INTRODUCTION — Many travelers return home with fever with or without other accompanying symptoms. Up to 8 percent of travelers to developing countries are ill enough to seek healthcare while abroad or after returning home [1-3]. Fever in the returned traveler can be a manifestation of a minor, self-limited process or can herald a progressive, life-threatening illness. It may be difficult to distinguish between trivial and serious infections based on initial findings.

The assessment of these patients is often hampered by the clinician's lack of familiarity with the types of infections that the patient may have encountered while traveling. A systematic approach to the evaluation of these patients is vital and should include basic information about the geographic distribution of infections in the locations where the person has lived and traveled (including even brief stays and airport transfers), as well as any activities that were undertaken [1,4,5]. The tempo and intensity of the initial work-up will be influenced by both the clinical findings and by the types of infections that are possible.

The evaluation of such patients should focus on three basic questions:

- What infections are possible given where the patient has lived or traveled and the time when exposures may have occurred?
- Which of these infections is more probable given the patient's clinical findings, pretravel measures, and potential exposures?
- Which of these infections is treatable or transmissible or both?

The epidemiology, etiology, and evaluation of fever in the returning traveler will be reviewed here. Skin lesions acquired during travel are discussed separately. (See "Skin lesions in the returning traveler").

EPIDEMIOLOGY AND ETIOLOGY — Illness after travel is common and is self-reported by 22 to 64 percent of travelers to developing countries [6]. Published series can provide a general framework for assessing which infections in returned travelers are more common. A number of studies have evaluated the epidemiology of fever in the traveler returning from a visit to a developing country [1-4,7-14].

The largest contemporary experience in illness related to travel to developing countries comes from GeoSentinel, the global surveillance network of the International Society of Travel Medicine and the Centers for Disease Control and Prevention [1,4]. Sentinel data on ill travelers are collected at more than 40 GeoSentinel sites on six continents.

A 2006 report from 30 GeoSentinel sites in developed countries provided clinical-based surveillance information on 17,353 ill travelers who returned from travel in developing countries and were seen between June 1996 and August 2004 [1]. The primary manifestations for approximately two-thirds of the returned travelers fell into five major syndrome categories: systemic febrile illness without localizing findings, acute diarrhea, dermatologic disorders, chronic diarrhea, and nondiarrheal gastrointestinal disorders. The causes of these disorders in particular regions are discussed separately.
A later report from GeoSentinel specifically evaluated fever, which was a chief reason for seeking care in 28 percent of almost 25,000 ill returned travelers seen between 1997 and 2006 [4]. The following findings were noted:

- The most common specific diagnoses among patients with fever were malaria and dengue fever (21 and 6 percent of cases, respectively); 22 percent of patients had an unspecified febrile illness. Since the clinical manifestations of dengue in many patients are mild and nonspecific, the frequency of diagnosis may be falsely low since many patients with dengue may not seek evaluation. One analysis estimated that 390 million infections occur yearly worldwide and 96 million are symptomatic [15]. (See "Dengue virus infection: Clinical manifestations and diagnosis").
- Febrile diarrheal disease occurred in 15 percent of patients; fever and respiratory infection occurred in 14 percent of patients.
- More than 17 percent had a disease preventable by vaccine (eg, Salmonella typhi infection, hepatitis A, influenza) or chemoprophylaxis (falciparum malaria).

Almost 70 percent of ill returned travelers seen at GeoSentinel sites had visited sub-Saharan Africa, Southeast Asia, the Caribbean, and Central and South America [4]. The following were the major causes of fever at these sites:

- Sub-Saharan Africa – A systemic febrile illness was present in 49 percent of patients (malaria in 42 percent, respiratory illness in 10 percent, diarrheal illness in 10 percent, and no diagnosis in 19 percent). In addition, most rickettsial infections were acquired in this region and were usually tickborne [14].
- Southeast Asia – A systemic febrile illness was present in 34 percent of patients (dengue fever in 18 percent, malaria in 7 percent, respiratory illness in 17 percent, diarrheal illness in 17 percent, and no diagnosis in 22 percent). More than 70 percent of cases of enteric fever (typhoid and paratyphoid) were acquired in south-central or Southeast Asia. (See "Diseases potentially acquired by travel to Southeast Asia").
- Caribbean and Central and South America – A systemic febrile illness was present in 25 percent (dengue fever in 9 percent, malaria in 8 percent, respiratory illness in 13 percent, diarrheal illness in 15 percent, and no diagnosis in 26 percent). (See "Diseases potentially acquired by travel to Latin America and the Caribbean").

