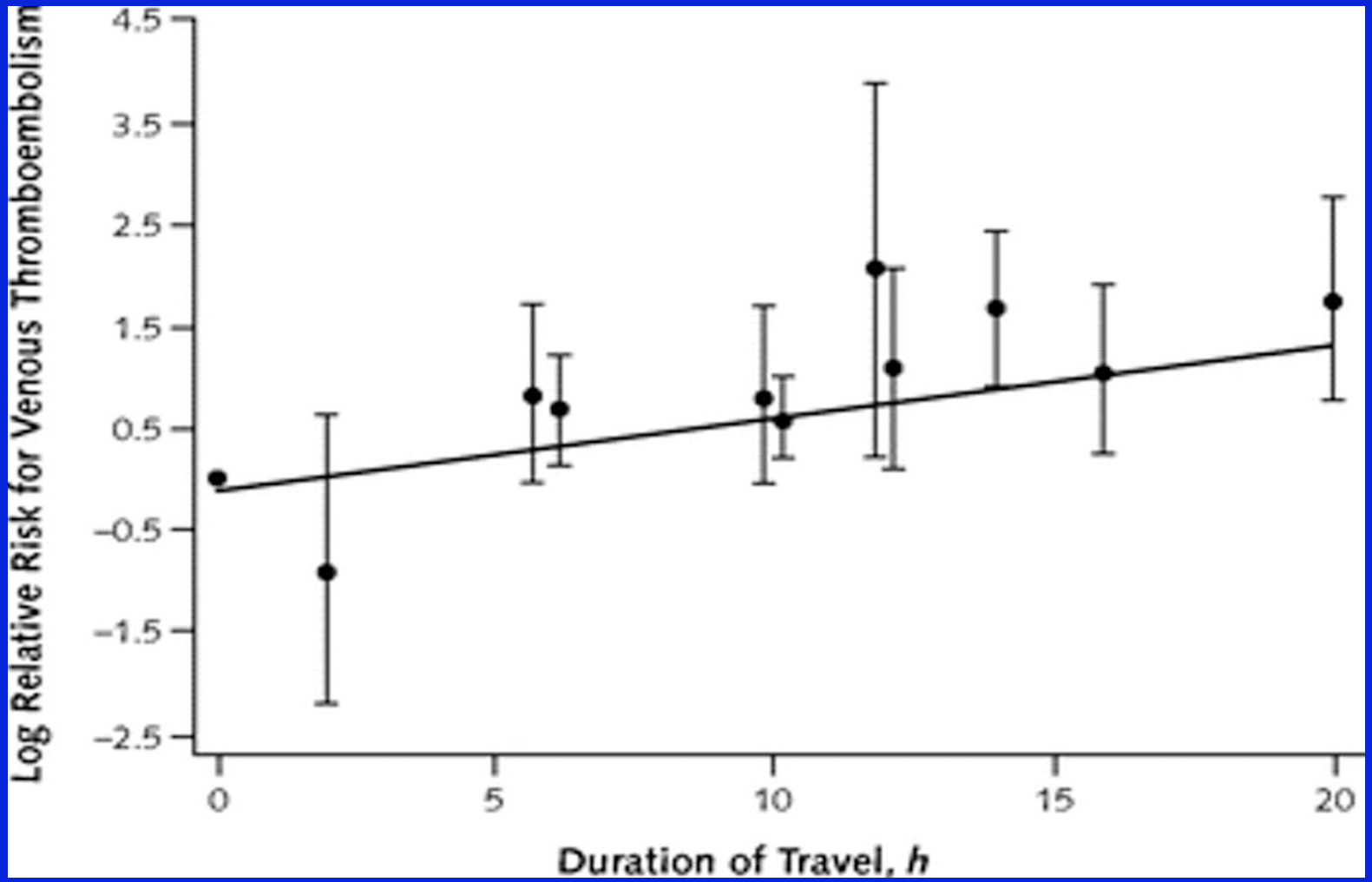
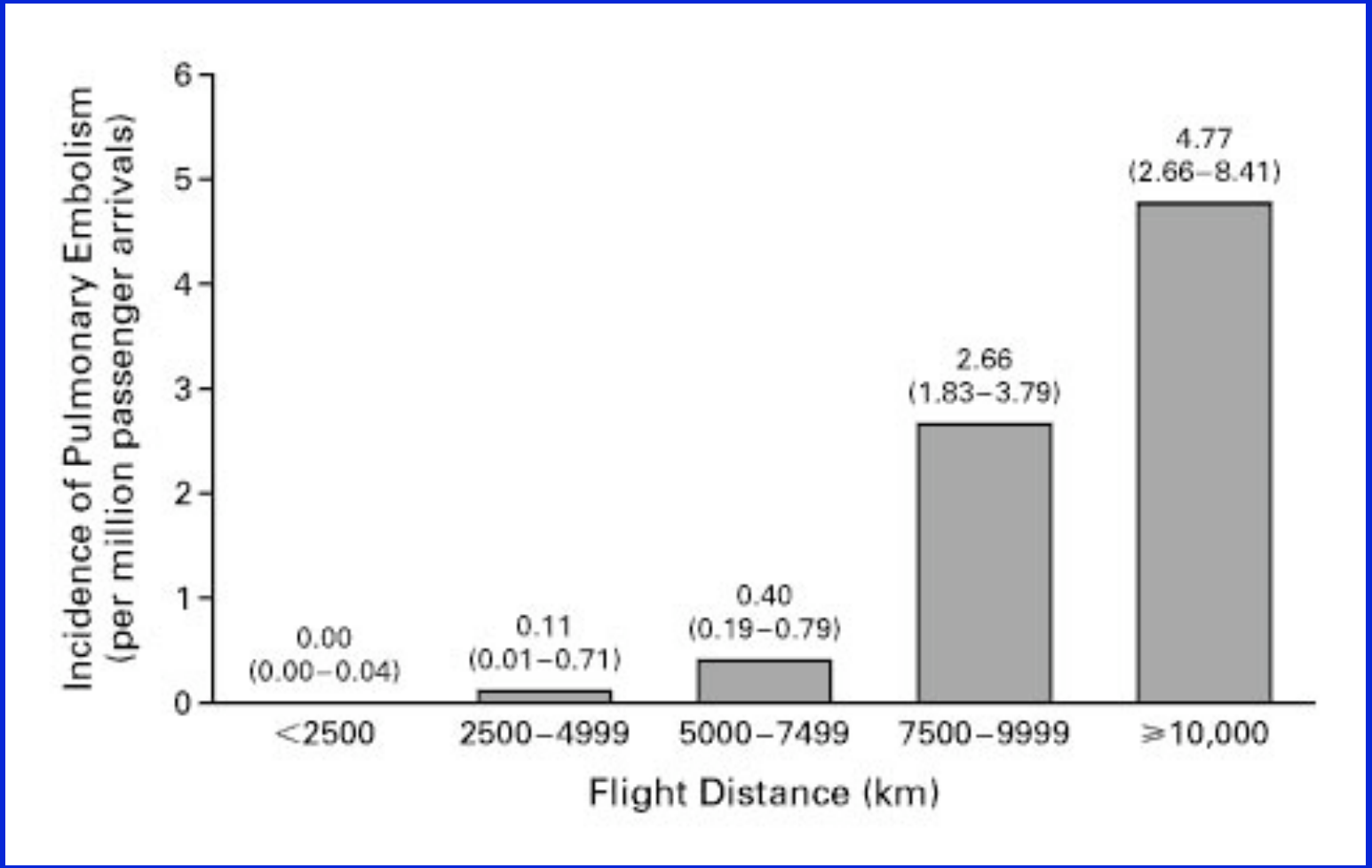
Relationship between duration of travel and relative risk for venous thromboembolism, as reported by 4 included studies



