

Travel advice for pregnant ladies & infants



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MCQ



Casus 1: woman 1^{ste} trim. pregn., man, girl 10 months
Senegal– 1w in Club Med, good conditions



Which vaccines would you recommend for the 3 persons

updating basic vaccinations +

1. YF and Hep A for all
2. YF for man; Hep A and typhoid fever for all
3. YF for man and girl; Hep A for all
4. YF for man and girl; Hep A and typhoid fever for man, MMR for girl; none for woman
5. Postpone trip or change destination

Casus 2: post partum lactating woman, man, girl 1m, boy 5y
Brazil (Rio de Janeiro + excursions) – 3m VFR



Which vaccines would you recommend for this family?

updating basic vaccinations +

1. YF, Hep A, typhoid fever and rabies for all
2. YF, Hep A and typhoid fever for all except for the baby girl
3. YF for man and boy; Hep A and typhoid fever for all except for the baby girl
4. Hep A and typhoid fever for all except for the baby girl; BCG for girl and boy
5. YF for man and boy, Hep A and typhoid fever for all except for the baby girl, BCG for girl, rabies for boy

Casus 3: pregn.woman 1st trim, man, girl 11m, boy 2y6m,
Austria, 3w hiking holiday in June



Which advice would you give to this family?

1. No special recommendations
2. Consider FSME-vaccination for all
+ slow ascent
3. Preventive measures against tick bites for all
+ slow ascent and lodging < 2000m
4. Consider FSME-vaccination for man and boy,
+ preventive measures against tick bites for all,
+ slow ascent and lodging <2000m
5. Consider FSME-vaccination for man and boy,
+ preventive measures against tick bites for all,
+ slow ascent and lodging <1000m

Overview

Specific issues for infants and pregnant ladies

- **General assesment**
- **Vaccinations**
- **Malaria prevention**
- **High altitude**
- **Air travel**
- **General advice (including traveler's diarrhoea)**



Key questions in travel health assessment

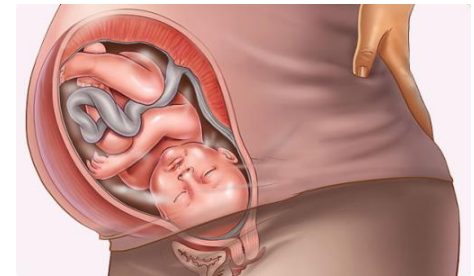
- Who?

- Pregnant lady + foetus
- Infant



- When?

- Why now?
- Season? How long?
- Best time to travel:
 - 2nd trimester
 - infant > 9 months



- Where?

- Itinerary /environment /health care...

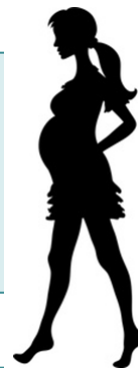
- Why?

- Tourist /expat / VFR...

- What?

- Transport
- Activities / contacts
- Accommodation

Pre-travel evaluation



- Obstetric evaluation (incl ultrasound and lab)
 - Normal pregnancy → travel rarely contraindicated
 - Complicated pregnancies → warrant extra consideration
- Travel
 - higher risk for infections
 - effect of disease or treatment on foetus
 - higher need for interventions
 - quality of medical infrastructure?

→ Postpone travel if risks outweigh benefits

Relative contraindications for travel during pregnancy



- Abnormal presentation
- Fetal growth restriction
- History of infertility
- History of miscarriage or ectopic pregnancy
- Maternal age <15 or >35 years
- Multiple gestation
- Placenta praevia or other placental abnormality

Absolute contraindications for travel during pregnancy



- Abruptio placentae
- Active labor
- Incompetent cervix
- Premature labor
- Premature rupture of membranes
- Suspected ectopic pregnancy
- Threatened abortion, vaginal bleeding
- Toxemia, past or present

Should any of these occurs at destination:
try “bringing care to mother”
instead of
“mother to care”

Trip related contraindications



- Remote areas / insufficient healthcare
- (Resistant) malaria region
- YF endemic zone for previously unvaccinated pregnant women
- Specific outbreaks

Pregnant traveler: education



- management of minor pregnancy discomforts
- recognition of more serious complications
 - bleeding
 - premature labor
 - rupture of the fetal membranes
 - pelvic or abdominal pain
 - symptoms of preeclampsia
 - vomiting, diarrhea, dehydration
 - symptoms of potential DVT or PE

Pregnant traveler: education



- Avoid unaccustomed vigorous activity
- Avoid risky activities
- Do not travel alone
- Prevention / management of travel-associated risks with focus on:
 - traveler's diarrhoea (which medication ok?)
For details see: <http://www.itg.be/itg/Uploads/MedServ/epregnancy.pdf>
 - worm infestations,
 - skin infections,
 - Hepatitis E, toxoplasmosis, listeria, rubella, etc.

Planning



- Identify health care facility at destination
- Insurance
(medical/travel/repatriation + check exceptions)
- Safe food and water
- Emergency medical kit
- Certificats / written medical info



Vaccination in infants and children: basic rules



- **Children < 2y:**

- **Infants < 6 months**

- Circulating maternal antibodies

- immature immune system

- ⇒ ↓ response to live-attenuated vaccines (LAV)

- ⇒ ↑ risk of disease from LAV

- **Infants 6m-2y**

- immature immune system

- ↓ B-cell response - impaired production of IgG

- ↓ collaboration of B- and T-cells

- ⇒ no consistent response to polysaccharide vaccines

- ⇒ adequate response to conjugated vaccines

- **Children ≥ 2y:**

- adequate response to all types of vaccines

Vaccination in infants and children: basic rules



- Vaccines = (primary) prevention
 - Consider benefit/risk ratio
- Contemporaneous administration - separate injections:
 - OK for most vaccines
- Preferred time-interval between different vaccines
 - Inactivated/ protein conjugate/ polysaccharide/ subunit vaccines: 4 weeks (min. 2 weeks)
 - Live attenuated vaccines: 4 weeks

