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

Incidence of Pulmonary Embolism According to Distance Traveled by Air

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

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

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)

- Definition
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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

Travel and Venous Thromboembolism (VTE)

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

Schreijer AJM. Lancet 2006; 367:832-8
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)

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

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