

# Post Travel Evaluation

- **General Approaches** to the Returned Traveller
- Respiratory Complaints
- **Eosinophilia**
- **Fever** in Returned Travellers
- **Persistent Travellers Diarrhea**
- **Skin & Soft Tissue Infections** in Returned Travelers
- Screening **Asymptomatic** Returned Travelers

# General Approaches

- Post travel-related problems occur in **22%–64%** of travelers to developing countries.
- Most illnesses are MILD
- About 8% are enough to seek care from a health care provider.
- **Most illnesses occur immediately after travel**
- Beware of Diseases with LONG incubation periods

# Taking a Medical History

- Severity of illness
- Travel itinerary and duration of travel\*\*
- Timing of onset of illness in relation to international travel (incubation period)
- Past medical history and medications
- History of a pre-travel consultation
- Immunizations
- Malaria Prophylaxis (Yes/No – if yes query adherence)

# Taking a Travel History

- Type of accommodations (looking at mosquitos!)
- Insect **precautions** taken (such as repellent, bed nets)
- Source of **drinking water**
- Ingestion of raw meat or **seafood** or **unpasteurized dairy products**
- Insect or arthropod bites
- **Freshwater** exposure (such as **swimming, rafting**)
- Animal bites and scratches
- Body fluid exposure (such as tattoos, sexual activity)
- Medical care while overseas (such as injections, transfusions)

# Travel Itinerary

- *For example patient comes to your clinic with a febrile illness with nonspecific symptoms*
- Travelers to **sub-Saharan Africa** presenting with fever, **malaria** was the most common specific diagnosis.
- Febrile patients who traveled to **Latin America or Southeast Asia** were much more likely to have dengue

# Timing of illness (incubation period)

- Majority of Travel-related illness have a short incubation period (2-4 weeks after travel)
- Long - **schistosomiasis, leishmaniasis, or tuberculosis** can manifest months or even years later.

# Vaccines received and prophylaxis used

- Adherence to malaria chemoprophylaxis does not rule out the possibility of malaria, but it does reduce risk and increase the chance of an alternative diagnosis.
- Fever and a rash in a traveler who is **not up-to-date with measles vaccination** would raise concern about measles

# Exposure history

- Mosquitos - Dengue virus, yellow fever virus, JE virus, chikungunya virus and filarial parasites
- Ticks - tickborne encephalitis, African tick-bite fever, CCF (?)
- Tsetse flies (painful bites) - African sleeping sickness
- Freshwater swimming - schistosomiasis, leptospirosis



# Respiratory Complaints

- Influenza is among the most common vaccine-preventable diseases associated with international travel.
- Respiratory symptoms plus fever - seasonal influenza, bacterial pneumonia, malaria, Legionnaires' disease (*more rare*)
- Delayed onset and chronic cough – tuberculosis (long-term traveler or health care worker)
- **Helminth infections** – schistosomiasis – can cause respiratory complaints

# Eosinophilia

- Eosinophils = type of disease-fighting white blood cell, high levels found body's tissues at the site of an infection or inflammation
- Fight parasites but also, along with mast cells, control mechanisms associated with allergy and asthma
- For a returning traveler it suggests a possible helminth infection

# Eosinophilia

- Fever and eosinophilia can be present during migrations of parasite
- **Acute schistosomiasis**
- **visceral larval migrans**
- **lymphatic filariasis**
- Allergic diseases, hematologic disorders, and some viral, fungal, and protozoan infections can also cause eosinophilia

# Fever

- Fever usually means serious illness in returned travellers
- Differential Diagnosis – Geographic Location, Incubation, Clinical Findings
- Malaria is primary concern (if traveller has come from endemic area)

# Geographic Location

- Caribbean
- Central America
- South America
- South Central-Asia
- South East Asia
- Sub-Saharan Africa

# Caribbean

- Common = Dengue, malaria (Haiti)
- Other fever causing infections = leptospirosis, chikungunya

# Central America

- Common = Dengue, malaria  
(primarily *Plasmodium vivax*)
- Other infections causing fever = Leptospirosis

# South America

- Common = Dengue, malaria (primarily *P. vivax*)
- Other Infections = leptospirosis, enteric fever (typhoid and paratyphoid)



# South-central Asia

- Common = Dengue, **enteric fever (typhoid and paratyphoid)**, malaria (primarily non-falciparum)
- Other infections that cause fever = Chikungunya

# South East Asia

- Common = Dengue, malaria (primarily non-falciparum)
- Other infections that cause fever = Chikungunya, leptospirosis

# Sub-saharan Africa

- Common = Malaria (primarily *P. falciparum*), acute schistosomiasis, **filariasis**
- Other infections that cause fever = African trypanosomiasis, chikungunya, enteric fever, filariasis

# Incubation less than 2 weeks

- Chikungunya
- Dengue
- Encephalitis, arboviral (Japanese encephalitis, tickborne encephalitis, West Nile virus, other)
- Typhoid-Paratyphoid
- Influenza
- Legionellosis
- Leptospirosis