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

Incidence of Pulmonary Embolism According to Distance Traveled by Air



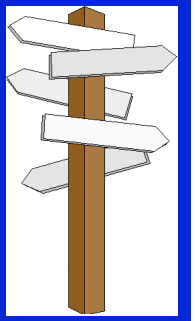
Lapostolle F et al. N Engl J Med 2001;345:779-783

Travel and VTE risk
Characteristics of the flight

- Flights > 4 hours
- Limited cohort : 80 patients and 108 controls
- Window seating 2,2 (1,1-4,4)
- Sleeping 1,5 (0,7-3,1)
- Alcohol consumption 1,1 (0,5-2,4)
- Business class 0,7 (0,2-1,8)

Schreijer et al. BJH 2008; 144: 425-9

Travel and Venous Thromboembolism (VTE)



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

Travel and VTE risk
Quantification of the risk

- International organisation workers
- = healthy adults, not generalizable
- N = 9000 workers
- Symptomatic VTE ≤ 8 weeks after flight
- 1/4600 flights > 4 hours
- 1/1260 flights > 16 hours

Kuipers Set al. J Thromb Haemost 2005; 3: P1657

Travel and VTE risk
Quantification of the risk

- Hospital admission for PE within 2 weeks after flight
- $9,6/10^6$ Australian citizens
- $43,5/10^6$ for non Australian citizens

- Risk of fatal PE within 4 weeks of flights > 3 h
  - $0,6/10^6$ passengers

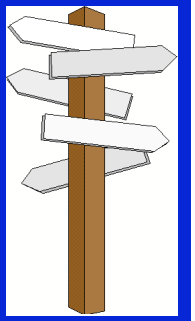
Kelman CW et al. Br Med J 2003; 327: 1072-5
Kline JA et al. Thromb Haemost 2002; 87: 342

Travel and VTE risk
Quantification of the risk

- Prospective study
- Flight average duration : 39 hours (multiple flights)
- Ultrasonography if symptoms within 3 months or increased D-dimers
- VTE events (mostly asymptomatic) :
  - 1% (9/878) (DVT + PE)

Hughes RJ et al. Lancet 2003; 362: 2039-44

Travel and Venous Thromboembolism (VTE)



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Travel and VTE risk
Associated risk factors (MEGA study)

- Consecutive patients < 70 years with a first VT
- Partners as matched controls
- 233/1906 patients : travel > 4 hours in the last 8 weeks
- OR : 2,1 (1,5-3)
- Highest risk in the first week
- Risk present for flying, car, bus or train
- Increased risk :
  - Factor V Leiden
  - Oral contraceptives
  - BMI > 30
  - > 190 cm or < 160 cm (for flight only)

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

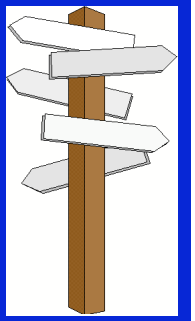
Travel and VTE risk
Associated risk factors

Combined risk factors : travel + ...

- Oral contraceptives + factor V Leiden 18x
- Increased factor VIII 6,2x
- Increased factor VIII + V Leiden 25x
- Increased factor VIII + OC 52x
- Increased BMI + OC 31x
- Increased BMI + V Leiden 21x

Kuipers et al. Blood 2009; 113: 2064-9

Travel and Venous Thromboembolism (VTE)



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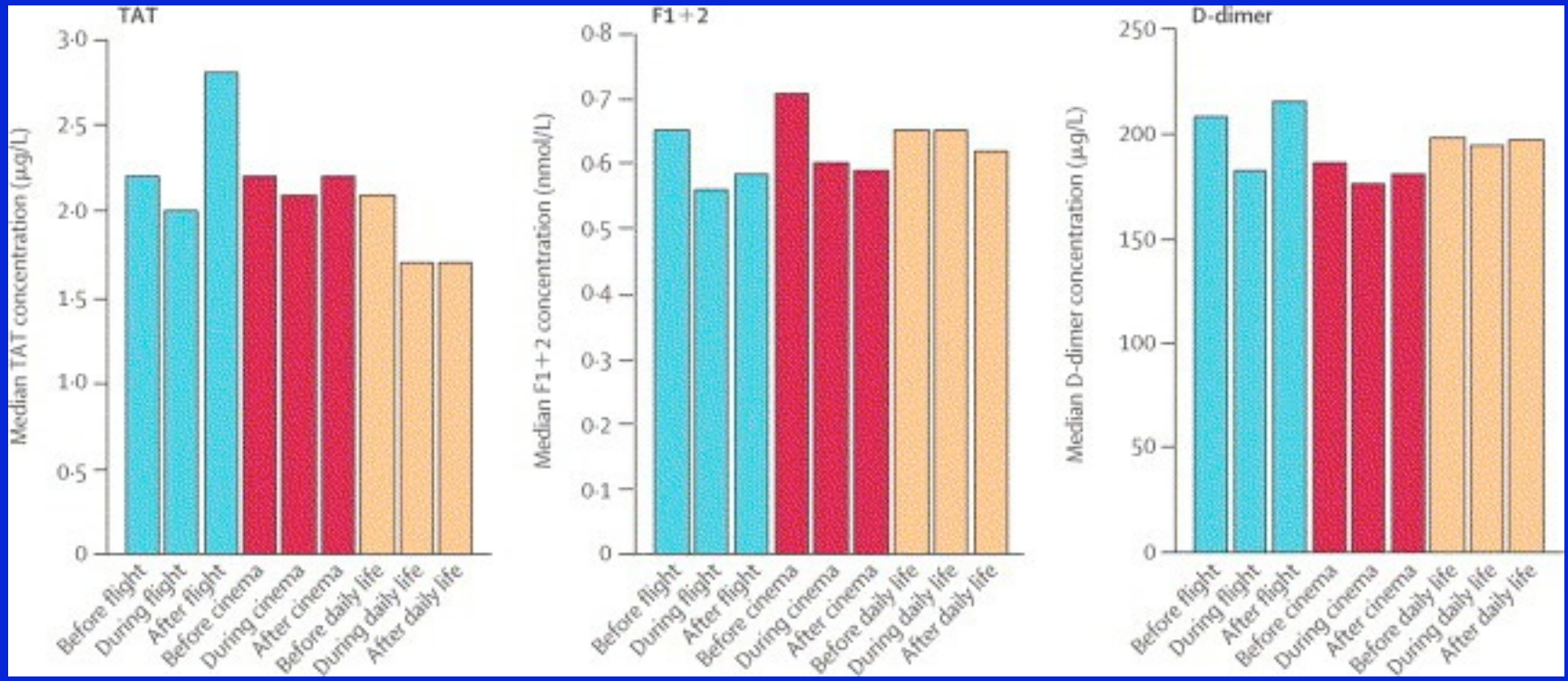
Travel and VTE risk Mechanisms

