Infectious Considerations Before During and After Medical Mission Trips

Elias B. Chahine, PharmD, FCCP, BCPS (AQ-ID)
Associate Professor of Pharmacy Practice
Lloyd L. Gregory School of Pharmacy
Palm Beach Atlantic University

Goal

- Upon completion of this presentation, the learner should be able to recommend appropriate options for the prevention of infections during medical mission trips.

Learning Objectives

- At the conclusion of this presentation, the learner should be able to:
  - Given an individual, select the appropriate vaccines to prevent diseases associated with travel to certain geographic regions.
  - Identify the causative organisms associated with travelers' diarrhea.
  - Given an individual, design an appropriate regimen to prevent and to treat travelers' diarrhea.
  - Compare and contrast the available agents to prevent malaria.
  - Given an individual, design an appropriate regimen to prevent malaria in short-term travelers.
  - Devise strategies to prevent travelers' diarrhea and malaria.

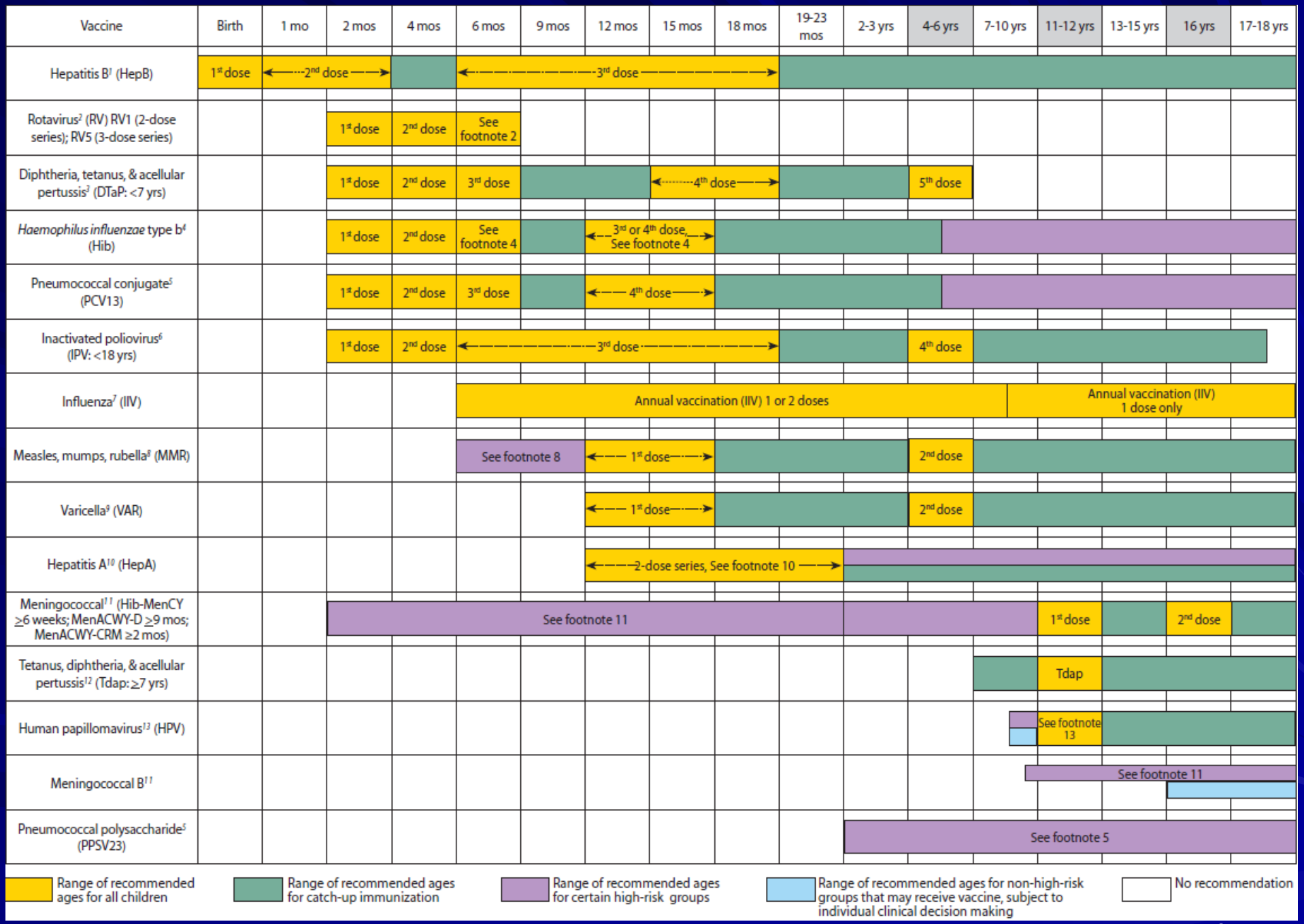
Outline

- Vaccines
  - Routine vaccines for children
  - Routine vaccines for adults
  - Travel vaccines
- Travelers's diarrhea
  - Causative organisms
  - Prevention
  - Treatment
- Malaria
  - Prevention for short-term travelers