# Incubation period 2 weeks to 6 weeks

- Amebic liver abscess (weeks to months)
- **Hepatitis A**
- Hepatitis E (up to 9 weeks)
- Acute schistosomiasis (up to 8 weeks)

# Incubation periods Greater than 6 weeks

- Hepatitis B
- Leishmaniasis, visceral
- Tuberculosis
- Amebic liver abscess, hepatitis E, malaria, acute schistosomiasis

# Incubation Period - Malaria

- Malaria, *Plasmodium falciparum* - 6–30 days (98% onset within 3 months of travel)
- Malaria, *P. vivax* - 8 days to 12 months (almost half have onset >30 days after completion of travel)
- *Since incubation periods overlap, how would you determine the causative species?*

# Common Clinical Findings\*

- Fever and rash
- Fever and abdominal pain
- Undifferentiated fever and normal or low white blood cell count
- Fever and hemorrhage
- Fever and eosinophilia
- Fever and pulmonary infiltrates
- Fever and altered mental status
- Fever with onset >6 weeks after travel



# Fever and Rash

- Dengue
- Chikungunya
- Typhoid/Paratyphoid (enteric fever)
- Measles

# Fever and Abdominal Pain

- Typhoid/Paratyphoid Fever (Enteric fever)
- Amebic liver abscess

# Fever and normal or low white blood cell count

- Dengue
- Malaria
- Typhoid/Paratyphoid (Enteric fever)
- Chikungunya

# Fever and Hemorrhage

- Viral hemorrhagic fevers
- Dengue
- Meningococccemia
- Leptospirosis

# Fever and eosinophilia

- Acute schistosomiasis
- Drug hypersensitivity reaction
- Other parasitic infections (rare)

# Fever and Pulmonary Infiltrates

- Pulmonary infiltrates = substance (ie pus, blood, or protein) that lingers within the parenchyma of the lungs.
- Common bacterial and viral pathogens
- Legionellosis
- Acute schistosomiasis
- Leptospirosis

# Fever and altered mental status

- Cerebral malaria
- viral or bacterial meningoencephalitis
- African trypanosomiasis

# Fever with onset >6 weeks after travel

- *Plasmodium vivax* or *ovale* malaria
- Acute hepatitis (B, C, or E)
- Tuberculosis
- Amebic liver abscess



# Keep in Mind

- Fever in a returned traveller is **always** a concern
- Don't overlook cosmopolitan infections
- Malaria can present with respiratory (including acute respiratory distress syndrome), gastrointestinal, or central nervous system findings.
- Consider infection control, public health implications, and requirements for reportable diseases.

# Persistent Diarrhea

- Definition = >14 days of gastrointestinal symptoms
- Persistent infection or coinfection with a second organism not targeted by initial therapy
- Previously undiagnosed gastrointestinal disease unmasked by the enteric infection
- Postinfectious phenomenon.

# Persistent Infection

- Immunosuppressed
- Infected sequentially by another pathogen (opportunistic infection)
- Parasites – Giardiasis, *Cryptosporidium*, *Cyclospora*
- *C. difficile*–associated diarrhea may follow treatment of a bacterial pathogen with a fluoroquinolone or other antibiotic, or may even follow malaria chemoprophylaxis- - *Persistent TD workup should include C. difficile stool toxin assay*
- *Tropical Sprue and Brainerd Diarrhea*

# Undiagnosed GI Condition

- Celiac Disease
- Crohn disease and ulcerative colitis
- Pathogen triggers inflammatory bowel disease in genetically susceptible people
- Note that a Diagnosis of Colorectal cancer should be considered in patients passing blood rectally or with the **onset of a new iron-deficiency anemia.**
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# Post-Infectious Phenomenon

- No source found
- Postinfectious (PI)-IBS
- (PI)-IBS symptoms should follow an episode of gastroenteritis or travelers' diarrhea if the work-up for microbial pathogens and underlying gastrointestinal disease is negative. - - **Diagnosis of exclusion**

# Diagnosis

- Three or more stool examinations should be performed for ova and parasites
- acid-fast stains for *Cryptosporidium*, *Cyclospora*
- *Giardia* antigen testing
- *C. difficile* toxin assay
- **D-xylose absorption test**
- Biopsies (if indicated)

# Management

- Dietary modification
- No loperamide if C.Diff is suspected (Why? What is the risk?)
- Probiotics are helpful
- Non-absorbable antibiotics (example?)

# Skin and Soft Tissue Infections

- One of the most frequent medical problems in returned travelers
- Cutaneous larva migrans, insect bites, and bacterial infections most common causes
- Skin problems associated with fever (rash or secondary bacterial infection)
- Skin Problems not associated with fever -- --  
**more common**



# Triaging your skin infection

- **Pattern recognition** of the lesions: papular, macular, nodular, linear, or ulcerative
- **Location of the lesions:** exposed versus unexposed skin surfaces
- **Exposure history:** freshwater, ocean, insects, animals, or human contact
- **Associated symptoms:** fever, pain, pruritus

*\*Not all skin problems are related to Travel!\**

# Papular Lesions

- Insect Bites – Bed bugs, scabies, fleas
- **Onchocerciasis** - generalized pruritic, papular dermatitis.

