Vaccine preventable diseases in travelers

Epidemiology and preventive strategies

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Conflict of interest declaration

I have or had within the past 3 years financial relationships

(honorarium or grants for research, support to attend meetings, paid lectures, advisory boards) with:

Vaccine producers

GlaxoSmithKline (Novartis Vaccines and Diagnostics)
Mérieux (Fondation)
Pfizer
Takeda
Valneva

Drug manufacturers (Travelers' diarrhea)

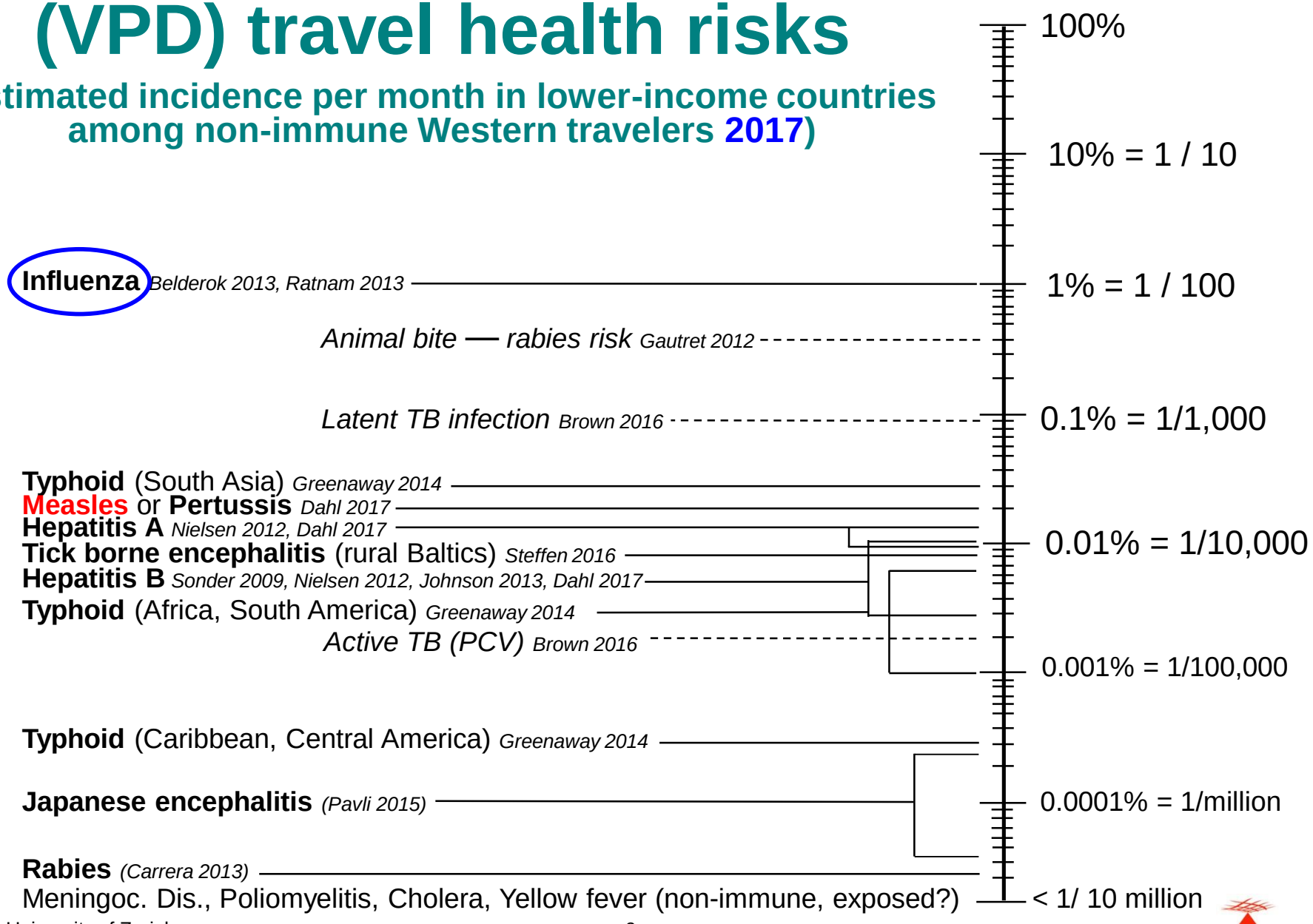
Dr. Falk Pharma GmbH
Host Therabiomics / Clasado

Drug manufacturers (Malaria)

Biointelect — Sixty Degrees Pharmaceuticals

Vaccine Preventable Disease (VPD) travel health risks

(Estimated incidence per month in lower-income countries among non-immune Western travelers 2017)



Influenza: high risk population

- Cruises in cool climate
  - July/August: Alaska, Northern Europe
  - December to April: South America, Antarctica
- Scenario: outbreak on board
  - Acute respiratory illness, ILI
  - Influenza frequent (70%) → Pneumonia, **death**
- **Elderly high risk**

ISTM / ESWI Initiative (2017):
- **Prolong shelf life of vaccine**
- **Opposite hemisphere vaccine available**

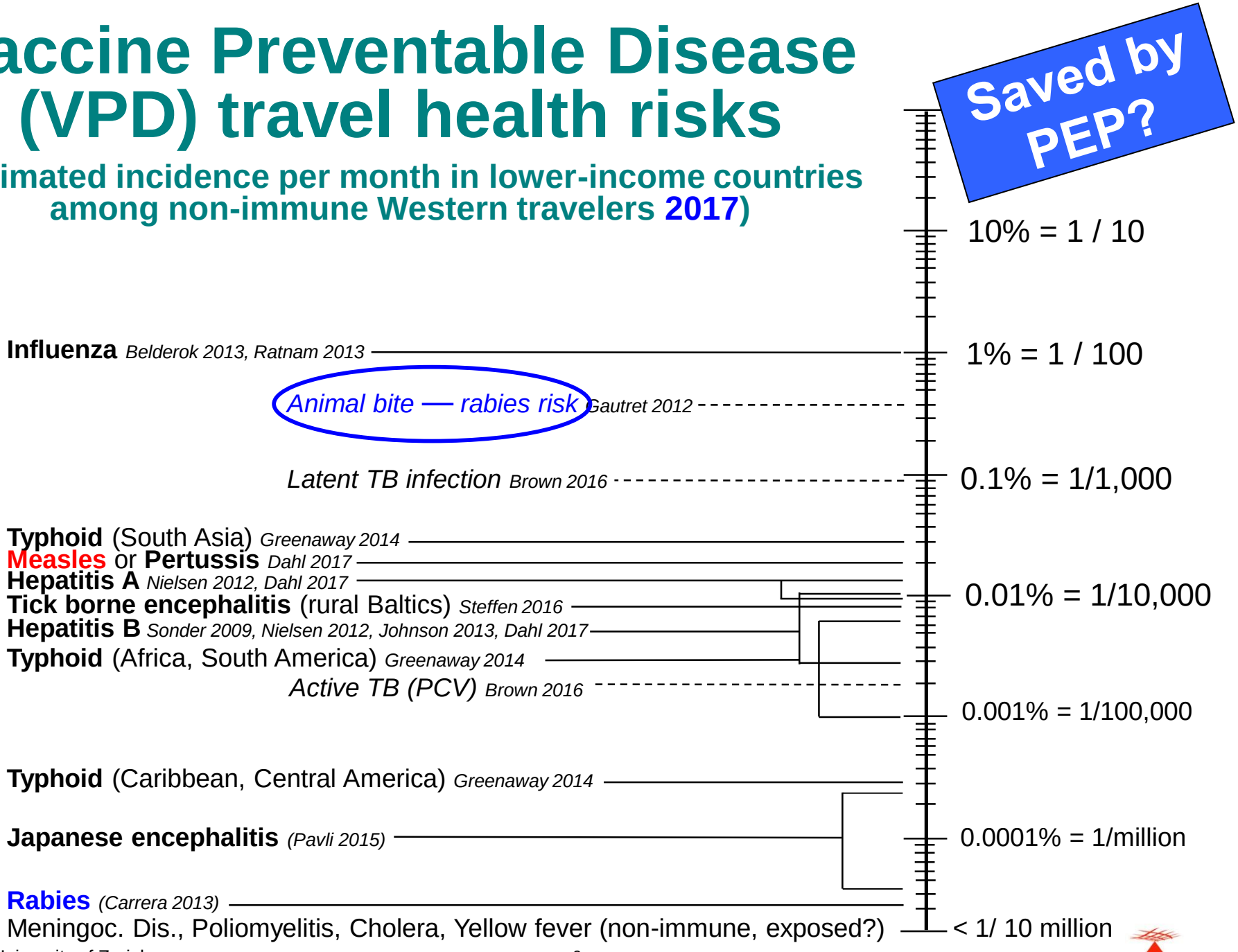
Goeijenbier M et al. J Travel Med. 2017; 24:taw078.

