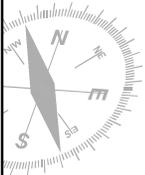


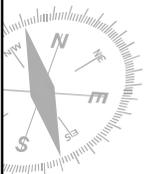
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will begin shortly.
There will be no
audio until then.



International Travel

Immunizations

Immunizations 2010

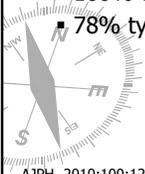


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Travel Associated Diseases

- ▶ New York City Dept of Health
- ▶ Travel related
 - 61% Hepatitis A cases
 - 100% of malaria cases
 - 78% typhoid cases



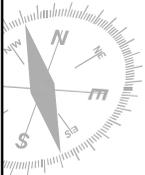
AJPH, 2010;100:1249-1252

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Definitions

- ▶ Common vs Special
- ▶ Required vs Recommended

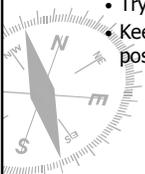


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Pregnancy

- Generally avoid all vaccines (especially live vaccines) during the 1st three months
- Where risk of disease is high and avoidance not possible give yellow fever, and JE
- Try to complete pregnancy while stateside
- Keep the baby stateside until 6-8 weeks old if possible



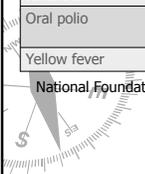
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Immunosuppressed – Transmissibility of Live Vaccines

Vaccine	Potential for Transmission
LAIV	Low
Varicella	Very low in normal hosts
MMR	Not transmitted to contacts (except rubella via breast milk)
Rotavirus	Excreted, potential
Oral polio	Excreted, transmission and disease documented
Yellow fever	Not transmitted

National Foundation of Infectious Diseases, 2016



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BCG

- Epidemiology
 - Tb is the leading infectious killer in adults in developing countries
 - 1/3 of the world's population are infected
 - UnRx active Tb cases will infect 10-15 people per year
 - Tb has been transmitted in airlines
- BCG Efficacy - 40-70%
- The WHO Expanded Program of Immunizations (EPI) recommends it for administration at birth.
- PPD considerations
 - Get PPD prior to travel
 - Generally BCG does not cause a PPD > 15 mm
 - Generally does not cause a persistently positive PPD > 5 years after immunization.
 - Do not withhold PPD in someone previously vaccinated with BCG. Read as per risk category.



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BCG

- Adverse reactions
 - Draining papule / pustule which heals with a scar at 10 weeks.
 - One to 10% develops ulceration and tender regional lymph nodes.
 - Progressive, disseminated, fatal disease is rarely seen (1/125,000 doses).
 - Other rare complications include abscess formation and osteomyelitis.



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BCG Indications - Travel

Children – Negative PPD, continually exposed, can't be separated from adults who have:

1. Untreated or ineffectively treated for TB disease if the child cannot be given long term treatment
2. TB strains resistant to INH and Rifampin

Health care workers / Others

1. High % patients - Tb strains resistant to both INH and Rif
2. Ongoing transmission of drug resistant M Tb strains to healthcare workers and subsequent infection is likely
3. Comprehensive Tb infections control precautions have been implemented, but have not been successful.

Other considerations

1. Incidence - 1.0%, surveillance and treatment can not be implemented

<http://www.cdc.gov/tb/publications/factsheets/prevention/bcg.htm>



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BCG Contraindications

- ▶ Current skin problems like burns and skin infections
- ▶ Immunodeficiency including steroids
- ▶ Symptomatic HIV
- ▶ Asymptomatic HIV unless in areas of high risk
- ▶ Pregnancy – theoretic since no fetal problems have been identified.