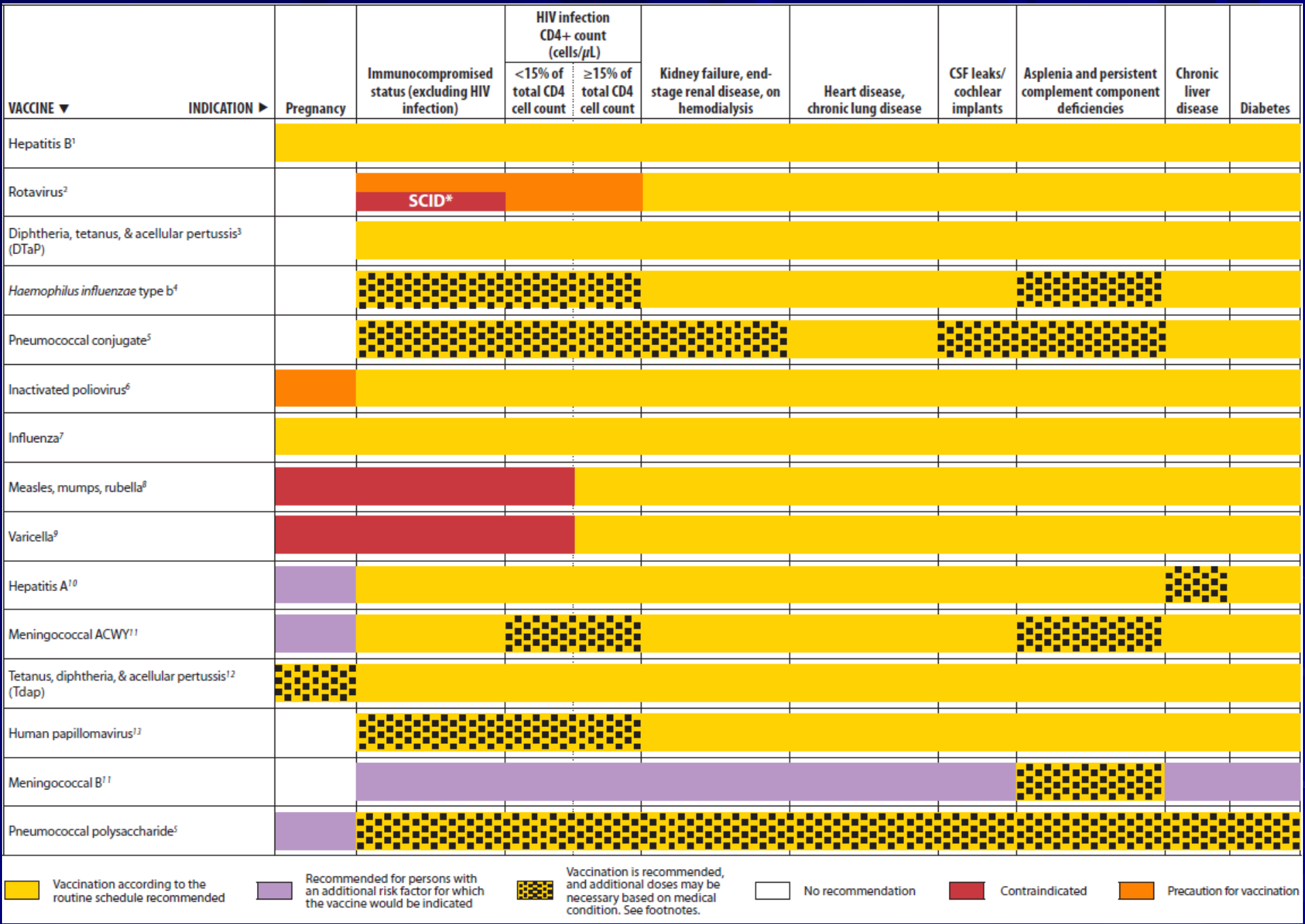
https://wwwnc.cdc.gov/travel/destinations/list/

Vaccines

- Routine vaccines for children
- Routine vaccines for adults
- Travel vaccines



https://www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html


VACCINE ▼
INDICATION ▶
Pregnancy
Immunocompromised status (excluding HIV infection)
HIV infection CD4+ count (cells/μL)
<15% of total CD4 cell count
≥15% of total CD4 cell count
Kidney failure, end-stage renal disease, on hemodialysis
Heart disease, chronic lung disease
CSF leaks/ cochlear implants
Asplenia and persistent complement component deficiencies
Chronic liver disease
Diabetes
Hepatitis B[1]
Rotavirus[2]
SCID*
Diphtheria, tetanus, & acellular pertussis[3] (DTaP)
Haemophilus influenzae type b[4]
Pneumococcal conjugate[5]
Inactivated poliovirus[6]
Influenza[7]
Measles, mumps, rubella[8]
Varicella[9]
Hepatitis A[10]
Meningococcal ACWY[11]
Tetanus, diphtheria, & acellular pertussis[12] (Tdap)
Human papillomavirus[13]
Meningococcal B[11]
Pneumococcal polysaccharide[5]
Vaccination according to the routine schedule recommended
Recommended for persons with an additional risk factor for which the vaccine would be indicated
Vaccination is recommended, and additional doses may be necessary based on medical condition. See footnotes.
No recommendation
Contraindicated
Precaution for vaccination

