CHAPTER 6. VACCINE-PREVENTABLE DISEASES, VACCINES AND VACCINATION

Occurrence
Pneumococcal diseases are a worldwide public health problem. \textit{S. pneumoniae} is the leading cause of severe pneumonia in children under 5 years of age, causing over 1 million deaths each year, mainly in developing countries. In industrialized countries, most pneumococcal disease occurs in the elderly.

Risk for travellers
Travellers with certain chronic conditions are at increased risk of pneumococcal disease and should be vaccinated. These predisposing conditions include sickle-cell disease, other haemoglobinopathies, chronic renal failure, chronic liver disease, immunosuppression after organ transplantation and other etiological factors, asplenia and dysfunctional spleen, leaks of cerebrospinal fluid, diabetes mellitus and HIV infection.

Vaccine
The current polysaccharide vaccines contain capsular antigens of 23 serotypes, which cause 90\% of pneumococcal infections. The vaccines are immunogenic in those over 2 years of age. Children under 2 years of age and immunocompromised individuals do not respond well to the vaccine. Vaccination provides a relative protection against pneumococcal pneumonia in healthy elderly individuals.

Pneumococcal vaccine is recommended for selected groups, above the age of 2 years, with increased risk of pneumococcal disease. In some countries, such as the USA, routine vaccination is recommended for everyone aged above 65 years.

A new generation of conjugate pneumococcal vaccines is now being evaluated. These vaccines contain 9–11 selected polysaccharides bound to a protein carrier, and induce a T-cell-dependent immune response. Conjugate vaccines are likely to be protective even in children below 2 years of age.

Precautions and contraindications
Pneumococcal polysaccharide vaccine is generally considered very safe. Mild, local reactions persisting for up to 48 hours are common; more severe local reactions are unusual. Moderate systemic reactions (e.g. fever and myalgia) are unusual and severe adverse effects (e.g. anaphylactic reactions) are rare.

Revaccination after 3–6 years may be considered for those in certain high-risk groups in whom immunity following vaccination is known to decline rapidly.
RABIES

Disease and occurrence
See Chapter 5.

Risk for travellers
The risk to travellers in endemic areas is proportional to their contact with potentially rabid animals. For instance, it is estimated that 13% of visitors to one country in south-east Asia come into contact with local animals. Veterinary workers and people who work in the streets of big-city slums where dogs roam wild are at the greatest risk. Most travellers in tourist resorts are at very low risk. There is a greater risk for children, however, who may have more contact with animals and may not report suspect incidents. It is prudent to avoid walking in populated areas where dogs roam. Following suspect contact, especially bites or scratches, medical advice should be sought at once at a competent medical centre, ideally in the capital city. First-aid measures should be started immediately (see also Chapter 5).

Vaccine
Vaccination against rabies is carried out in two distinct situations:

- to protect those who are likely to be exposed to rabies, i.e. pre-exposure vaccination;
- to prevent the establishment of rabies infection after exposure has taken place, usually following the bite of an animal suspected of having rabies, i.e. post-exposure vaccination.
CHAPTER 6. VACCINE-PREVENTABLE DISEASES. VACCINES AND VACCINATION

The vaccines used for pre-exposure and post-exposure vaccination are the same, but the schedule of administration differs according to the type of application. Modern vaccines of cell-culture origin are safer and more effective than the older vaccines, which were produced in brain tissue, and are now used in most countries.

Pre-exposure immunization should be offered to people at high risk of exposure, such as laboratory staff working with rabies virus, veterinarians, animal handlers and wildlife officers, and to other individuals living or travelling in areas where rabies is endemic. Pre-exposure immunization is advisable for children in endemic areas, where they provide an easy target for rabid animals.

Such immunization should preferably consist of three full intramuscular doses of cell-culture rabies vaccine given on days 0, 7 and 21–28 (a few days' variation in the timing is not important). For adults, the vaccine should always be administered in the deltoid area of the arm; for young children, the anterolateral area of the thigh is also acceptable. The gluteal area should never be used, since vaccine administration in this area results in lower neutralizing antibody titres.

