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Streamlined management of venous thromboembolism

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Consultant	No relevant conflicts of interest to declare
Major Stockholder	No relevant conflicts of interest to declare
Speakers Bureau	No relevant conflicts of interest to declare
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My talk today

- What are the 2012 diagnostic algorithms in suspected DVT and PE?
- Are there graded recommendations on VTE diagnosis?
- Were are the pitfalls and the controversies?
- Is more less? Or the danger of overdiagnosis
- Streamlining also the treatment

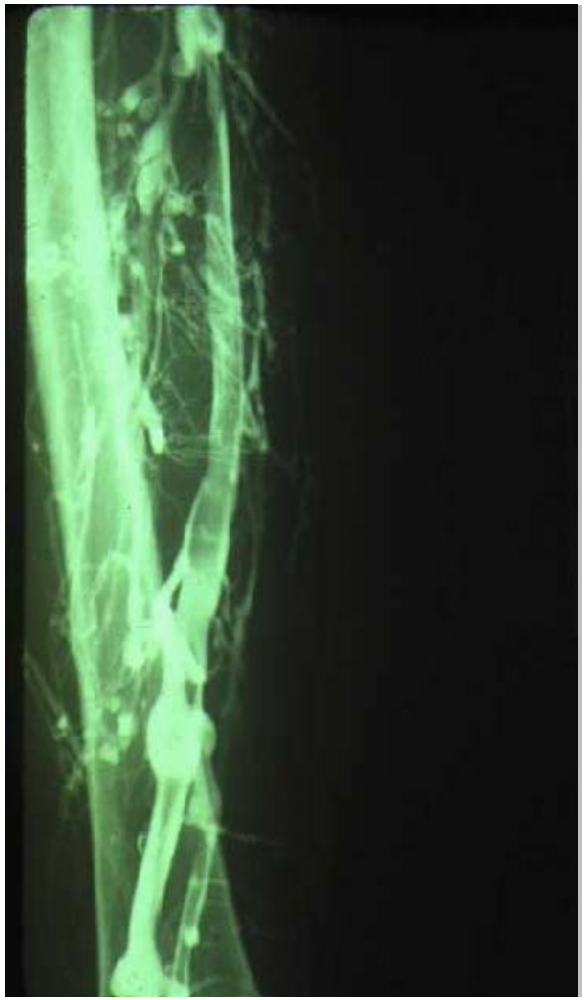
Goldhaber SZ and Bounameaux H. Lancet 2012;**379**:1835-46
Bates SM et al. Chest 2012; **141(2)**Suppl.:e351S-e418S

Conclusions

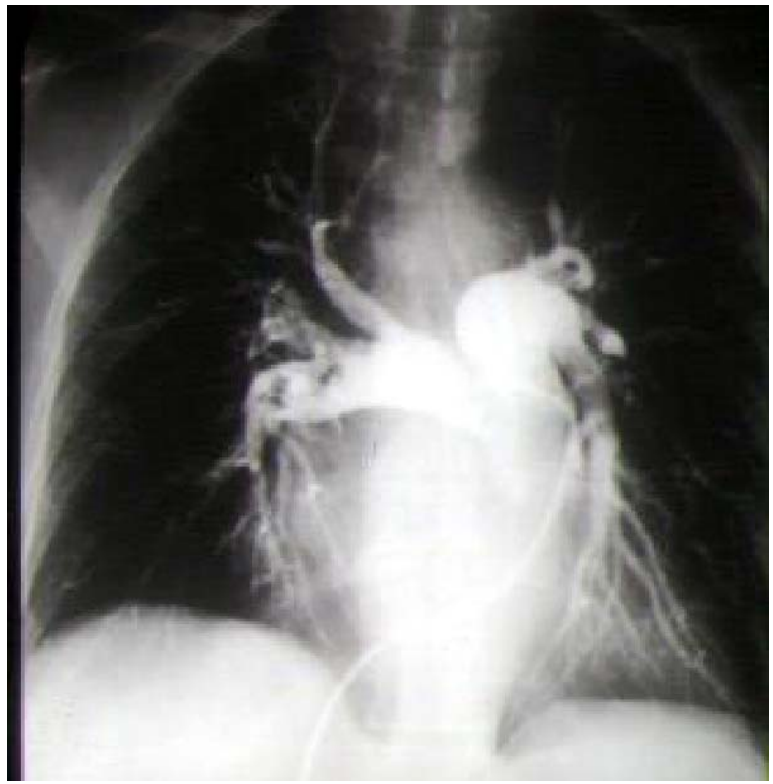
- Diagnosis of DVT and PE has changed considerably over the past two decades (non-invasive, sequential, easy, validated)
- It includes initial clinical assessment, D-dimer measurement (except for high-probability patients) and CUS (suspected DVT) or CTPA (suspected PE)
- Recent evolutions (*whole-leg* CUS instead of *proximal* CUS for suspected DVT, new generations of scanners with increased sensitivity to minor, potentially clinically non-relevant PE) may lead to overdiagnosis and hence overtreatment with its inherent risks
- Development of novel oral anticoagulants will likely simplify treatment of VTE in the next years and contribute to streamlined management of this condition

In the 70’s-80’s

- Invasive
- Costly
- Not devoid of risks

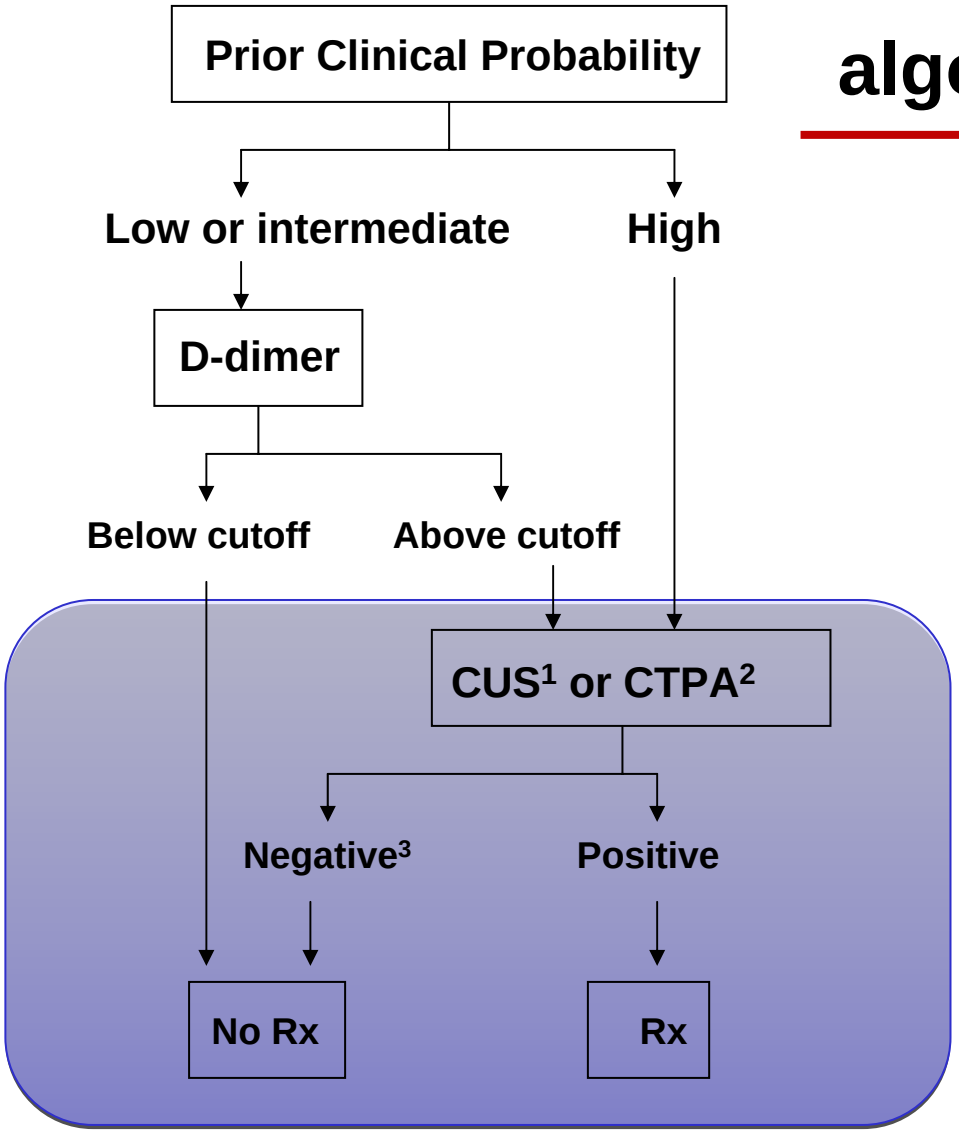


Phlebography



Pulmonary angiography

The 2013 diagnostic algorithm for suspected VTE



[1]CUS (lower limb venous compression ultrasonography) in case of suspected DVT

[2]CTPA (multi-row) in case of suspected PE

[3]In case of negative CUS or MSCT and high prior clinical probability, consider additional imaging, e.g. venography (suspected DVT) or lung ventilation/perfusion scintigraphy or pulmonary angiography (suspected PE)

Rx stays for treatment

Righini M et al. J Thromb Haemost 2008; 6:1059-71
Goldhaber SZ and Bounameaux H. Lancet 2012, 379:1835-46

The Diagnostic Tools

- Pulmonary Angiography
- Phlebography
- Ventilation/Perfusion lung scan
- Echocardiography: reserved for hemodynamically unstable patients (not focus of the present talk)

- **D-dimer**
- Venous compression ultrasonography
- Clinical probability
- Single-row CTPA
- Multi-row CTPA
- MRI ?

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D-dimer for PE: what evidence?

ER: Dr. Green says:

« Electrolytes, CBC, blood gases **and D-dimer!** »

Seen on TV
Which level of evidence ??