Mütsch M et al Clin Infect Dis. 2005; 40:1282-87.
Pavli A et al. Travel Med Infect Dis. 2016; 14:389-97.
Millman AJ et al. J Travel Med. 2015; 22:306-11.
Leder K, Torresi J et al, Ann Intern Med. 2013; 158:456-68.

Influenza in Paris — trivial?

Vaccine Preventable Disease (VPD) travel health risks

(Estimated incidence per month in lower-income countries among non-immune Western travelers **2017**)



Risk of rabies exposure in travelers

Population	N: Bitten / Total	Destination	Bitten / Month	Ref.
US Peace Corps	175 / > 2,000	Worldwide	0.4%	1
Expatriates	72 / N/A	Worldwide	0.2%	2
Tourists Expatriates	56 / N/A 43 / N/A	Nepal Nepal	0.02% 0.06%	3
Backpackers	6 / 870	Thailand	0.7% (licked: 3.6%)	4
Metaanalysis	**N/A / approx. 1.27 mill.**	**Various**	**0.4%** (range 0.01 – 2.3)	5
Travelers BKK AP	66 / 7,681	Thailand	1.1%	6
Japanese expatriates Japanese travelers	105 / 1,208 9 / 590	Thailand Thailand	0.2% 4.3%	7

1 Bernard K & Fishbein DB. Vaccine. 1991; 9:833-6.
2 Hatz CF et al. Vaccine. 1995; 13:811-5.
3 Pandey P et al. J Travel Med. 2002; 9:127-31.
4 Piyaphanee W et al. Am J Trop Med Hyg. 2010; 82:1168-71.
5 Gautret P & Parola P. Vaccine. 2012; 30:126-33.
6 Piyaphanee W et al. PLoS Negl Trop Dis. 2012; 6:e1852.
7 Kashino W et al. J Travel Med. 2014; 21:240-7.

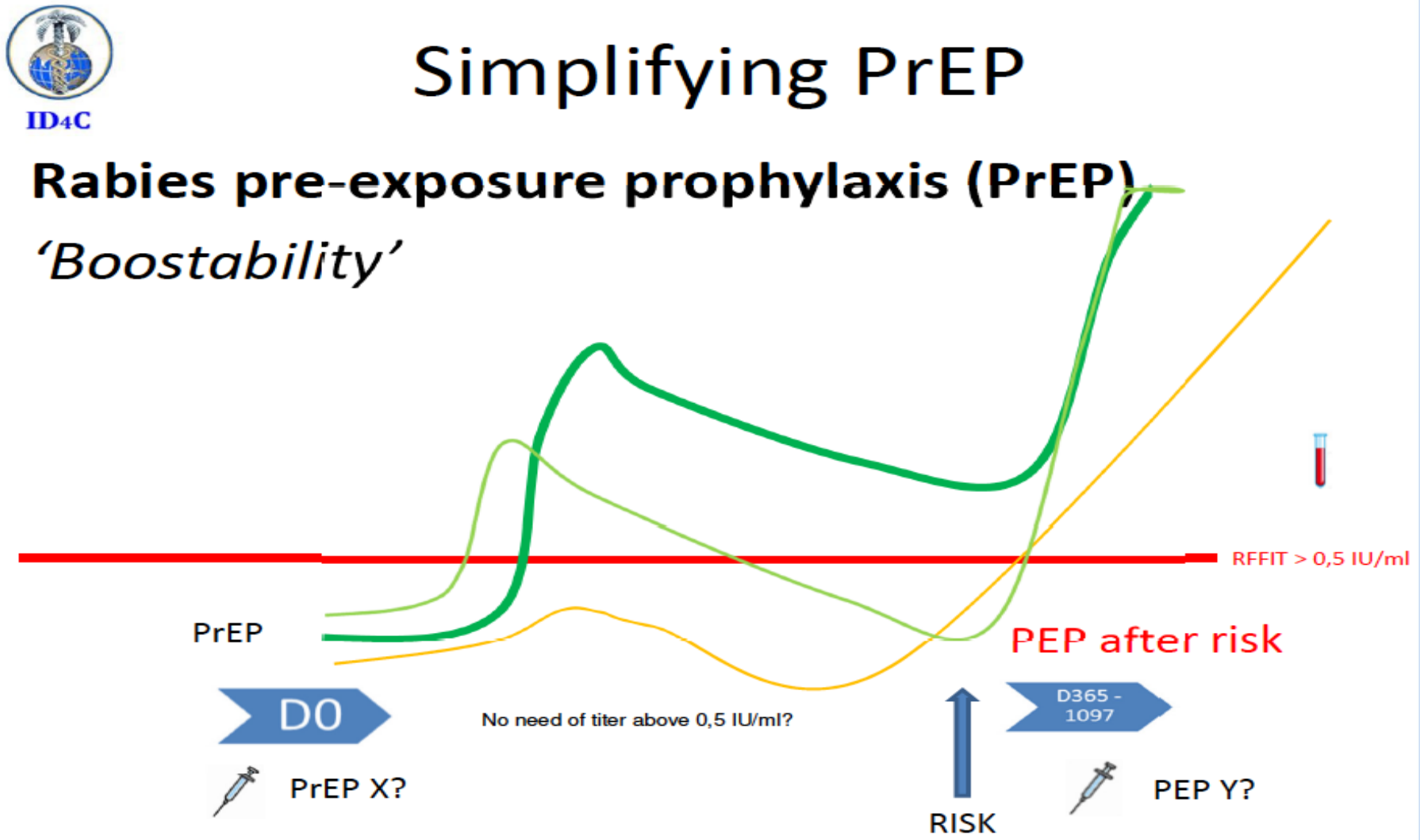
Conclusion:
- **Considerable risk in Asia**
- **India? Africa? No data!**

60 fatal rabies cases in travelers 1990 – 2012

Carrara P et al. PLoS Negl Trop Dis. 2013; 7:e2209.