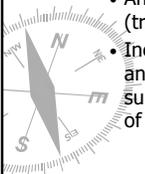


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Cholera

- No country or territory officially requires cholera vaccine
- Dukoral from Biotec AB – inactivated toxin, oral vaccine
- Antibodies to the cholera toxin and ETEC toxin (traveler's diarrhea)
- Increased risk in endemic areas - chronic antacid therapy (≥ 3 days / week), history of surgery for gastric or duodenal ulcers, history of liver disease, or achlorhydria

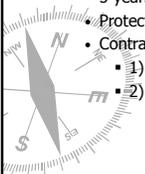


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Cholera

- Indications - High risk groups when under poor sanitary conditions
- Adults and children > 6 yo (>2 years for ETEC)
- 2 doses, 1-6 weeks apart and 1 week before departure
- Booster X 1 if dose given 6m-5years earlier for cholera and 3m-5 years earlier for ETEC
- Protection – 6 months cholera and 3 months for ETEC.
- Contraindications
 - 1) Previous serious reaction to the vaccine.
 - 2) Pregnancy?



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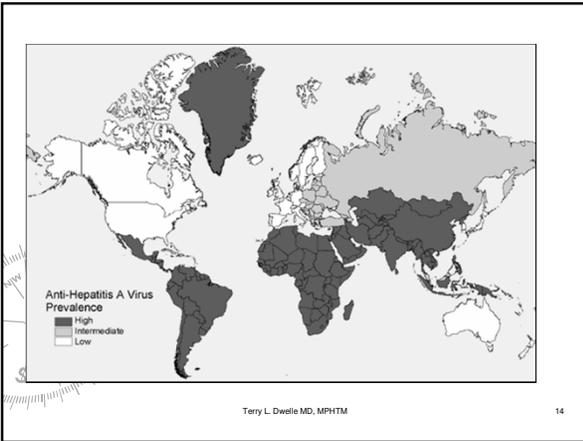
Hepatitis A

- Most common infectious cause of death in ex-patriots
- Average work loss with disease - 33 days.
- Developing countries 100% infection by 5 yo
- Risk with travel - 3-20 / 1000 / mo, US foreign service 1/1000/yr, Peace Corps 20/1000/yr, missionaries 28% - 2yr, 90%- >20yr.



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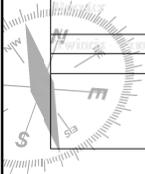


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Hepatitis A Vaccines

HAVRIX - 2 doses		
	< 18 yo	≥ 18 yo
Primary	1 dose (1440 IU, 1)	1 dose (720 IU, 1)
Booster	1 dose 6-12 m after primary dose	1 dose 6-12 m after primary dose
VAQTA - 2 doses		
	< 18 yo	≥ 18 yo
Primary	1 dose (20 IU)	1 dose (25 IU)
Booster	1 dose (20 IU) 6-18 m after primary	1 dose (25 IU) 6-18 m after primary
HEPACIM - 2 doses (Hepatitis A and B)		
	< 18yo	≥ 18yo
Primary	1 dose (720 IU, 1) at 0, 1 and 6 m or 0, 1, 21-30d and 12 m	

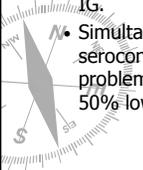


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Hepatitis A Vaccine

- Vaccine efficacy - 94-100%, duration 20 yr.
- Single dose efficacy in adults is 90% in 15 days, 99% in 1 month, Child - 1st dose efficacy- 95%, 2 doses - 100%. Consider single dose for travelers if given 2-4 weeks (4 weeks ACIP) before travel. If <2-4 weeks - IG.
- Simultaneous administration of IG with VAQTA - seroconversion rate 100% at 28 weeks - ? no problem with simultaneous administration. Titer was 50% lower but still ok.

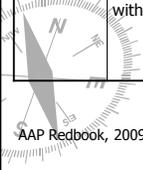


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Hepatitis A for travelers

Age	Recommendation	Notes
< 12 m	IG	0.02 m./kg protects for up to 3 m, 0.06 ml/kg protects for 5 m
1 y – 40 y	Vaccine	
>40y	Vaccine with or without IG	If departure < 2 weeks away, older adults, immune compromised, chronic liver disease, other chronic medical condition – give vaccine and IG with the initial dose