Vaccine type	Vaccines
Inactivated vaccines	DTP-IPV-HB-HiB; DTP; DTP-IPV; dTPa; dT-IPV; IPV Rabies vaccines Hep A vaccines FSME-vaccine JE-vaccine (Ixiaro®)
Protein Conjugate vaccines	Pneumococcal conjugate vaccine (Prevenar13®) Men C-vaccine Men ACYW135 (Menveo®/Nimenrix®)
Subunit vaccines	Hep. B- vaccine
Polysaccharide vaccines	IM Typhoid fever vaccines
Life attenuated vaccines	YF-vaccine MMR-vaccine BCG Oral typhoid fever vaccine Rotavirus-vaccine

Vaccination schedule 2013 (Flanders); 0-15y



	IPV-DTPa- Hib-HBV	Pnc	MBR	MenC	IPV- DTPa	HPV2	dTpa3
Age	Infanrix Hexa	Prevenar13	Priorix	NeisVac- C	Infanrix -IPV	Gardasil	Boostrix
8 weeks	X	X					
12 weeks	X						
16 weeks	X	X					
12 months		X	X				
15 months	X			X			
1st class PS (6 y)					X		
5th class PS (10 y)			X				
1st class SS (12 y)						XXX	
3rd class SS (14 y)							X

Rotavirus vaccination is recommended but not part of the vaccines provided by Flanders. Administration is recommended at ages: 2m and 3m, (4m) 19



Accelerated vaccination with routine pediatric vaccines

Vaccine	Youngest starting age	Minimal interval between doses	# doses needed for a complete primo-vaccination
DTPa-IPV-HiB-HBV	6w	4w	3
PCV13	6w	4w	2
MMR**	6m		1
Rotavirus*	6w	4w	2/3

*Rotarix®: 2 doses or Rotateq®: 3 doses

**MMR: the dose given before age of 12m is considered a supplementary dosis

Vaccines for travel medicine – use in infants and children



	Min. age	Primo- vaccination	booster/ remarks
Hepatitis A	1y	2 doses at d ₀ , 6–12m	none
Typhoid fever	2y	1 dose	3y
Yellow fever	9m (6m)	1 dose	(10y) (ip children <1 (2)y)
Tick-borne encephalitis	1y	3 doses at d ₀ , 1–3m, 9–12m	3y
Meningococcus (ACYW135) (conjugate vaccine)	1y (UK:2m– Menveo®)	1 dose (2 doses, ≥ 1 m apart)	? (1 dose, 12m after primo- vaccination)
Rabies	birth	3 doses at d ₀ ,7,21 or 28	none
Japanese B encephalitis	2m	2 doses at d ₀ and 28	(once after 12–24m), not in <18y olds (Age <3y: ½ dosis)
BCG	birth	1 dose	none

Vaccination in pregnant ladies: principles



- **Consider risk / benefit ratio**
- **Inactivated vaccines:**
 - **generally safe**
 - **administer preferably after 1st trimester**
- **In general: avoid all live attenuated vaccines**
 - **Yellow fever : not in routine**
(not before 6 months; carefully thereafter if really at risk)
- **Never give live-attenuated vaccines with virus with known teratogenic effects**
 - **MMR vaccine** formally contraindicated

Vaccination in pregnant ladies: overview

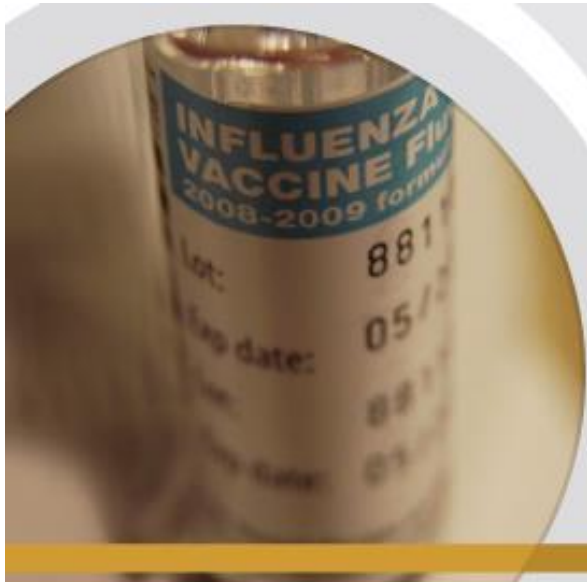


- **tetanus/diphtheria/whooping cough:** specifically indicated; preferably given in 2nd or 3rd trimester
- **influenza:** (inactivated): specifically indicated
- **hepatitis A** preferably as of 2nd trimester
- **hepatitis B** often specifically indicated
- **polio:** injectable inactivated vaccine
- **typhoid fever:** injectable inactivated vaccine
- **meningococcal meningitis:** not in routine; can be given
- **rabies:** not in routine; can be given
- **Frühsommer Meningo-Enzephalitis:** not in routine; can be given
- **Japanese encephalitis:** not in routine; can be given
- **Yellow fever** contraindicated → waiver (after 6m: if strictly indicated)
- **MMR vaccine** formally contraindicated

INFLUENZA



INFLUENZA



TECHNICAL REPORT

ECDC scientific advice on seasonal influenza vaccination of children and pregnant women



INFLUENZA



Risk for travellers

- time of year
- type of travel & contacts (cruise ships, crowds, ...)
- destination
- duration

Influenza: frequent vaccine preventable infection among travelers to tropical and subtropical countries

Ref:

NATHNAC

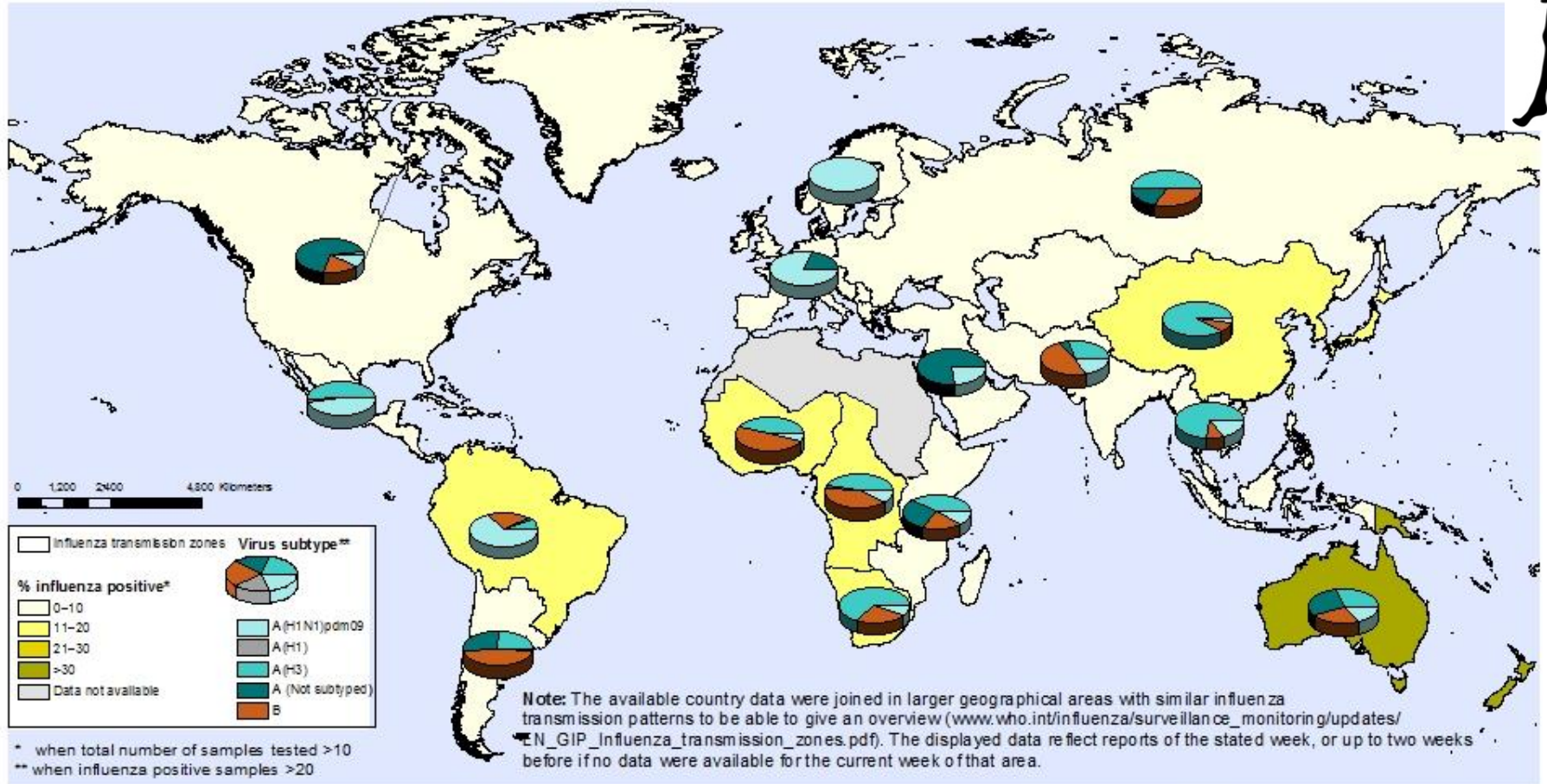
Slaten DD, Mitruka K. Cruise ship travel. CDC. Health Information for International Travel 2012. Elsevier: Atlanta. 2011: 474-8.

Boggild AK, Castelli T, Gautret P et al. Vaccine preventable diseases in returned international travelers: results from the GeoSentinel Surveillance Network. 28;7389-95,2010

Marti F, Steffen R, Mutsch M. Influenza vaccine: a travelers' vaccine? Exp Rev Vac. 7:679-687, 2008

Percentage of respiratory specimens that tested positive for influenza By influenza transmission zone

Status as of week 39
22 - 28 September 2013



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: WHO/GIP, data in HQ as of 08 October 2013. Data used are from FluNet (www.who.int/flu-net), 16:30 UTC snapshot, from WHO regional offices and/or ministry of health websites.

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FSME

Austria

- 1980's: 300-700 hosp. cases/y
- Since introduction of vaccine (vaccination rate: 85%): 50-100 hosp cases/y

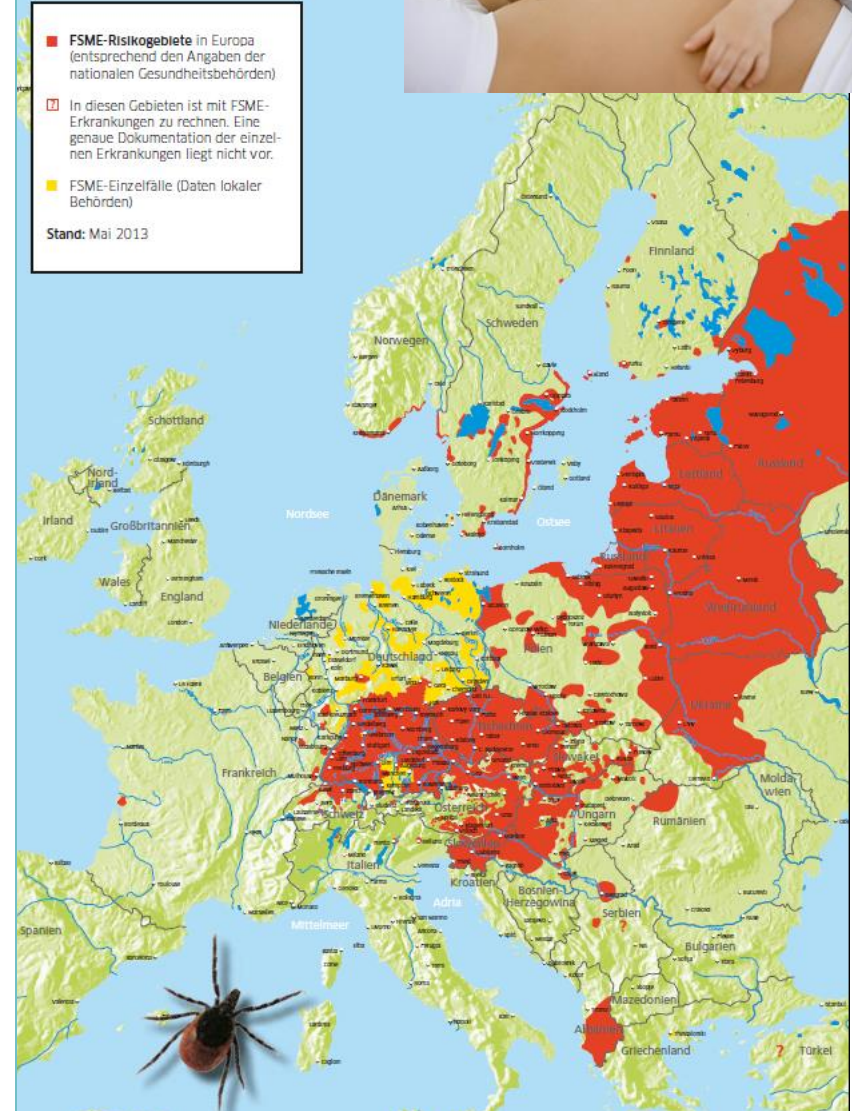
Prevention:

-Avoidance of tick bites

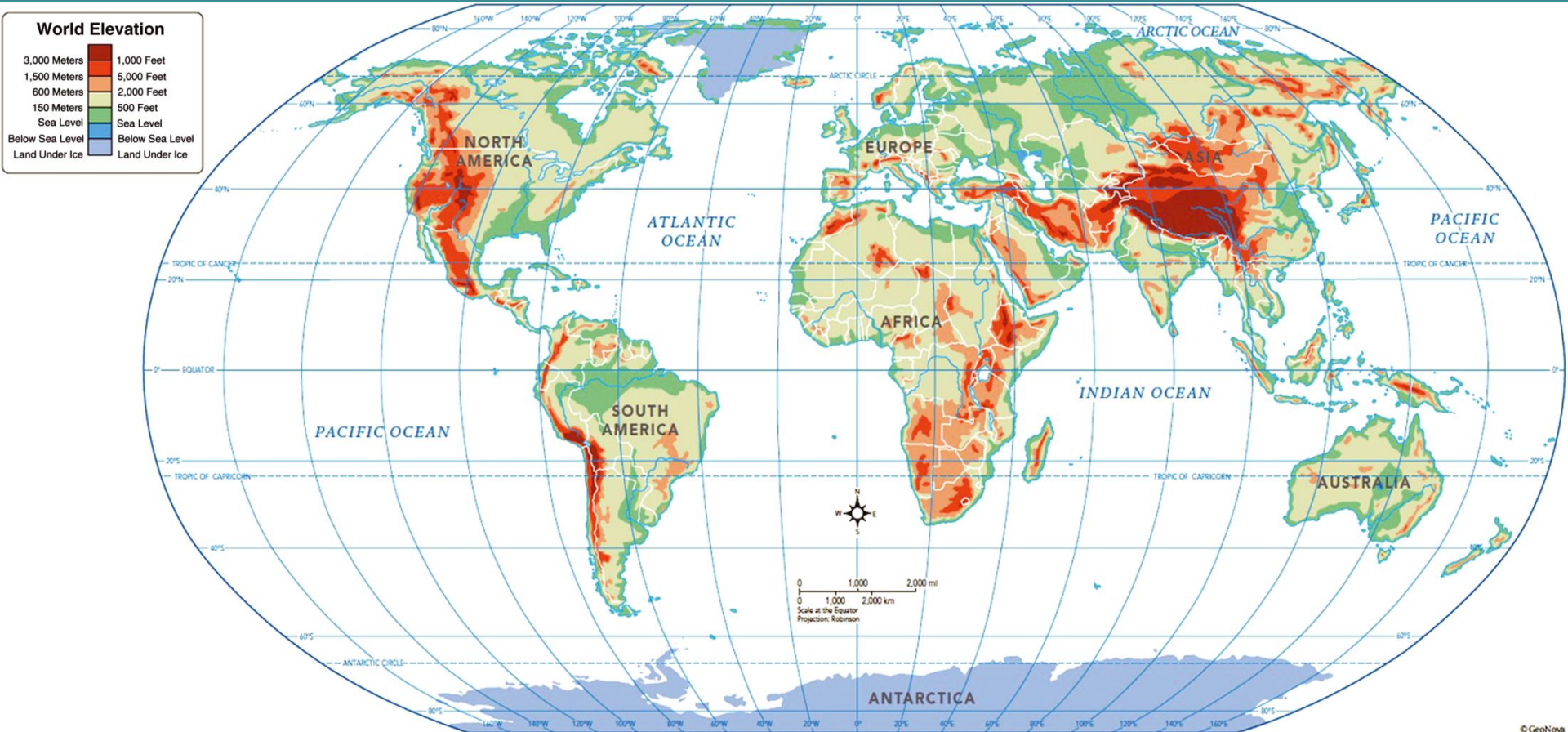
- Clothing
- Daily check for tick bites
- Appropriate removal of ticks
- Application of insect repellent (DEET/icaridine)/ permethrine on cloths

