
Departures
FLIGHT 0312
AIR MCGILL
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DEC 03 2019

Disclaimer

- Senior Medical Advisor-Passenger Health
  - *Air Canada*
- Medical Consultant
  - *Air Transat*
- Director "*Onboard Medical Emergencies*" course
  - McGill University
- Speaker
  - Pfizer

Objectives

- To become familiar with aviation physiology & how it impacts disease processes
- To identify which patients are fit to fly

Fit?

- Recommendations based on expert opinions
- Limited data available !
  - Canadian Cardiovascular Society 1998 & 2004
  - Aerospace Medical Association (AsMA)
  - Federal Aviation Administration (FAA)
  - Transport Canada
    - Civil Aviation Division

Medical Tourism

- For few years
  - More passengers travelling for medical tourism
  - Longer flights
  - Sicker & older passengers
  - Booked online: first seen at gate
  - Not screened by airlines prior to flying!
    - otherwise: DENIED

All commercial flights:

Airlines make the final decision

Case 1

- In walk-in clinic near YUL airport
- Mr. Tim Pannum is sent by the airline for evaluation
- When he flew this morning, he experienced pain just before landing
- Blockage in the right ear

- What is the diagnosis?
- What can you do?
- Can he fly again tomorrow?

Gas Laws

- Boyle's law:
  - expansion of gas with altitude

Pressure Effect in the Ear

Do NOT fly if you have a cold !

- Pain, Dizzy, Vertigo, Tinnitus

Treatment

- Yawning, Swallowing, Chewing
- Perform a Valsalva
- Vasoconstrictor (nasal spray & systemic)
- Child: Bottle, Breastfeeding, Straw, Balloon
- Tympanostomy tube

Back to *Tim Pannum*

- Fit to fly again?