D-dimer in Suspected DVT

Type of D-dimer	Deep vein thrombosis		Pulmonary embolism	
(number of studies)	Sn, %	Sp, %	Sn, %	Sp, %
Microplate ELISA				
Asserachrome (24)	**94** (83-98)	47 (29-65)	96 (80-99)	44 (21-69)
Membrane ELISA				
Instantia (13)	**86** (59-96)	65 (43-81)	89 (54-98)	62 (33-84)
Nycocard (23)	**88** (68-96)	50 (31-68)	91 (64-98)	47 (23-72)
Latex quantitative				
Tinaquant (12)	**92** (75-98)	53 (32-73)	94 (71-99)	50 (23-76)
STA-lia test (25)	**94** (83-98)	46 (28-64)	96 (80-99)	43 (20-68)
ELFA				
VIDAS (40)	**96** (93-98)	44 (36-52)	97 (91-99)	41 (26-57)
Whole-blood assay				
SimpliRed (40)	**82** (59-93)	72 (56-84)	86 (43-97)	70 (44-87)

di Nisio et al, JTH 2007;5:296-304

D-dimer in Suspected PE

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RIETE data
(N>17,000)

90.6 (87.0-94.1)

97.3 (96.7-97.8)

97.6 (97.0-98.2)

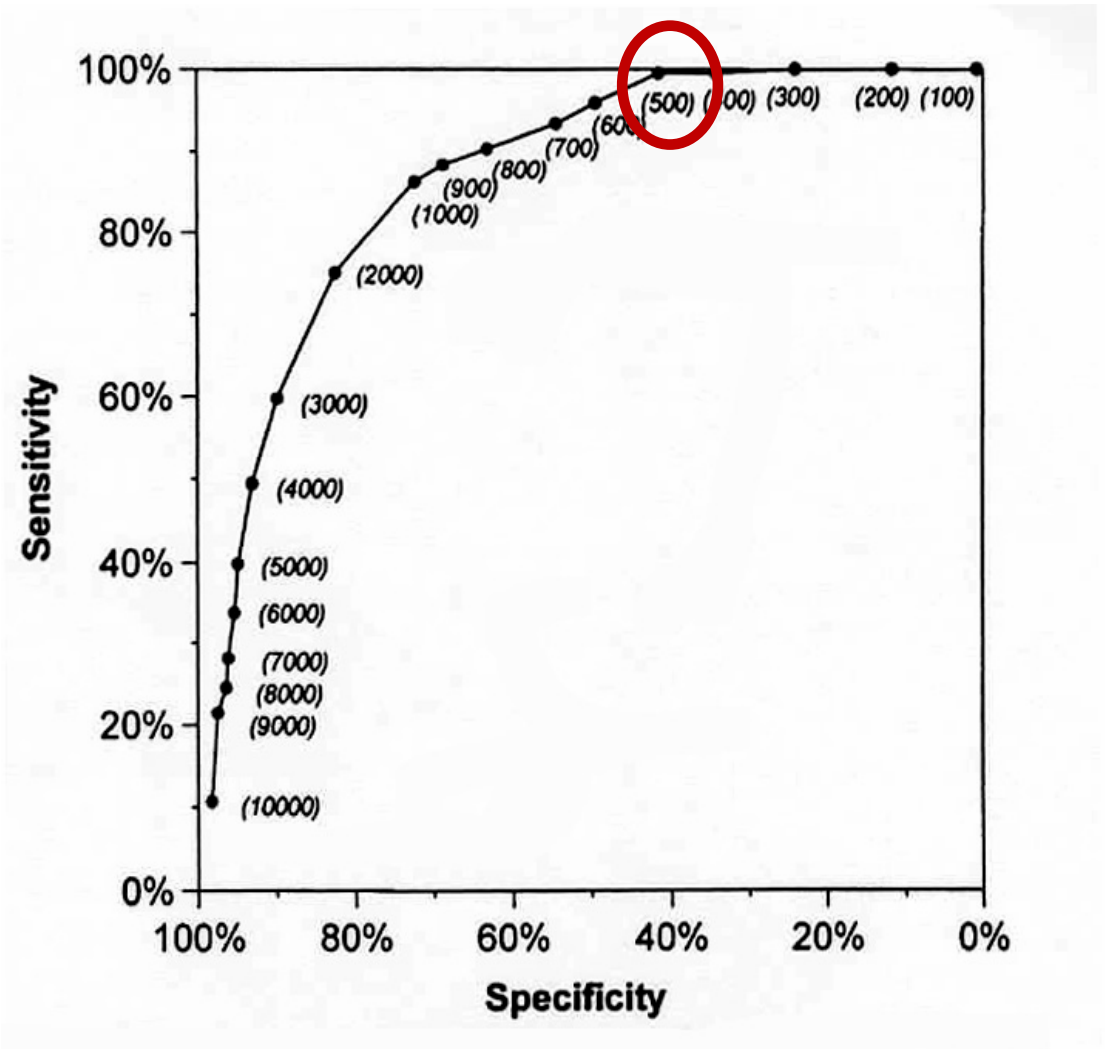
Soto MJ et al. RIETE
JTH 2011; 9:407-10

di Nisio et al, JTH 2007;5:296-304

D-dimer: Number Needed to Test (NNT) to Rule Out one VTE Event in Selected Patient Populations

	NNT
Outpatients	3
Patients < 60 years	2
Patients > 80 years	20
Inpatients	14
Cancer patients	12

Receiver Operating Characteristics (ROC) Curve to Define the Diagnostic Cut-off in Suspected PE



Perrier A et al. Am J Respir Crit Care Med 1997;156:492-6

Age-adjusted DD cut-off in suspected PE (I)

Derivation set

N=1721
Prevalence of PE: 24%

Age-adjusted cut-off (above age 50):
Age (years) x 10 (ug/L)

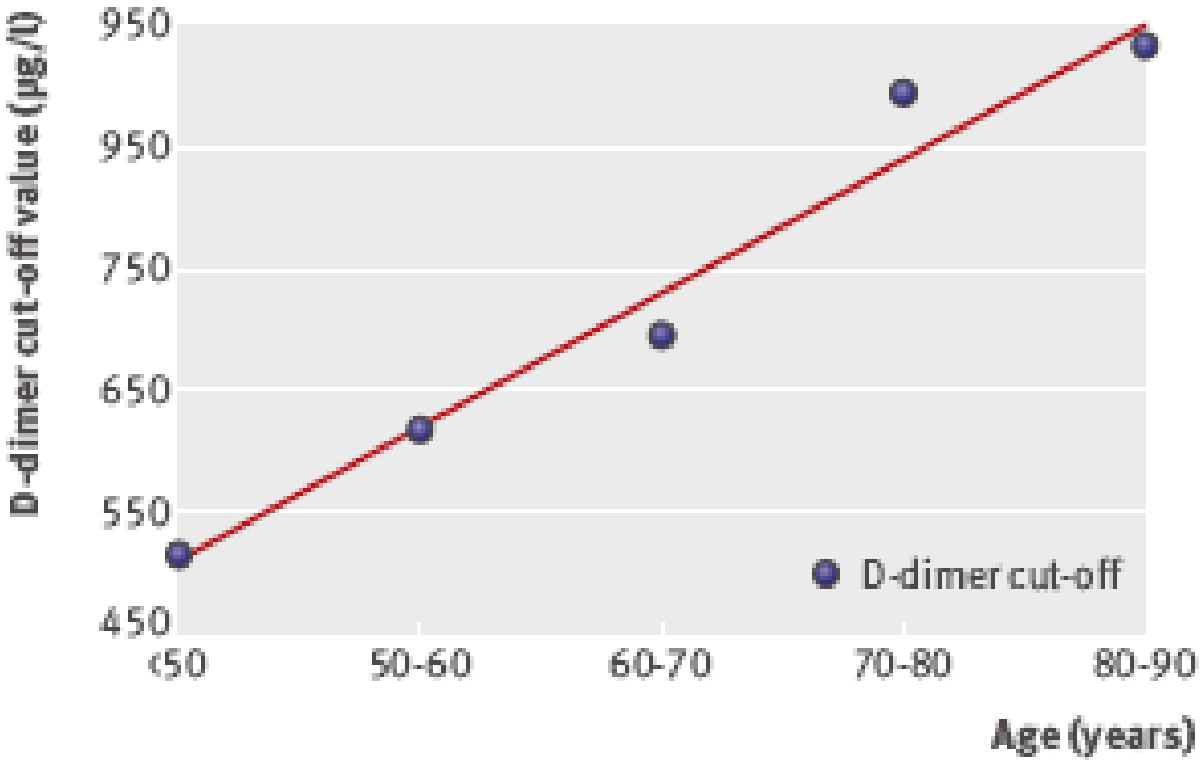


Fig 1| Optimal cut-off values for D-dimer test for pulmonary embolism by age in patients with an unlikely clinical probability of pulmonary embolism (sensitivity set at 100%)

Douma RA et al. BMJ online first March 30, 2010; 340:c1475

Age-adjusted DD cut-off in suspected PE (II)

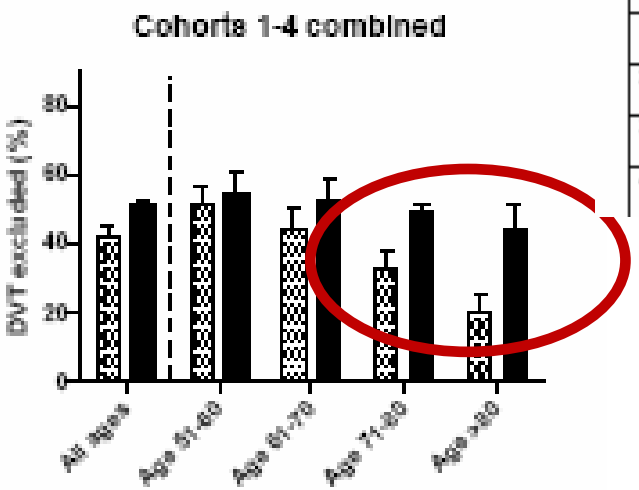
Table 2 | Proportion of patients in the derivation set with an unlikely clinical probability of pulmonary embolism* in whom pulmonary embolism could be excluded based on a D-dimer test result below the cut-off value: comparison of different cut-off values stratified by age group