Where feasible, and particularly in individuals at occupational risk, the presence of virus-neutralizing antibodies should be confirmed using serum samples collected 1–3 weeks after the final dose.

Tissue-culture or purified duck-embryo rabies vaccines of potency at least 2.5 IU/dose induce adequate antibody titres when carefully administered intradermally in 0.1 ml volumes on days 0, 7 and 28. Vaccination by the intradermal route is less immunogenic than intramuscular vaccination, but offers cost savings since the dose is only 0.1 ml per intradermal site.

For post-exposure vaccination see Chapter 5.

Precautions and contraindications

Modern rabies vaccines are well tolerated. The frequency of minor adverse reactions (local pain, erythema, swelling and pruritus) varies widely from one report to another. Occasional systemic reactions (malaise, generalized aches and headaches) have been noted after both intramuscular and intradermal injections.
Disease and occurrence

See Chapter 5.

Risk for travellers

Travellers who walk and camp in infested areas during the tick season (usually spring to early autumn) are at risk and should be vaccinated. Some degree of protection is afforded by clothing that covers as much skin as possible and by applying insect repellent.

Vaccine

The vaccine should be offered only to high-risk travellers. It is an inactivated whole-cell virus vaccine containing a suspension of purified TBE virus grown on chick embryo cells and inactivated with formaldehyde. Two doses of 0.5 ml should be given i.m. 4–12 weeks apart. A third dose is given 9–12 months after the second dose, and confers immunity for 3 years. Booster doses are required to maintain immunity and should be given every 3 years if the risk continues. Outside endemic countries, the vaccine may be unlicensed and will have to be obtained by special request.

Precautions and contraindications

Occasional local reactions may occur, such as reddening and swelling around the injection site, swelling of the regional lymph nodes or general reactions (e.g. fatigue, pain in the limb, nausea and headache). Rarely, there may be fever above
38 °C for a short time, vomiting or transient rash. In very rare cases, neuritis of varying severity may be seen, although the etiological relationship to vaccination is uncertain. The vaccination has been suspected of aggravating autoimmune diseases such as multiple sclerosis and iridocyclitis, but this remains unproven. Sensitivity to thiomersal (a vaccine preservative) is a contraindication.

<table>
<thead>
<tr>
<th>Type of vaccine:</th>
<th>Killed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of doses:</td>
<td>Two, given i.m. 4–12 weeks apart, plus booster</td>
</tr>
<tr>
<td>Booster:</td>
<td>9–12 months after second dose</td>
</tr>
<tr>
<td>Contraindications:</td>
<td>Sensitivity to the vaccine preservative thiomersal adverse reaction to previous dose</td>
</tr>
<tr>
<td>Adverse reactions:</td>
<td>Local reactions occasionally; rarely fever</td>
</tr>
<tr>
<td>Before departure:</td>
<td>Second dose 2 weeks before departure</td>
</tr>
<tr>
<td>Recommended for:</td>
<td>High-risk individuals only</td>
</tr>
<tr>
<td>Special precautions:</td>
<td>Avoid ticks; remove immediately if bitten</td>
</tr>
</tbody>
</table>

**TUBERCULOSIS**

**Disease and occurrence**

See Chapter 5.

**Risk for travellers**

Most travellers are at low risk for tuberculosis (TB). The risk for long-term travellers (>3 months) in a country with a higher incidence of tuberculosis than their own may be comparable to the risk for local residents. Living conditions, as well as duration of travel, are important in determining the risk of infection: high-risk settings include health facilities, prisons and shelters for the homeless.

**Vaccine**

BCG vaccine is of very limited use for travellers. In the first year of life it provides good protection against complications of TB. In countries with high TB prevalence, infants are generally immunized as soon after birth as possible with a single dose of BCG, which protects against severe forms of TB in infancy and early childhood. Other protective benefits of the vaccine are uncertain. BCG should be considered for infants travelling from an area of low incidence to one of high incidence.
INTERNATIONAL TRAVEL AND HEALTH 2002

For health workers BCG provides some level of protection and one dose should be offered.