GRID

Basing on the principle of priming

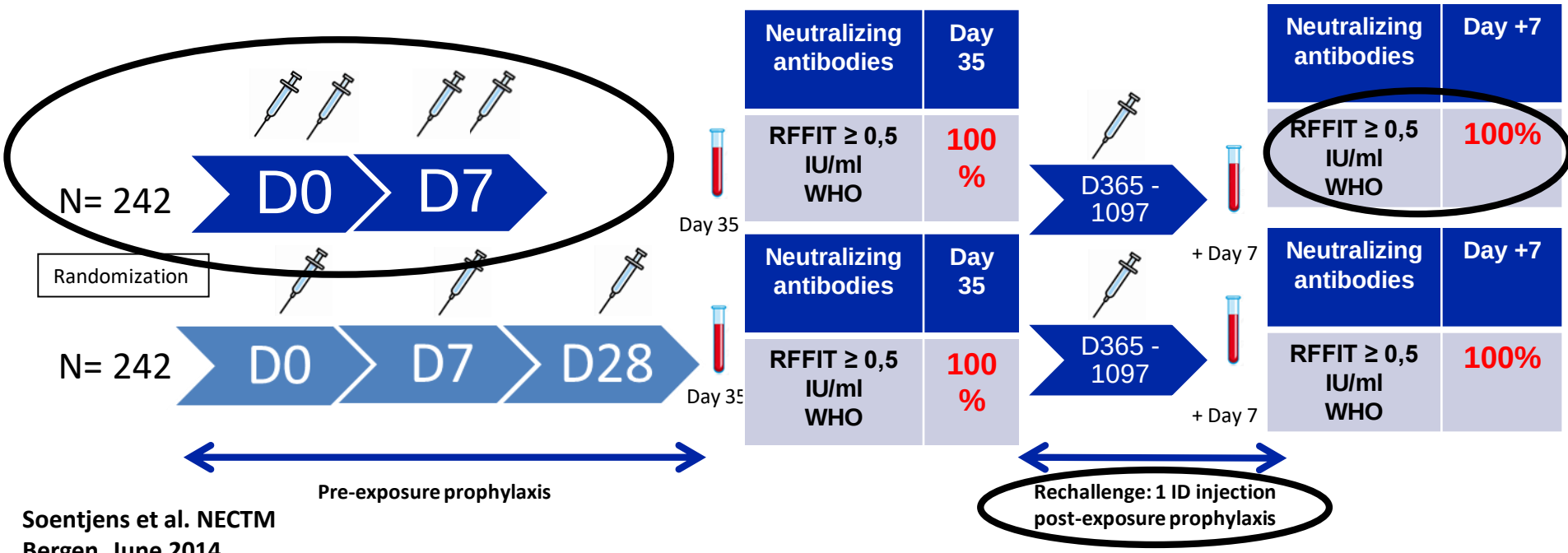


Courtesy Dr. Patrick Soentjens, ITM Antwerp, Belgium

RCT1: Simplifying Rabies PrEP to two visits
Vaccine d0, d7, d28 1x ID compared to Vaccine d0, d7 2x ID

NOTE: d0, d7 priming NOT endorsed by WHO or anybody else

SAGE will consider (endorse?) shorter PrEP → Revision TRS

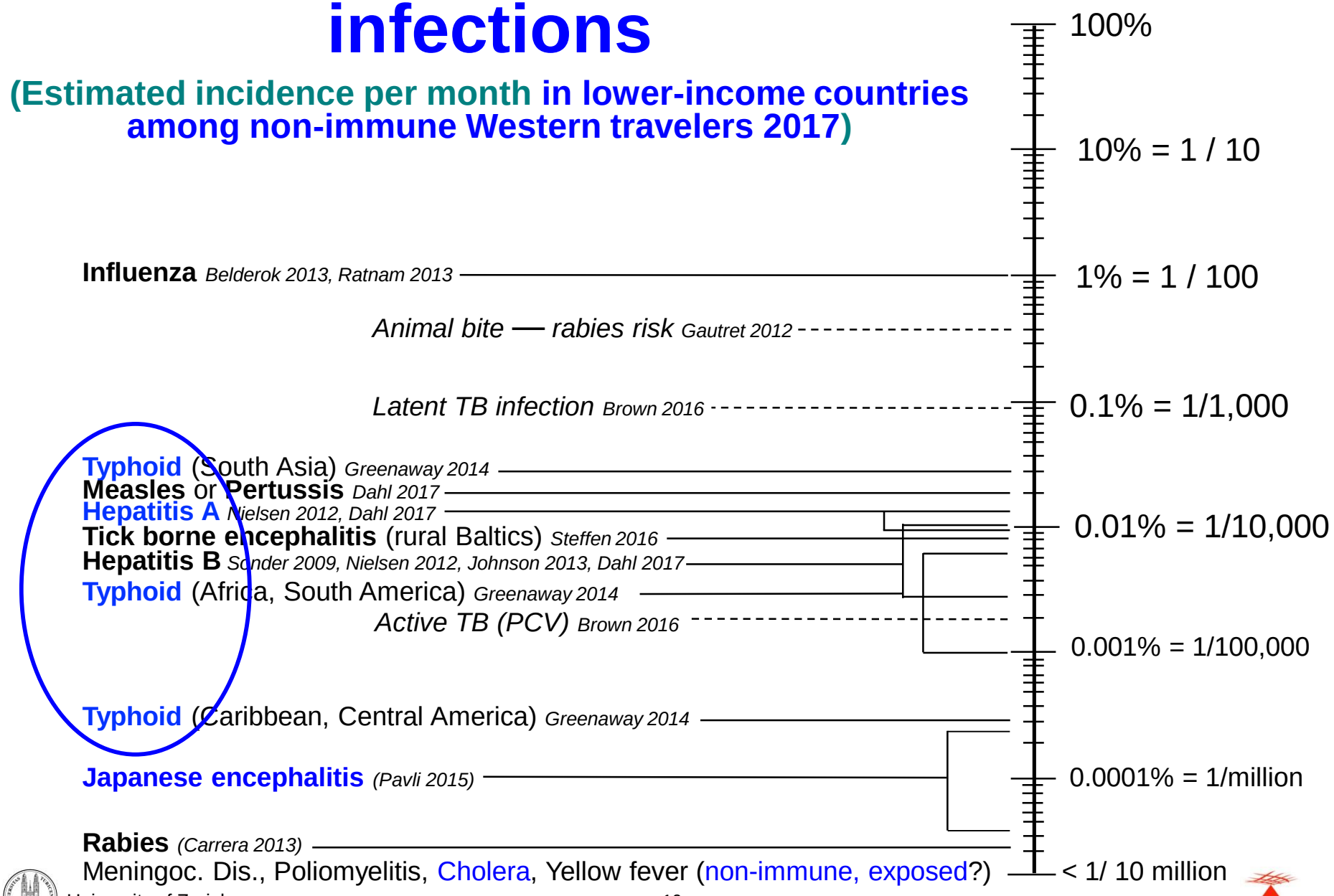


Soentjens et al. NECTM Bergen, June 2014, London, June 2016.