-Vaccination

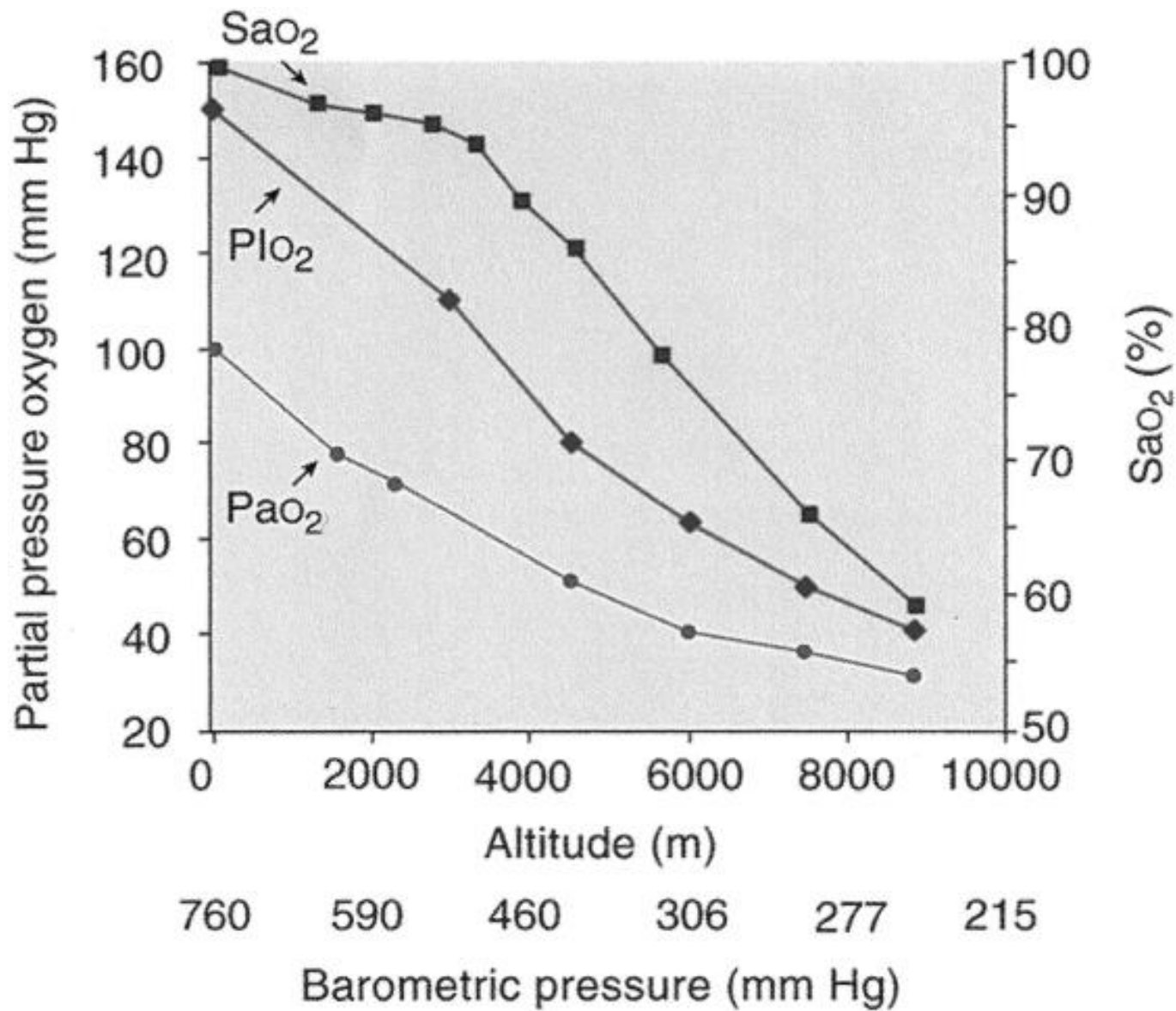
- Schedule: d_0 , 1-3m, 5-12m, booster 3y
- Accelerated schedule: d_0 , d_{14} , 5-12m, booster à 3y
- FSME-Immun/FSME-Immun jr



High Altitude



Netzer et al.



(Data from Morris A: Clinical pulmonary function tests: A manual of uniform lab procedures. Intermountain Thoracic Society, 1984, and Sutton JR, Reeves JT, Wagner PD, et al: Operation Everest II: Oxygen transport during exercise at extreme simulated altitude. *J Appl Physiol* 64:1309-1321, 1988, with permission.)

Altitude Illness in Adults



In setting of recent gain in altitude > 2500m:

- **AMS**
Headache + any of:
 - **gastrointestinal** (anorexia, nausea or vomiting)
 - **fatigue or weakness**
 - **dizziness or lightheadedness**
 - **difficulty sleeping**
- **HACE**: considered “end stage AMS”
 - **change in mental status** and/or **ataxia** in a person with **AMS**
 - mental status changes and ataxia in a person without AMS
- **HAPE**: Symptoms: at least 2 of:
 - **dyspnea** at rest
 - **cough**
 - **weakness** or decreased exercise performance
 - **chest tightness or congestion**
 - Signs: at least 2 of:
 - **crackles or wheezing** in at least one lung field
 - **central cyanosis**
 - **tachypnea**
 - **tachycardia**

Altitude Illness in Children



- **Altitude associated illnesses:** Rapid ascent to altitude >2500m
 - **Acute mountain sickness (AMS):** Freq.: children = adults (~30%)
 - Symptoms: fussiness, lack of playfulness, anorexia, vomiting, sleep problems
 - **High altitude pulmonary edema (HAPE):** Freq.: ~1.5%
 - Symptoms related to hypoxia (dyspnea, tachypnea, cyanosis, ↓ activity tolerance), cough, hemoptysis, fever
 - Possibly fatal
 - **High altitude cerebral edema (HACE):** Freq.: rare
 - Headache, ataxia, behavioral changes, altered mentation, focal neurological signs
 - Possibly fatal
 - **Subacute infantile mountain sickness:** Freq.: 1% infants born from lowland parents
 - Prolonged stay at high altitude with children <1y
 - Pulmonary hypertension and right heart failure
- **Environmental risks: cold and sun**
- **Dehydration**

Risk factors for AMS in children



Risk factor	Comment
Rate of ascent	Adults: rapid ascent is associated with AMS
Absolute altitude gained	Adults: ↑ incidence of AMS with ↑ altitude
exertion	Possible factor in adults
Current cold	↑ Risk for HAPE
Preceding viral resp. infection	↑ Risk for HAPE in lowland children
Unil. absence of right pulmonary artery or prim pulm. hypertension	↑ Risk for HAPE
Perinatal pulm. hypertension or hypoxia	↑ pulm. hypertension
Congenital heart disease	↑ Risk for HAPE
Organized groups	↑ Risk of dying from AMS, because of less flexibility
Reascent to altitude	↑ Risk of HAPE in highland children after a stay in lowland
Individual susceptibility	↑ Risk for AMS

Altitude sickness : preparation of journey

- Education
 - Symptoms
 - (Adapted) Lake Louise scoring system
- Itinerary planning - slow ascent; rest days
- Prevention
 - Graded ascent with time for acclimatisation:
 - $\leq 300\text{m}$ ascent/day above 2500m and 1 rest day every 1000m
 - Drug prophylaxis – to be used only in rare cases
 - Acetazolamide (info relative contraindications)
- Emergency plan
 - Rapid descent should be possible – communication means
 - Access to oxygen
 - Emergency kit (medication and written guidelines)
- Medical and evacuation insurance



