Travel and Risk for Venous Thromboembolism

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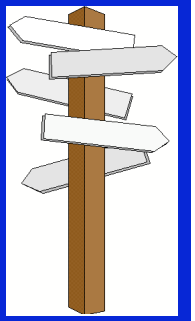
Travel and Venous Thromboembolism (VTE)



- Definition
- Myth or reality
- Analysis of the risk
- Absolute risk
- Associated risk factors
- Pathophysiology
- Prevention

Venous Thromboembolism : The third most frequent vascular disorder

Incidence	
DVT	PE +/- DVT
145 / 100,000 [1,2]	23-69 / 100,000 [3] mortality : 11%/2 weeks

1. Gillum RF. *Am Heart* 1987;114:1262-1264
2. Anderson F Jr, et al. *Arch Intern Med* 1991;151:933-938
3. Silverstein MD et al. *Arch Intern Med* 1998;158:585-593

ENDOTHELIAL INJURY

traumatism
surgery

Age
Obesity 2x
IBD
Nephrotic syndrome
Behcet

THROMBOPHILIA

Prot C, S, AT deficiency 4-8x
APC resistance (V Leiden) 2,5x
Factor II 20210A 2,8x
Hyperhomocysteinemia 2,5x
Antiphospholipids
Elevated factor VIII-c
Cancer 7x
Oral Contraceptives 4x

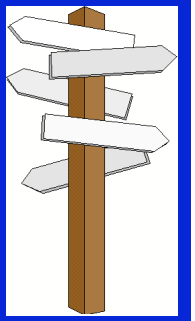
VENOUS STASIS

Venous insufficiency
Immobilisation, plaster
Heart failure
Stroke

Travel and VTE risk
Definition

- Symptomatic and/or asymptomatic VTE
- Lower limbs venous thrombosis and/or pulmonary embolism
- In the first weeks after travel
- ≠ economic class : other than air travel
- 1986 : PE occurred more often in the arrival than the departure hall
- 2000 : sudden death of a young Australian woman travelling to London

Travel and Venous Thromboembolism (VTE)



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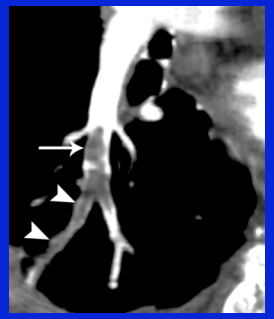
Travel and VTE risk
Evaluating the risk

- 2,5 10^9 air travellers in 2010
- PE (pulmonary embolism) potentially fatal
- Conflicting results

?



- 50% studies: no relationship
- 50% studies : positive relationship

Travel and VTE risk
Evaluating the risk

- 14 studies (out of 42) finally selected
- 7 : statistically significant association
- 7 : no association

Meta-analysis. Chandra et al. Ann Intern Med 2009; 151: 180-90

Travel and VTE risk
Evaluating the risk

- 14 studies (out of 42) finally selected

Design	Studies number	Participants number	VTE number
Case-control	11	3980 + 5413 ctrl	3980
Cohorts	2	10932	29
Case-crossover	1	5408	46

Meta-analysis. Chandra et al. Ann Intern Med 2009; 151: 180-90

Travel and VTE risk
Evaluating the risk

- Heterogenous
- Design :
  - 11 case-controls :
    - more VTE cases
    - does not allow to calculate absolute risk
    - selecting controls...the probability of travel must be equal to the general population from which the cases come from
  - 2 cohorts :
    - large groups in specific populations
    - allow to calculate VTE risk in relationship to travel
    - few cases but few bias

Meta-analysis. Chandra et al. Ann Intern Med 2009; 151: 180-90

Travel and VTE risk
Evaluating the risk

- Heterogenous
- Design :
  - 11 case-controls :
    - 5/11 : condition of the controls is not related to travel (i.e respiratory infection)
    - *6/11 : controls have been referred for suspicion of VTE but tested negative; the probability of travel is increased*

Meta-analysis. Chandra et al. Ann Intern Med 2009; 151: 180-90

Travel and VTE risk
Evaluating the risk

- Heterogenous
- Design :
  - 1 case-crosover :
    - Same people in different periods of time
    - Discard confounding factors

Meta-analysis. Chandra et al. Ann Intern Med 2009; 151: 180-90

Travel and VTE risk
Evaluating the risk

- Type of travels :
  - 5 : air only
  - 9 : air or surface travel
- VTE :
  - 7 : DVT (deep venous thrombosis) alone
  - 5 : PE (pulmonary embolism) and DVT
  - 2 : PE alone
- Location :
  - 10 : Europe
  - 2 : Europe + North america
  - 2 : Australia + New Zeeland