Among these patients presenting to GeoSentinel clinics (specialized travel/tropical centers), almost 26 percent of febrile patients and 46 percent of those with a systemic febrile illness required hospitalization [4].

**CLINICAL HISTORY** — The clinical history should establish the geographic region of travel, dates of travel, duration of stay, types of accommodations, activities and exposures, and information about the host, including preparation for travel and any predispositions to infection (table 1). The clinical history should also include careful documentation of the time of onset and nature of various signs and symptoms. It should also establish whether the person has visited malarious areas during the past 12 months. All febrile patients should be questioned about travel within the past three weeks to areas with ongoing outbreaks such as Ebola or other active outbreaks. In some instances, isolation and special infection control interventions should be instituted based on clinical and exposure history and before laboratory results are available.

The type of transportation, layovers, and intermediate stops are also relevant, as infections can be acquired en route. Transmission of a wide range of infections has been traced to airplanes, cruise ships, buses, and trains. These include influenza, tuberculosis, Legionnaires' disease, cholera, norovirus, measles, severe acute respiratory syndrome, shigellosis, rubella, and salmonellosis [16-19].
Good resources that provide current information about what infections occur in different geographic areas are essential [20-22]. The Centers for Disease Control and Prevention website includes an online version of Health Information for International Travel under Travelers’ Health and updates on travel-related infections [22]. The World Health Organization website also has regularly updated information about outbreaks.

**Timing of exposure** — Understanding the timeline of the clinical history and exposures is important for refining and limiting the differential diagnosis. Knowing when potential exposures occurred allows the determination of an incubation period. Most of the severe, rapidly progressive infections (such as falciparum malaria and hemorrhagic fevers) acquired in tropical or developing countries usually become apparent within one to two months after return. In a large study from Belgium, for example, 78 percent of febrile returning travelers had onset of fever during travel or within one month of return [8]. If more than one month has lapsed since tropical travel, many infections can be excluded. The Table lists the causes of fever after travel by the interval since exposure (table 2).

The duration of stay is also relevant. Infections that can be transmitted by inhalation, by a single arthropod bite, or by ingestion of contaminated food or water can follow even a brief sojourn in an area, although the probability of infection increases with the length of stay. As an example, among British travelers to West Africa, the relative risk of malaria was more than 80 times greater for stays of 6 to 12 months compared with stays of one week [23].

The initial history should focus on the preceding year. It is distinctly uncommon for a pathogen to cause an acute febrile illness if the travel occurred more than one year earlier, especially if the duration of the trip was short. Illnesses that turn out to be diagnostic puzzles will require probing for more remote history and consideration of pathogens that can persist and cause symptoms following a long latent or asymptomatic period, such as tuberculosis or visceral leishmaniasis.

Some infections, including many filarial infections such as lymphatic filariasis, onchocerciasis, and loiasis, develop primarily in persons who were born and raised in endemic areas or who have spent prolonged periods in tropical areas, though infections occasionally follow stays of <30 days [24]. Clinical presentation often does not include fever.

**Timing of presentation** — It is helpful to know when symptoms are most likely to develop from an infection acquired during tropical travel [4,25]. The largest experience comes from GeoSentinel, which found that the interval varied widely by diagnosis [4]:

- 66 percent of patients with dengue were seen within one week of return
- 65 percent of patients with falciparum malaria were seen within two weeks of return; only 27 percent of patients with vivax malaria were seen within two weeks, while 54 percent were seen more than six weeks after return.
- 34 percent of patients with hepatitis (mostly hepatitis A or nonspecified hepatitis) were seen more than six weeks after return.