		Age range (years)			
	All patients	51-60	61-70	71-80	>80
No (%) of patients	1331	189 (14)	211 (16)	265 (20)	198 (15)
Median (IQR) age (years)	61 (44-75)	56 (54-58)	66 (63-68)	76 (73-78)	85 (82-88)
Conventional cut-off value†					
No (%, 95% CI) of patients below cut-off value:	477 (36, 33 to 39)	97 (51, 44 to 58)	63 (30, 24 to 36)	40 (15, 11 to 20)	11 (6, 3 to 10)
With false negative result	0 (0, 0 to 0.8)	0 (0, 0 to 3.8)	0 (0, 0 to 5.8)	0 (0, 0 to 8.8)	0 (0, 0 to 26)
Number needed to test‡	2.8	1.9	3.3	6.6	18
Age adjusted cut-off value†					
No (%, 95% CI) of patients below cut-off value:	560 (42, 39 to 45)	102 (54, 47 to 61)	76 (36, 30 to 43)	75 (28, 23 to 34)	41 (21, 16 to 27)
With false negative result	1 (0.2, 0 to 1.0)	0 (0, 0 to 3.6)	0 (0, 0 to 4.8)	1 (1.3, 0.2 to 7.2)	0 (0, 0 to 8.6)
Number needed to test‡	2.4	1.9	2.8	3.5	4.8
Increase in percentage of patients below cut-off value:					
Absolute	6.3	2.6	6.2	13	15
Relative	17	5.2	21	67	273

IQR=interquartile range
*Based on Wells clinical decision rule.
†Conventional cut-off value for D-dimer test=500 µg/l, age adjusted cut-off value=(age×10) µg/l (if age >50).
‡Number needed to test to find one normal D-dimer test result

Douma RA et al. BMJ online first March 30, 2010; 340:c1475

Age-adjusted DD cut-off in suspected DVT



Cut-off 500 ug/L

Age-adjusted cut-off

Table 1. Specifications of diagnostic tests and cut-off values used in the five study cohorts.

Study cohort	N	Clinical probability assessment	Type of D-dimer	Imaging technique to confirm DVT
1. Schutgens et al. 2003 (3)	812	Non-high: Wells score </=2	Tinaquant	(repeat) CUS
2. Perrier et al. 1999 (2)	474	Non-high: Clinical score (2)	VIDAS	CUS, phlebography
3. Legnani et al. 2010 (13)	401	Non-high: Wells score </=2	STA LIA	CUS, Impedance plethysmography
4. Bates et al. 2003 (4)	556	Non-high: Wells score </=2	MDA	(repeat) CUS, venography

Failure rate (3-month FU)

	All patients with non-high clinical probability	Age 51-60 years	Age 61-70 years	Age 71-80 years	Age > 80 years
Cohort 1-4 combined					
N (% of total)	1672	271 (16)	316 (19)	361 (22)	222 (13)
False negative rate with conventional cut-off, n, % (95% CI)	5/707 (0.7; 0.2-1.6)	0/139 (0; 0-2.6)	0/139 (0; 0-2.6)	0/119 (0; 0-3.1)	1/44 (2.3; 0.1-12)
False negative rate with new cut-off, n, % (95% CI)	7/850 (0.8; 0.3-1.7)	0/150 (0; 0-2.4)	1/168 (0.6; 0.02-3.3)	0/177 (0; 0-2.1)	2/98 (2.0; 0.3-7.2)

Douma RA et al. Haematologica epub April 17, 2012

The Diagnostic Tools

- Pulmonary Angiography
- Phlebography
- Ventilation/Perfusion lung scan
- Echocardiography: reserved for hemodynamically unstable patients (not focus of the present talk)
- D-dimer
- **Venous compression ultrasonography**
- Clinical probability
- Single-row CTPA
- Multi-row CTPA
- MRI ?

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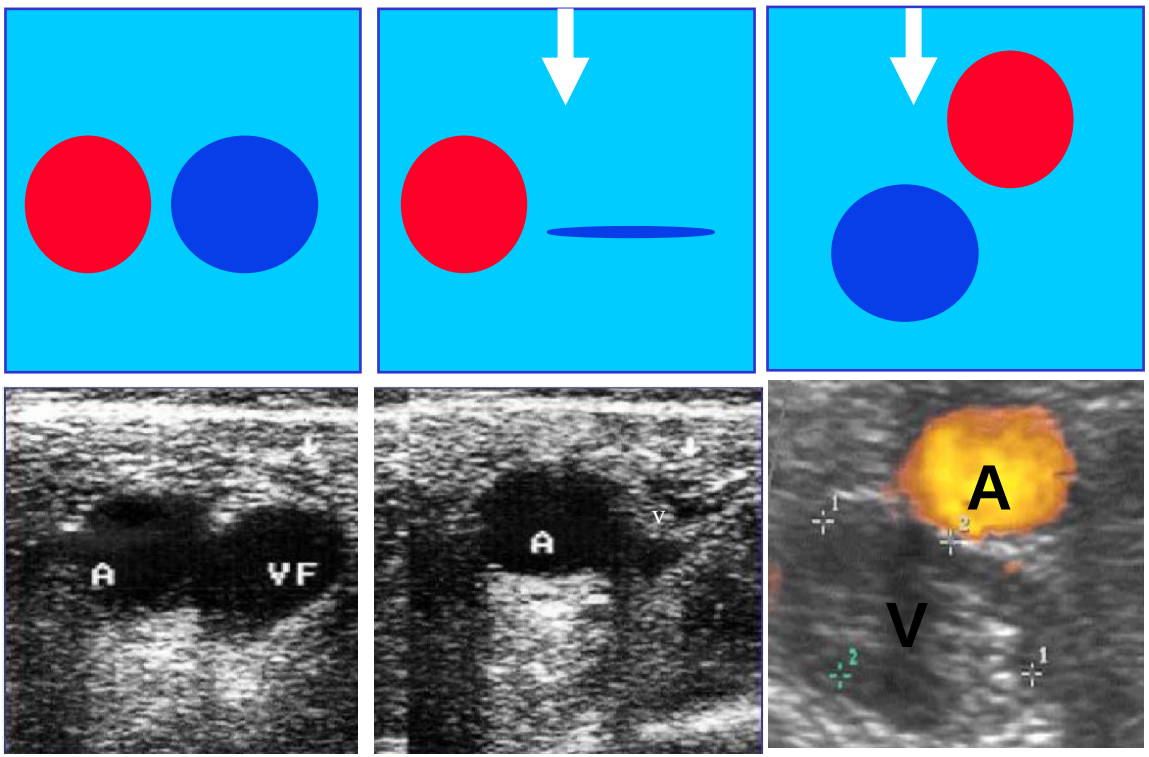
Compression ultrasonography (CUS)



Goldhaber SZ and Bounameaux H. Lancet 2012;**379**:1835-46

How to perform CUS?

1. Proximal CUS only*
2. Complete (proximal and distal) CUS

* Often in combination or not with repeat exam (after 7 days) (so-called serial CUS), ideally in combination with other tests (DD, clinical probability) in order to increase the yield and cost-effectiveness

Righini M. JTH 2007; 5 (Suppl. 1):55-9
Palareti G and Schellong S et al. JTH 2012; 10:11-9

Diagnostic performance of CUS

	Sensitivity, %	Specificity, %
Symptomatic proximal DVT	97	98
Asymptomatic distal DVT	50-75	90-95

Kearon et al., Ann Intern Med 1998; 128: 663-677

Proximal CUS for DVT diagnosis in 5 large prospective studies

Tool/Strategy	Cogo et al.	Bernardi et al.	Wells et al.	Perrier et al.	Kraaijenhagenet al.
No of patients	1702	946	593	474	1756
% initial population	82%	83%	65%	91%	92%
DVT prevalence	24%	28%	16%	24%	22%
PCP	-	-	score	empirical	score
DD	-	Instant-IA	-	VidasDD	SimpliRED
US	100%	100%	100%	73%	100%
Repeat US	1302 (76%)	88 (9%)	166 (28%)	0	520 (30%)
Yield of RUS	**0.9%**	**5.7%**	**1.8%**	**-**	**3%**
Venography	-	-	33 (6%)	2 (0.4%)	-
FU-VTE risk	**0.7% (0.3-1.2)**	**0.4% (0-0.9)**	**0.6% (0.1-1.8)**	**2.6% (0.2-4.9)**	**0.7% (0.3-1.6)**

VTE stands for venous thromboembolism

Bounameaux H and Perrier A. Thromb Haemost 1999; 82 :1360;
Perone N, Bounameaux H, Perrier A. Am J Med 2001 ; 110 :33-40.
Kraaijenhagen et al. Arch Intern Med 2002;162 :907-11.

Pooled data of these 5 large studies

- Total of 5471 patients with clinically suspected DVT
- Various diagnostic strategies
- All based on limited proximal CUS

- 1273 DVT diagnosed (23.2%)
- 3–month follow-up of 4181 patients in whom no proximal DVT had been initially diagnosed, one DVT diagnosed among 61 patients with symptoms

1.5%, 95% IC: 1.1-1.8

Is this acceptable ?

- 160 patients with clinically suspected DVT and a negative phlebogram
- No anticoagulant treatment, 3-month follow-up
- Thromboembolic events:

3/160 **1.9%** (95%CI: 0.4-5.4)

Hull R et al. Circulation 1981;64:622-5.

ACCP guidelines: 9th edition

- In patients with a **low pretest clinical probability**, we recommend initial testing with D-dimer or ultrasound (US) of the proximal veins over no testing (1B), venography (1B) or whole-leg US (2B).
- In patients with **moderate pretest clinical probability**, we recommend initial testing with a highly sensitive D-dimer test, proximal or whole-leg US rather than no testing (1B) or venography (1B).
- In patients with a **high pretest clinical probability**, we recommend proximal or whole-leg US over no testing (1B) or venography (1B).

Bates SM et al. Chest 2012; **141(2)**Suppl.:e351S-e418S

Proximal vs. complete US ?