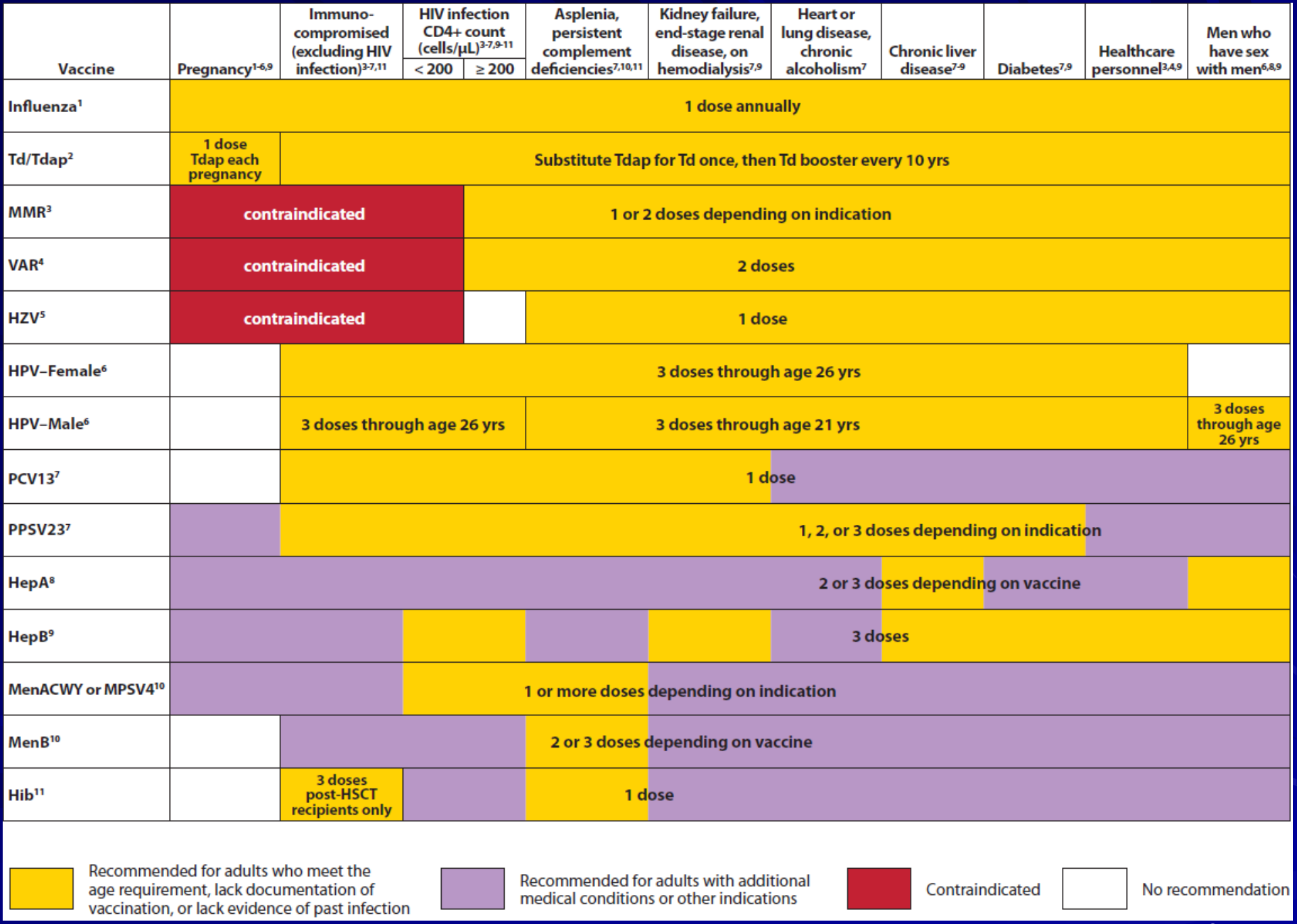
Vaccine	19–21 years	22–26 years	27–59 years	60–64 years	≥ 65 years
Influenza[1]	1 dose annually				
Td/Tdap[2]	Substitute Tdap for Td once, then Td booster every 10 yrs				
MMR[3]	1 or 2 doses depending on indication				
VAR[4]	2 doses				
HZV[5]				1 dose	
HPV–Female[6]	3 doses				
HPV–Male[6]	3 doses				
PCV13[7]	1 dose				
PPSV23[7]	1 or 2 doses depending on indication				1 dose
HepA[8]	2 or 3 doses depending on vaccine				
HepB[9]	3 doses				
MenACWY or MPSV4[10]	1 or more doses depending on indication				
MenB[10]	2 or 3 doses depending on vaccine				
Hib[11]	1 or 3 doses depending on indication				

Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection

Recommended for adults with additional medical conditions or other indications

No recommendation

https://www.cdc.gov/vaccines/schedules/hcp/adult.html



https://www.cdc.gov/vaccines/schedules/hcp/adult.html

Travel Vaccines

- Cholera
- Hepatitis A
- Hepatitis B
- Japanese encephalitis
- Meningococcal
- Rabies
- Typhoid
- Yellow fever

Travel Vaccines

Vaccine	Brand	Standard Adult Schedule	Duration of Protection
Cholera	Vaxchora	Single dose	6 mo?
Hepatitis A	Havrix Vaqta	0 and 6 to 18 mo	Lifelong
Hepatitis B	Engerix-B Recombivax-HB	0, 1, and 6 mo	Lifelong
Japanese encephalitis	Ixiaro	0, 28 days	Single booster >1 yr if ongoing risk

Travel Vaccines

Vaccine	Brand	Standard Adult Schedule	Duration of Protection
Meningococcal	Menomune Menveo Menactra	Single dose	Repeat every 5 years if ongoing risk
Rabies	Imovax RabAvert	0, 7, and 21 or 28 days	Routine boosters are not necessary
Typhoid	Vivotif Typhim Vi	1 cap every other day for 4 doses Single dose	Repeat every 5 years if ongoing risk Repeat every 2 years if ongoing risk
Yellow fever	YF-Vax	Single dose	Long-lasting protection

Case Presentation

- C.C. is a 40-year-old man who is in your travel clinic today because he is planning to go on a medical mission trip to Uganda in June.
- His immunizations record indicates that he completed a 3-dose series of hepatitis B vaccine 5 years ago.
- PMH: Hypertension
- All: NKDA

Question

- What would you recommend to C.C. for the prevention of viral hepatitis?
  - **A) Hepatitis A immune globulin**
  - **B) Hepatitis A vaccine**
  - **C) Hepatitis B immune globulin**
  - **D) Hepatitis B vaccine**

Question

- Which additional travel vaccine(s) would you recommend to C.C.?
  - I. Japanese encephalitis
  - II. Typhoid
  - III. Yellow fever
  - **A) I only**
  - **B) III only**
  - **C) I and II only**
  - **D) II and III only**
  - **E) I, II, and III**