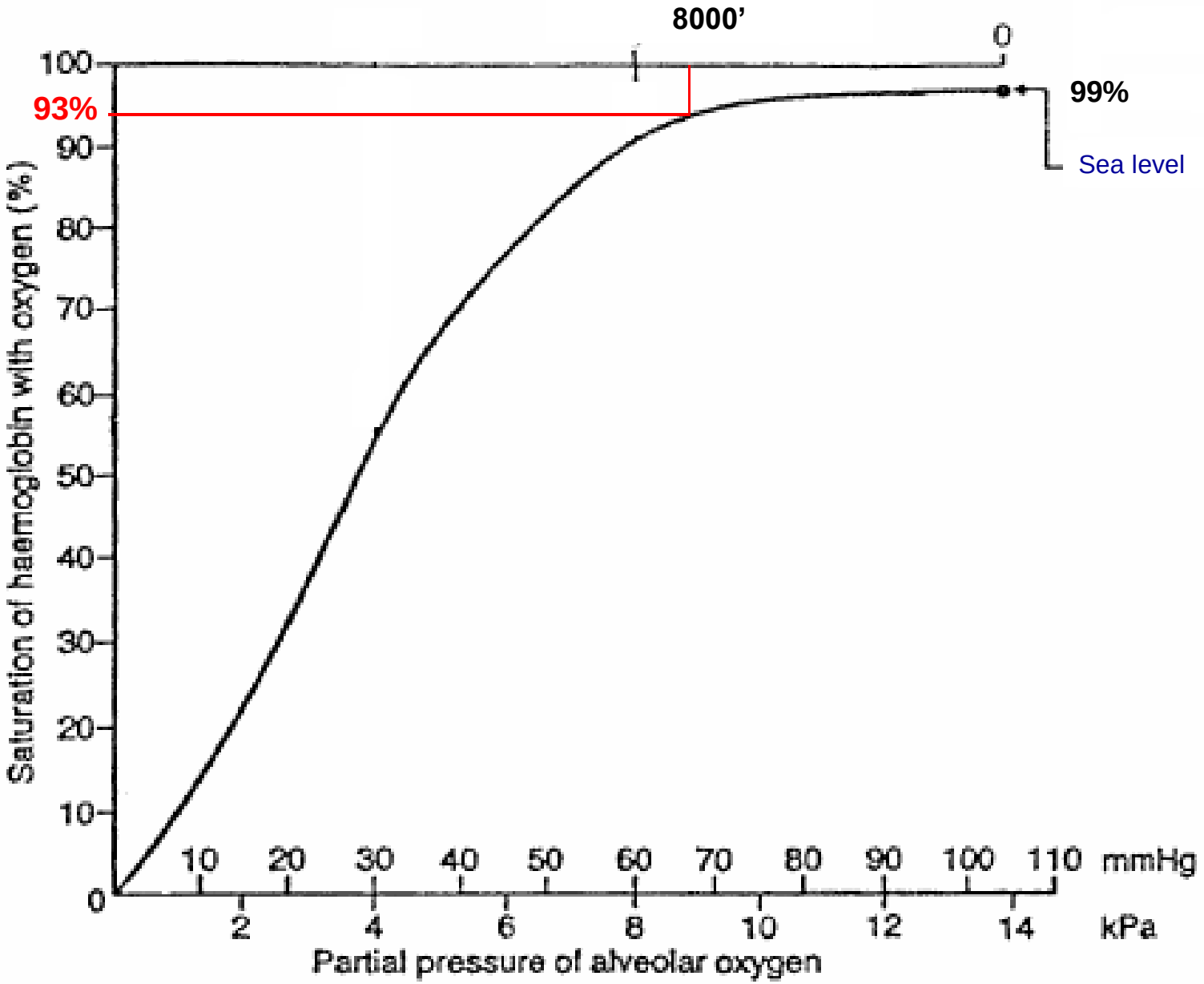
Contraindications to Flying

ENT *(Aerospace Medical Association)*

- OM
- Acute or severe chronic sinusitis
- 2 weeks post-tonsillectomy
- Tympanostomy tubes: OK
- Same day filling

Case 2

- Mrs. Puffy, a 68 yo ♀ COPDer
- Comes to your office for pre-flight check-up
- Her COPD is stable on her current meds
- She feels great & asymptomatic with baseline saturation of 92%
- Is she fit-to-fly?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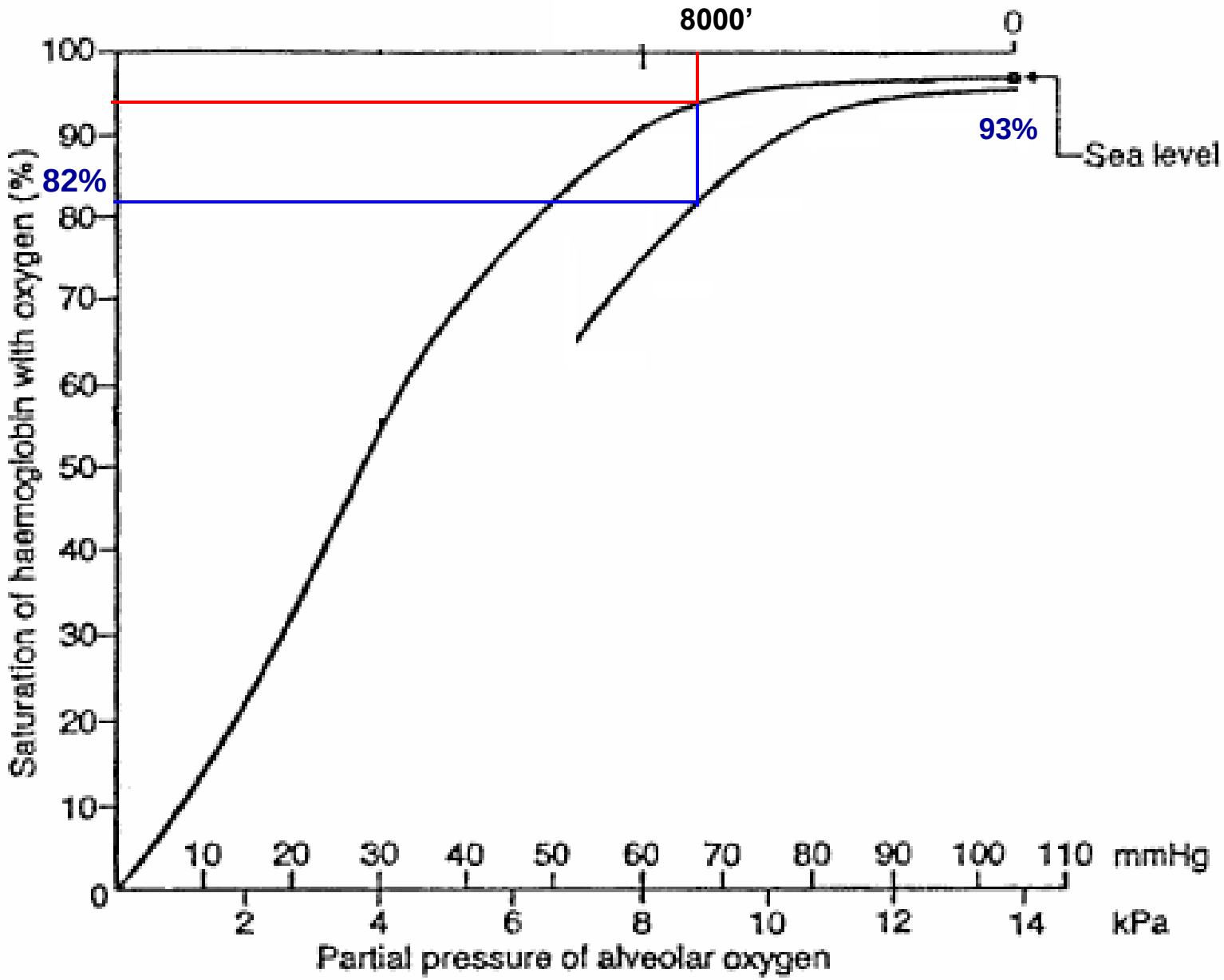
Saturation of haemoglobin with oxygen (%)
10 20 30 40 50 60 70 80 90 100 110 mmHg
2 4 6 8 10 12 14 kPa
Partial pressure of alveolar oxygen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Saturation of haemoglobin with oxygen (%)
10 20 30 40 50 60 70 80 90 100 110 mmHg
2 4 6 8 10 12 14 kPa
Partial pressure of alveolar oxygen