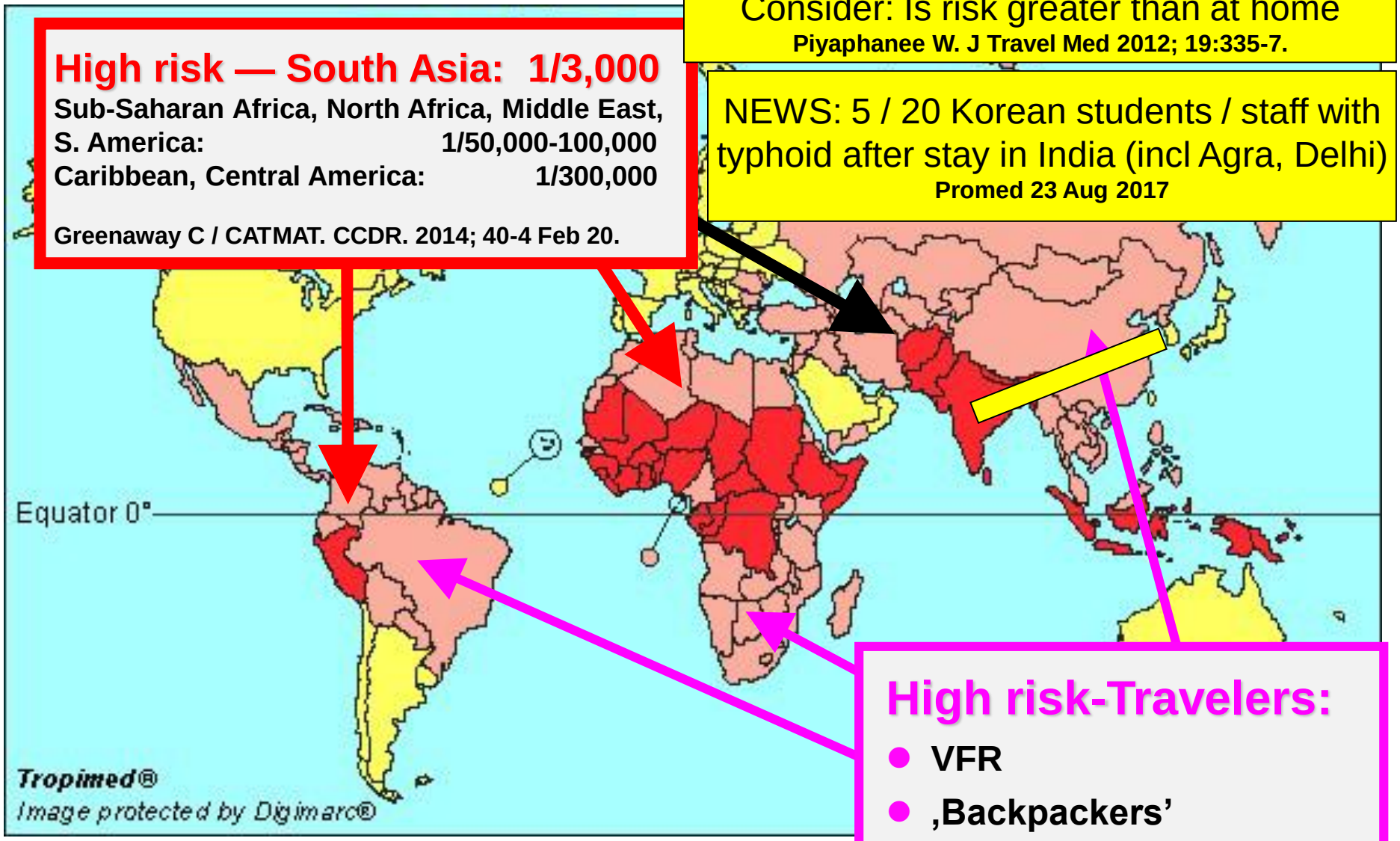
Courtesy Dr. Patrick Soentjens, ITM Antwerp, Belgium

‘Classical’ travel related infections

(Estimated incidence per month in lower-income countries among non-immune Western travelers 2017)



Typhoid risk in travellers



High risk — South Asia: 1/3,000

Sub-Saharan Africa, North Africa, Middle East, S. America: 1/50,000-100,000
Caribbean, Central America: 1/300,000

Greenaway C / CATMAT. CCDR. 2014; 40-4 Feb 20.

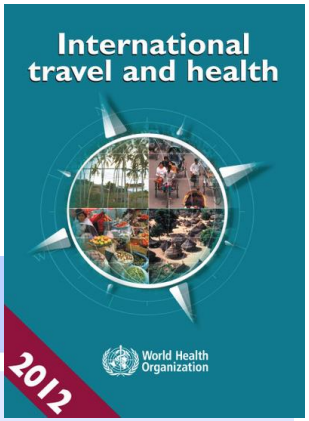
Consider: Is risk greater than at home
Piyaphanee W. J Travel Med 2012; 19:335-7.

NEWS: 5 / 20 Korean students / staff with typhoid after stay in India (incl Agra, Delhi)
Promed 23 Aug 2017

High risk-Travelers:

- **VFR**
- **‚Backpackers'**
- **Stay > 1 month**

WHO Map of HAV Risk Areas



Hepatitis A, countries or areas at risk

Consider: Is risk greater than at home

Piyaphanee W. J Travel Med 2012; 19:335-7.

Incidence rate per month now 1 per 3000 non-immune travelers

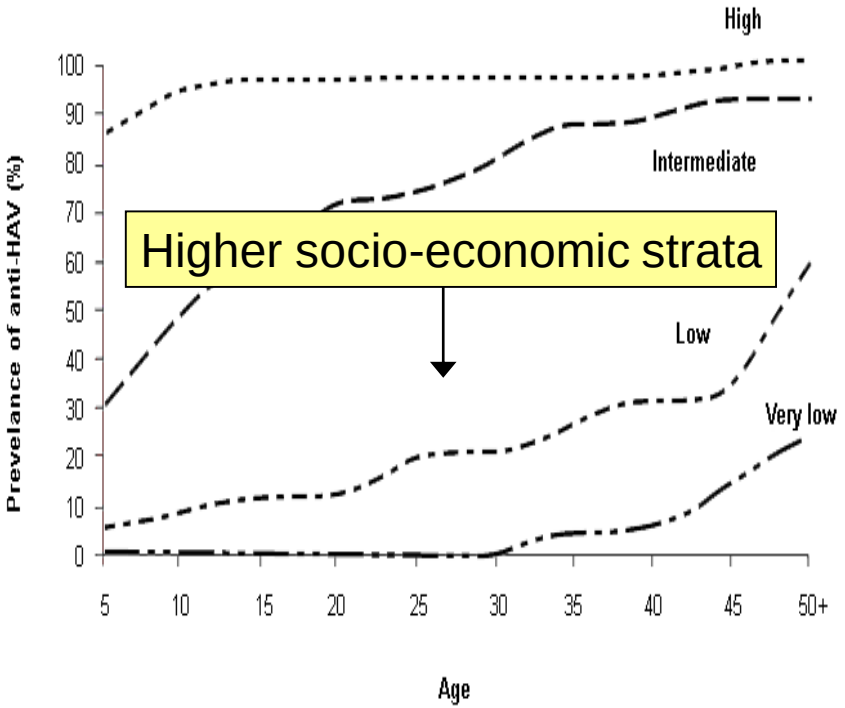
The risk of infection is based on the estimated prevalence rate of antibody to hepatitis A virus (anti-HAV) –a marker of previous HAV infection- among population. This marker is based on limited data and may not reflect current prevalence.