Many industrialized countries with a low incidence of TB have ceased giving BCG routinely to neonates; instead, a dose is given in adolescence. Other countries do not use BCG at all but rely on early detection and treatment to control the disease.

Booster doses of BCG are not recommended by WHO.

Precautions and contraindications

BCG is one of the more difficult vaccines to administer and the reconstituted vaccine must be given intradermally. Symptomatic HIV-infected individuals should not be vaccinated.

<table>
<thead>
<tr>
<th>Type of vaccine:</th>
<th>Live bacterial (BCG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of doses:</td>
<td>One</td>
</tr>
<tr>
<td>Contraindications:</td>
<td>Symptomatic HIV infection</td>
</tr>
<tr>
<td>Adverse reactions:</td>
<td>Local: abscess, regional lymphadenitis. Distant: osteitis, disseminated disease</td>
</tr>
<tr>
<td>Before departure:</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Consider for:</td>
<td>Infants under 6 months of age travelling to high-risk countries and health workers</td>
</tr>
<tr>
<td>Special precautions:</td>
<td>Skin test adults before administration; do not vaccinate if reaction is greater than 5 mm</td>
</tr>
</tbody>
</table>

TYPHOID FEVER

Disease and occurrence

See Chapter 5.

Risk for travellers

All travellers to endemic areas are at potential risk of typhoid fever, although the risk is generally low in tourist and business centres where standards of accommodation, sanitation and food hygiene are high. The risk is particularly high in the Indian subcontinent. Even vaccinated individuals should take care to avoid consumption of potentially contaminated food and water.
CHAPTER 6. VACCINE-PREVENTABLE DISEASES. VACCINES AND VACCINATION

Vaccine

Travellers to countries where the risk of typhoid fever is high, especially those staying for longer than a month, those exposed to conditions of poor hygiene, and those visiting the Indian subcontinent and destinations where there is the possibility of antibiotic-resistant organisms, may be offered one of the following vaccines.

- **Oral Ty21a.** This live attenuated mutant strain of *Salmonella typhi* Ty21a, supplied as liquid or enteric coated capsules, is given orally in three doses (four in USA) 2 days apart, and produces protection 7 days after the final dose. Seven years after the final dose the protective efficacy is still 67% in residents of endemic areas but may be less for travellers.

- **Injectable Vi CPS.** Capsular Vi polysaccharide vaccine (Vi CPS), containing 25 µg of polysaccharide per dose, is given i.m. in a single dose and produces protection 7 days after injection. In endemic areas, the protective efficacy is 72% after 1.5 years and 50% 3 years after vaccination.

Both vaccines are safe and effective, currently licensed and available. They offer alternatives to the previous, poorly tolerated, whole-cell typhoid vaccine. However, their efficacy in children under 2 years of age has not been demonstrated.

A combined typhoid/hepatitis A vaccine is also available.

**Precautions and contraindications**

Proguanil, mefloquine and antibiotics should be stopped from 1 week (12 hours in the USA) before starting Ty21a until 1 week after.

Comparison of the adverse effects of typhoid vaccines show that more systemic reactions (e.g. fever) occur after i.m. administration of inactivated vaccine than after either Ty21a or Vi CPS. No serious adverse effects have been reported following administration of Ty21A or Vi polysaccharide.

These vaccines are not recommended for use in infant immunization programmes: there is insufficient information on their efficacy in children under 2 years of age.
## YELLOW FEVER

### Disease and occurrence

See Chapter 5.

### Risk for travellers

The normally low risk to travellers increases with travel to jungle areas in endemic countries and in or near cities during urban outbreaks. Areas where yellow fever virus is present far exceed those officially reported. The risk of exposure to infection can be reduced by taking measures to prevent mosquito bites (see Chapter 3). It should be noted that the mosquito vectors of yellow fever bite mostly during daylight hours.