# Nodular or Subcutaneous Lesions

- **Bacterial skin infections** - Cellulitis, Impetigo caused by *Staphylococcus aureus* or *Streptococcus pyogenes*.
- **Myiasis** presents as a painful lesion similar to a boil. - Latin American Bot Fly
- **Loa loa filariasis\***

# Macular Lesions

- **Tinea corporis** (ringworm) – fungal infection - expanding red, raised ring, with a central area of clearing in the middle
- **Lyme disease**, a tickborne infection -  $\geq 1$  large *erythematous patches*, with or without central clearing

# Linear Lesions

- **Cutaneous larva migrans** - extremely pruritic, serpiginous, linear lesion
- **Phytophotodermatitis** is a noninfectious condition that results from spilled lime juice, and ultraviolet radiation from the sun.

# Skin Ulcers

- *Staphylococcus* infections
- Unseen spider bite
- **Cutaneous Leishmaniasis** - chronic, usually painless ulcer with heaped-up margins on exposed skin surfaces.

# Skin Infections Associated with Water

- Can occur after both freshwater and saltwater exposure
- Especially if there is associated trauma
- *V. vulnificus* - contaminated marine water, or undercooked shellfish – treat with antibiotic with gram positive and gram negative coverage (FQ or 3<sup>rd</sup> Gen Ceph)
- “Hot tub folliculitis” due to *Pseudomonas aeruginosa* - no antibiotic necessary

# Skin Infections associated with bites

- *Pasteurella multocida* isolates from dog bite wounds is 20%–50% and is major pathogen in cat bite infection- - **treat with Amoxi-clav**
- **Splenectomized patients** are at particular risk of severe cellulitis and sepsis due to *Capnocytophaga canimorsus* after a dog bite.



# Skin Infections associated with bites

- Dog and cat bites - rabies postexposure prophylaxis, tetanus immunization, and antibiotic prophylaxis (Dogs – controversial – only use for asplenic patients, Cats – always amovi-clav)
- Same as above for Monkey Bites
- Old World macaque monkeys - fatal encephalomyelitis due to B virus infection in humans - Valcyclovir prophylaxis after high risk exposure

# Fever and Rash

- **Dengue** - faint macular rash (evident on the second to fourth day of illness. A petechial rash may also be present
- **Chikungunya** - Similar to dengue - rash, but hemorrhage, shock, and death are not typical of chikungunya. **Distinguishing feature is joint pain**
- **South African tick typhus**, or African tick-bite fever - most frequent cause of fever and rash in southern Africa

# Asymptomatic Returned Travellers

- Screening for Asymptomatic Parasitic Diseases is difficult to do
- Most helminths generally have a natural lifespan of months to a few years, which ensures eventual spontaneous cure.
- No tests can detect latent infections with *Plasmodium vivax* or *P. ovale*.

# Asymptomatic Returned Travellers

- *Strongyloides*\*
- Schistosomiasis
- Filariasis
- American trypanosomiasis

# Strongyloidiasis

- An intestinal nematode, *Strongyloides stercoralis*.
- TRANSMISSION – Filariform larvae found in contaminated soil penetrate human skin
- Pruritic, erythematous papular rash can develop at the site of skin penetration, followed by pulmonary symptoms, diarrhea, abdominal pain, and **eosinophilia**.
- duration of carriage after infection is unlimited
- Hyperinfection or disseminated disease
- Diagnosis - microscopic examination of stool
- Treatment – Ivermectin

# Asymptomatic Returned Travellers

- Stool microscopy for protozoa is expensive, not very sensitive, and not highly reproducible, and many laboratories have limited expertise
- Serologic testing has been advocated as the best screening tool – **HIGH Sensitivity, LOW Specificity**
- Screening for eosinophilia – **LOW Sensitivity, HIGH Specificity**

# Asymptomatic Returned Travellers

- No clear guidelines on who should be screened
- Travelers with a high duration and risk of exposure - **Travel Destination, Exposure risks** (ie fresh water, residence in primitive housing in Latin America etc..)
- Immigrants higher probability
- Treat all those found to be positive

# Guidelines

- Short stay travellers (<3–6 months) yield of screening is low, use specific risk factors revealed in the history.



# GI Symptoms

- A history of prolonged (>2 weeks) digestive symptoms during travel can suggest protozoal infection

# Schistosomiasis

- Exposure to fresh water in a region endemic for schistosomiasis, especially in Africa
- serologic screening
- Addition of stool and urine examination in the case of high-intensity exposure.

# Strongyloides

- High risk of skin exposure to soil likely to be contaminated with human feces,
- History of frequently walking barefoot outdoors.
- Serology for *Strongyloides*

# Longer Stay Travellers

- Emphasis should be on those with the longest stays and the most problematic sanitary conditions
- Stool examinations
- Eosinophil counts
- Serologic testing for schistosomiasis and strongyloidiasis
- Mantoux or IGRA tests should be limited to those who have worked in a health care or similar setting
- Exposure to bloodborne pathogens – Hepatitis B,C
- Knowledge about local outbreaks - Ebola