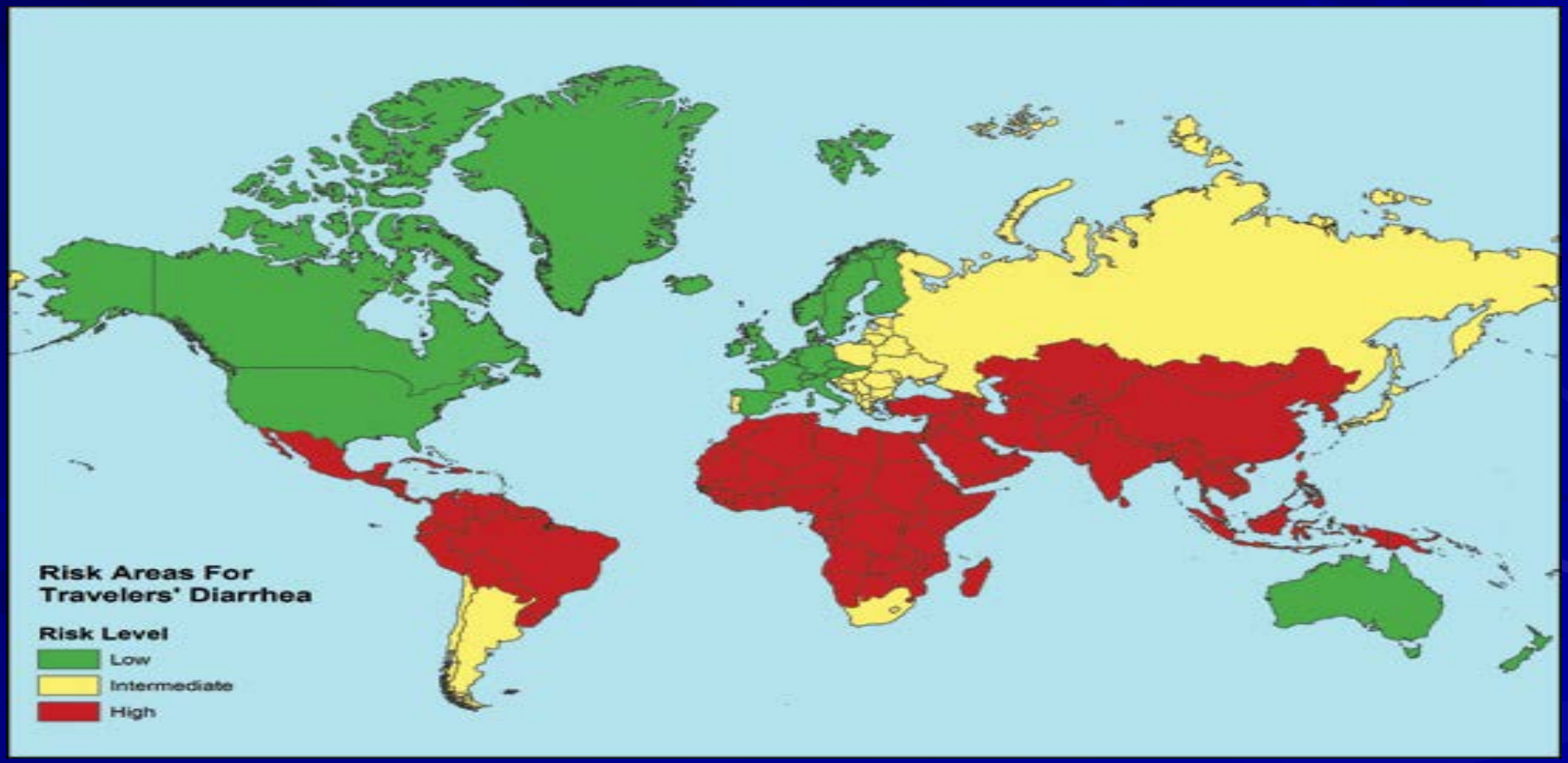
Travelers' Diarrhea

- Epidemiology
- Causative organisms
- Risk factors
- Prevention
- Treatment

http://www.history.com/topics/ancient-history/the-egyptian-pyramids

Epidemiology

- Incidence between 10 and 40%



https://www.travmed.com/pages/health-guide-chapter-6-travelers-diarrhea

Causative Organisms

- Bacteria (~70%)
  - **ETEC**
  - EAEC
  - *Campylobacter*
  - *Salmonella*
  - *Shigella*
  - *Vibrio*
  - *Aeromonas*
  - *Yersinia*
- Viruses (~25%)
  - Rotavirus
  - Norovirus
  - Enteric adenovirus
- Parasites (~5%)
  - *Giardia*
  - *Cryptosporidium*

Risk Factors

- Tap water and ice
- Raw vegetables
- Raw fruits
- Seafood
- Buffet-style meals

- Unpasteurized milk and dairy products
- Uncooked or undercooked food
- Alcohol consumption (> 5 drinks per day)

http://lowgravityascents.com/2016/11/29/avoid-travelers-diarrhea-tonsai-tummy-thailand/

Risk Factors

- Conditions
  - Cancer
  - HIV/AIDS
  - Solid organ tranplantation
  - Achlorhydia
  - Inflammatory bowel disease
- Medications
  - Chemotherapy agents
  - Immunosuppressants
  - Antacids
  - Proton pump inhibitors
  - Diuretics
  - Digoxin
  - Lithium
  - Insulin

Prevention

- Antimicrobials
  - Norfloxacin 400 mg PO daily
  - Ciprofloxacin 500 mg PO daily
  - Rifaximin 200 mg PO daily or BID
  - Bismuth subsalicylate 2 tabs or 30 mL (524 mg) PO q6h
- Non Antimicrobials
  - “Peel it, boil it, cook it, or forget it”
  - Travelers’ kits

GET SMART
About Antibiotics Week
WWW.CDC.GOV/GETSMART

Treatment

- Supportive care
- Antibiotics
- Loperamide
  - 4 mg first dose
  - 2 mg dose after each loose stool
  - NOT to exceed 16 mg in a 24-hour period

Treatment

- Antibiotic choices
  - Norfloxacin 400 mg PO BID for up to 3 days
  - Ciprofloxacin 500 mg PO BID for up to 3 days
  - Ofloxacin 200 mg PO BID for up to 3 days
  - Levofloxacin 500 mg PO daily for up to 3 days
  - Azithromycin 1000 mg PO single dose
  - Rifaximin 200 mg PO TID for up to 3 days

Case Presentation

- A.N. is a 45-year-old woman who is leading a medical mission trip to the Dominican Republic.
- During her stay in the Caribbean country, she indulged in local culinary delights. Three days later, she started complaining of fatigue and watery diarrhea that are interfering with her daily activities.
- She called E.C. asking for a recommendation to treat her symptoms.

Question

- What would E.C. recommend to A.N.?
  - I. Oral rehydration
  - II. Ciprofloxacin 500 mg PO BID for 3 days
  - III. Ciprofloxacin 500 mg PO BID for 7 days

  - **A) I only**
  - **B) III only**
  - **C) I and II only**
  - **D) II and III only**
  - **E) I, II, and III**

Malaria

- Epidemiology
- Causative organisms
- Risk factors
- Prevention
- Presemptive self treatment

http://blogs.cdc.gov/global/files/2013/08/contest7_full-3LaurenLambert-560x413.jpg

Epidemiology

wwwnc.cdc.gov/travel/yellowbook/2016/infectious-diseases-related-to-travel/malaria