### Vaccine

Yellow fever vaccine is highly effective (approaching 100%), while the disease may be fatal in adults who are not immune. Vaccination is recommended for all travellers (with few exceptions, see below) who visit countries or areas where there is a risk of yellow fever transmission. For domestic travel, vaccination is recommended for travel outside the urban areas of countries in the yellow fever endemic zone (Africa and south America), even if these countries have not officially reported the disease.

<table>
<thead>
<tr>
<th>Type of vaccine:</th>
<th>Oral Ty21a and injectable Vi CPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of doses:</td>
<td>One of Vi CPS, l.m. Three or four of live Ty21a, generally at 2-day intervals as liquid or enteric coated capsule</td>
</tr>
<tr>
<td>Booster:</td>
<td>Every 3 years for Vi CPS, every 6 years for Ty21a</td>
</tr>
<tr>
<td>Contraindications:</td>
<td>Stop proguanil, mefloquine and antibiotics 1 week (12 hours in the USA) before starting Ty21a until 1 week after</td>
</tr>
<tr>
<td>Adverse reactions:</td>
<td>None significant</td>
</tr>
<tr>
<td>Before departure:</td>
<td>1 week</td>
</tr>
<tr>
<td>Recommended for:</td>
<td>Travellers to high-risk areas and travellers staying longer than 1 month or likely to consume food or beverages away from the usual tourist routes in developing countries</td>
</tr>
<tr>
<td>Special precautions:</td>
<td>Vi CPS – not under 2 years of age; avoid proguanil, mefloquine and antibiotics with Ty21a</td>
</tr>
</tbody>
</table>
CHAPTER 6. VACCINE-PREVENTABLE DISEASES, VACCINES AND VACCINATION

Note. Vaccination for personal protection of travellers is not a mandatory requirement.

Precautions and contraindications

Tolerance of the vaccine is generally excellent—only 2–5% of vaccine recipients have mild reactions, including myalgia and headache. Contraindications include true allergy to egg protein, cellular immunodeficiency (congenital or acquired, the latter sometimes being only temporary) and symptomatic HIV infection. Many industrialized countries administer yellow fever vaccine to persons with symptomatic HIV infection provided that the CD4 count is at least 400 cells/mm³. Asymptomatic HIV-positive individuals may have a reduced response to the vaccine. There is a theoretical risk of harm to the fetus if the vaccine is given during pregnancy, but this must be weighed against the risk to the mother of remaining unvaccinated and travelling to a high-risk zone. (However, pregnant women should be advised not to travel to areas where exposure to yellow fever may occur.) Encephalitis has been reported as a rare event following vaccination of infants under 9 months of age; as a result, administration of the vaccine is not recommended before 9 months of age.

There have been recent reports of a small number of serious adverse reactions, including deaths, following yellow fever vaccination; most of these reactions occurred in elderly persons. However, the risk to unvaccinated individuals who visit endemic countries is far greater than the risk of a vaccine-related adverse event. It remains important for all travellers at risk to be vaccinated; nonetheless, yellow fever vaccination should not be prescribed for individuals who are not at risk of exposure to infection.

| Type of vaccine: | Live viral |
| Number of doses: | One priming dose of 0.5 ml |
| Booster: | 10-yearly |
| Contraindications: | Egg allergy; immunodeficiency from medication, disease or symptomatic HIV infection; hypersensitivity to a previous dose; pregnancy (see text above) |
| Adverse reactions: | Rarely, encephalitis or hepatic failure |
| Before departure: | International certificate of vaccination becomes valid 10 days after vaccination |
| Recommended for: | All travellers to endemic zones |
| Special precautions: | Not for infants under 9 months of age; restrictions in pregnancy |
Mandatory vaccination

Yellow fever

Mandatory vaccination against yellow fever is carried out to prevent the importation of yellow fever virus into vulnerable countries. These are countries where yellow fever does not occur but where the mosquito vector and non-human primate hosts are present. Importation of the virus by an infected traveller could potentially lead to the establishment of infection in mosquitoes and primates, with a consequent risk of infection for the local population. In such cases, vaccination is an entry requirement for all travellers arriving from countries, including airport transit, where there is a risk of yellow fever transmission.