Indications for medical O_2 onboard flights (2-4 L)

- Use of O_2 at sea level
- Hgb < 90
- Saturation < 93% sea level
- Baseline PaO_2 less than 70 mmHg
- Angina CCS class III-IV
- Cyanotic congenital heart disease
- Primary pulmonary HTN
- Any CV DZ with known baseline hypoxemia
- Sickle cell

6 months later…

Your patient, with chronic lung disease, now uses oxygen at 2Lpm every day.

Going to Europe for summer…

She asks you if that will be enough in the airplane.

Rules for O_2 on plane

- **Must increase by 2**

- If 2 Lpm on ground
  - 4 Lpm on plane

- If mode « pulse » with POC at 3
  - 5 « pulse » on plane

Practical test

- Walk 50 meters
- If saturation < 93% : needs supplemental oxygen

Portable O_2 Concentrator

- Transport Canada allows POCs onboard
  - January 2008
  - ***31 brands allowed***
  - Safe onboard (no liquid O_2) : *Zeolite*
  - No hazardous materials
  - Gives 30% O_2 @ 1-3l/min
  - Cannot use aircraft electrical outlet, only battery
    - Needs enough batteries!
  - Under seat, no emergency exit

Contraindications to Commercial Flights

(Aerospace Medical Association)

Pulmonary

- Assessment: *walk 50 meters or flight of stairs*
  - COPD with PaO_2< 70 mmHg
    - Needs supplemental O_2
  - Infections
    - Active pneumonia
    - TB
  - Pneumothorax
    - OK with CT & MD
    - or after 2 weeks post-resolution
  - PE: only when stable, asymptomatic, normal O_2 sat & anticoagulated

Before she leaves…

- Is oxygen required?
  - O_2 tank
  - POC
- Medical escort?
- Wheelchair?
- Medication?

Case 3

- Week on the ward
- Mrs. White is a 72 yo ♀
- PMHx: CAD
- LGI bleed due hemorrhoids
- Daily blood work shows
  - Hgb 83
- She has been stable for 3 days and wants to fly for a weeding in FLL in 2 days

Anemia

- Will you let her fly as she is?
- Any concerns?