Similar findings were noted in a review of malaria cases in the United States in 2007 from the Centers for Disease Control and Prevention [26]. Approximately 80 percent of patients with *Plasmodium falciparum* malaria developed symptoms within one month of returning from travel [26]. In contrast, only 36 percent of patients with *Plasmodium vivax* infection presented for medical care during the first month after return, about 20 percent were first seen more than six months after return, and 3 percent >1 year. Overall, 1.6 percent of all malaria cases reported in the United States in 2007 was diagnosed more than one year after the travelers returned from malarious regions.

Acute schistosomiasis, which can cause high, persistent fevers, has a longer incubation [27-29]. Among travelers with acute schistosomiasis acquired during freshwater swimming in Mali, the median incubation period was 40 days (range 14 to 63 days) [28].
Vaccines and chemoprophylaxis — The history of vaccination prior to travel and use of chemoprophylactic agents during the trip influences the likelihood of acquiring infections for which effective vaccines or chemoprophylaxis exist. These interventions vary in efficacy. The yellow fever and hepatitis A vaccines are highly efficacious, making infection unlikely in persons who have received the vaccines. The protective efficacy with the parenteral Vi capsular polysaccharide typhoid vaccine is estimated to be 60 to 72 percent in field trials in endemic regions [30]. In addition, some travelers lack immunity to measles, rubella, and diphtheria because of gaps in immunization. During travel, they may be exposed to these infections, which still circulate in some parts of world. (See "Travel advice" and "Immunizations for travel").

The efficacy of various malaria chemoprophylactic regimens varies with the geographic region and also changes over time. As an example, travelers taking agents that were effective for malaria prophylaxis in the past may experience higher failure rates, especially with travel to areas where resistance of malaria parasites is prevalent. Even in areas where no resistance has been reported, malaria chemoprophylaxis is not 100 percent effective. Clinicians should inquire as to the type of medication, the dose administered, the intervals between doses, and the duration of therapy prior to and leaving the endemic area. Commonly used chemoprophylactic drugs do not prevent relapse of vivax malaria [31]. Use of chemoprophylaxis may also delay the onset of symptoms of malaria [32]. (See "Prevention of malaria infection in travelers").

Sex and travel — Sexual contact with new partners is common during travel [33-35]. In a study of 782 travelers in 1991 and 1992, 19 percent reported a new sexual partner on their most recent trip abroad, and 6 percent acquired a sexually transmitted infection [36]. An active industry has developed around sexual tourism, aimed at providing new sexual partners as a primary reason for travel.

Many studies have documented high rates of sexual contact with new partners in expatriates, backpackers, volunteers, and military personnel, among others. Barrier protection is frequently absent or inadequate. In one study of Peace Corps volunteers, only 32 percent reported always using condoms [37]. In a study of international travelers, 15 percent reported having sex with a new partner or a potential exposure to blood and body fluids (eg, through injections, tattoos, dental work, and other skin perforating procedures) [38].

Several sexually transmitted infections can manifest with fever and systemic symptoms in the absence of genital lesions. (See "Epidemiology and pathogenesis of Neisseria gonorrhoeae infection" and "Syphilis: Epidemiology, pathophysiology, and clinical manifestations in HIV-uninfected patients" and "Acute and early HIV infection: Pathogenesis and epidemiology").

The initial history should include a sexual history, including number of partners, types of sexual activities, and whether barrier protection was used. Patients typically will not offer this information and may be unaware that it has any relevance. The Table lists sexually transmitted infections that may cause fever (table 3). The complete physical examination should include a careful genital examination in persons who have had sexual contact while traveling. (See "Epidemiology, clinical manifestations, and diagnosis of genital herpes simplex virus infection" and "Chancroid").

INITIAL EVALUATION

Physical examination — The physical examination should include evaluation for skin lesions, lymphadenopathy, retinal or conjunctival changes, enlargement of liver or spleen, genital lesions, and neurologic findings.