Series	Patients (n)	DVT (distal) prevalence (%)	CUS per 100 patients (n)	**3-mo TE Risk (%, 95%CI)**
Proximal CUS				
Cogo,1998	**1702**	**24 (0)**	**176**	0.7 (0.3-1.2)
Birdwell, 1988	**404**	**16 (0)**	**170**	0.6 (0.1-2.1)
Bernardi, 1998	**946**	**28 (0)**	**109**	0.4 (0 - 0.9)
Wells, 1997	**593**	**16 (0)**	**128**	0.6 (0.1-1.8)
Kraaijenhagen, 2002	**1756**	**22 (0)**	**131**	0.7 (0.3-1.6)
Pooled estimate	**5876**	**23 (0)**	-	**0.5 (0.2-0.7)**
Prox + distal CUS				
Elias, 2003	**623**	**36 (45)**	**100**	0.5 (0.1-1.8)
Schellong, 2003	**1646**	**17 (56)**	**100**	0.3 (0.1-0.8)
Stevens, 2004	**445**	**14 (31)**	**100**	0.8 (0.2-1.3)
Subramaniam, 2005	**526**	**22 (57)**	**100**	0.2 (0.01-1.3
Pooled estimate	**3240**	**20 (50)**	**100**	**0.3 (0.1-0.6)**

Righini M. JTH 2007; 5 (suppl. 1):55-59.

Proximal versus complete US in suspected DVT:
The only RCT

	Proximal US	Complete US (Proximal and distal)
N	1045	1053
DVT	231 (22.1%)	278 (26.4%)
Proximal	231	213
Distal	0	65
3-mo TE risk	0.9% (0.3-1.8)	1.2% (0.5-2.2)

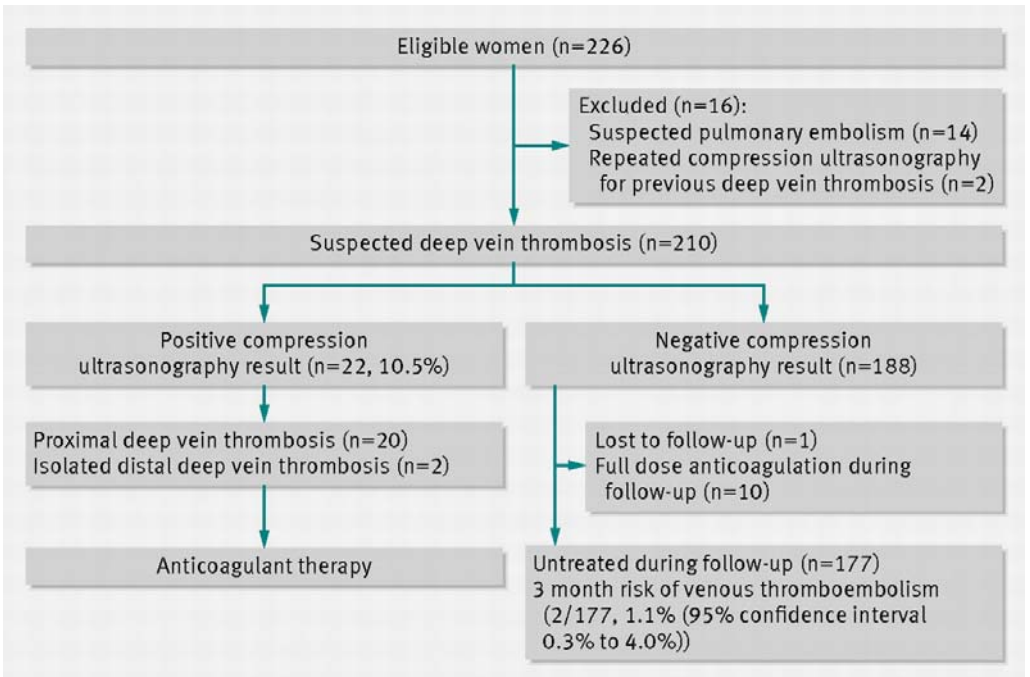
Bernardi E et al. JAMA 2008; 300:1653-9.

Is more less?

- Using whole-leg CUS rather than just proximal CUS is associated with a substantial increase of patients who require anticoagulant treatment
- With no obvious benefit in 3-month outcome
- With an increased risk of adverse bleeding events

Diagnosis of DVT in pregnant women

- Two tertiary care hospitals and 18 private practices in France and Switzerland
- 210 pregnant women (clinically suspected): DVT in 22 (10.5%) on whole-leg CUS (20 proximal, 2 isolated distal)



Clinical probability

low:	2/107	(1.9%)
intermediate:	7/85	(8.2%)
high:	13/18	(72%)

Le Gal G et al. BMJ. 2012 Apr 24;344:e2635. doi: 10.1136/bmj.e2635. PMID: 22531869

ACCP guidelines: 9th edition

- In pregnant patients suspected of having lower extremity DVT, we recommend initial evaluation with proximal CUS over other initial tests including a whole-leg CUS (2C), moderately sensitive D-dimer (2C), highly sensitive D-dimer (1B), or venography (1B).

- If proximal CUS is negative we suggest further testing with serial proximal CUS (1B) or a sensitive D-dimer (2B).

Bates SM et al. Chest 2012; **141(2)**Suppl.:e351S-e418S

Why using sequential diagnostic algorithms ?

- Because the prevalence of DVT/PE regularly declines among suspected patients (< 20%, sometimes as low as 5%), while the use of imaging is steadily increasing (costs and radiation)
- In order to save time and money by better selecting patients who really need imaging
- And, above all, in order to improve patient care

Diagnostic algorithms to improve outcome

Table 3. **Patient Outcomes at 3 Months after Exclusion of Pulmonary Embolism***

Diagnostic Work-up	Patients Receiving Appropriate Management (n = 418)	Patients Receiving Inappropriate Management (n = 506)	P Value
Total thromboembolic events, n (%)	5 (1.2)	39 (7.7)	<0.001
Nonfatal thromboembolic event, n	2	10	0.045
Unexplained sudden death, n	3	29	<0.001

Roy PM et al. *Ann Intern Med.* 2006;144:157-164

The Diagnostic Tools

- Pulmonary Angiography
- Phlebography
- Ventilation/Perfusion lung scan
- Echocardiography: reserved for hemodynamically unstable patients (not focus of the present talk)

- D-dimer
- Venous compression ultrasonography
- **Clinical probability**
- Single-row CTPA
- Multi-row helical CTPA
- MRI ?

1960

2012

Clinical probability assessment for suspected VTE

- Identifies a low-risk group in which invasive tests are not required
  - risk of recurrent PE or DVT only ~ 2% in patients with:
    - a low-intermediate clinical probability
    - a non-diagnostic lung scan
    - absence of DVT on US
- Allows exclusion of DVT or PE in the low-risk group in combination with less sensitive tests (e.g. SimpliRed)
- Allows the individualization of the diagnostic strategies
- Can be assessed implicitely (empirically) or explicitely (scores)

Wells' score for suspected DVT

Elements	Points
Cancer	+1
Paralysis or recent plaster cast immobilization	+1
Bedrest > 3 days or surgery < 4 weeks	+1
Pain on palpation of the deep veins	+1
Swelling of entire leg	+1
Diameter difference of affected calf > 3 cm	+1
Pitting edema*	+1
Dilated superficial veins*	+1
Alternative diagnosis at least as probable as DVT	-2

**affected side only*

Probability of PE	Score	Prevalence of DVT
Low	0	3%
Intermediate	1-2	17%
High	3 or more	75%

Wells PS et al. Lancet 1997;350:1795

Wells' CPR for suspected PE

Clinical signs of DVT (limb edema and pain on palpation of deep veins)	+ 3
Alternative diagnosis less probable than PE	+ 3
Heart rate > 100/min	+ 1,5
Immobilization or surgery < 4 weeks	+ 1,5
Previous DVT or PE	+ 1,5
Hemoptysis	+ 1
Cancer	+ 1

	Probability of PE	Score	Prevalence of PE
3 categories	Low	<2	4 %
	Intermediate	2-6	21 %
	High	>6	67 %
2 categories	Unlikely	≤ 4	15 %
	Likely	> 4	40 %

Wells PS et al. Thromb Haemost 2000;83:416-20
Goekoop J et al. Thromb Haemost 2007;97:146-50

Revised Geneva CPR for suspected PE

- Age > 65 years + 1
- Previous DVT/PE + 3
- Surgery/fracture (4 w) + 2
- Active cancer + 2
- Pulse rate
  - 75-94 /min + 3
  - ≥ 95 /min + 5
- Pain by palpation of leg and edema + 4

- Symptoms
  - Unilateral leg pain + 3
  - Haemoptysia + 2
- Maximum score + 25

Probability of PE	Score	Prevalence of PE
Low	0-3	8%
Intermediate	4-10	29%
High	≥ 11	74%

Le Gal G et al, Ann Intern Med, 2006; 144:165-71

PIOPED I: Results in relation with clinical probability assessment (empirical)

Prevalence of PE according to lung scintigraphic probability*

Clinical probability	Very low	Low	Intermediate	High
Low (< 20%)	2%			56%
Intermediate			28%	88%
High (≥ 80%)		40%	66%	96%

Empirical assessment (compared to CPR)
- performs similarly
- cannot be easily transmitted
- is less reproducible

PIOPED Investigators. JAMA 1990;263:2753

** as compared with a composite reference standard*

PIOPED II: Results in relation to clinical probability assessment (explicit, Wells)