If yellow fever vaccination is contraindicated for medical reasons, a medical certificate is required for exemption.

The international yellow fever vaccination certificate becomes valid 10 days after vaccination and remains valid for a period of 10 years.

For information on countries that require proof of yellow fever vaccination as a condition of entry, see country list.

Travellers should be aware that the absence of a requirement for vaccination does not imply that there is no risk of exposure to yellow fever in the country.

The international certificate of vaccination is reproduced with explanatory notes on page 129.

Meningococcal meningitis

Vaccination against meningococcal meningitis is required by Saudi Arabia for all pilgrims who visit Mecca for the Umrah and Hajj. A number of countries require vaccination of travellers returning from the Umrah and Hajj.

Following the occurrence of cases of meningitis due to N. meningitidis W-135 among pilgrims in 2000, the current requirement is for vaccination with quadrivalent vaccine (A, C, Y and W-135). Vaccine requirements for Hajj pilgrims are issued each year and published in the Weekly epidemiological record.

Special groups

Infants and young children

Because not all vaccines can be administered to the very young, it is especially important to ensure protection against health hazards such as foodborne illnesses
CHAPTER 6. VACCINE-PREVENTABLE DISEASES, VACCINES AND VACCINATION.

and mosquito bites by means other than vaccination. Some vaccines can be administered in the first few days of life (BCG, oral poliomyelitis vaccine, hepatitis A and B). Others (diphtheria/tetanus/pertussis, diphtheria/tetanus, inactivated poliomyelitis vaccine) should not be given before 6 weeks of age, and yellow fever vaccine not before 9 months of age. Because it may be difficult to reduce children's exposure to environmental dangers such as placing contaminated objects in the mouth or mosquito bites, it is particularly important to ensure that their routine vaccinations are fully up to date. A child who travels abroad before completing the full schedule of routine vaccines is at risk from vaccine-preventable diseases.

Adolescents and young adults
Adolescents and young adults make up the largest group of travellers and the group most likely to acquire sexually transmitted diseases. They are particularly at risk when travelling on a limited budget and using accommodation of poor standard (e.g. when backpacking), as well as from a lifestyle that may include risky sexual behaviour and other risks taken under the influence of alcohol or drugs. Because risk reduction through behaviour modification may not be reliable, this age group should be strongly encouraged to accept all appropriate vaccines before travel and to adhere to other precautions for avoiding infectious diseases.

Frequent travellers
Individuals who travel widely, usually by air, often become lax about taking precautions regarding their health. Having travelled numerous times without major health upsets, they may neglect to check that they are up to date with vaccination. Such travellers pose a special problem for health advisers who should, nonetheless, encourage compliance.

Last-minute travellers
Certain individuals, including emergency aid and health care workers, may need to travel at very short notice to dangerous, often war-torn countries. It may be difficult to give them multiple vaccines in a short space of time. If some vaccines have not been administered by the time of departure, it may be possible for the traveller to carry the doses safely in a vacuum flask (with or without ice, depending on the required temperature for the vaccine), together with the
appropriate injection devices. Vaccines should travel well like this until they can be stored at the appropriate temperature at the destination, awaiting timely use. If there is any doubt about being able to keep vaccines cold in transit, the traveller should be encouraged to obtain the remaining doses in the country of destination after the appropriate interval.

Those in occupations that make the need for emergency travel likely to arise should be strongly encouraged to keep their routine and other recommended vaccinations fully up to date.

Pregnancy

Pregnancy should not deter a woman from receiving vaccines that are safe and will protect both her health and that of her child. However, care must be taken to avoid the inappropriate administration of certain vaccines that could harm