Signs requiring urgent intervention — Findings that should prompt urgent intervention include [39]:

- Hemorrhagic manifestations
- Respiratory distress
- Hypotension or hemodynamic instability
- Confusion, lethargy, stiff neck, or focal neurologic findings
Many infections can be associated with hemorrhage, including viral hemorrhagic fevers, meningococcemia, leptospirosis, plague, rickettsial infections, and vibrio infection [40]. (See related topics.)

**Laboratory tests** — The initial work-up in febrile patients who have had tropical exposures should include the following: complete blood count and differential, liver enzymes, blood cultures, blood smears for malaria, and chest radiograph. Additional studies depend upon exposures and other factors (table 4).

Tests for malaria (rapid diagnostic tests and blood smears) should be carried out urgently (same day) in persons who may have falciparum malaria. Because parasites may be sequestered in the deep vasculature in patients with falciparum malaria, few parasites may be visible on a peripheral smear even in severe infection. Blood smears should be repeated if the initial smears are negative [41,42]. (See "Diagnosis of malaria").

**DIFFERENTIAL DIAGNOSIS** — Routine causes of febrile illness should be considered together with tropical infections. Patients may have been incubating an infection prior to departure or have become ill after their return. To focus solely on unusual infections may lead to missing important treatable causes of fever. Some routine infections that may occur more commonly after travel include staphylococcal skin infections, meningococcemia, and urinary tract infections. In addition, there may be unusual antibiotic resistance patterns if the pathogens were acquired overseas. The differential diagnosis for travel-related infections should include those with a worldwide distribution, such as influenza [43], including those that occur more commonly in developing countries, and unusual infections such as malaria and dengue fever with focal geographic distributions (table 5).

Returned travelers often present with an acute fever, few or no remarkable findings on physical examination, normal or low white blood cell count, and normal or low platelets. Patients may not appear to be severely ill. Although some of these patients may have self-limited illness, several infections that can be severe or life-threatening also produce this same constellation of findings.

GeoSentinel data has demonstrated that, among patients with systemic febrile illness, the most common specific diagnoses are [1]:

- Malaria
- Dengue fever
- Mononucleosis (due to Epstein-Barr virus or cytomegalovirus)
- Rickettsial infection
- Typhoid or paratyphoid fever (enteric fever) [44]

The most life-threatening infections include *P. falciparum* malaria, dengue, and melioidosis [8,45]. Infections with cosmopolitan distribution include pneumonia, sepsis, *Clostridium difficile* diarrhea, sepsis, and AIDS. It is also important to consider causes of infection that may be acquired domestically. Geographically focal infections in the United States that can be acquired during travel include plague, babesiosis, Lyme disease, coccidioidomycosis, ehrlichiosis, relapsing fever, Colorado tick fever, rickettsial infections, tularemia, and hantavirus pulmonary syndrome. In focal areas of Europe, infections include visceral leishmaniasis, hemorrhagic fever with renal syndrome, sandfly fever, and tick-borne encephalitis.

Many noninfectious diseases also cause fever and should be considered if the initial evaluation does not yield a diagnosis. For example, in one study, noninfectious causes accounted for 2.2 percent of the fevers in patients seen after tropical travel [8]. Some of these may be directly related to the process of travel (eg, thrombophlebitis and pulmonary emboli) or drug fever due to pharmacologic agents taken for prophylaxis or empiric therapy.

**Malaria** — Any patient who has spent time in a malarious region and who gives a history of fever should be tested for malaria, even if afebrile at the time of evaluation. Fevers in malaria wax and wane; ≥40 percent of
patients may not have fever at the time of the initial evaluation [46]. Physical examination can be completely normal in a patient with acute falciparum malaria [47,48]. (See "Clinical manifestations of malaria in nonpregnant adults and children").

**Dengue fever** — Although dengue fever does not respond to currently available antivirals, supportive therapy is sometimes needed and can be lifesaving in patients with complicated dengue (eg, dengue hemorrhagic fever and dengue shock syndrome) [49,50]. (See "Dengue virus infection: Prevention and treatment").