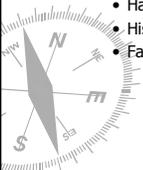
AAP Redbook, 2009

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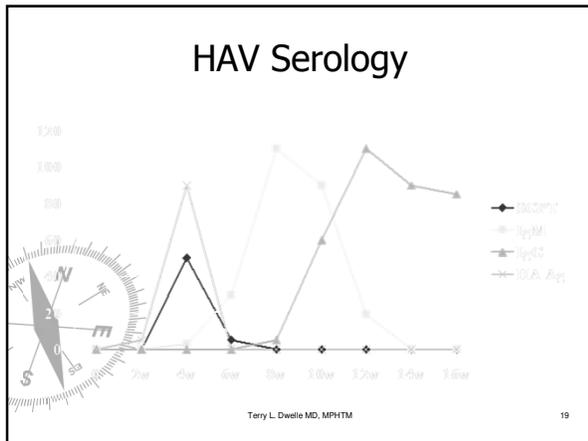
HAV Screening

- Need 44% prevalence of hepatitis A to make screening cost effective
 - Over 30-40 years old
 - History of receiving Factor VIII treated with detergents / solvents – doesn't work on non-enveloped virus' like HAV
 - Having lived in a high risk area
 - History of hepatitis or jaundice
 - Family history of hepatitis

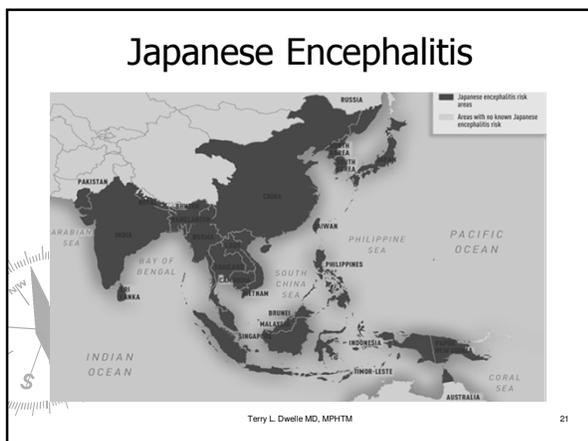


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- ### Japanese Encephalitis
- Japanese Encephalitis is a mosquito born arboviral disease seen in Asia
 - Ninety percent of the infections are asymptomatic but with symptoms there is a 20-50% mortality rate
 - Following immunization 20% of individuals will experience fever, headache, malaise, myalgia or rash.
 - Rarely severe reactions with hives, low blood pressure, arthritis and anaphylaxis may occur as long as 2 1/2 weeks after inoculation (88% within 3 days).
 - All vaccinees should be observed for 30 minutes after the vaccination and remain within access to good medical care for 10 days.
 - History of allergy (ie asthma, allergic rhinitis, etc.) slightly increases the chance of severe reactions
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JE Vaccine

- Indications
 - Live in endemic areas (Asia)
 - Planning trips of > 30 days into rural, farming areas or sleeping in unscreened quarters
 - Travel < 30 days duration and includes extensive outdoor activities
- Contraindications
 - Acutely ill with fever and/or active infection.
 - Persons with cardiac, renal, or hepatic disorders, leukemia, lymphoma, or other generalized malignancies.
 - Persons with a history of severe reactions to the vaccine.
 - Pregnancy.



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JE Vaccine

- ▶ 3-dose primary series (0, 7, 30d) – adult 1.0 ml doses
- ▶ Abbreviated schedule (0, 7d, 14d)
- ▶ Booster needed every 2 years if at continued risk
- ▶ Children 1-3 yo (0.5 ml doses)

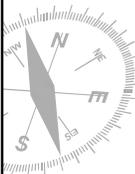


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Meningococcus

- Causes epidemic meningitis – SS Africa, Mid-East.
- Saudi Arabia - certificate of vaccination not > 3 years or < 10 days before arrival



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Meningococcal Serogroups

- ▶ A, B, C, Y, W-135, X
- ▶ Serogroup A – most common cause of epidemics outside the US
- ▶ Since 2002 W-135 has increased in SS Africa and the Haji
- ▶ In 2006 increased cases with X seen in Niger
- ▶ In the US serogroups B, C and Y account for 30% each of the cases
- ▶ Current vaccines cover A, C, Y, and W-135

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Meningitis Belt



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Meningococcal Vaccine

- Indications
 - All children 11-18 years old
 - People at increased risk (asplenia, properidin deficiency, terminal complement deficiency)
 - Military personnel.
 - Travelers
 - >2 years old to countries with epidemic/hyperendemic disease
 - ▶ Persons > 3months old in epidemic situations. At < 18 months the vaccine is given in 2 doses.
- Contraindications
 - Pregnancy unless there is substantial risk of infection.
- Booster
 - Every 3 years?

