



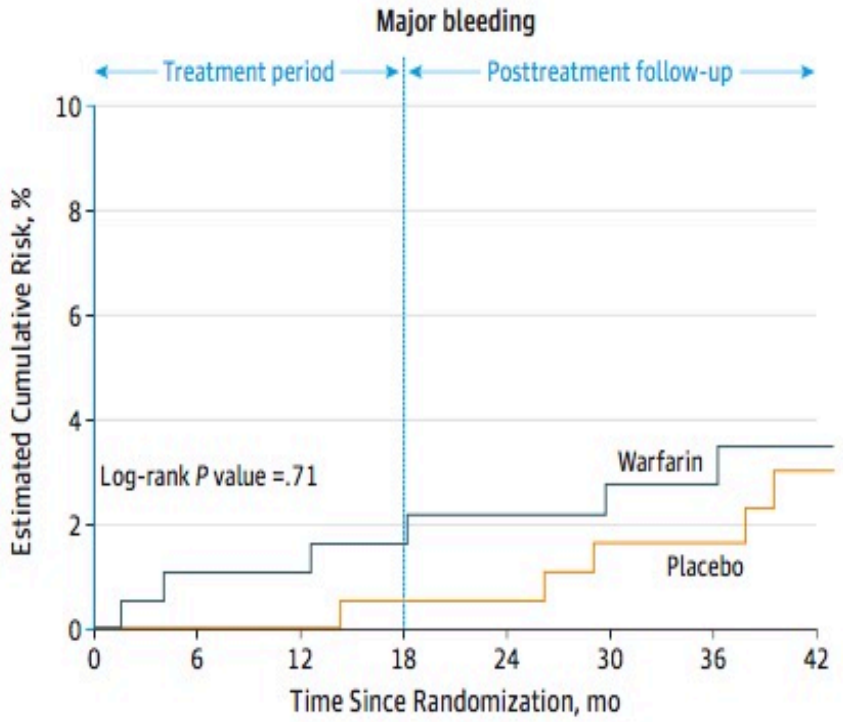
Original Investigation

# Six Months vs Extended Oral Anticoagulation After a First Episode of Pulmonary Embolism

## The PADIS-PE Randomized Clinical Trial




| No. at risk | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Placebo | 187 | 170 | 162 | 158 | 155 | 141 | 117 | 105 |
| Warfarin | 184 | 182 | 180 | 174 | 168 | 150 | 120 | 110 |




| No. at risk | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Placebo | 187 | 185 | 183 | 182 | 181 | 170 | 148 | 130 |
| Warfarin | 184 | 182 | 180 | 177 | 176 | 162 | 138 | 126 |

Original Investigation

# Effect of a Retrievable Inferior Vena Cava Filter Plus Anticoagulation vs Anticoagulation Alone on Risk of Recurrent Pulmonary Embolism A Randomized Clinical Trial

PREPIC-2

Table 3. Clinical Outcomes For Patients With at Least 1 Event in the PREPIC2 Trial

| Clinical Outcomes | Group, No. With Events (%) | | Relative Risk, % (95% CI) | *P* Value[b] |
|---|---|---|---|---|
| | Filter (n = 200)[a] | Control (n = 199) | | |
| At 3 Months | | | | |
| Recurrent pulmonary embolism (primary efficacy outcome)[c] | 6 (3.0) | 3 (1.5) | 2.00 (0.51-7.89) | .50 |
| Fatal | 6 (3.0) | 2 (1.0) | | |
| Nonfatal | 0 (0.0) | 1 (0.5) | | |
| Recurrent deep vein thrombosis | 1 (0.5) | 1 (0.5) | 1.00 (0.06-15.9) | >.99 |
| Recurrent venous thromboembolism | 7 (3.5) | 4 (2.0) | 1.75 (0.52-5.88) | .36 |
| Major bleeding | 8 (4.0) | 10 (5.0) | 0.80 (0.32-1.98) | .63 |
| Death | 15 (7.5) | 12 (6.0) | 1.25 (0.60-2.60) | .55 |

Semblable à 6 mois

# Prédiction de HTP après une EP
## Score de prédiction clinique

**Table 3:** Multivariable analysis and derivation of clinical prediction score.

PE= pulmonary embolism; CT= computed tomography; VTE= venous thromboembolism.

| | Regression coefficient | 95% confidence interval | p-value | Points for score |
|---|---|---|---|---|
| Unprovoked PE | 18 | 1.8- >100 | 0.011 | +6 |
| Known hypothyroidism | 8.7 | 2.1-34 | 0.002 | +3 |
| Symptom onset >2 weeks before PE diagnosis | 6.9 | 2.5-19 | <0.001 | +3 |
| Right ventricular dysfunction on CT or echocardiography | 5.9 | 1.8-19 | 0.003 | +2 |
| Known diabetes mellitus | Infinity low | | 0.004 | -3 |
| Thrombolytic therapy or embolectomy | Infinity low | | 0.003 | -3 |