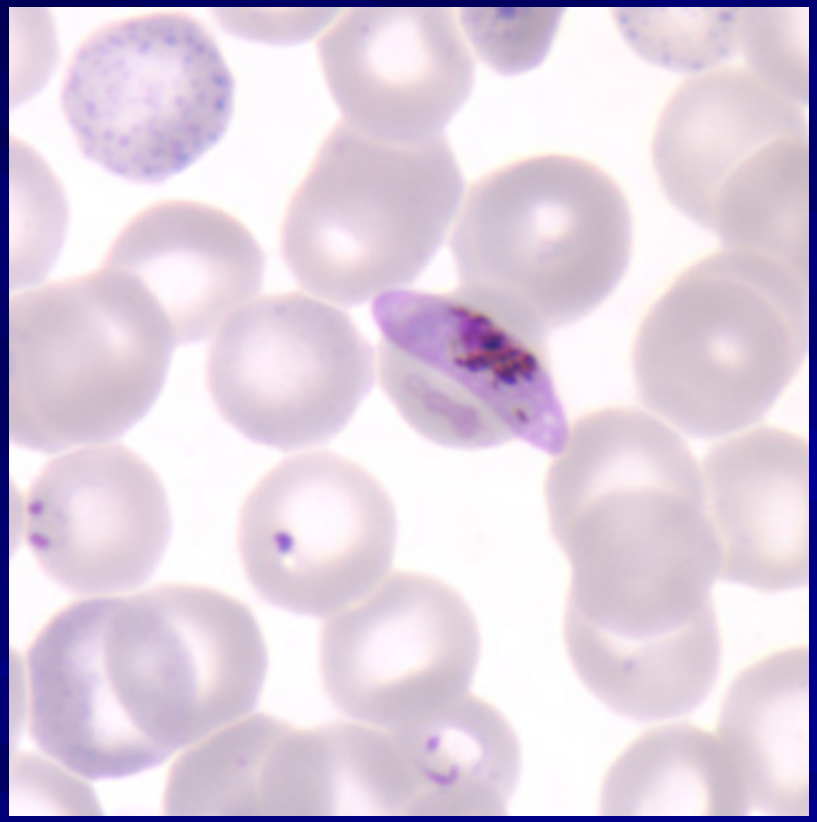
Epidemiology

- Major international public health problem
- Estimated 207 million infections worldwide
- Estimated 627,000 deaths worldwide
- Increasing cases among travelers

Causative Organisms

- *Plasmodium falciparum*
  - Africa, Haiti, Dominican Republic, Amazon, New Guinea
- *Plasmodium vivax*
  - India, Pakistan, Bangladesh, Sri Lanka, Central America
- *Plasmodium ovale*
  - Africa
- *Plasmodium malariae*
  - Where the *Anopheles* live and thrive
- *Plasmodium knowlesi*
  - Southeast Asia

Causative Organisms



www.cdc.gov/dpdx/malaria

Prevention

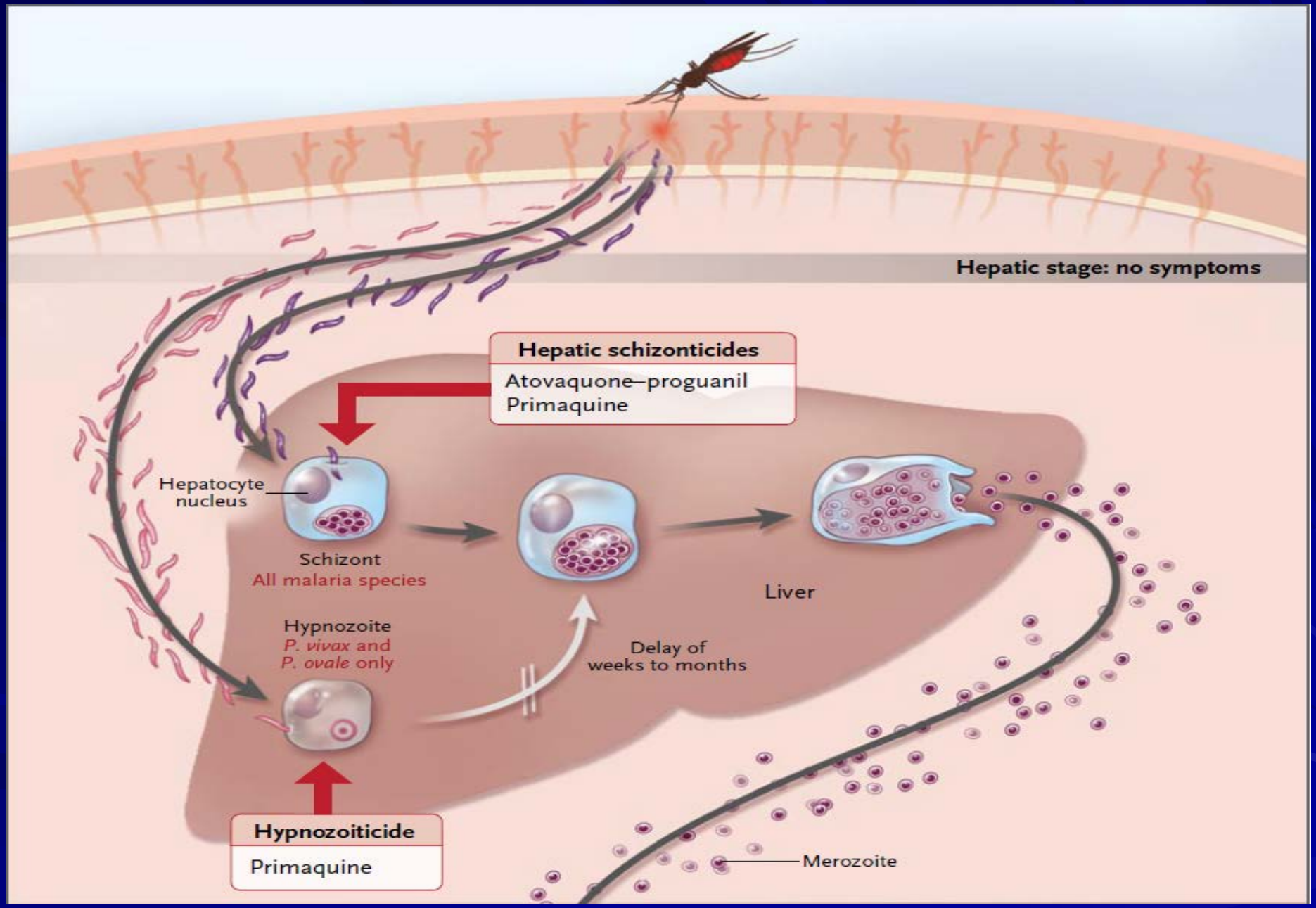
- Use effective personal protection against mosquitoes (nets, clothes, DEET, picaridin)
- Adhere to an antimalarial regimen before, during, and after the trip
- No chemoprophylactic regimen against malaria is 100% effective