High altitude during pregnancy



- Risk of altitude-related illness in mother not increased
- Risk of foetal hypoxia
- Long stay above 2500m → increased rate of complications (bleeding, hypertension, preeclampsia, abruptio placentae, preterm labor, IUM and IUGR)
- **Sleep below 2500m; do not ascend above 4000m**
- **Limit physical exercise**
- **Be vigilant**
- **Avoid dehydration**
- Extra risks: remote area / cold / sun / trauma

High altitude during pregnancy



Contraindications:

- 1st trimester: if high risk of spontaneous abortion
- From 2nd trimester on: if co-morbidities
- From 20 weeks: also if maternal smoking

Remarks:

- Acetazolamide: not in routine as “relatively” contraindicated
- In case of long stay: vigilant IUGR

High altitude – infants: General approach



- Trekking in remote settings
 - Children 0-2y: Lodging \leq 2000m
 - Children 2-10y: lodging \leq 3000m
- Holidays in ski resorts - industrialised countries (most \leq 3000m)
 - Ok for children, even infants
 - Appropriate care is available
- VFR at high altitude with baby from lowland parents
 - Healthy baby: wait until 6 weeks old
 - Preterm or diseased infant: ask for specialised advice

Children's Lake Louise Score (0-4y)



- **Diagnosis of AMS:** - Ascent in last 4 days
 - CLLS-score ≥ 7 , with fussiness score ≥ 4 and ped. symptom score ≥ 3

Table 1. PEDIATRIC SYMPTOM SCORE

			<i>score</i>
Rate how well your child has eaten today	Normal	0	
	Slightly less than normal	1	
	Much less than normal	2	
	Vomiting or not eating	3	
Rate how playful your child is today	Normal	0	
	Playing slightly less	1	
	Playing much less than normal	2	
	Not playing	3	
Rate ability of your child to sleep today	Normal	0	
	Slightly less or more than normal	1	
	Much less or more than normal	2	
	Not able to sleep	3	
			<i>SCORE PSS</i>

Children's Lake Louise Score (0-4y)

Table 2. FUSSINESS SCORE

score

Amount of unexplained fussiness								
0	1	2	3	4	5	6		
No fussiness		Intermittent fussiness			Constant fussiness when awake			
Intensity of fussiness								
0	1	2	3	4	5	6		
No fussiness		Moderate fussiness			Hard crying and extreme fussiness			
							<i>SCORE FS</i>	

Score PSS	
+ Score FS	
TOTAL SCORE	

AMS in children treatment



Acute mountain sickness

Mild

1. Rest (stop further ascent) or preferably descend until symptoms cease (particularly with younger children).
2. Symptomatic treatment, such as analgesics and antiemetics.

Moderate (worsening symptoms of AMS despite rest and symptomatic treatment)

1. Descent
2. Oxygen
3. Acetazolamide 2.5 mg/kg/dose p.o. 8 to 12 hourly (maximum 250 mg per dose)
4. Dexamethasone 0.15 mg/kg/dose p.o. 6 hourly
5. Hyperbaric chamber (only used to facilitate descent, which should be undertaken as soon as possible)
6. Symptomatic treatment, such as analgesics (acetaminophen, ibuprofen) and antiemetics in appropriate pediatric doses. Use of aspirin is not recommended in young children, due to the association with Reyes syndrome.