Klok FA et al. JTH 29 oct 2015

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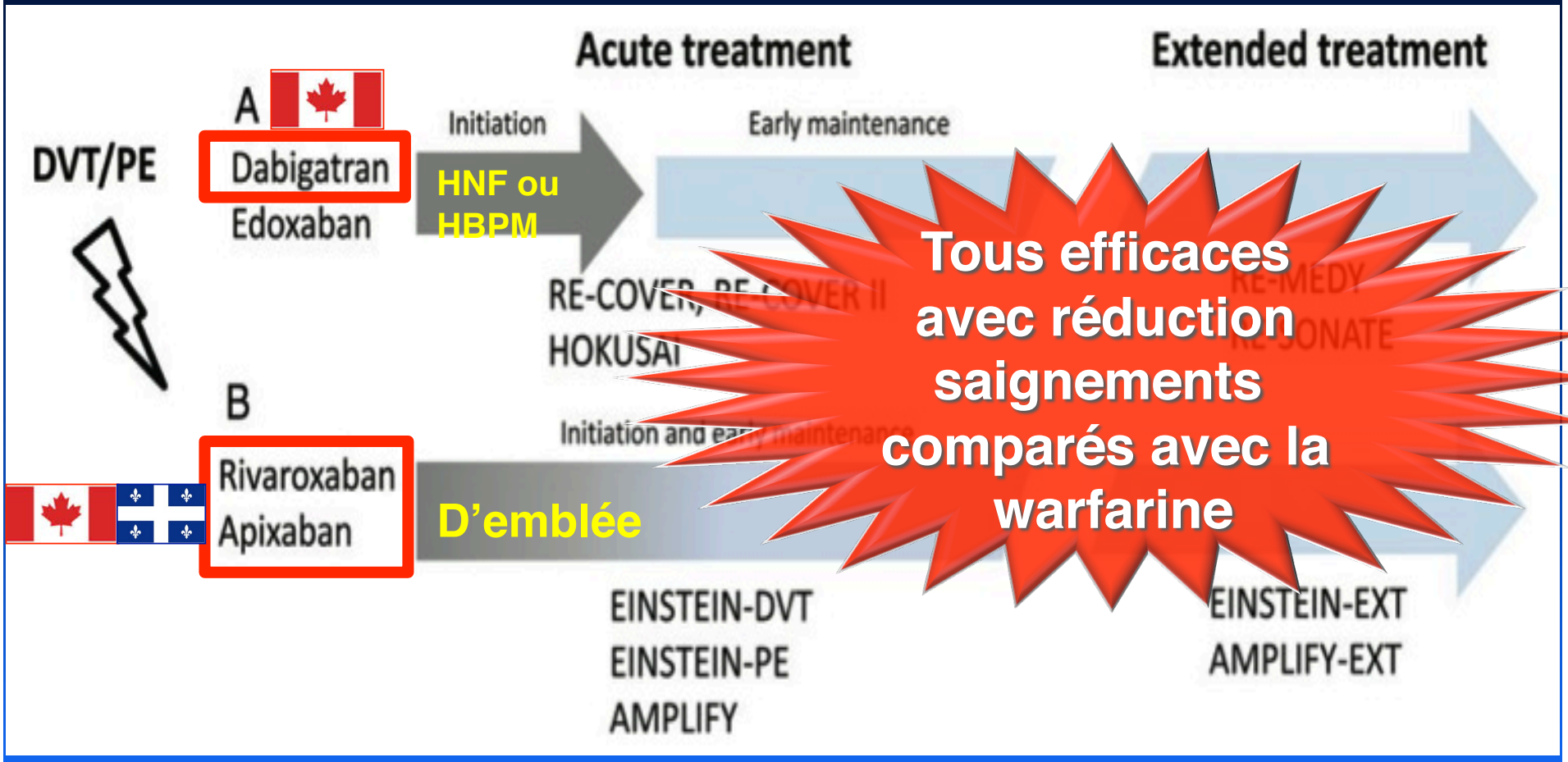
# Les AOD pour la TEV
## Comparaison des devis d'études Phase III




Fontana P et al. EHJ 2014

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# Options de traitement de la TEV
## AOD et INESSS

Code CV 157 pour TVP
6 mois
Si warfarine problématique

Code CV 165 pour EP
long terme
Si warfarine problématique

**AOD**

- **Rivaroxaban 15 mg BID durant 21 jours, puis 20 mg DIE**
- **HBPM (HNF) durant 5-10 jours, puis dabigatran 150/110 mg BID**
- **Apixaban 10 mg BID durant 7 jours, puis 5 mg BID 6 mois puis 2.5 mg BID**

Code CV 169 pour TEV (TVP et EP)
6 mois

Code CV 170 pour TEV
Après 6 mois pour 12 mois

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# RÉFÉRENCES

Thrombosis Canada

Thrombose Canada

SSVQ
Société des sciences vasculaires du Québec

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# RÉFÉRENCES TEV

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2015

### Apixaban (Eliquis®)

*Anticoagulant & Antiplatelet Drugs, Atrial Fibrillation, Novel Oral Anticoagulants, Venous Thromboembolism*

To provide an overview of the mechanism of action, licensed indications, dosing regimens and side-effects of apixaban.

### Cancer and Thrombosis

*Venous Thromboembolism*

To assist health care professionals in the management of cancer-associated thrombosis (CAT).

### Central Venous Catheter-Related Deep Vein Thrombosis

*Venous Thromboembolism*

To provide guidance on the diagnosis, treatment and prevention of central venous catheter-related deep vein thrombosis (DVT).

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*Venous Thromboembolism*

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### Pregnancy: Venous Thromboembolism Treatment

Pregnancy & Thrombosis, Venous Thromboembolism

To provide an evidence-based approach to treatment of deep vein thrombosis and/or pulmonary embolism during pregnancy and the postpartum period.


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2015

PDF

# Pulmonary Embolism (PE): Diagnosis and Treatment

## Objective:

To provide a diagnostic algorithm and treatment options for patients with acute pulmonary embolism (PE).

# Références: "App"

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