Prevention

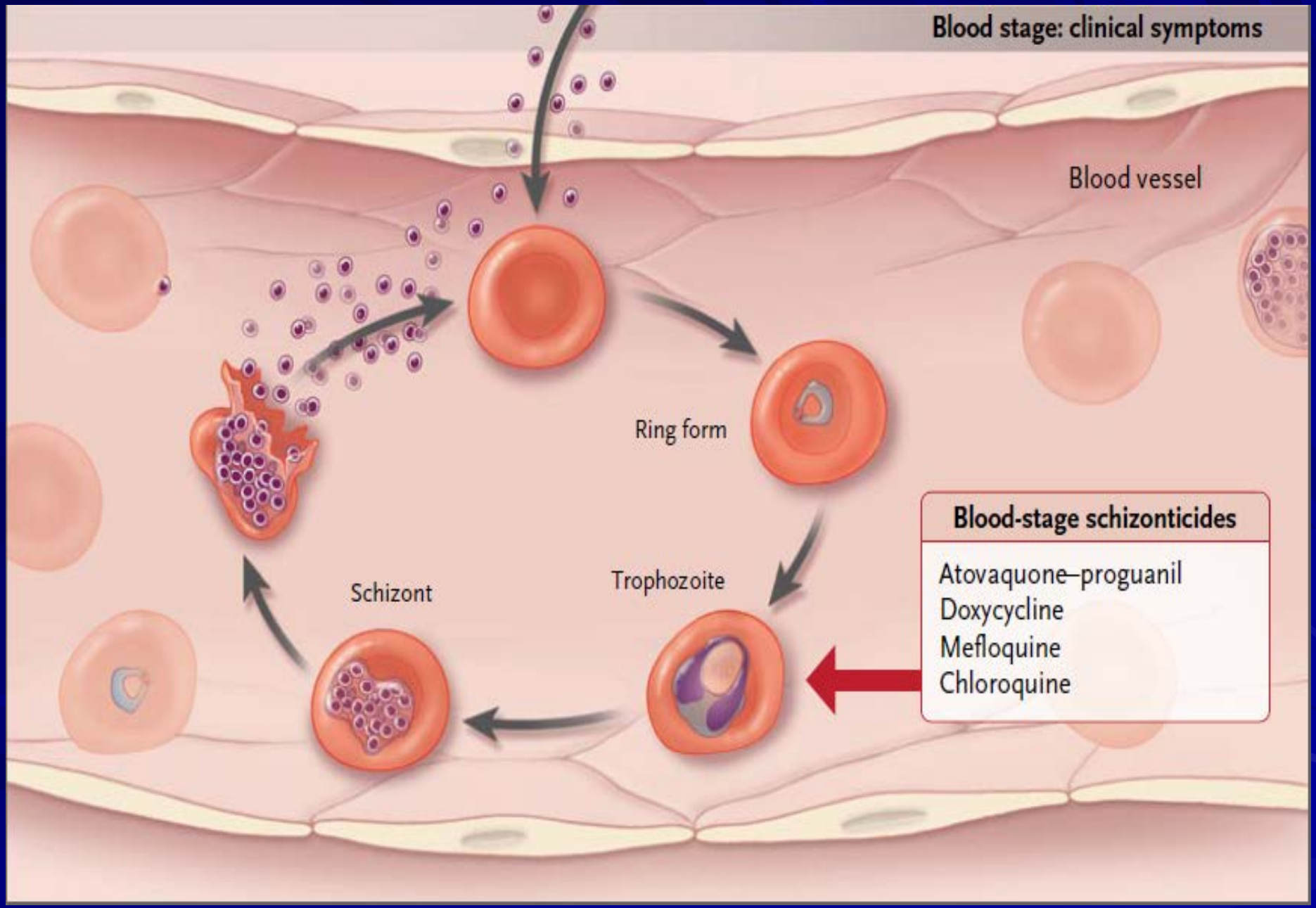
Drug	Dose	Before Trip	During Trip	After Trip
Atovaquone Proguanil	250 mg 100 mg	1 to 2 days	Daily	7 days
Chloroquine phosphate	500 mg (300 mg base)	1 week	Weekly	4 weeks
Doxycycline	100 mg	1 to 2 days	Daily	4 weeks
Mefloquine	250 mg salt (228 mg base)	1 to 3 weeks	Weekly	4 weeks
Primaquine phosphate	52.6 mg salt (30 mg base)	1 to 2 days	Daily	7 days