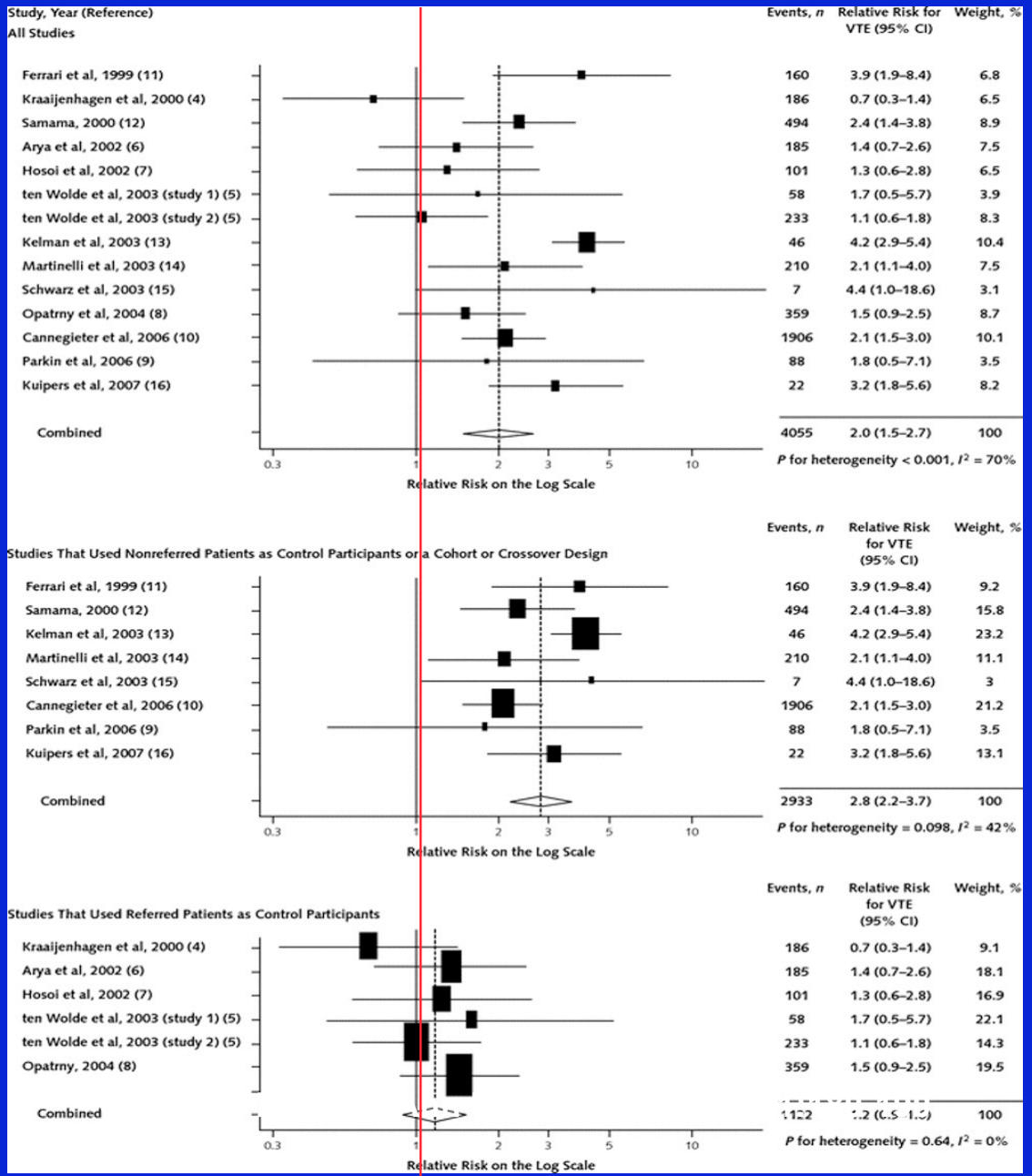
Meta-analysis. Chandra et al. Ann Intern Med 2009; 151: 180-90

Relative Risks for travel-related VTE

All studies

Well designed

Inappropriate design



Relative Risks for travel-related VTE

	n	RR	95% CI
Study location			
Europe	10	1,8	1,3 - 2,4
North America	2	2,2	1 - 4,5
Australia New Zeal	2	3,5	1,8 - 6,8

Chandra, D. et. al. Ann Intern Med 2009;151:180-190

Relative Risks for travel-related VTE

	n	RR	95% CI
VTE type			
DVT	7	1,5	1,1 - 2,2
PE	2	1,1	0,7 - 1,9
DVT or PE	5	3	2,1 - 4,2
Mode of travel			
Flight	11	2,2	1,4 - 3,2
Surface	6	1,4	1 - 2,1
Follow-up			
≤ 3 weeks	3	2,5	1,4 - 4,7
> 3 weeks	11	1,8	1,3 - 2,5

Chandra, D. et. al. Ann Intern Med 2009;151:180-190

Travel and VTE risk
Evaluating the risk

- Previous metanalysis with negative results : inadequate selection of controls

- Dose-response :
  - 18% risk increase/2 h;
  - For air travel only, 26% risk increase/2 h;
  - Suggestive of causal relationship.