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Use in pregnancy</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG</td>
<td>No</td>
<td>Safety not determined</td>
</tr>
<tr>
<td>Cholera</td>
<td></td>
<td>Safety not determined</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>Yes, administer if indicated</td>
<td></td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Yes, administer if indicated</td>
<td></td>
</tr>
<tr>
<td>Influenza</td>
<td>Yes, administer if indicated</td>
<td>In some circumstances—consult a physician</td>
</tr>
<tr>
<td>Japanese encephalitis</td>
<td></td>
<td>Safety not determined</td>
</tr>
<tr>
<td>Measles</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Mumps</td>
<td>Yes, administer if indicated</td>
<td></td>
</tr>
<tr>
<td>Poliomyelitis</td>
<td>No</td>
<td>Normally avoided</td>
</tr>
<tr>
<td>OPV</td>
<td>Yes, administer if indicated</td>
<td></td>
</tr>
<tr>
<td>IPV</td>
<td>Yes, administer if indicated</td>
<td></td>
</tr>
<tr>
<td>Rubella</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Tetanus/diphtheria</td>
<td>Yes, administer if indicated</td>
<td></td>
</tr>
<tr>
<td>Rabies</td>
<td>Yes, administer if indicated</td>
<td></td>
</tr>
<tr>
<td>Typhoid Ty21a</td>
<td></td>
<td>Safety not determined</td>
</tr>
<tr>
<td>Varicella</td>
<td>No</td>
<td>Avoided unless at high risk</td>
</tr>
<tr>
<td>Yellow fever</td>
<td>Yes, administer if indicated</td>
<td></td>
</tr>
</tbody>
</table>

* Live vaccine—to be avoided during pregnancy.
the unborn baby. Killed or inactivated vaccines, toxoids and polysaccharides
can generally be given during pregnancy, as can oral polio vaccine. Live vaccines
are generally contraindicated because of largely theoretical risks to the baby.
Measles, mumps, rubella, BCG and yellow fever vaccines should be avoided in
pregnancy. The risks and benefits should nevertheless be examined in each
individual case. Vaccination against yellow fever may be considered after the
sixth month of pregnancy when the risk from exposure is deemed greater than
the risk to the fetus (see Table 6.2). However, pregnant women should be advised
to travel to areas where there is a risk of exposure to yellow fever.

Elderly travellers
Vaccination of healthy elderly travellers does not differ in principle from
vaccination of younger adults. However, special considerations arise if the elderly
traveller has not been fully immunized in the past and/or has existing medical
problems.

Many elderly people may have never been vaccinated with the vaccines used in
routine childhood immunization programmes, or may have neglected to keep
up the recommended schedule of booster doses. As a consequence, they may be
susceptible to diseases such as diphtheria, tetanus and poliomyelitis as well as to
other infections present at the travel destination.

Elderly travellers who have never been vaccinated should be offered a full primary
course of vaccination against diphtheria, tetanus, poliomyelitis and hepatitis B.
In addition, those who are not immune to hepatitis A should be vaccinated against
this disease before travelling to a developing country.

Since the elderly are at risk for severe and complicated influenza, regular annual
vaccination is recommended. For travellers from one hemisphere to the other,
vaccine against the currently circulating strains of influenza is unlikely to be
obtainable before arrival at the travel destination. Those arriving shortly before,
or early during, the influenza season, and planning to stay for more than 2–3
weeks, should arrange vaccination as soon as possible after arrival. Pneumococcal
vaccine should also be considered for elderly travellers in view of the risk of
pneumococcal pneumonia following influenza infection.

Special considerations arise in the case of elderly travellers with pre-existing
chronic health problems (see below).
Travellers with chronic medical problems

Travellers with chronic medical conditions involving impaired immunity, including cancer, diabetes mellitus, HIV infection and treatment with immunosuppressive drugs, may be at risk of severe complications following administration of vaccines that contain live organisms. Consequently, it may be advisable to avoid measles, oral polio, yellow fever and BCG vaccines for these travellers. For travel to a country where yellow fever vaccination is mandatory, a medical certificate will be required to obtain exemption.

Travellers with chronic cardiovascular and/or respiratory conditions or diabetes mellitus are at high risk for severe influenza and its complications. Regular annual vaccination against influenza is recommended. For travel from one hemisphere to the other shortly before, or early, during the influenza season, vaccination should be sought as soon as possible after arrival at the travel destination (see also pages 102-103).