Prevention

Drug	Children	Pregnancy	Adverse Events & Precautions
Atovaquone Proguanil	Yes	No (C)	GI upset Avoid in patients with severe renal impairment
Chloroquine phosphate	Yes	Yes (C)	Visual impairment, pruritus Avoid in patients with psoriasis Use only in areas with chloroquine-sensitive malaria
Doxycycline	≥8 years	No (D)	Photosensitivity, GI upset
Mefloquine	Yes	Yes (B)	Neuropsychiatric effects, cardiac effects Use only in areas with mefloquine-sensitive malaria
Primaquine phosphate	Yes	No (D)	GI upset, methemoglobinemia Avoid in patients with G6PD deficiency



Freedman DO. N Engl J Med. 2008;359:603-12



Freedman DO. N Engl J Med. 2008;359:603-12

Presumptive Self Treatment

Drug	Dose	Regimen	Comments
Atovaquone-Proguanil (Malarone)	250 mg 100 mg	4 tablets orally as a single dose daily for 3 consecutive days	Avoid in patients with severe renal impairment Avoid in patients on atovaquone-proguanil prophylaxis Avoid in pregnant women
Artemether-Lumefantrine (Coartem)	20 mg 120 mg	4 tablets orally followed by 4 tablets 8 hours later, then 4 tablets twice daily for 2 days	Avoid in patients on mefloquine prophylaxis Avoid in pregnant women

Question

- Which agent can be used as an alternative to chloroquine for prophylaxis against malaria in areas with chloroquine-sensitive malaria?
  - **A) Infliximab**
  - **B) Hydroxychloroquine**
  - **C) Leflunomide**
  - **D) Methotrexate**

Case Presentation

- A family of three persons is planning a medical mission trip to Zambia.

- The itinerary includes:
  - 3 days in Lusaka
  - 3 days in Victoria Falls
  - 4 days in Mpulungu

Case Presentation

- The 31-year-old husband takes no medications currently, but he recently discontinued fluoxetine, which he had taken for depression.
- His 29-year-old wife, who was selected to go on the trip by a competition at her church, is healthy and 15 weeks pregnant.
- Their 7-year-old child is in good health.

Question

- What would you recommend for the 31-year-old husband to prevent malaria?
  - **A) Atovaquone-proguanil**
  - **B) Chloroquine**
  - **C) Doxycyline**
  - **D) Mefloquine**

Question

- What would you recommend for the 29-year-old wife to prevent malaria?
  - **A) Atovaquone-proguanil**
  - **B) Chloroquine**
  - **C) Doxycyline**
  - **D) Mefloquine**

Question

- What would you recommend for the 7-year-old child to prevent malaria?
  - **A) Atovaquone-proguanil**
  - **B) Chloroquine**
  - **C) Doxycyline**
  - **D) Mefloquine**

Therefore go and make disciples of all nations, baptizing them in the name of the Father and of the Son and of the Holy Spirit.

Matthew 28:19 (NIV)

Key References & Readings

- CDC. Recommended Immunization Schedule for Children and Adolescents, 2017. Available at https://www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html. Accessed March 1, 2017.

- CDC. Recommended Immunization Schedule for Adults, 2017. Available at https://www.cdc.gov/vaccines/schedules/hcp/adult.html. Accessed March 1, 2017.

- CDC. Treatment of Malaria (Guidelines for Clinicians) 2013. Available at www.cdc.gov/malaria/resources/pdf/clinicalguidance.pdf.

Key References & Readings

- Guidelines for the Treatment of Malaria. 3rd edition. Geneva: World Health Organization; 2015.

- Arguin PM, Tan KR. Malaria. In: Brunette GW. Yellow Book 2016. Available at wwwnc.cdc.gov/travel/yellowbook/2016/infectious-diseases-related-to-travel/malaria.

- Freedman DO, Chen LH, Kozarsky PE. Medical considerations before international travel. N Engl J Med. 2016;375:247-60.

Infectious Considerations Before During and After Medical Mission Trips

Elias B. Chahine, PharmD, FCCP, BCPS (AQ-ID)
Associate Professor of Pharmacy Practice
Lloyd L. Gregory School of Pharmacy
Palm Beach Atlantic University