O_2 capacity

- Hgb 150 mg/dl

  gives O_2 carrying capacity of 21cc/100cc blood

- Hgb 100 mg/dl (anemia)

  will give O_2 carrying capacity of 14 cc/100cc

- O_2 saturation will be the same (misleading) but delivery will be diminished

- Most airlines do not allow passengers Hgb <90

Indications for Medical Oxygen Onboard Flights (2-4 L)

- Use of O2 at sea level
- Baseline PaO2 less than 70 mmHg
- Angina CCS class III-IV
- Cyanotic congenital heart disease
- Primary pulmonary HTN
- Any CV DZ with known baseline hypoxemia
- Sickle cell
- Hgb < 90

Case 4

- Mrs. Anne Kull, visiting from China, missed a step at the Montreal Basilica
- She has a bimalleolar ankle #
- You put a cast on
- She flies tomorrow to Shanghai
- Fit-to-fly?
- Concerns?

Cast in Flight

- Swelling in cast
- If < 48 hrs from time of injury→ bivalve

- -Hip or femur #

  stretcher

Case 5 —busy ER shift

You see multiple chest pain patients:

- A 63y woman with atypical CP

- A 40y male with ischemic sounding CP
  -negative ED workup

- A 46y man with SVT, which you converted with adenosine

Case 5

They are all part of the G7, due to fly back to South America tomorrow.

Are they fit to fly?

Who should not take the plane ?

A. Justin Trudeau , *SVT*

B. Angela Merkel, atypical CP

C. Emmanuel Macron, *cardiac CP*

D. Donald Trump, just because……!

Can J Cardio November 2004

- Uncomplicated MI
  - Class I
    - 1 week for repatriation, low risk on angio/non invasive studies
    - 6-8 weeks for elective travel
  - Class II-IV
    - Only if necessary with MD & O_2
- ACBP (class I-II)
  - 4 days post-op flight < 2 hrs (Hgb >90)
  - 7 days post-op, longer flight (Hgb >90)
- UA or Class IV angina
  - now stable, OK with MD & O_2 after 24hrs

Can J Cardio November 2004

- Heart failure
  - Class I-II: unrestricted
  - Class III: O_2
- Angioplasty: next day if no symptoms
- Angio post-MI: criteria of MI
- Arrythmia/post-arrythmia procedure
  - Class I-II: 1 day post-procedure for SVT
  - " " : 2 days " " for ventricular arrythmia
  - Class III-IV: NO Commercial

Can J Cardio November 2004

- Post-pacemaker/ICD implant:
  - 1 day post-implant if no pneumothorax
- Security
  - Metal detector generally safe North America
  - **NO** hand-held detector

Case 6: The Clautts

The Clautts

- A 69y woman with morbid obesity
- Her 73y husband, with lung cancer
- Their 35y daughter, currently two months pregnant
- Her husband, with a past history of an idiopathic DVT
- The grandson, 15y, in a shortleg cast

The *Clautts*

- Flying in a week YUL-NRT
  - 12 hour flight

- Prophylaxis against DVT?

Traveler's thrombosis

⇨**Venous stasis**

- venodilation
- passenger immobility
- venous blood flow diminished by half
- popliteal vein compression by front edge of seat

Traveler's thrombosis

- Low risk:
  - Age>40, obesity, inflammatory disease
- Medium:
  - Age>75, hormonotherapy, recent MI, postpartum, trauma lower limbs, varicosities
- High:
  - Previous DVT, known thrombophilia, previous CVA, cancer, AT or protein C or S deficiency, severe immobility

Old Recommendations from ACCP

- Flight > 8 hrs
  - No constrictive clothing around LE or waist
  - Avoid dehydration
  - Frequent calf muscle stretching
- If risk factors
  - Below-knee compression stockings (15-30 mm Hg)
  - LMWH 2-4 hrs prior departure
- ASA
  - No evidence in favour

Review of the Evidence

- VTE risk increases 18% per 2h of travel
- Symptomatic DVT 1/4600 flights (min 4h)
- Asymptomatic DVT 0.5-1.5%
- Association strongest for flights >8 hours
- Body habitus/window seat may play role

Anticoagulate?