**Viral hepatitis** — Hepatitis E is being recognized more frequently as a cause of hepatitis and jaundice in travelers now that many travelers are protected against hepatitis A and hepatitis B [51]. (See "Hepatitis E virus infection").

**Other infections** — Other infections that are uncommon or rare in travelers but important to recognize include African trypanosomiasis (sleeping sickness), which has increased recently in Africa [52-54], ameobic liver abscess [55], anthrax, diphtheria, melioidosis [56,57], Q fever, rabies, relapsing fever, and visceral, cutaneous, or mucocutaneous leishmaniasis [58]. (See related topic reviews.)

Another emerging infection is chikungunya fever [59]. Chikungunya is an alphavirus that is transmitted to humans via the bite of an infected *Aedes* mosquito [60]. Infection is characterized by a febrile illness with prominent polyarthralgia, which may be severe and persistent; skin rash occurs in about half of patients [61,62]. (See "Chikungunya fever").

Zika virus causes an infection characterized by acute onset of low-grade fever with maculopapular rash, arthralgia (notably small joints of hands and feet), or conjunctivitis (nonpurulent). (See "Zika virus infection: An overview").

Leptospirosis may be more common than recognized in travelers returning from tropical areas [63,64]. In one report, 32 cases were recognized in Dutch travelers over a five-year period; the infection was acquired in Thailand or other countries in Southeast Asia from contact with surface water [63]. (See "Epidemiology, microbiology, clinical manifestations, and diagnosis of leptospirosis").

Fungal infections such as histoplasmosis and coccidioidomycosis have caused outbreaks in travelers to Latin America [65-67]. Risk factors have included exploration of caves and proximity to excavation or construction sites. (See "Diagnosis and treatment of pulmonary histoplasmosis" and "Primary coccidioidal infection").

**INFORMATION FOR PATIENTS** — UpToDate offers two types of patient education materials, “The Basics” and “Beyond the Basics.” The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on “patient info” and the keyword(s) of interest.)

- **Basics topics** (see "Patient education: Vaccines for travel (The Basics)" and "Patient education: When to worry about a fever in adults (The Basics)")
- **Beyond the Basics topic** (see "Patient education: General travel advice (Beyond the Basics)"

**SUMMARY**
Much of travel-related illness is attributable to gastrointestinal disease, febrile illness, and dermatologic disease. The most common specific diagnoses among patients with fever are malaria and dengue. (See ‘Epidemiology and etiology’ above.)

The clinical history should establish the geographic region of travel, dates of travel, duration of stay, types of accommodations, activities and exposures, and information about the host, including preparation for travel and any predispositions to infection (table 1). The clinical history should also include careful documentation of the time of onset and nature of various signs and symptoms. The history should establish whether the person has visited malarious areas during the past 12 months. (See ‘Clinical history’ above.)

Good resources that provide current information about what infections occur in different geographic areas are essential. The Centers for Disease Control and Prevention website includes an online version of Health Information for International Travel under Travelers' Health and updates on travel-related infections. The World Health Organization website also has regularly updated information about outbreaks. (See ‘Clinical history’ above.)

Knowing when potential exposures occurred allows the determination of an incubation period. Most of the severe, rapidly progressive infections (such as falciparum malaria and hemorrhagic fevers) acquired in tropical or developing countries become apparent within one to two months after return. The Table lists the causes of fever after travel by the interval since exposure (table 2). (See ‘Timing of exposure’ above.)

The physical examination should include evaluation for skin lesions, lymphadenopathy, retinal or conjunctival changes, enlargement of liver or spleen, genital lesions, and neurologic findings. The initial work-up in febrile patients who have had tropical exposures should include the following: complete blood count and differential, liver enzymes, blood cultures, rapid diagnostic tests and blood smears for malaria, and chest radiograph. Additional studies depend upon exposures and other factors (table 4). (See ‘Initial evaluation’ above.)

Routine causes of febrile illness should be considered first; subsequently, the differential diagnosis should be expanded to include infections related to travel (table 5). Among patients with systemic febrile illness, the most common specific diagnoses are malaria, dengue fever, mononucleosis, rickettsial infection, and enteric fever (typhoid or paratyphoid fever). (See ‘Differential diagnosis’ above.)