23% of positive CTs

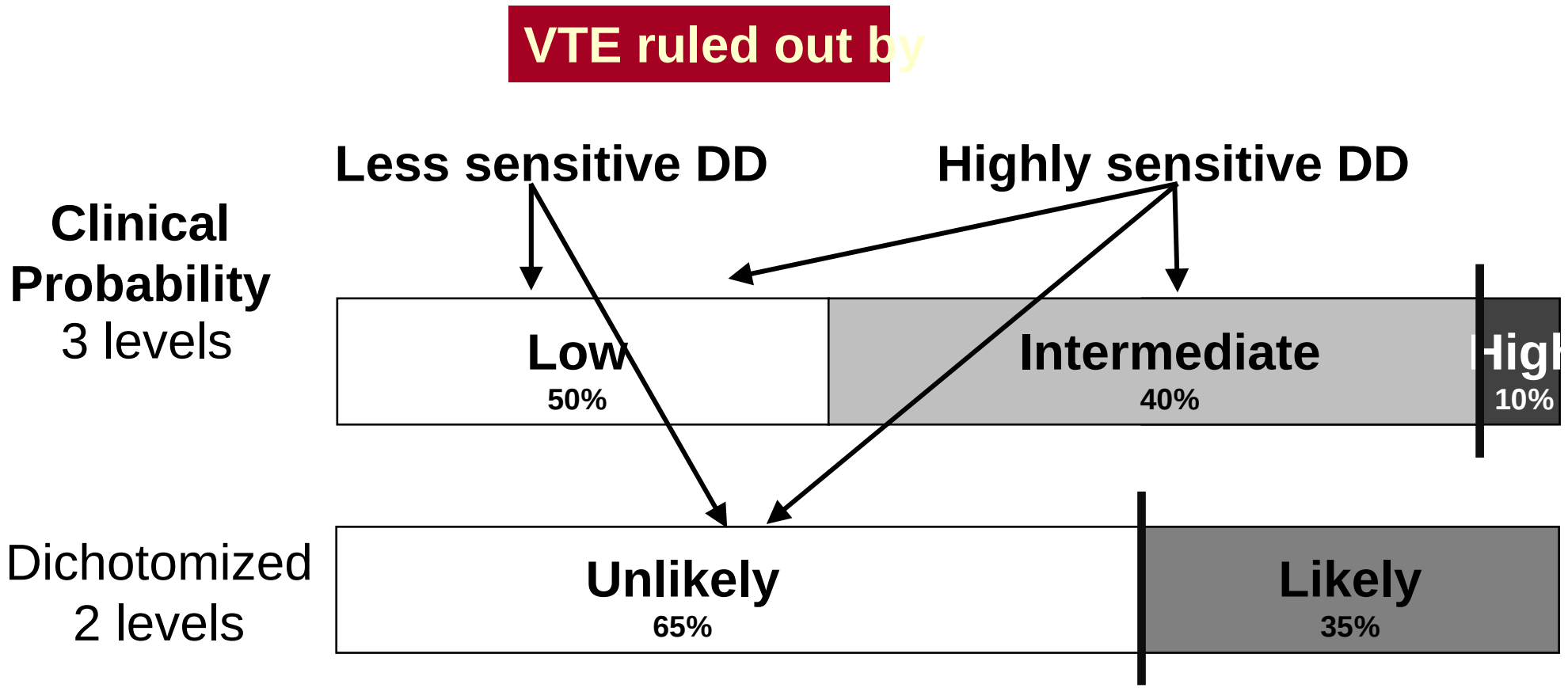
	Prevalence of PE, n/n (%)*	
Clinical probability	**CT positive**	**CT negative**
Low	22/38 (58%)	8/164 (4%)
Intermediate	93/101 (92%)	15/136 (11%)
High	22/23 (96%)	6/15 (40%)

2% of negative CTs

Stein PD et al. N Engl J Med 2006;354:2317-27

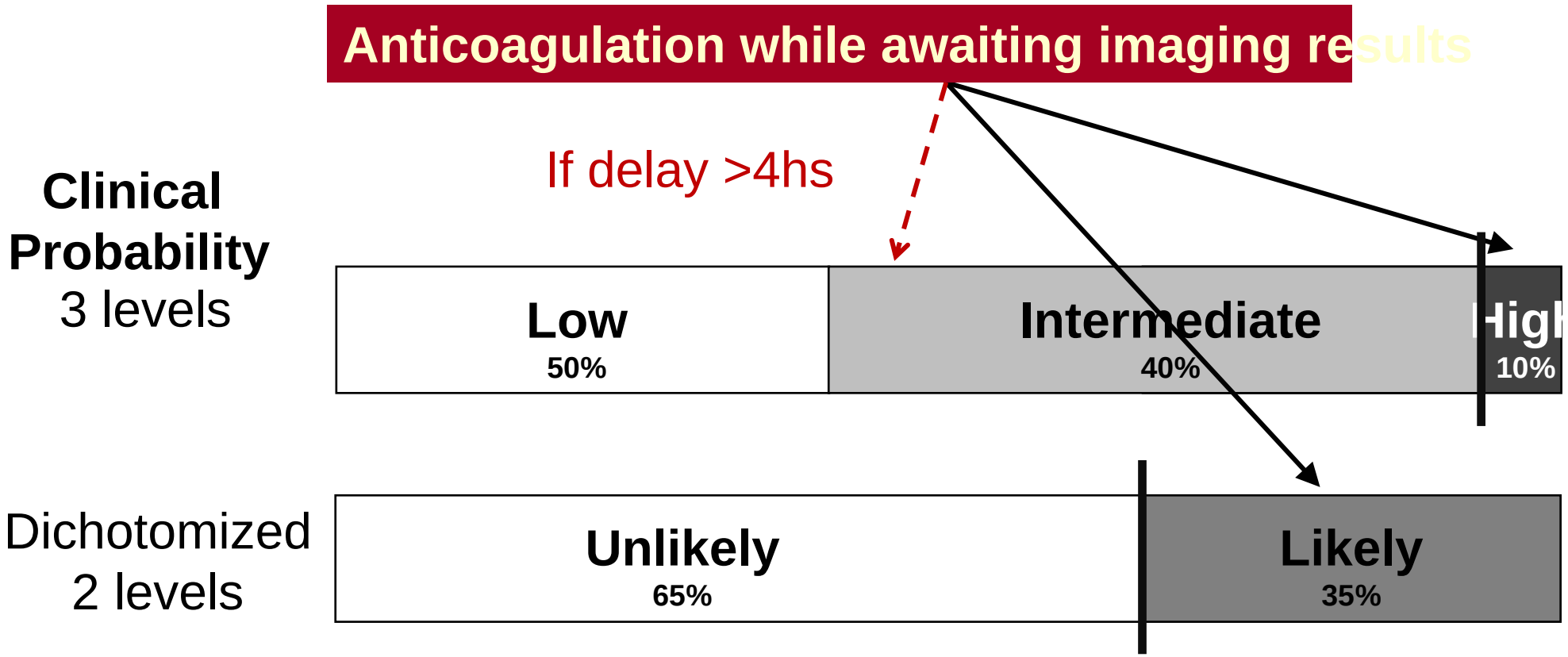
** as compared with a composite reference standard*

Why combining clinical probability and DD ? (I)



Bounameaux H et al. Vasc Med 2010; 15: 399–406

Why combining clinical probability and DD ? (II)



Bounameaux H et al. Vasc Med 2010; 15: 399–406

ACCP guidelines: 9th edition

To treat or not to treat while awaiting test results

- In patients with a **high clinical suspicion** of DVT/PE, we suggest treatment with parenteral anticoagulants over no treatment (2C).
- In patients with an **intermediate clinical suspicion** of DVT/PE, we suggest treatment with parenteral anticoagulants over no treatment if the results of the diagnostic tests are expected to be delayed for more than 4 hours (2C).
- In patients with a **low clinical suspicion** of DVT/PE, we suggest no treatment while awaiting test results (1B).

Kearon C et al. Chest 2012; **141(2)**Suppl.:e419S-e494S

Helical CTPA in suspected PE

Accuracy studies

	Patients, n	Sn, % (95% CI)	Sp, % (95% CI)
Single-row			
Geneva Study	299	**70** (62 to 78)	91 (86 to 95)
ANTELOPE	237	**69** (63 to 75)	86 (80 to 92)
Multi-row			
PIOPED II	824	**83** (76 to 92)	96 (93 to 97)

Ann Intern Med 2001;135:88-97
J Thromb Haemost. 2005;3:17-25
N Engl j Med. 2006; 354:2317-2327

Multi-row Detector CTPA in Suspected PE:
Outcome Studies

Aim: To assess safety of a negative mrCT for ruling out PE

- Without lower limb venous ultrasonography
- In patients with a non-high clinical probability (Geneva score) or a dichotomized Wells' score below 4 points (« unlikely »)

3-month venous thromboembolic risk in patients not given anticoagulant therapy based on a negative mrCT AND a negative CUS:

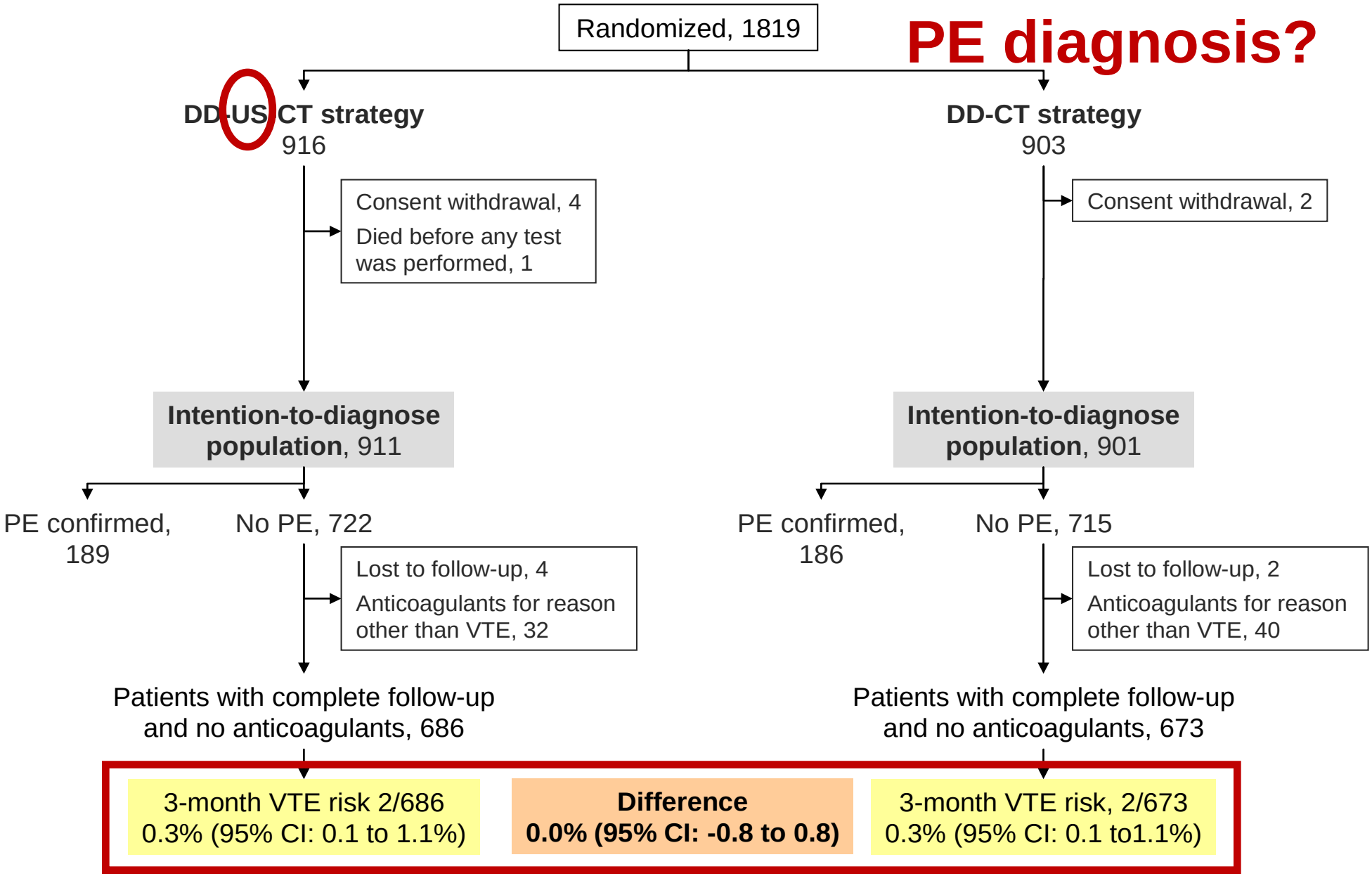
Swiss-Belgian-French Consortium	1.7% (0.7 to 3.9)
CHRISTOPHER Study	1.3% (0.7 to 2.2)