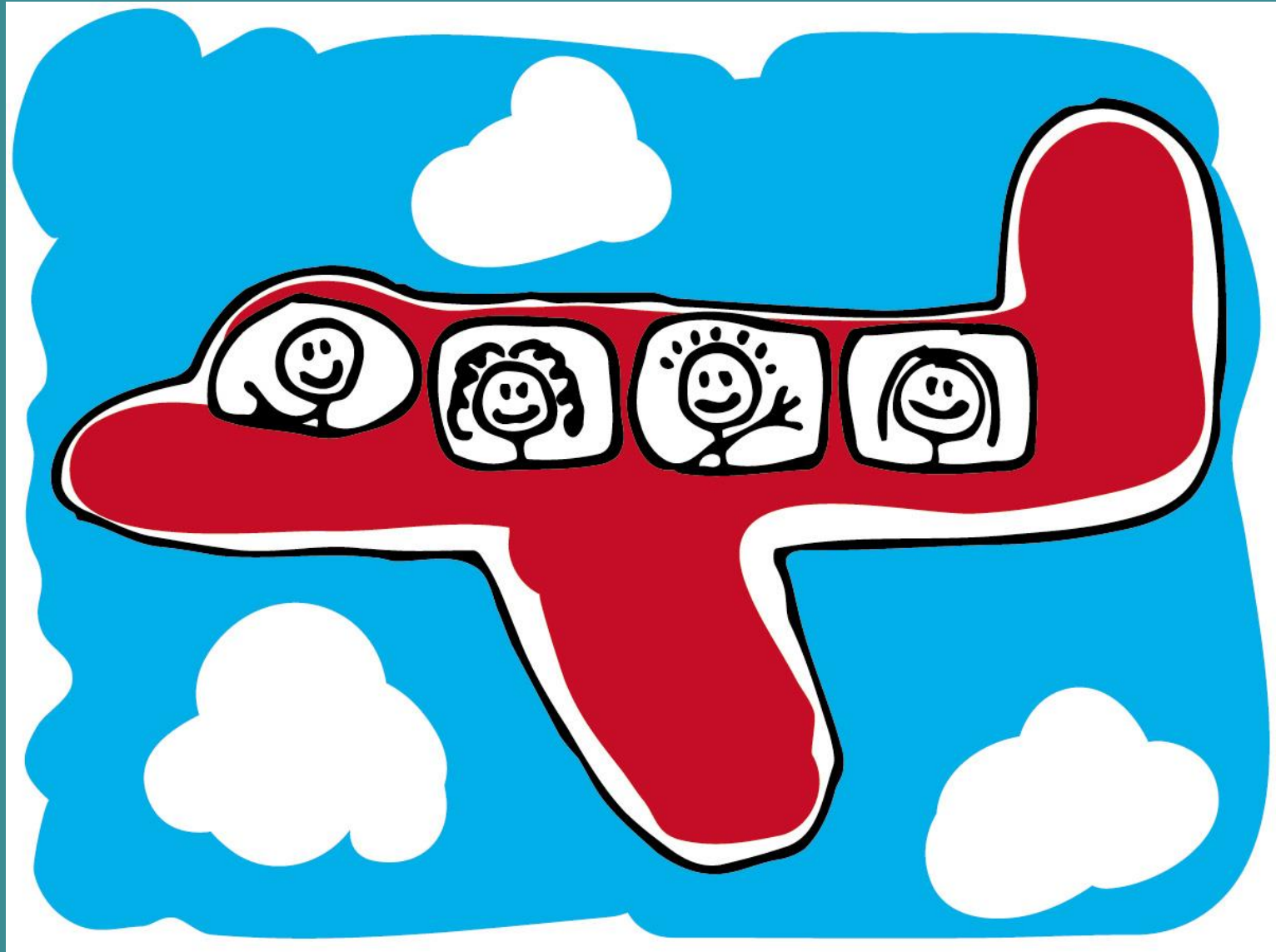
High altitude pulmonary edema

1. Descent
2. Sit upright
3. Oxygen
4. Nifedipine 0.5 mg/kg/dose p.o. 8 hourly (maximum 20 mg for capsules and 40 mg for tabs, slow release preparation is preferred). Nifedipine is necessary only in the rare case when response to oxygen and/or descent is unsatisfactory.
5. Use of dexamethasone should be considered because of associated HACE.
6. Hyperbaric chamber (only used to facilitate descent, which should be undertaken as soon as possible)

High altitude cerebral edema

1. Descent
 2. Oxygen
 3. Dexamethasone 0.15 mg/kg/dose p.o. 6 hourly
 4. Hyperbaric chamber (only used to facilitate descent, which should be undertaken as soon as possible)
-

Air travel



Air travel during pregnancy

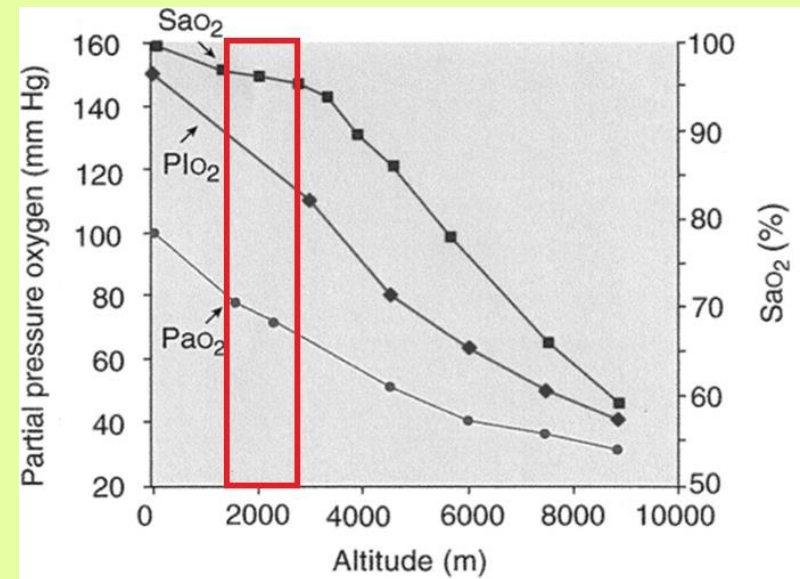


- Check **airline regulations** (certificates ?)
 - No intercontinental flights after 32w
 - No flights after 36w
 - Lapse between delivery and first flight: min 7 days
- **Comfort:** aisle seat (upgrade)
- Fasten the **lap belt** under abdomen
- **Promote circulation:** mobilisation
- **Drink plenty of fluids**
- caveat for frequent fliers (e.g. pilots): cosmic radiation

Airtravel with children



- **Pressurised aircrafts**
equivalent of 1500-2500m
- **Ears/sinusses**
 - ~15% of children
 - Bottel feeding/ nasal drops
- **Hypoxia**
 - Adults: Resp. stimulation
 - Newborns (0-14d): resp stimulation followed by resp suppression
 - Preterm BB: apnoea
- **British Airways**
 - $>34 \cdot 10^6$ passengers/y
 - ~750.000 inf/10y - no SIDS



Pre-flight assessment for infants and children



- Term infants (>37w): wait until 1w after birth term (= GA of 41w)
- Preterm born infants (<37w): not yet at birth term (GA:40w): availability of inflight O₂ in case of resp symptoms
- Infants <1y with neonatal chronic resp problems: advice of Pediatric Pulmonologist (and HCT)
- Children with chronic lung dis (CF,..): if FEV₁<50% pred. => advice of Pediatric Pulmonologist (and HCT)
- Infants/children with chronic O₂-therapy: double the O₂-flow rate during the flight. No HCT needed.
- Infants/children with longterm O₂-therapy in last 6m: advice of Pediatric Pulmonologist (and HCT)