Countries or areas with moderate to high risk

0 1,250 2,500 5,000 Kilometers

Hepatitis A — individual impact

- Incapacitation **4-10 weeks**
  - younger flight attendants short
  - older airline pilots longer
- Case fatality rate
  - ≥ 40 years old **2.1%**
  - ≥ 60 years old **4.0%**
- Early childhood
  - infection usually **asymptomatic**
  - viral shedding
    → **outbreak** e.g. kindergarden
    → teachers, parents **symptomatic**

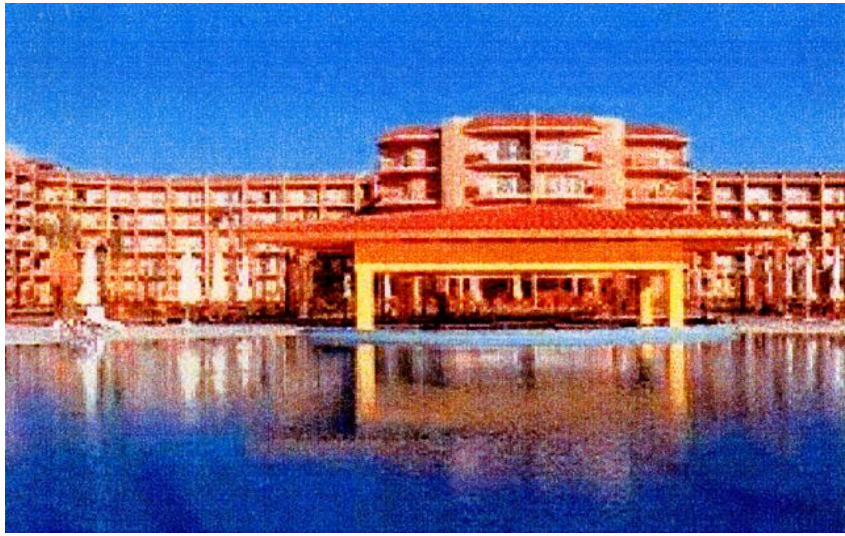


Age-specific seroprevalence of anti-HAV depending on endemicity / socio-economic / hygienic conditions

Gutersohn T et al. Aviat Space Environm Med. 1996; 67:153-6.
Ly KN & Klevens RM. J Infect Dis. 2015; 212:176-82.

PH relevance of travel related hepatitis A

- **Outbreak: 352 Tourists** (Germans) 2004 after a stay in the Siva Grand Beach Hotel, Hurghada, Egypt (Orange juice!)
- 2012/13 also **n=80**
- **Outbreaks** in kindergardens, day-nurseries
- **Outbreaks** associated with food-handlers
- **Outbreaks** associated with mixed berries
- Clusters around adopted children, refugees



Guzman-Herrador BR et al. Arch Virol. 2015; 160:2823-6.
MacDonald E et al. Eurosurveillance. 2013; 18:pii: 20473.

EUROPRIDE — Mass gathering AMS 2016 → Hepatitis A outbreaks **among MSM** in

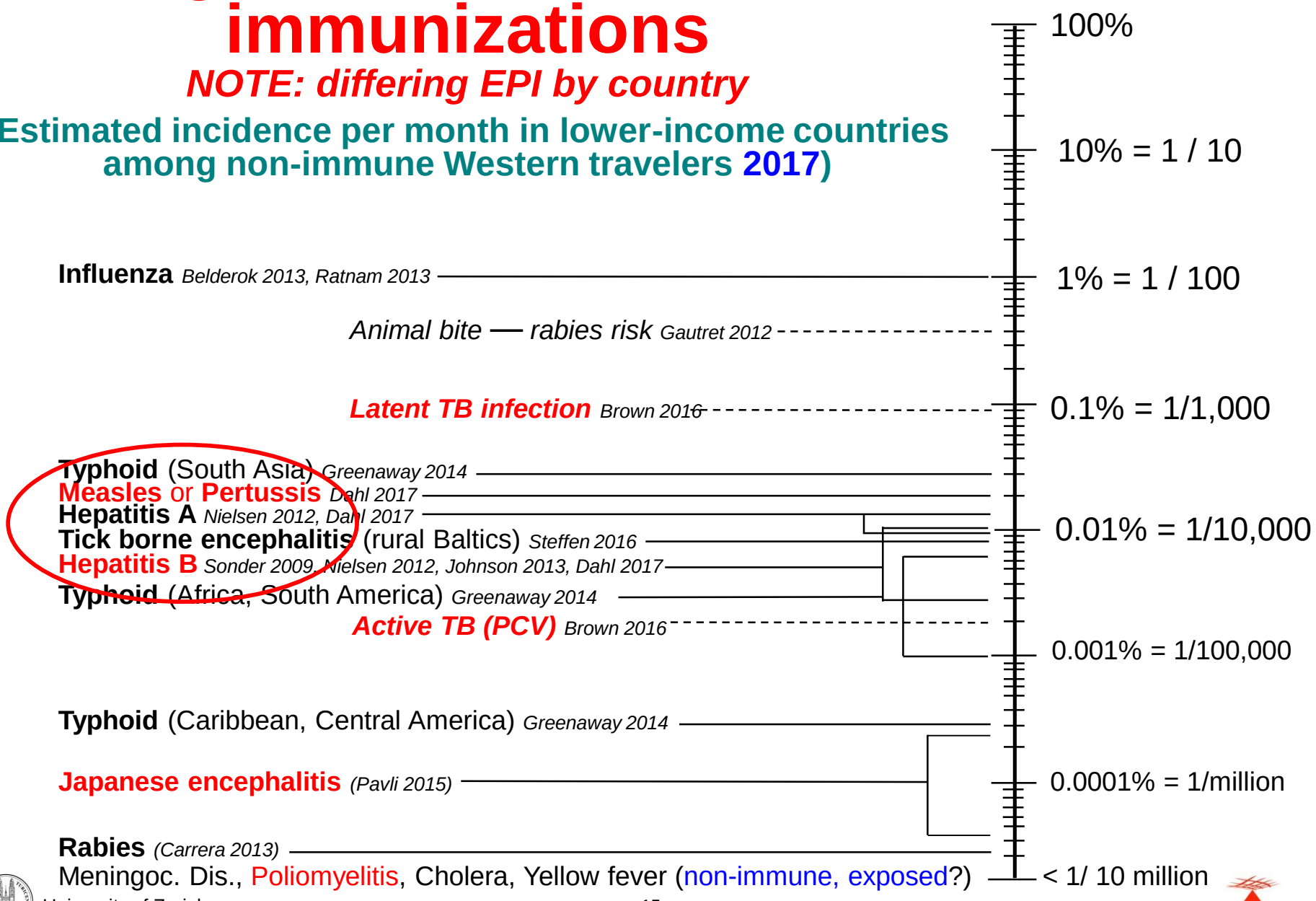
- **15 European countries (n = 1,173)**
- Israel

Gozlan Y et al. Euro Surveill. 2017 Jul 20; 22. pii: 30575.
Freidl GS et al. Euro Surveill. 2017 Feb 23; 22. pii: 30468.