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REFERENCES


Topic 3888 Version 18.0

GRAPHICS

Key elements of the history in returning travelers

<table>
<thead>
<tr>
<th>Geography</th>
</tr>
</thead>
<tbody>
<tr>
<td>Countries visited or passed through; urban or rural</td>
</tr>
<tr>
<td>Dates of travel and duration of stay in each place</td>
</tr>
</tbody>
</table>
### Means of transportation

### Accommodations (eg, hotel, dormitory, local household, tent)

### Activities and exposures during travel

- Sex or other intimate contact (eg, type, number of partners, barrier protection)
- Animals, including birds (eg, shared living quarters or physical proximity, seeing rodents, bites, licks) or animal products (eg, hunting, skinning, other)
- Arthropod (eg, seeing or receiving bites from mosquitoes, flies, ticks, fleas, other)
- Needle and blood exposure (eg, shared needles, injections, acupuncture, tattoos, ear or other body piercing, dental work, transfusions, surgery)
- Food and beverages (eg, raw or undercooked flesh, unpasteurized milk, tap or surface water, local delicacies)
- Soil and water contact (eg, recreational, such as hiking, boating, swimming, hunting, spelunking or professional activities, such as archeological digs)

### Host factors

- Age and sex
- Medical problems and past surgery (eg, splenectomy, gastrectomy, HIV infection)
- Past infections and vaccines
- Medications, including immunosuppressive and immunomodulating agents, over the counter drugs, antipyretics
- Past medical history, including immunosuppression
- Preparation for travel (eg, vaccines, chemoprophylaxis)
- Pregnancy

## Infections by interval between exposure and onset of fever or other symptoms

<table>
<thead>
<tr>
<th>Short incubation (7 to 10 days or less)</th>
<th>Intermediate incubation (within 1 month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arboviruses (many)</td>
<td>Amebic liver abscess</td>
</tr>
<tr>
<td>Anthrax</td>
<td>Brucellosis</td>
</tr>
<tr>
<td>Brucellosis*</td>
<td>Clonorchiasis</td>
</tr>
<tr>
<td>Chikungunya virus</td>
<td>Coccidiodomycosis (acute)</td>
</tr>
<tr>
<td>Dengue fever</td>
<td>Cytomegalovirus (CMV)</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>Fascioliasis</td>
</tr>
<tr>
<td>Ehrlichiosis*</td>
<td>Hepatitis A</td>
</tr>
<tr>
<td>Hantavirus infections (eg, hemorrhagic fever)</td>
<td>Hepatitis C</td>
</tr>
<tr>
<td>Short incubation (&lt;3 months)</td>
<td>Long incubation (≥3 months)</td>
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<tr>
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<tr>
<td>with renal syndrome*, hantavirus pulmonary syndrome, others)*</td>
<td></td>
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<tr>
<td>Histoplasmosis (acute)*</td>
<td>Hepatitis E</td>
</tr>
<tr>
<td>HIV (acute)*</td>
<td>Human immunodeficiency virus infection (HIV)</td>
</tr>
<tr>
<td>Influenza</td>
<td>Leishmaniasis, visceral</td>
</tr>
<tr>
<td>Japanese encephalitis</td>
<td>Rubella</td>
</tr>
<tr>
<td>Lassa and other viruses that cause hemorrhagic fever*</td>
<td>Schistosomiasis (acute)</td>
</tr>
<tr>
<td>Legionnaire's disease</td>
<td>Toxoplasmosis</td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>Trypanosomiasis, African</td>
</tr>
<tr>
<td>Lyme disease*</td>
<td>Trypanosomiasis, American</td>
</tr>
<tr>
<td>Malaria*</td>
<td></td>
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<tr>
<td>Measles*</td>
<td></td>
</tr>
<tr>
<td>Melioidosis*</td>
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<tr>
<td>Meningococcal infections</td>
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<tr>
<td>Plague</td>
<td>Amebic liver abscess</td>
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<tr>
<td>Psittacosis</td>
<td>Bartonellosis</td>
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<tr>
<td>Q fever*</td>
<td>Brucellosis</td>
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<tr>
<td>Rabies*</td>
<td>Clonorchiasis</td>
</tr>
<tr>
<td>Relapsing fever</td>
<td>CMV</td>
</tr>
<tr>
<td>Rickettsial infections (multiple)</td>
<td>Fascioliasis</td>
</tr>
<tr>
<td>Tickborne encephalitis</td>
<td>Filariasis</td>
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<tr>
<td>Toxoplasmosis*</td>
<td>Gnathostomiasis</td>
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<tr>
<td>Trichinosis*</td>
<td>Hepatitis B</td>
</tr>
<tr>
<td>Tularemia</td>
<td>Hepatitis C</td>
</tr>
<tr>
<td>Typhoid and paratyphoid fever* (and nontyphoidal salmonellosis)</td>
<td>Histoplasmosis</td>
</tr>
<tr>
<td>Yellow fever</td>
<td>HIV</td>
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<tr>
<td></td>
<td>Leishmaniasis, visceral</td>
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<tr>
<td></td>
<td>Lyme disease</td>
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<td></td>
<td>Malaria</td>
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<tr>
<td></td>
<td>Melioidosis</td>
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<td></td>
<td>Penicilliosis marneffii</td>
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<tr>
<td></td>
<td>Rabies</td>
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<tr>
<td></td>
<td>Syphilis</td>
</tr>
</tbody>
</table>
Trypanosomiasis, African
Trypanosomiasis, American
Tuberculosis
Visceral larva migrans