- Parameters : TAT, D-dimers, F1+2
- Daily activity, immobilisation, flight
- Thrombophilia effect
- Contraceptives effect

Schreijer AJM. Lancet 2006; 367 :832-8

Travel and VTE risk Mechanisms



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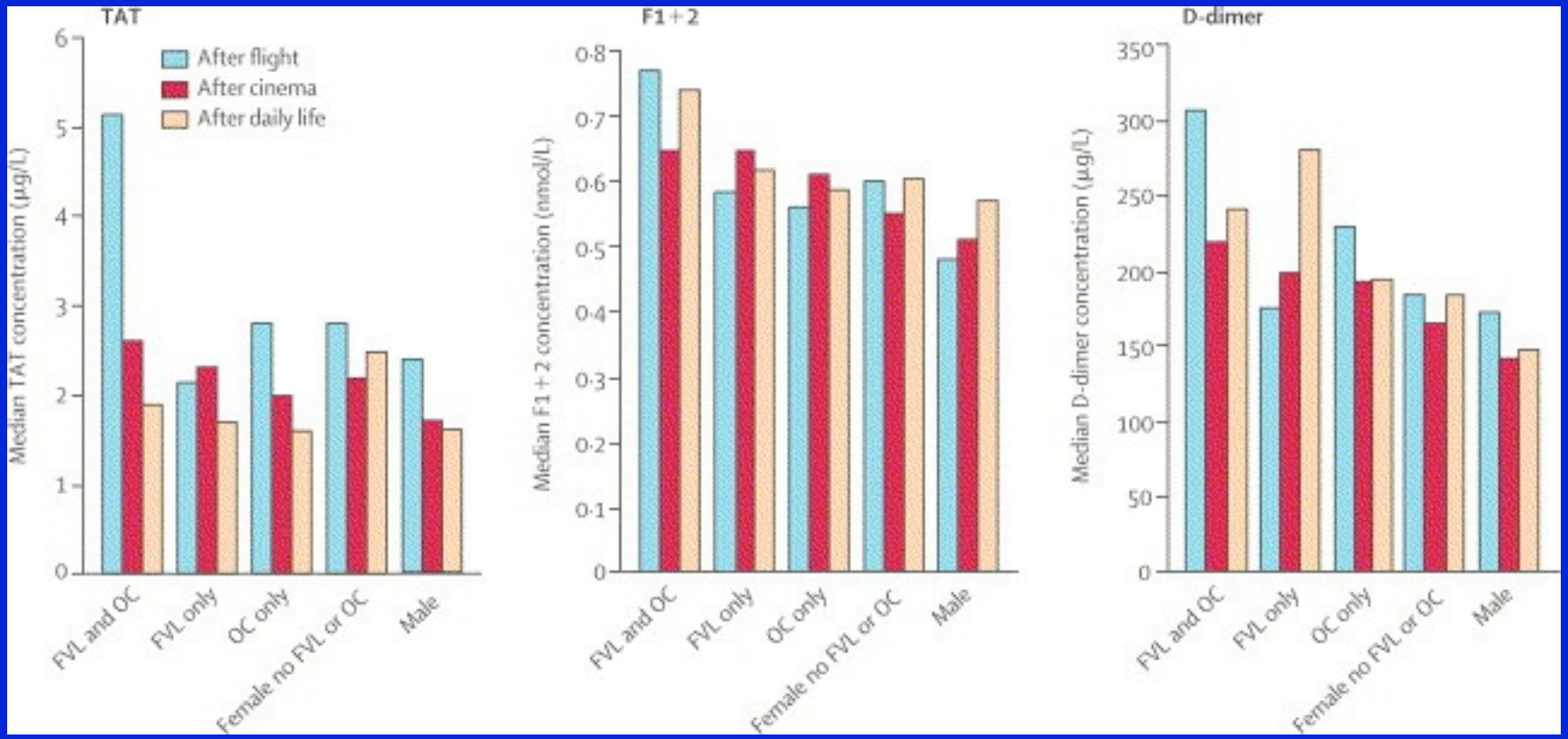
Travel and VTE risk Mechanisms