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Rabies

- Rabies is a virus that causes fatal encephalitis.
- Rabies risk is world-wide (most countries in Central and South America, the Indian subcontinent, SE Asia [except Japan and Taiwan], and most of Africa)
- Norwegian missionaries - 7% significant rabies exposure (10% in children) in 4-5 y
- Even with pre-exposure vaccination, a two dose post exposure booster series is recommended but no rabies immunoglobulin is necessary.
- IM recommended. Some countries use ID



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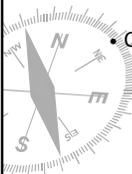
Rabies Vaccine

► Indications

- Persons living in or visiting (for more than 30 days) rabies endemic countries.
- High-risk occupations; veterinarians, animal handlers, spelunkers, and certain laboratory workers.

• Contraindications

- Pregnancy - not a contraindication for post-exposure prophylaxis.



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Reasons for Pre-Exposure Prophylaxis

► No need for RIG

- HRIG is often not available
- Increased reactions to Equine RIG

► Decreased injections post-exposure (5 to 2)



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Rabies Vaccine

- ▶ 4 Vaccines
 - Human diploid cell vaccine (HDCV) IM, ID
 - Rabies vaccine adsorbed (RVA) IM
 - Purified chicken embryo cell vaccine (PCECV) IM
 - Inactivated nerve tissue vaccines (INTV)
- ▶ Only HDCV and PCECV available in the US
- ▶ HDCV and PCECV can be used for pre-exposure prophylaxis
- ▶ Pre-exposure series – 0, 7, 21 or 28 days

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Rabies Vaccine – Boosters and Serology

- Serum Ab persists for 2 years
- Keep titers 1:5 CDC or WHO ≥ 0.5 IU/mL
- Serology monitoring
 - ▶ Q6m – rabies researchers, rabies biological production workers
 - ▶ Q2y – rabies diagnostic lab workers, spelunkers, veterinarians and staff, animal – control and wildlife workers in rabies enzootic areas, bat handlers
- Chloroquine or Mefloquine may decrease serologic response
- 6% reactions with boosters

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Typhoid

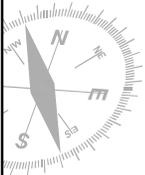
- Typhoid fever causes intestinal and generalized disease.
- It is transmitted from infected humans by contaminated food or water.
- It causes approximately 12.5 million infections per year and is seen primarily in Africa, Asia, Central and South America.

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Typhoid Vaccine

- Vaccines
 - The Ty21a oral vaccine (Vivotif) for ≥ 6 yo
 - Typhim - Vi IM for ≥ 2 yo



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Antimalarials / antibiotics

- Mefloquine / chloroquine – delay vaccine for 24 hrs
- Proguanil – take >10 days after the 4th vaccine dose
- Atavaquone – can interfere with immunogenicity
- Avoid antibiotics for 24 before the first dose and until 7 days after the 4th dose.

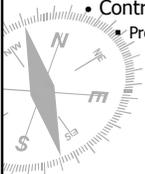


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Typhoid Vaccine

- Indications
 - Travelers to areas of recognized typhoid risk
 - Exposure to documented typhoid fever carriers.
 - Laboratory workers with frequent contact with typhoid organisms
- Contraindications
 - Pregnancy?