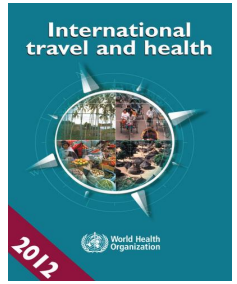
Neglected routine / EPI immunizations

NOTE: differing EPI by country

(Estimated incidence per month in lower-income countries among non-immune Western travelers 2017)



Infections preventable by routine vaccination in travelers (WHO/ITH 2017)

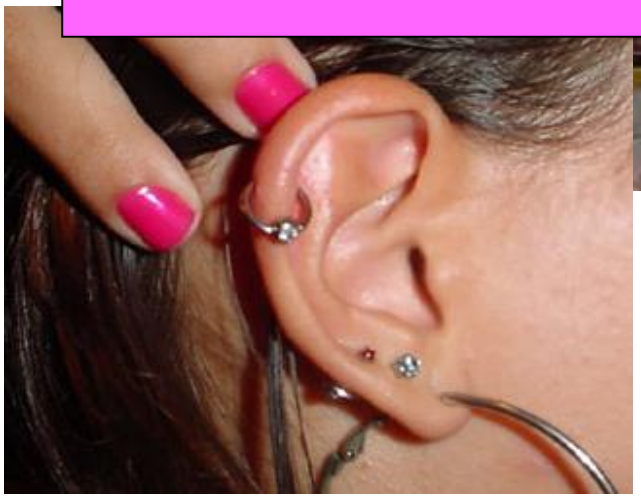


Vaccine	N =	Travel history	Reference
Diphtheria	Rare	Afghanistan > Finland (asylum), USSR	Sane J 2016
Tetanus	1	German in Spain	Werner GT 1985
Pertussis	Many	European, Americans	Dahl V 2017, Barbosa F 2017, Gomez-Junient J, 2015
Hepatitis B	Many	Immigrants, Scandinavians	Dahl V 2017, Daw MA 2017, Boggild AK 2015, Lachish 2013
Measles	Many	Europeans, Japanese in USA, etc.	Dahl V 2017, Barrett P 2016, Zhangzhu J 2016, Jost M 2015
Mumps	Some	N/A	Dahl V 2017, MMWR 2006
Rubella	Few	Yemen > US, various > Scandinavia	Robyn M 2017, Dahl V 2017
Poliomyelitis	1	Pakistan > Australia (student)	Stewardson AJ, Carnie JA 2009
Pneumococcal	Rare	Hajj pilgrimage	Memish ZA 2017, Boggild 2010
Rotavirus	1	India > Hungary	Laszlo B 2009
Tuberculosis	Many	Immigrants, VFR, Peace Cps, Expats	Lim PL 2012, Jung P 2008
Varicella	Many	Various, immigrants	Siikamäki H 2017, Boggild 2010

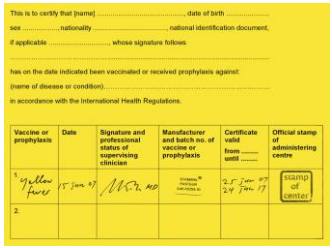
No data on *Haemophilus influenzae* B, Human Papilloma Virus

Travel related risk of hepatitis B

10 - 15% in high-risk situation:
Willingly vs. not predictable



Legally required travel vaccines


This is to certify that [name] ..... date of birth .....
sex ..... nationality ..... national identification document,
if applicable ....., whose signature follows
.....
has on the date indicated been vaccinated or received prophylaxis against:
(name of disease or condition) .....
in accordance with the International Health Regulations.

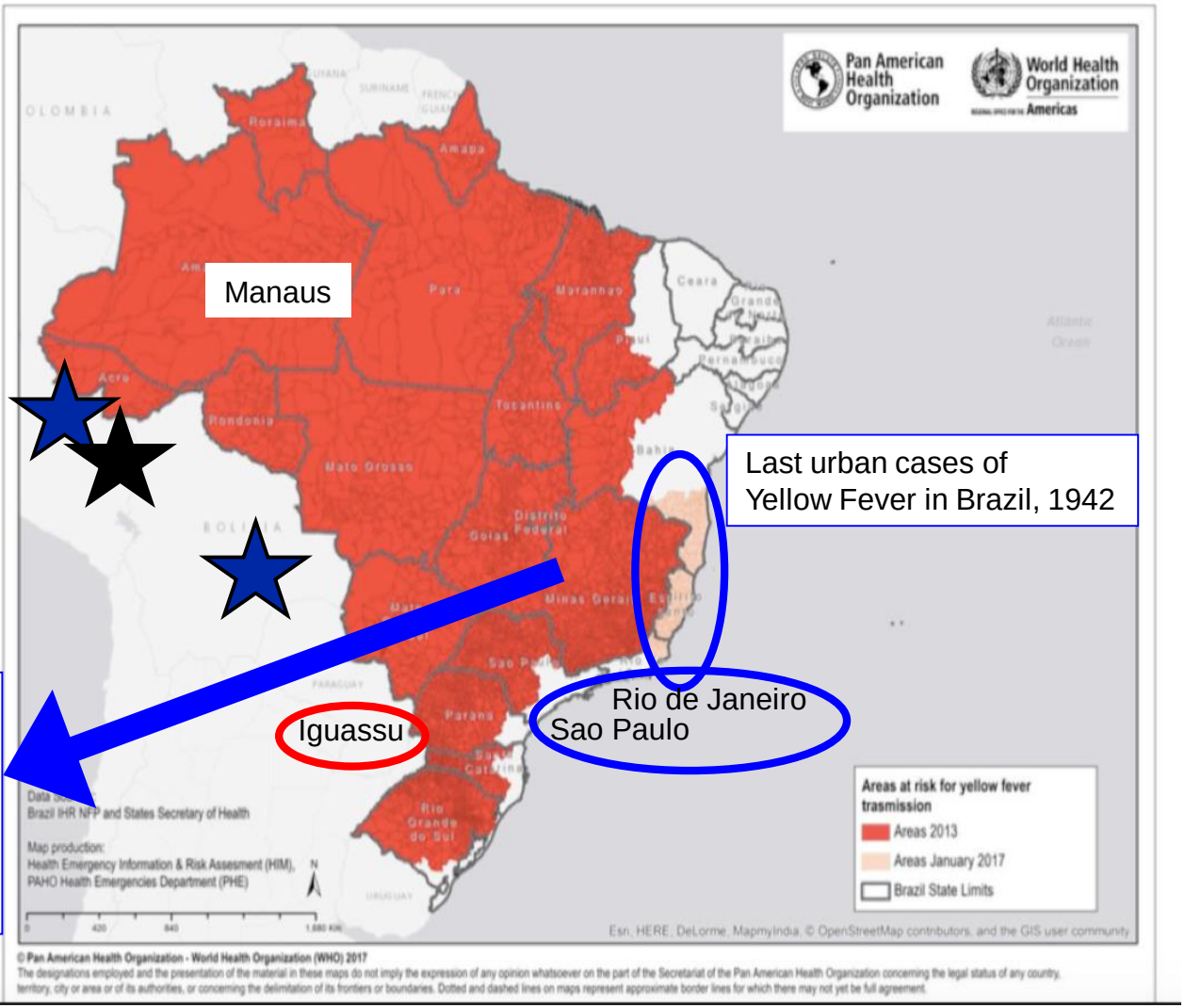
Vaccine or prophylaxis	Date	Signature and professional status of supervising clinician	Manufacturer and batch no. of vaccine or prophylaxis	Certificate valid from ..... until	Official stamp of administering centre
1. Yellow fever	15 Jan 07	MSTh MD	[illegible]	25 Jan 07 – 24 Jan 17	stamp of center
2.					