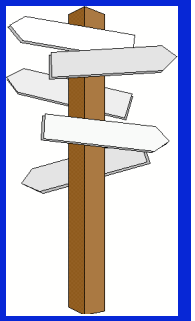
Schreijer AJM. Lancet 2006; 367 :832-8

Travel and VTE risk Mechanisms

- Immobilisation
  - Increased if asleep
  - Controversial effect on thrombin generation
- Hypobaric hypoxia :
  - Equivalent to an altitude of 2400 m
  - SaO2 : 90-93%, even to 80% if asleep
  - Controversial effect on thrombin generation
- Air travel :
  - Increased thrombin generation
  - More than movie marathon
  - Most evident in women with OC + factor V Leiden

Schreijer AJM. Lancet 2006; 367 :832-8

Travel and Venous Thromboembolism (VTE)



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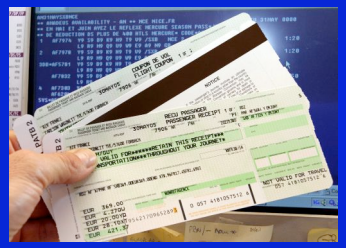
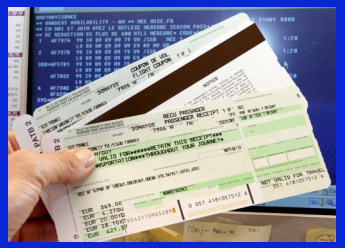
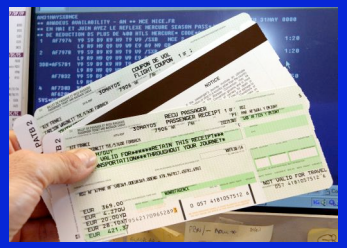
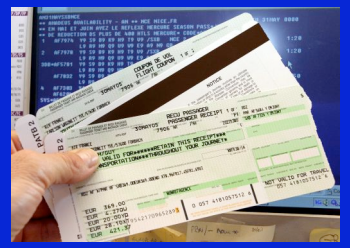
Travel and VTE risk Prevention



Travel and VTE risk Prevention

- Healthy volunteers; n = 200
- Flight > 8 hours; median : 24 hours
- No additional risk factors
- Elastic stockings class I (20-30 mmHg), below knee
- Ultrasonography before + 48h post-flight
- Results :
  - 12/100 DVT in control group : calf, asymptomatic
  - 0/100 DVT but 4 SVT in stockings group
- Confirmed in another trial: reduction of asymptomatic DVT from 3,7 to 0,2%

Scurr et al. Lancet 2001; 357: 1485-9

Travel and VTE risk Prevention

- General measures flight > 8 hr : expert-based (≠EBM)(grade 1C) :
  - Hydratation
  - Frequent calf muscle contraction, ambulation
  - Against alcohol use
  - No data to justify widespread use of LMWH
- Only for individuals at high risk
  - Elastic stockings class I (20-30 mmHg)(grade 2C)
  - Prophylactic dose of LMWH (ACCP grade 2C)
    - Fraxiparine 0,4 ml
    - Clexane 40 mg
- Don't use aspirin (ACCP grade 1B)

ACCP 2008 Recommendations

Take travel messages

- After travel > 8 hr
- VTE absolute risk very low : < 1/1000 (symptomatic)
- Associated factors increased the risk : OC, thrombophilia, obesity, cancer, surgery…
- Immobilisation + hypobare hypoxia
- General measures recommended
- Specific measures (stockings, LMWH) for high risk patients