Both studies suggest that mrCTpPA may safely rule out PE without lower limb venous compression ultrasonography

Perrier et al. N Engl J Med 2005;352:1760-8,
CHRISTOPHER Investigators JAMA 2006;295:172-9

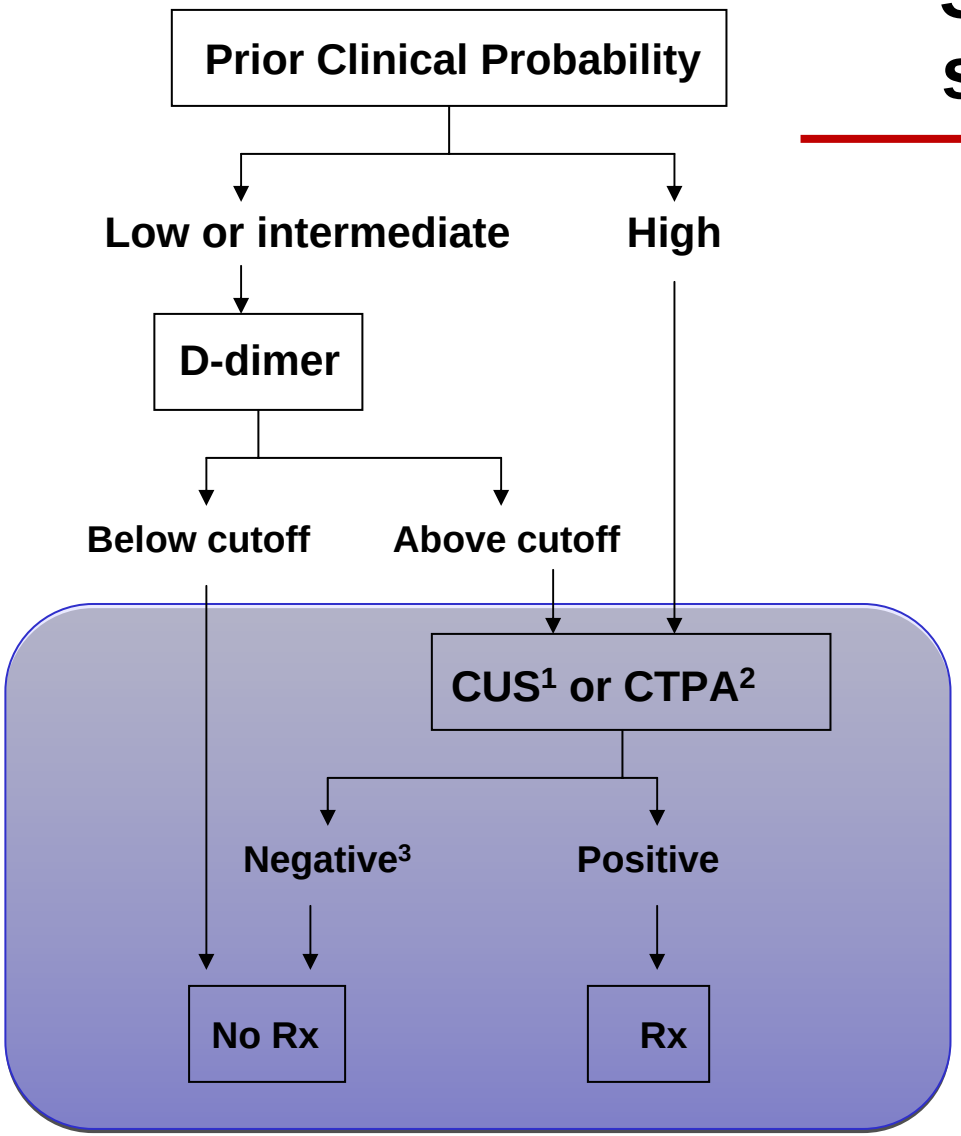
Intention-to-PE diagnose analysis

Need for CUS for PE diagnosis?



Righini M et al. Lancet 2008; 371:1343-52

Streamlined testing for suspected VTE in 2013



[1]CUS (lower limb venous compression ultrasonography) in case of suspected DVT

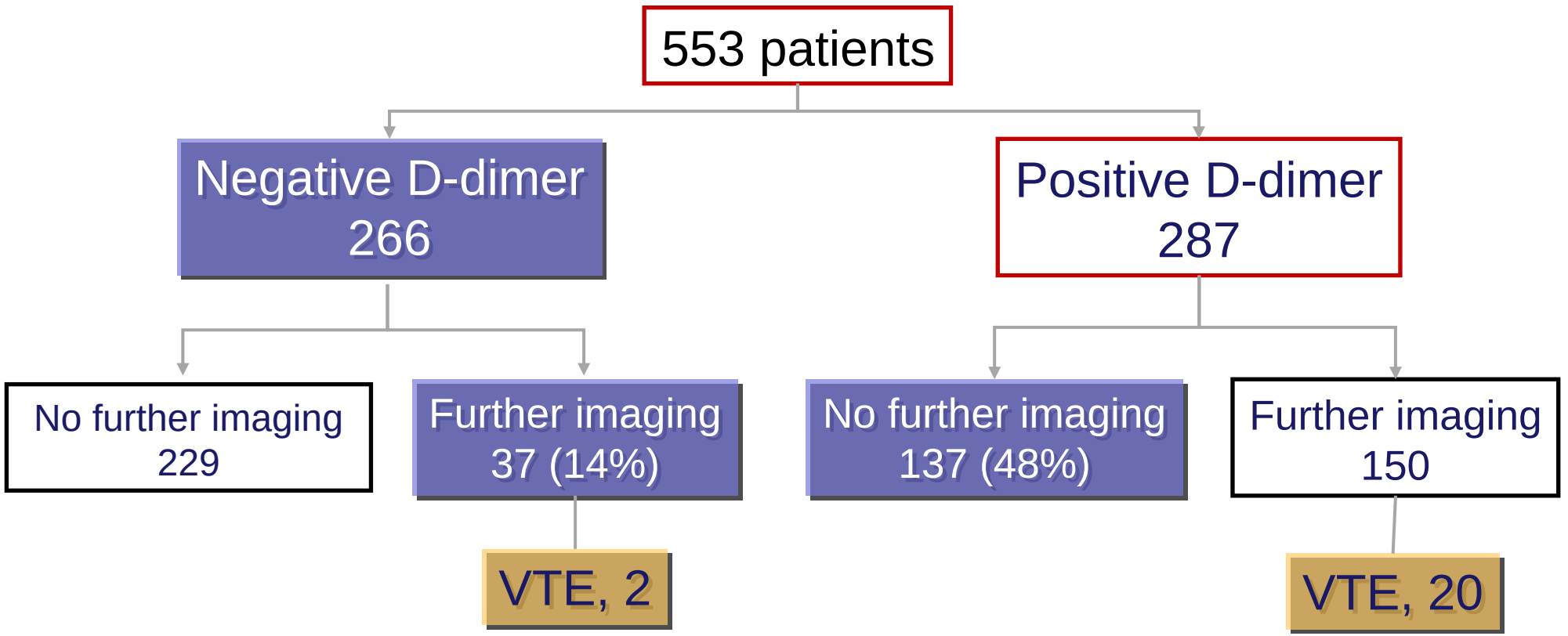
[2]CTPA (multi-row) in case of suspected PE

[3]In case of negative CUS or MSCT and high prior clinical probability, consider additional imaging, e.g. venography (suspected DVT) or lung ventilation/perfusion scintigraphy or pulmonary angiography (suspected PE)

Rx stays for treatment

Righini M et al. J Thromb Haemost 2008; 6:1059-71
Goldhaber SZ and Bounameaux H. Lancet 2012, 379:1835-46

Are we there?



Ann Emerg Med. 2009;54:442-446

A place for new diagnostic tools?
What about MRI?

The proportion of technically inadequate images ranged from 11% to 52% across the seven participating centres. Technically adequate MRA had a sensitivity of 78% and a specificity of 99%, while technically adequate MRA and MRV had a sensitivity of 92% and a specificity of 96%, but 52% of patients (194 of 370) had technically inadequate results, which seriously limits its clinical utility.