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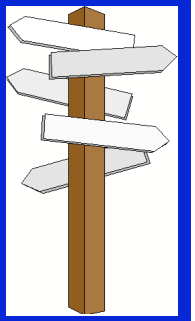

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Travel and VTE risk
Types of travel (MEGA study)

Travel Characteristic	Subcategory	Patients (n = 1,906), Number	Controls (n = 1,906), Number	Matched OR (95% CI)
Travel[c]	−	1,673	1,724	1
	+	233	182	2.1 (1.5–3.0)
Air travel	−	1,673	1,724	1
	+	86	72	1.7 (1.0–3.1)
Travel by bus	−	1,673	1,724	1
	+	23	18	2.2 (0.8–6.3)
Travel by car	−	1,673	1,724	1
	+	113	86	2.2 (1.3–3.7)
Travel by train	−	1,673	1,724	1
	+	11	5	3.5 (0.8–16.8)
Duration of travel	No travel	1,673	1,724	1
	4–8 h	93	62	2.0
	8–12 h	68	65	1.8
	>12 h	66	51	2.8

Cannegieter et al. PLOS Medicine 2006; 3: 1258-65

Travel and VTE risk

Timing (MEGA study)

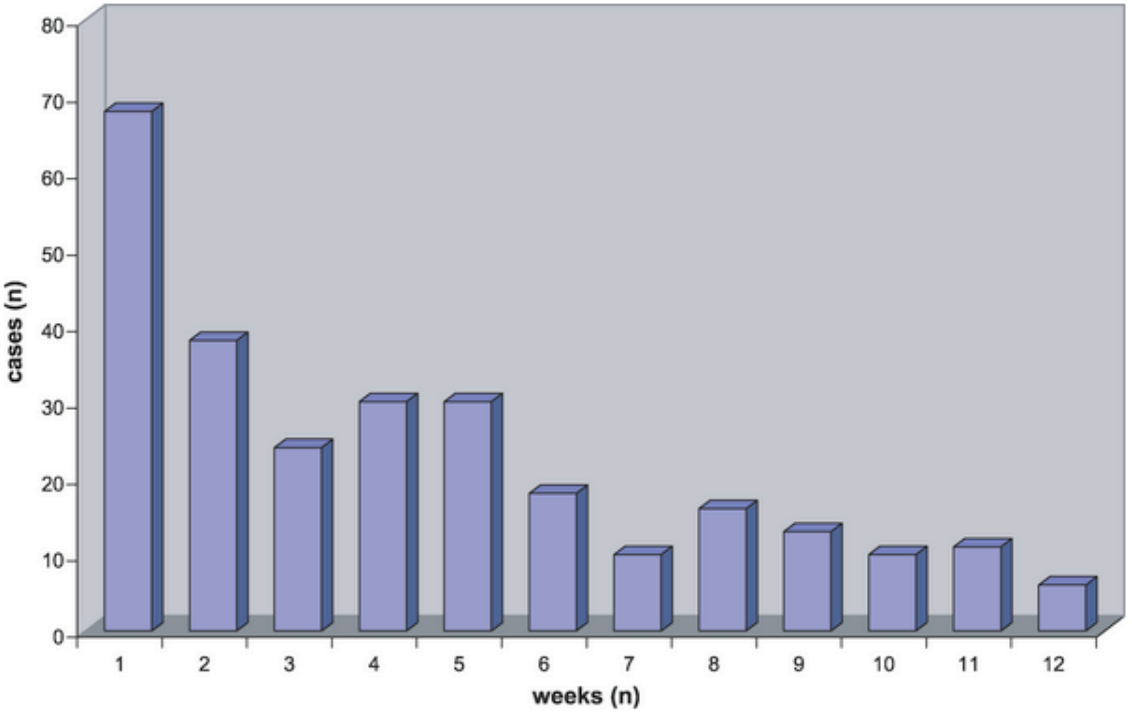

Figure 1. Frequency of the Occurrence of Events within the First 12 wk after Travel

The time window of analysis concerned the first 8 wk.

Cannegieter et al. PLOS Medicine 2006; 3: 1258-65