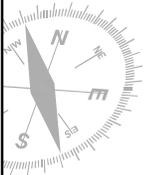


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Yellow Fever

- Yellow fever causes a mosquito born viral disease with jaundice, hemorrhage and albumin in the urine



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Approximate Global Distribution of Yellow Fever, by State/Province, 2007

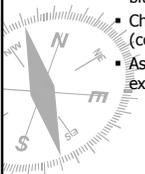


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YF Vaccine

- Indications
 - All persons > 9 months old in areas of endemic yellow fever (Areas of South America and Africa).
 - Children 4-9 months old only in areas of ongoing epidemic yellow fever and a high level of protection against mosquito bites are not possible.
 - Children 4-6 months old only under unusual circumstances (consult CDC).
 - Asymptomatic HIV patients who cannot avoid potential exposure. Monitor neutralizing antibody for protection.



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YF Vaccine

- Contraindications
 - Pregnant women.
 - Immune suppression including HIV.
 - Hypersensitive to eggs.
 - Having received cholera vaccine within 3 weeks.

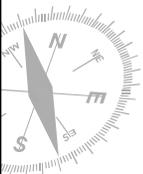


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YF Vaccine

- ▶ Booster every 10 years



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Multiple Organ System Failure

- ▶ Associated with 17DD YF and 17D-204 vaccine strains (MMWR 50;30:643-45)
- ▶ Fever, lymphopenia, thrombocytopenia, mild to moderate LFT elevations, hypotension, respiratory failure.
- ▶ Often require dialysis
- ▶ Risk 1/400,000
- ▶ Most commonly reported in the elderly



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Tick Borne Encephalitis

- ▶ Infected Ixodes ticks or drinking unpasteurized milk from infected animals
- ▶ Scandinavia, Western and Central Europe, former Soviet Union
- ▶ Transmission rate 0.9 cases / 1000 man months (US servicemen)
- ▶ European vaccine - 3 doses over 6 months
- ▶ Not recommended for regular travelers. Consider in long term residents in endemic areas.
- ▶ Increased adverse reactions in children



Ixodes

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Hepatitis B

- Geographic areas of increased prevalence - Asia, SE Asia, Central Asia, parts of the Middle East, sub-Saharan Africa, Amazon basin, some Caribbean islands, and Oceania .
 - Asia (70-90 % adults infected with 8-15% chronically infected).
 - US, Canada, western Europe (5-8% infected with 0.2-0.9% chronically infected).
 - Rest of the world - chronic infection 2-7%.
 - 45 % of the world lives in hepatitis B highly endemic areas (2-7% chronically infected)



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Hepatitis B in travelers

- ▶ Many travelers will visit highly endemic areas where hygienic conditions are not great
- ▶ Travelers especially long term travelers are often exposed to blood products

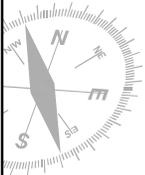


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Hepatitis B Vaccine

- ▶ Seroconversion 93-99%, ≥ 40 88-89%
- ▶ 13-60% of normals lose detectable antibody in 7-10 years

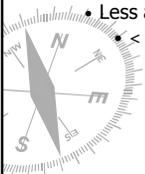


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Hepatitis B Vaccine Schedules

- Acceptable dose schedules
 - 4-6 months before travel
 - 2-4 months before travel
 - ▶ 0, 1-2m, 4-6 m
 - ▶ 0, 1m, 2 months after the first dose, 12 m
- Less acceptable alternatives
 - < 3 weeks before travel
 - ▶ 0, 7d, 21d, 12 m



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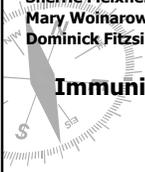
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Type your question to the right in the chat window

After the presentation, questions may be sent to:

Molly Howell	mahowell@nd.gov
Abbi Berg	alberg@nd.gov
Lexie Barber	abarber@nd.gov
Miranda Baumgartner	mibaumgartner@nd.gov
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Mary Woinarowicz	mary.woinarowicz@nd.gov
Dominick Fitzsimmons	dfitzsimmons@nd.gov

Immunization Program : 701.328.3386 or toll-free 800.472.2180



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- ▶ Post-test
 - Nurses interested in continuing education credit, visit:
<http://www.ndhealth.gov/disease/post/default.aspx?PostID=124>
 - Successfully complete the five-question post-test to receive your certificate.
- ▶ Credit for this session is available until Tuesday, June 7, 2016.
- ▶ This presentation will be posted to our website:
www.ndhealth.gov/immunize