For those who lack a functional spleen, additional vaccines are advised: Hib, meningococcal vaccine (conjugate C as well as A+C or quadrivalent vaccine) and pneumococcal vaccination should be considered, in addition to regular vaccination against influenza.

HIV-positive and immunocompromised travellers

The likelihood of successful immunization is reduced in some HIV-infected children and adults, but the risk of serious adverse effects remains low. Asymptomatic HIV-infected children should be immunized according to standard schedules. With certain exceptions, symptomatic HIV-positive individuals should also be immunized as usual. Both measles and oral poliomyelitis vaccines may be given to persons with symptomatic HIV infection. The following are contraindicated for this group:

- *Measles vaccine* has generally been recommended for individuals with moderate immunodeficiency if there is even a low risk of contracting wild measles from the community. A low level of risk is associated with use of measles vaccine in individuals who are HIV-infected and whose immune system is impaired. Where the risk of contracting wild measles infection is negligible, it may be preferable to avoid use of the vaccine.

- *Yellow fever vaccine* is not recommended for symptomatic HIV-positive adults and children. It is not certain whether yellow fever vaccine poses a risk for asymptomatic HIV-infected persons. Any adverse reactions to the vaccine occurring in HIV-positive individuals should be reported to WHO. In many
CHAPTER 5. VACCINE-PREVENTABLE DISEASES, VACCINES AND VACCINATION

industrialized countries, yellow fever vaccine is administered to people with symptomatic HIV infection or suffering from other immunodeficiency diseases, provided that their CD4 count is at least 400 cells/mm³ and if they plan to visit areas where epidemic or endemic yellow fever actually occurs.

BCG vaccine should not be given to individuals with symptomatic HIV/AIDS.

Adverse reactions and contraindications

Reactions to vaccines

While vaccines are generally both effective and safe, no vaccine is totally safe for all recipients. Vaccination may sometimes cause certain mild side-effects: local reaction, slight fever and other systemic symptoms may develop as part of the normal immune response. In addition, certain components of the vaccine (e.g. aluminium adjuvant, antibiotics or preservatives) occasionally cause reactions. A successful vaccine reduces these reactions to a minimum while inducing maximum immunity. Serious reactions are rare. Health workers who administer vaccines have an obligation to inform recipients of known adverse reactions and the likelihood of their occurrence.

A known contraindication should be clearly marked on a traveller’s vaccination card, so that the vaccine may be avoided in future. In exceptional circumstances, the medical adviser may consider the risk of a particular disease to be greater than the theoretical risk of administering the vaccine and will advise vaccination.

Common mild vaccine reactions

Most vaccines produce some mild local and/or systemic reactions (summarized in Table 6.3) relatively frequently. These reactions generally occur within a day or two of immunization. However, the systemic symptoms that may arise with measles or MMR vaccine occur 5–12 days after vaccination. Fever and/or rash occur in 5–15% of measles/MMR vaccine recipients during this time, but only 3% are attributable to the vaccine; the rest may be classed as background events, i.e. normal events of childhood.

Uncommon, severe adverse reactions

Most of the rare vaccine reactions (detailed in Table 6.4) are self-limiting and do not lead to long-term problems. Anaphylaxis, for example, although potentially fatal, can be treated and has no long-term effects.
Encephalopathy is included as a rare reaction to measles or DTP vaccine, but there is no certainty that there is a causal relationship.

Although extremely rare, a reaction to yellow fever vaccine can be life-threatening and unpredictable. Ideally, anyone who receives the vaccine should be asked to stay in the clinic for 15–30 minutes; if a reaction occurs, it can be treated and potentially serious consequences avoided.

All serious reactions should be reported immediately to the relevant national health authority and marked on the vaccination card. In addition, the patient and relatives should be instructed to avoid the vaccination in the future.