Hypoxic challenge test



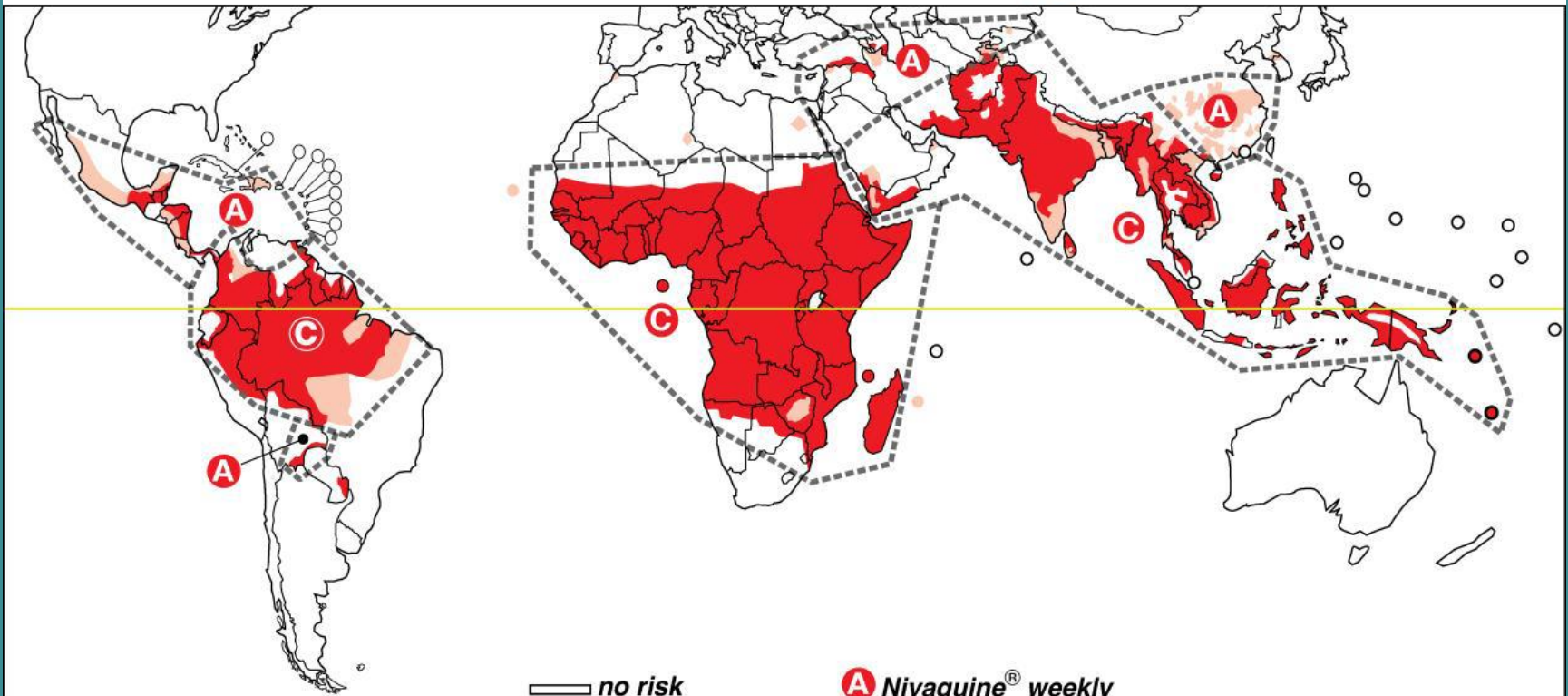
Body box plethysmograph

Box 1 Hypoxic challenge test (HCT) in infants or young children

The infant or young child, wearing nasal cannulae, is placed in a whole body plethysmograph with a parent or carer and baseline oxygen saturation (SpO_2) is monitored for a few minutes until the reading is stable. The air in the body box is then diluted to 15% oxygen with nitrogen. If SpO_2 falls to $<85\%$ (infants <1 year of age) or $<90\%$ (older children), supplementary in-flight oxygen is recommended. The flow required is determined by titrating oxygen via the nasal cannulae to restore SpO_2 to the original value. This will usually be 1–2 l/min. Where whole body plethysmography is not available, a tight-fitting non-rebreathing face mask incorporating a one-way valve assembly may be used through which high-flow 14% oxygen is administered, although this may not be as reliable.

malaria

Malaria 2010-2011 (source WHO 2009)



— no risk
— limited risk
— elevated risk

A Nivaquine[®] weekly

C Malarone[®] or doxycycline daily; Lariam[®] weekly

for details : see www.itg.be

Malaria prevention infants



- **A: Awareness**
- **B: Anti-Bite**
- **C: Chemoprophylaxis**
 - Chloroquine (Nivaquine®)
 - Dosage: 5mg/kg 1x/w; 1w prior to 4w after the journey
 - Mefloquine (Lariam®)
 - Infants \geq 5kg BW
 - contra-indication:
 - hyperthermic seizures and age $<$ 6y
 - psychological disorders (also use of Rilatine®)
 - Side effects: incidence children = adults
 - Dosage: 5mg/kg; 1x/w 3w prior to 4w after the journey
 - Atovaquone-proguanil (Malarone®)
 - Infants \geq 5kg BW
 - 1/4 co/10kg 1x/d; 1d prior to 7d after the journey
 - Doxycycline (Vibratab®/ Vibramycine®)
 - Not in children $<$ 8y
 - 1x/d 2mg/kg (max 100mg)
- **D: prompt diagnosis at first symptoms**

Malaria pregnant ladies



- **A: Awareness**

- **B: Anti-Bite**

(DEET: prefer 20-30%)

- **C: Chemoprophylaxis**

- **Chloroquine (Nivaquine®)** considered safe
- **Mefloquine (Lariam®)** : considered safe from 2nd trimester (in specific circumstances also earlier: expert advice)
- **Atovaquone-proguanil (Malarone®)** : lack of data
- **Doxycycline**: teratogenicity; conflicting data

- **D: prompt diagnosis** at first symptoms

For details and dosage see: <http://www.itg.be/itg/Uploads/MedServ/epregnancy.pdf>



Plan and prepare !!!



Safe transport means

plan itinerary

ask advice in time (>2m ahead)



Emergency medical kit

travel and evacuation insurance

Protection from sun and cold

References and further reading

- Traveling during pregnancy
 - ITM Antwerp: <http://www.itg.be/itg/Uploads/MedServ/epregnancy.pdf>
 - CDC Yellow book: <http://wwwnc.cdc.gov/travel/yellowbook/2014/chapter-8-advising-travelers-with-specific-needs/pregnant-travelers>
 - Jay S. Keystone. Travel Medicine 3rd edition. Chapter 22: The pregnant and breastfeeding traveler. (including good overview of drug safety during pregnancy)
- Traveling with infants
 - ITM Antwerp: <http://www.itg.be/itg/Uploads/MedServ/echildren.pdf>
 - <http://wwwnc.cdc.gov/travel/yellowbook/2014/chapter-7-international-travel-infants-children/traveling-safely-with-infants-and-children>
 - www.zorg-en-gezondheid.be/basisvaccinatieschema
 - Children at High Altitude: An International Consensus Statement by an Ad Hoc Committee of the International Society for Mountain Medicine. HIGH ALTITUDE MEDICINE & BIOLOGY 2001; 2 (3)
 - BTS guidelines air travel Thorax 2011;66:i1-i30
- General
 - Gezond op reis. Fons Van Gompel & Paul Geerts
 - Reizen en ziekte. A.M.L Van Gompel & G.J.B. Sonder