CHEST Supplement

ANTITHROMBOTIC THERAPY AND PREVENTION OF THROMBOSIS, 9TH ED: ACCP GUIDELINES

Prevention of VTE in Nonsurgical Patients

Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines

February 2012

For long-distance travelers (no increased VTE risk)

- No ASA or anticoagulants
- No GCS

Chest/141/2/February2012 Supplement

For long-distance travelers at risk of VTE

- **Previous VTE**
- **Recent surgery or trauma**
- **Active malignancy**
- **Pregnancy or estrogen use**
- **Advanced age, limited mobility, severe obesity, or**
- **Known thrombophilic disorder**

- Frequent ambulation, calf muscle exercise or sitting in an aisle seat if feasible

- Properly fitted, below-knee GCS 15-30mmHg

(all recommendations Grade 2C)

Chest/141/2/February2012 Supplement

- **Anticoagulation for high risk travelers must be made on an individual basis**
  - consider that risks may outweigh benefit

Chest/141/2/February2012 Supplement

The Clautts

- How long is their flight? > 8 hrs
- Are they high risk: YES (all)

- An 69y woman with morbid obesity YES
- Her 73y husband, with lung cancer YES
- Their 35y daughter, currently two months pregnant NO
- Her husband, with a past history of an idiopathic DVT YES
- The grandson, 15y, in a shortleg cast NO

DOAC

Direct Oral Anticoagulants

- Dabigatran (*Pradaxa*)
- Rivaroxaban (*Xarelto*)
- Apixaban (*Eliquis*)
- Edoxaban *(Lixiana)*

- American Hematology Society
  - Guidelines 2020
    - *“Prevention VTE in Air Travel”*
  - No data on DOAC

Case 7

- Doing a locum in the Bahamas
- Diver with tingling in hand and shoulder pain post-dive
- Needs to fly tonight to Cayman Islands for bank deposit
- Any concerns?

Contraindications to Commercial Flights

(Aerospace Medical Association)

Scuba diving

- Acute DCS: **absolute**
  HBO asap
- Single dive per day with no decompression stop: 12 hrs surface interval
- Multiple dives/day or dive with decompression: 24 hrs surface interval

Case 8

- Call from Chisasibi
- 55 yo male intoxicated, fall from own height
- Headache and persistent vomiting
- Transferring MD asks you
  - Any concerns for flight?

Contraindications to Commercial Flights

(Aerospace Medical Association)

- **CNS**
  - If ↑ ICP: OK to fly
    - NO low altitude flight, unless pneumocephalus
  - Uncontrollable and frequent seizures
  - If recent seizure:
    - 24 hrs post-crisis
    - ↑ medications & travel companion
  - Craniotomy: 7 days post-op

Contraindications to Commercial Flights

(Aerospace Medical Association)

- Skull Fractures
  - Brain edema: Not an issue
  - If pneumocephaly, wait minimum 7 days

Case 9

- Your 34 week pregnant ♀ with twins wants to fly to India for the New Year in 5 days
- 6th pregnancy
- Always delivers past her due date
- Can she fly?

Contraindications to Commercial Flights

(Aerospace Medical Association)

- **OB & Peds**
  - > 36 wks single pregnancy
  - > 32 wks for multiple pregnancy
  - > 28 wks: letter from MD
- **Newborn**
  - > 1 week old for long-haul (> 2 hrs)
  - 48 hrs for short flights (<2 hrs)

Commercial flights

- If in doubt about pt fitness to fly:
  - Contact Airline:
    - Most airlines have information online
    - ***Air Canada*** medical desk

  – Insurance Company

Recommendations

- Contact airlines early enough (72 hrs) for O_2 & wheelchair & special diet
  - Diabetic meal
  - Low-calorie meal
  - Low-cholesterol/low-fat meal
  - Low-sodium meal
- Arrive at airport early to minimize stress
- Double-check with insurance co if covered
  - Recent meds change
  - Recent hospital admission

Recommendations

– Encourage hydration

-1 glass water/hr

-No EtOH or caffeine

- Ø carbonated beverages before a flight

– Walk or leg exercises

Recommendations

- Make sure enough meds & put in carry-on
- Keep separate list of meds with doses in safe place
- Keep copy of recent EKG

All commercial flights

Airlines make final decision