- **Yellow fever**: **Required (IHR)** if arrival from
  - any country: many in tropical Africa, French Guyana
  - endemic country: many countries, incl. Asian ones
  - Additional: **recommended** if traveler exposed to risk
- **Meningococcal** disease ($ACW_{135}Y$) **required** for hajj
- **Poliomyelitis**
  - **Required** for hajj if arriving from infected/vulnerable state
  - **Required** for some when Exit Pakistan, Afghanistan
- Cholera: none

http://who.int/ith/updates/20170408/en/ (4 August 2017)
WHO. Wkly Epidemiol Rec. 2014; 89:345-56.

YF endemicity: South America 2017

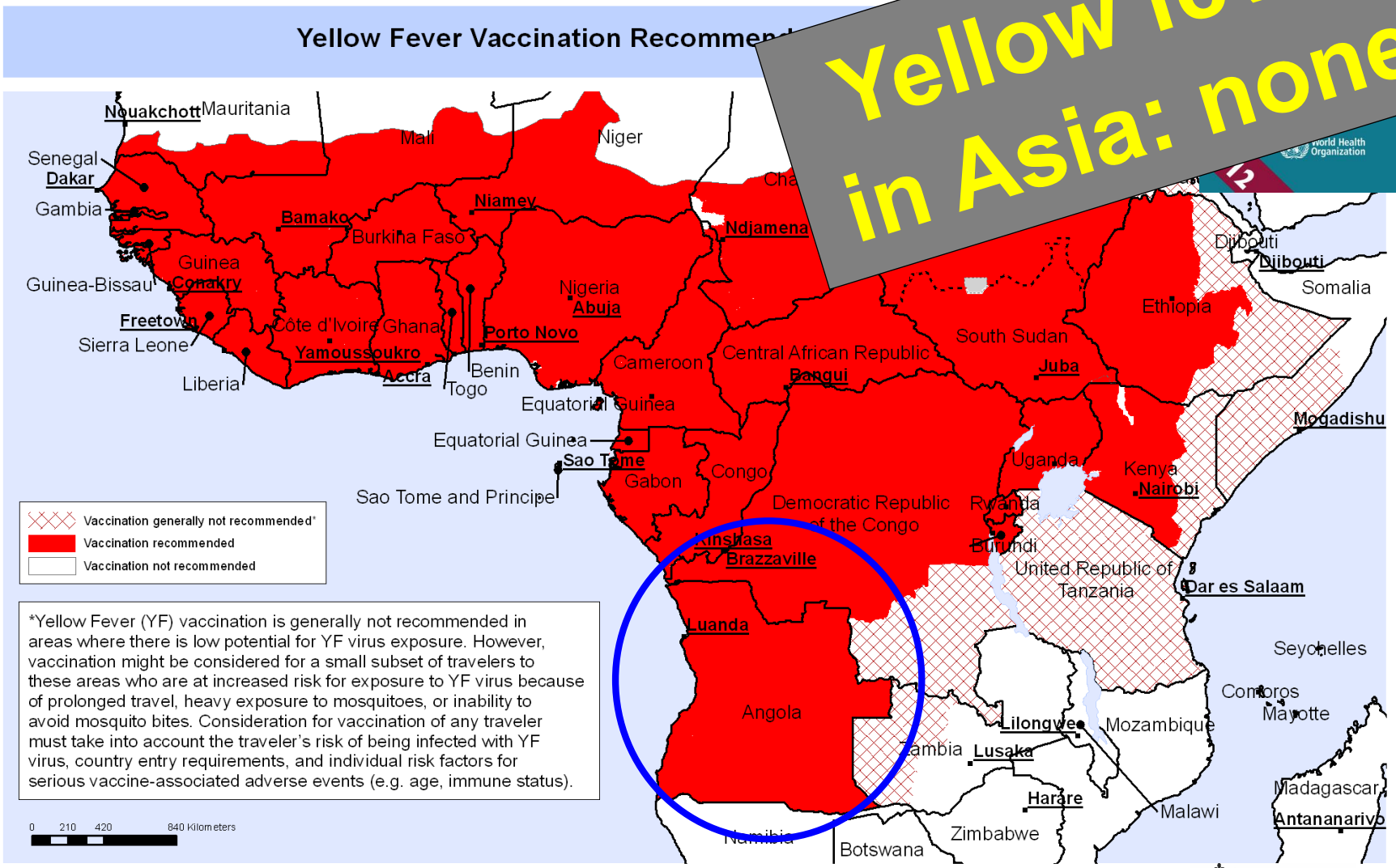
Figure 2. Areas at risk for yellow fever transmission in Brazil, 2013-2017



Suspected cases: 3240
Confirmed cases: 792
Case fatality rate: 35%
(mainly Minas Gerais)

PAHO. Epidemiological update
Yellow Fever: 2 August 2017
WHO, DON: 30 August 2017

YF endemicity: Africa



Yellow fever in Asia: none

YF cases in travelers 1979 - 2016

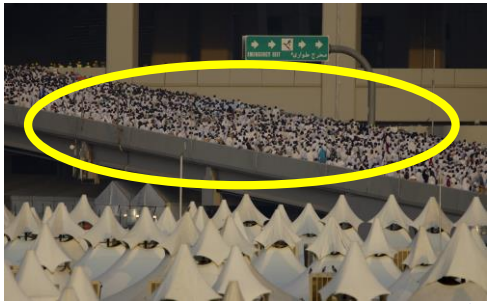
M 42y	Senegal	died	1979
M 25y	Senegal	died	1979
F 27y	Guinea-Bissau	survived	1985
F 37y	West Africa	survived	1988
M 53y	Brasil	died	1996
M 42y	Brasil	died	1996
M 40y	Yvory Coast	died	1999
M 48y	Venezuela	died	1999
F 47y	The Gambia	died	2001
M 47y	Brasil	died	2002

YF exports: Angola →
- **China (n = 11)**
- **DR Congo (58)**
- **Kenya (2)**
- **Mauretania (1)**
- **Morocco (1)**

Poumerol G. APTHS 2012 Singapore, Abstract S05-2.
Behrens RH. J Travel Med. 2008; 15:285-6.
Wassermann S et al. Int J Infect Dis. 2016; 48:98-103.
Schlagenhauf P & Chen LH. Int J Infect Dis. 2017; 60:91-2.
Cui S et al. Int J Infect Dis. 2017; 60:93-5.