Lists are not exhaustive.
* Incubation period is commonly longer than 10 days.

*Adapted from: Tropical Infectious Diseases: Principles, Pathogens, and Practice (listed as Box 125-3). Graphic 55035 Version 6.0*

**Sexually transmitted infections causing fever and systemic symptoms**

- Syphilis
- Disseminated gonococcal infection
- Primary HIV-1 infection
- Hepatitis B
- Cytomegalovirus infection
- Hepatitis A (oral-anal)
- Hepatitis C (rare sexual transmission)
- Epstein-Barr virus

**Initial laboratory evaluation for fever and tropical exposures**

<table>
<thead>
<tr>
<th>Routine laboratory tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete blood count with differential</td>
</tr>
<tr>
<td>Liver enzyme and function tests</td>
</tr>
<tr>
<td>Blood cultures</td>
</tr>
<tr>
<td>Urinalysis (culture if abnormal sediment)</td>
</tr>
<tr>
<td>Rapid diagnostic test (if available) and blood smears for malaria</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other tests to consider (depends upon physical examination and exposure history)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stool culture and/or examination for blood, fecal leukocytes, ova and parasites</td>
</tr>
<tr>
<td>Chest radiograph</td>
</tr>
<tr>
<td>Serologic tests</td>
</tr>
<tr>
<td>Urinary antigens (eg, for Legionella)</td>
</tr>
</tbody>
</table>
Blood smears for Babesia, Borrelia, filaria

Bone marrow aspirate/biopsy

Biopsy of skin lesion, lymph nodes, other masses

Examination of cerebrospinal fluid

Other imaging studies

**Key concepts in the evaluation of fever after travel**

Diseases unrelated to travel can appear after exotic travel

Infections can be acquired en route or on brief layovers

Fever related to tropical exposures usually begins during travel or shortly after return, but can rarely be delayed for months or years

Defining the range of relevant incubation periods can help limit the differential diagnosis

Malaria is still possible even if an initial malaria smear is negative

Patients with acute falciparum malaria may have a normal physical examination and no fever when first seen

Early symptoms of self-limited infections and life-threatening infections may be indistinguishable

Risks for infectious diseases and manifestations of infections in local residents and in visitors to a geographic region may differ widely

Risks for infectious diseases vary from one tropical area to another and may vary depending upon the season and year

Familiar infectious diseases acquired in a tropical, developing area may have an unusual resistance pattern or may be acquired during an unexpected time of year (eg, influenza in July)