Not ready for prime time

Stein PD et al. Ann Intern Med 2010; 152:434-43

SPECIAL ARTICLE

LESS IS MORE

The Diagnosis and Treatment of Pulmonary Embolism

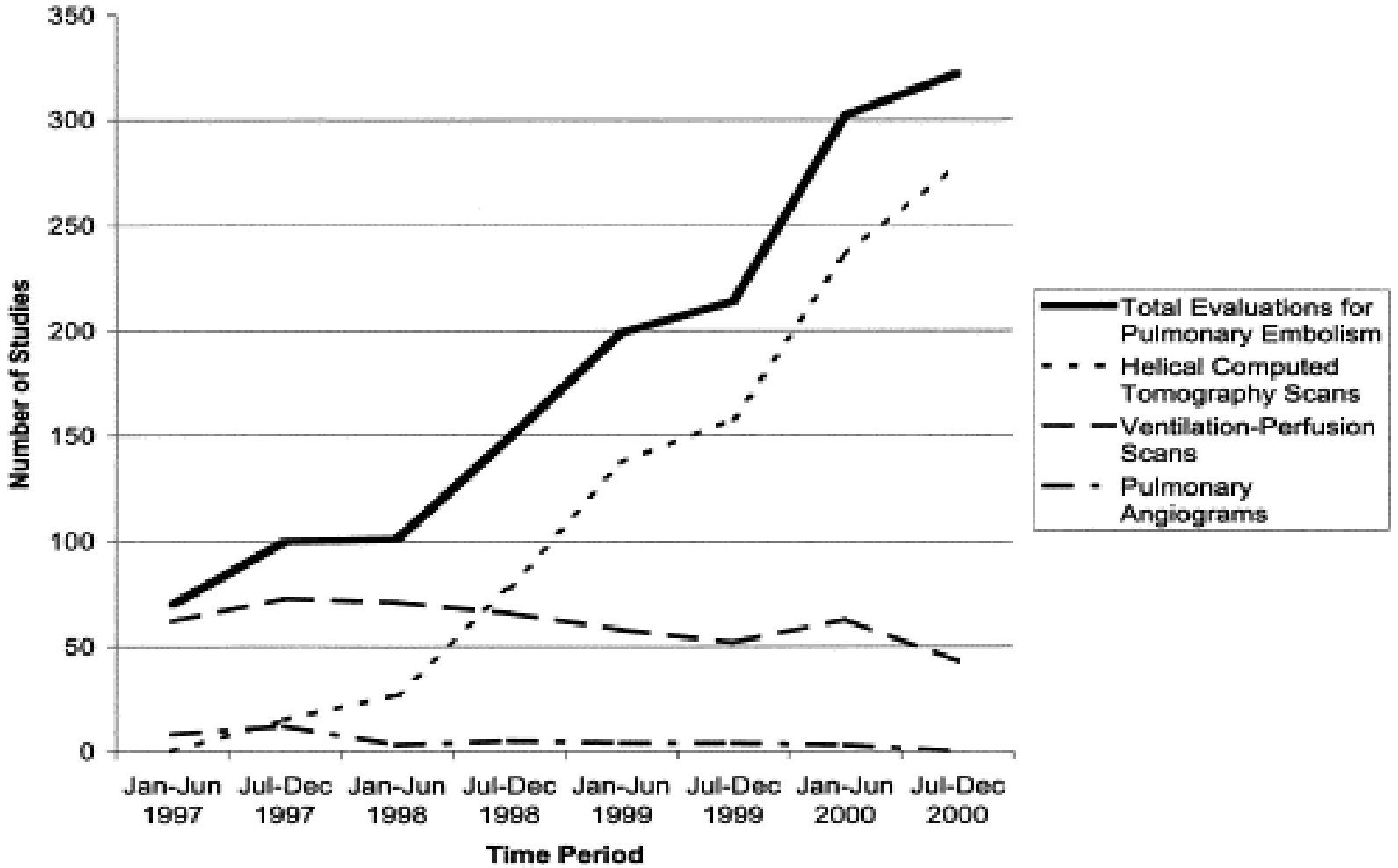
A Metaphor for Medicine in the Evidence-Based Medicine Era

Vinay Prasad, MD; Jason Rho, MD; Adam Cifu, MD

Author Affiliations: Departments of Medicine, Northwestern Memorial Hospital, Northwestern University (Drs Prasad and Rho), and University of Chicago Medical Center, University of Chicago (Dr Cifu), Chicago, Illinois.

Arch Intern Med. 2012;172(12):955-958.
Published online April 2, 2012.
doi:10.1001/archinternmed.2012.195

Offer increases demand



Trowbridge RL et al. Am J Med 2004; 116:84-90

Evolution of severity of PE

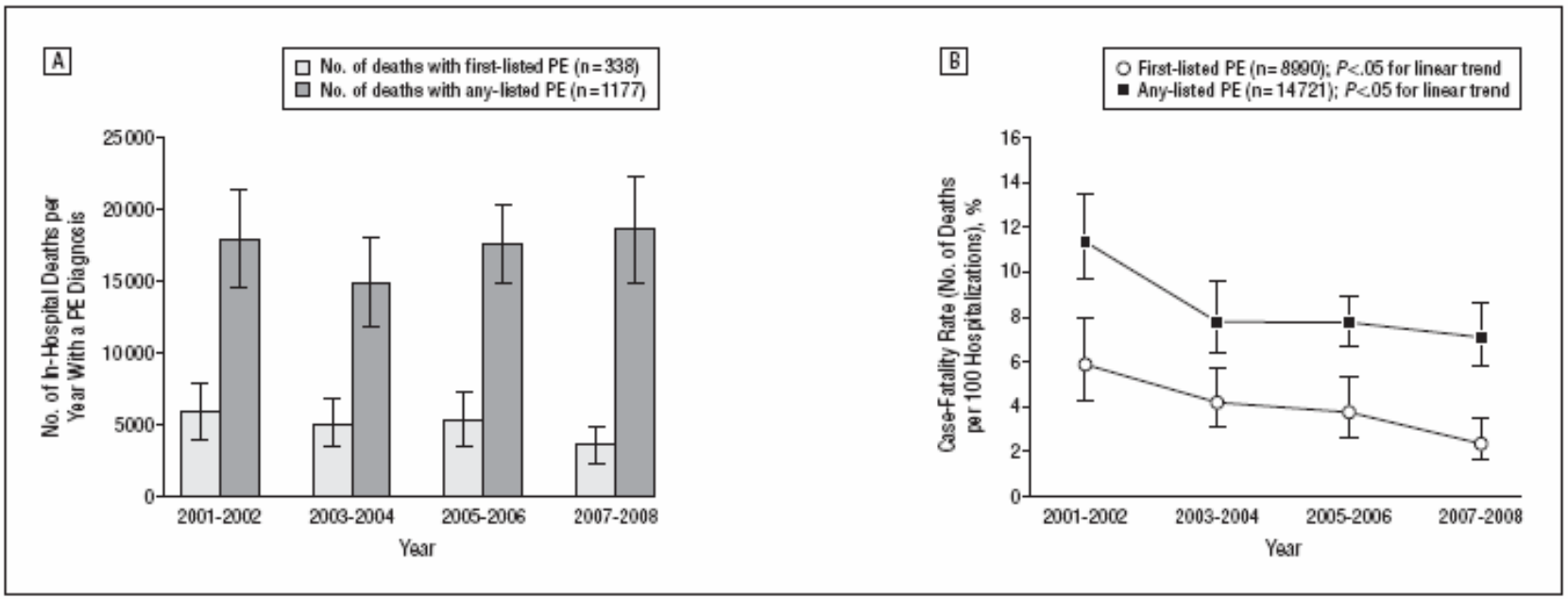


Figure. Estimated annual number of in-hospital deaths with a diagnosis of pulmonary embolism (PE) (A) and estimated case-fatality rates (B) among hospitalizations with a PE diagnosis during the periods 2001-2002, 2003-2004, 2005-2006, and 2007-2008, National Hospital Discharge Survey, United States.

- Death rates with a diagnosis of PE remain remarkably constant over the years
- Case-fatality rates diminish over the years

Tsai J et al. Arch Intern Med 2012; 172:960-1

Evidence for overdiagnosis

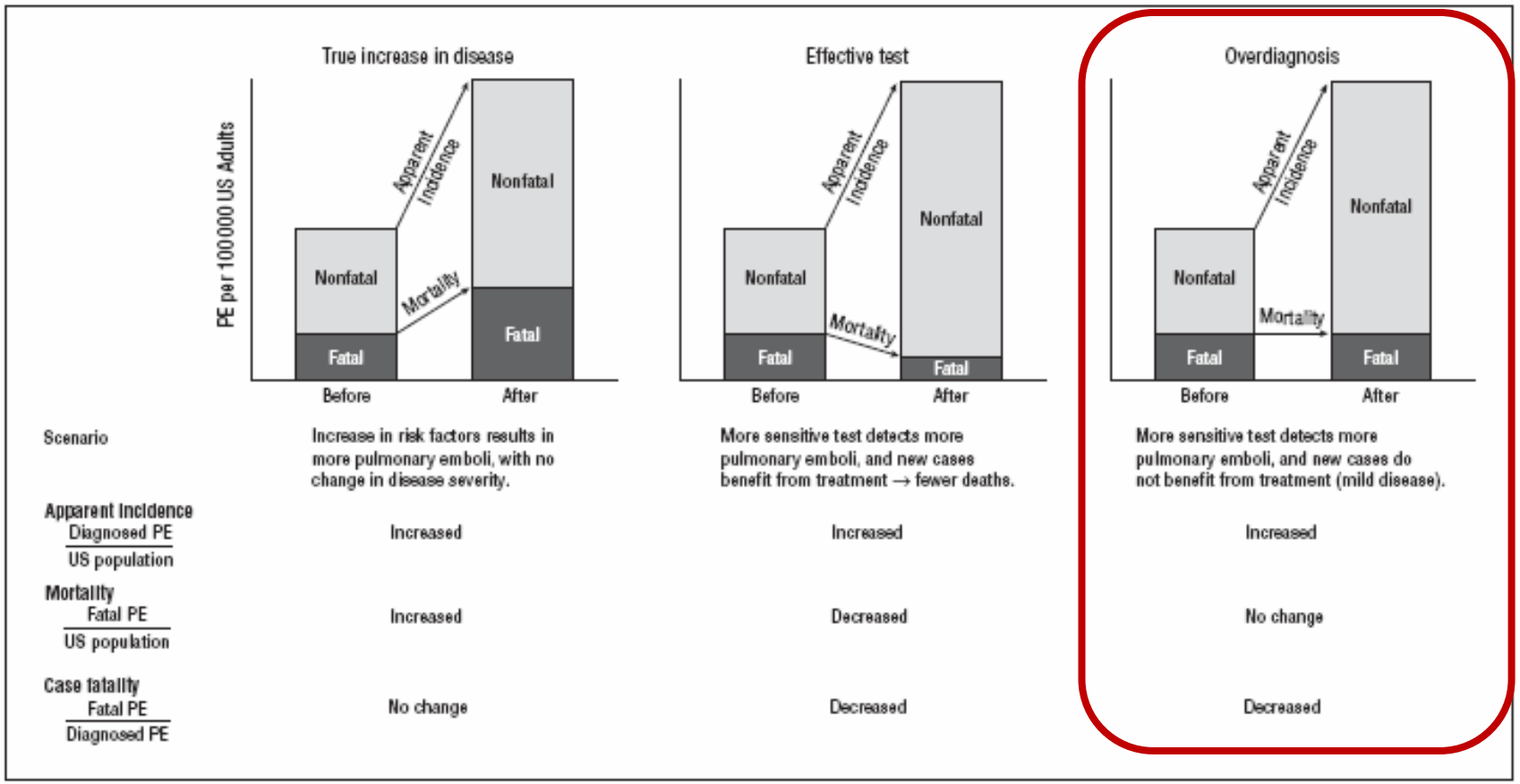


Figure 1. Expected change in mortality and case fatality in various scenarios of rising apparent incidence. PE indicates pulmonary embolism.