Crowding:
MenDis Risk Factor Relevant to Travellers

Dormitories
- Educational institutions
- Military
- Trekking huts
  - Nepal in the 1980s



Pilgrimage
- Hajj, Umrah
  - Quadrivalent vaccination
    No 'exported outbreaks' since **2004**

Discotheque

Crowding

Transport
- Air Travel (n = 2)
- School bus

Sporting events
- Rugby
  - No increased **Men Dis** incidence during the EURO 2004 football tournament

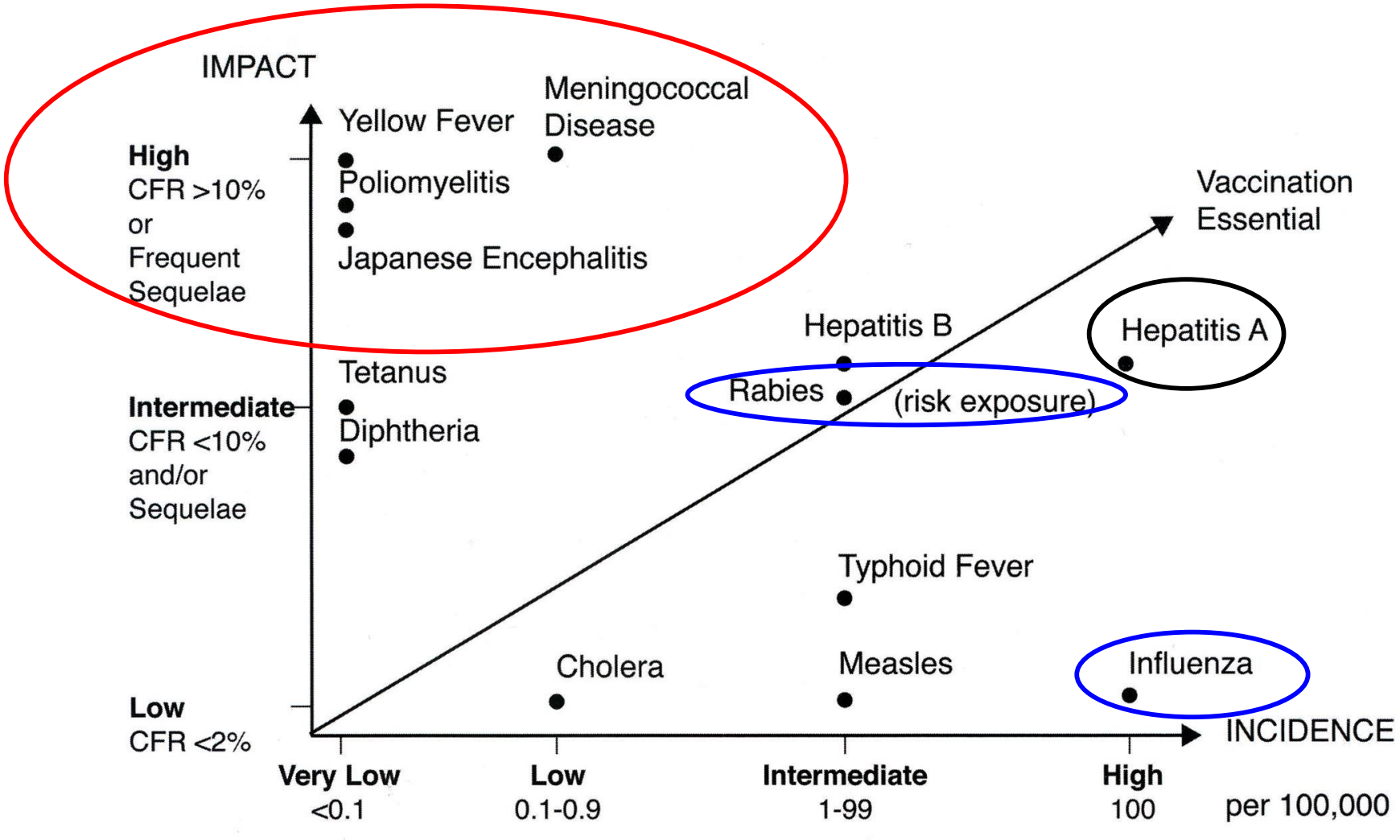
Refugee camps

Photo courtesy Prof. Z. Memish

Incidence rate for travelers 0.4-3 per million = similar to home in Europe

Koch S & Steffen R, J Travel Med 1994;1:4-7.

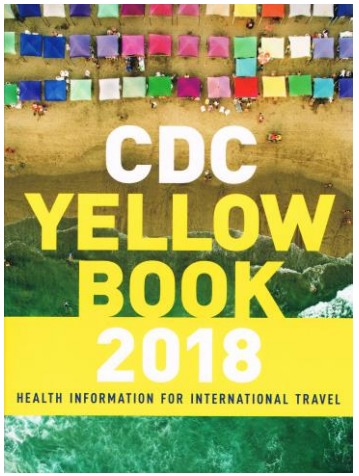
Impact of VPD in international travelers

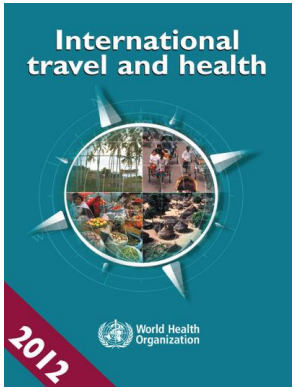


Steffen R & Connor BA. J Travel Med. 2005; 12:26-35.

Strategic conclusions — general

- Create awareness in the public, particularly VFR
- Follow guidelines
  - National
  - U.S. CDC
  - WHO





www.who.int/ith

- Essential to have access to website with latest epidemiological news, e.g. NaTHNaC, Tropimed(engl)
- Pre-travel consultation is not limited to vaccination

Pre-travel consultation = opportunity for adult vaccination

Strategic conclusions — individual

- 1st priority: **R**equired vaccines
- 2nd priority: **R**outine vaccines (EPI, catch-up)
- 3rd priority: **R**ecommended vaccines, basing on
  - Incidence rate of infection: Destination, environmental characteristics → **Risk profile** (incremental risk vs. home)
  - Impact of infection
  - Financial limitations

- Question about future travel, **cumulative** exposure
- Consider **host factors**, e.g. immune deficiency, age

Questions?

Comments?

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