Wiener RS et al. Arch Intern Med. 2011; 171:831-9

Evidence for increased risk of anticoagulation treatment

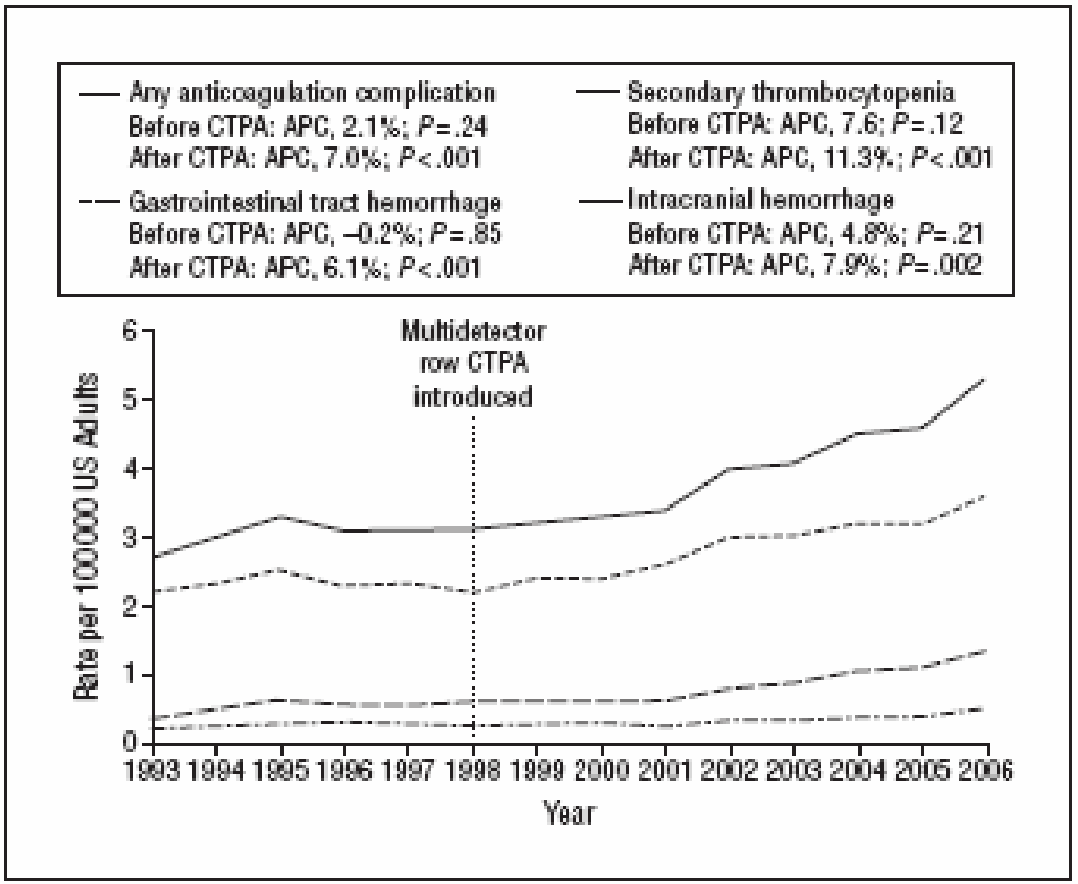


Figure 3. Rates of potential complications of anticoagulation treatment among US adults hospitalized with a pulmonary embolism, 1993-2006. APC indicates annual percentage change; and CTPA, computed tomographic pulmonary angiography.

Wiener RS et al. Arch Intern Med. 2011; 171:831-9

Is more less?

- Using CTPA as diagnostic test for suspected PE is associated with a substantial increase of patients who require anticoagulant treatment
- With no change in disease mortality
- With an increased incidence of bleeding events
- With an increased radiation

ACCP guidelines: 9th edition
What about incidental VTE?

- 3.5. In patients who are incidentally found to have asymptomatic DVT of the leg, we suggest the same initial and long-term anticoagulation as for comparable patients with symptomatic DVT (2B).

- 6.9. In patients who are incidentally found to have asymptomatic PE, we suggest the same initial and long-term anticoagulation as for comparable patients with symptomatic PE (2B).

Kearon C et al. Chest 2012; **141(2)**Suppl.:e419S-e494S

The fundamental question to be answered

Which patients with VTE benefit from anticoagulation at all?

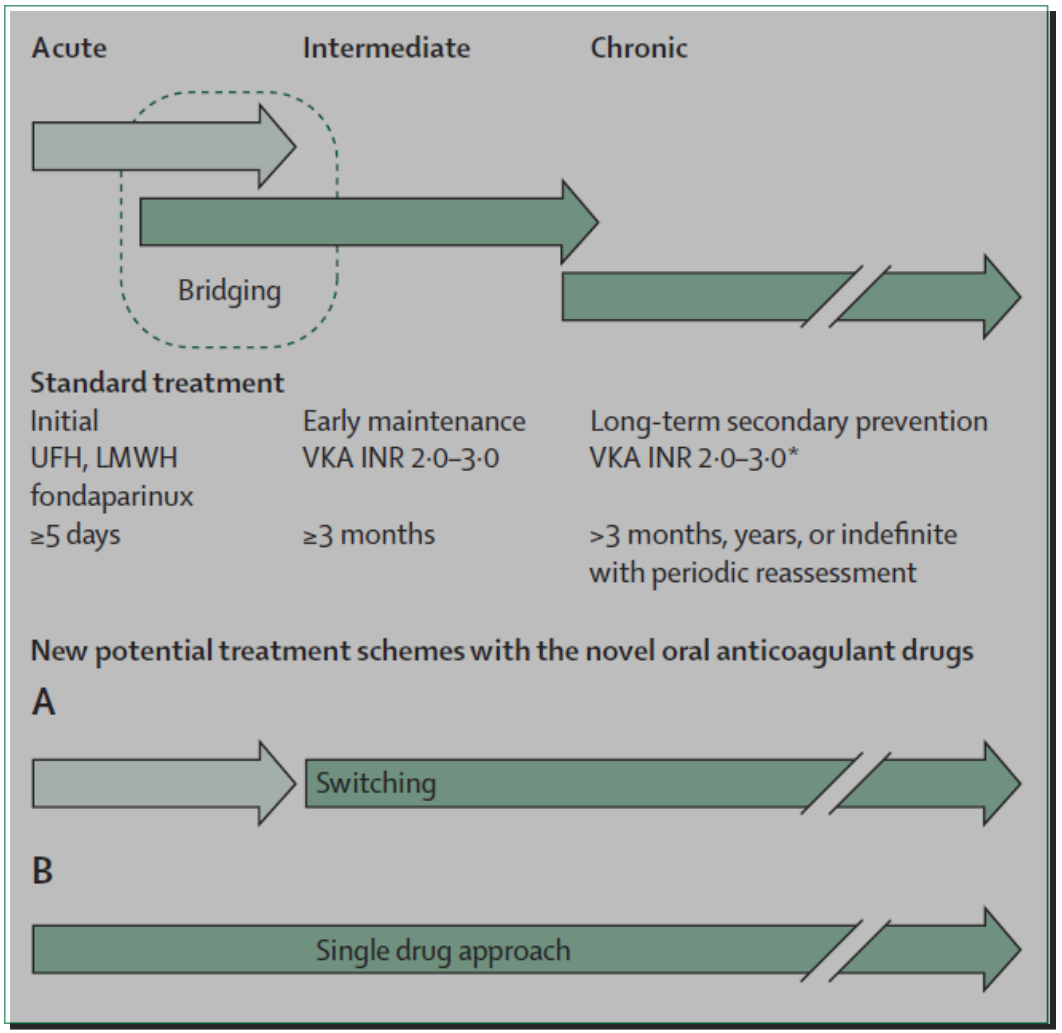
- Patients with subsegmental PE (NCT01455818)
- Patients with isolated distal DVT (NCT00421538)

?

Of note, these studies have recruitment and funding problems, *which should move toward a model where funds are pooled into a central and impartial agency that decides what trials to administer.*

(Prasad V et al. Arch Intern Med 2012)

Streamlined treatment of VTE



Dabigatran
2 x 150 mg/j

Rivaroxaban
2 x 15 mg/ pdt. 3 sem
puis 1 x 20 mg/j

Goldhaber SZ & Bounameaux H.Lancet 2012; 379: 1835–46

Conclusions

- Diagnosis of DVT and PE has changed considerably over the past two decades (non-invasive, sequential, easy)
- It includes initial clinical assessment, D-dimer measurement (except for high-probability patients) and CUS (suspected DVT) or CTPA (suspected PE)
- Recent evolutions (*whole-leg* CUS instead of *proximal* CUS for suspected DVT, new generations of scanners with increased sensitivity to minor, potentially clinically non-relevant PE) may lead to overdiagnosis and hence overtreatment with its inherent risks
- Development of novel oral anticoagulants will likely simplify treatment of VTE in the next years and contribute to streamlined management of this condition

Thank you for your attention

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