Table 6.3 Summary of common minor vaccine reactions

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Possible minor adverse reaction</th>
<th>Expected frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG</td>
<td>Local reaction (pain, swelling, redness) Common</td>
<td></td>
</tr>
<tr>
<td>Cholera</td>
<td>Oral presentation—none</td>
<td></td>
</tr>
<tr>
<td>DTP</td>
<td>Local reaction (pain, swelling, redness) Up to 50% Fever</td>
<td>Up to 50%</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>Local reaction (pain, swelling, redness) Up to 50%</td>
<td></td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Local reaction (pain, swelling, redness) Adults up to 30%, Children up to 5% Fever 1-6%</td>
<td></td>
</tr>
<tr>
<td>Hib</td>
<td>Local reaction (pain, swelling, redness) 5-15% Fever</td>
<td></td>
</tr>
<tr>
<td>Japanese encephalitis</td>
<td>Local reaction, low-grade fever, myalgia, gastrointestinal upset</td>
<td>Up to 20%</td>
</tr>
<tr>
<td>Lyme disease</td>
<td>Local reaction, myalgia, influenza-like illness Up to 20%</td>
<td></td>
</tr>
<tr>
<td>Measles/MMR</td>
<td>Local reaction (pain, swelling, redness) Irritability, malaise and non-specific symptoms, fever Up to 10% Up to 5%</td>
<td></td>
</tr>
<tr>
<td>Pneumococcal</td>
<td>Local reaction (pain, swelling, redness) 30–50%</td>
<td></td>
</tr>
<tr>
<td>Poliomyelitis (OPV)</td>
<td>None</td>
<td>Less than 1%</td>
</tr>
<tr>
<td>Poliomyelitis (IPV)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Rabies</td>
<td>Local and/or general reaction depending on type of vaccine (see product information) 15–25%</td>
<td></td>
</tr>
</tbody>
</table>
### Vaccine Possible minor adverse reaction Expected frequency

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Minor adverse reactions</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meningococcal</td>
<td>Mild local reactions</td>
<td>Up to 71%</td>
</tr>
<tr>
<td>Tetanus/Td</td>
<td>Local reaction (pain, swelling, redness)</td>
<td>Up to 10%</td>
</tr>
<tr>
<td></td>
<td>Malaise and non-specific symptoms</td>
<td>Up to 25%</td>
</tr>
<tr>
<td>Tick-borne encephalitis</td>
<td>Local reaction (pain, swelling, redness)</td>
<td>Up to 10%</td>
</tr>
<tr>
<td>Typhoid fever</td>
<td>Depends on type of vaccine use (see product information)</td>
<td>—</td>
</tr>
<tr>
<td>Yellow fever</td>
<td>Headache</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Influenza-like symptoms</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>Local reaction (pain, swelling, redness)</td>
<td>5%</td>
</tr>
</tbody>
</table>

*With whole-cell pertussis vaccine. Rates for acellular pertussis vaccine are lower.

*Rate of local reactions likely to increase with booster doses, up to 50–85%.

### Uncommon severe adverse reactions

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Adverse reaction</th>
<th>Rate per million doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG</td>
<td>Suppurative lymphadenitis</td>
<td>100-1000</td>
</tr>
<tr>
<td></td>
<td>BCG-osteitis</td>
<td>1-700</td>
</tr>
<tr>
<td></td>
<td>Disseminated BCG-itis</td>
<td>2</td>
</tr>
<tr>
<td>Cholera</td>
<td>NR</td>
<td>—</td>
</tr>
<tr>
<td>DTP</td>
<td>Persistent crying</td>
<td>1000-60 000</td>
</tr>
<tr>
<td></td>
<td>Seizures</td>
<td>570</td>
</tr>
<tr>
<td></td>
<td>Hypotonic-hyporesponsive episode</td>
<td>570</td>
</tr>
<tr>
<td></td>
<td>Anaphylaxis</td>
<td>20</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>NR</td>
<td>—</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Anaphylaxis</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td>Guillain–Barré syndrome (plasma-derived)</td>
<td>5</td>
</tr>
<tr>
<td>Hib</td>
<td>NR</td>
<td>—</td>
</tr>
<tr>
<td>Japanese encephalitis</td>
<td>Mouse-brain only—neurological event</td>
<td>Rare</td>
</tr>
<tr>
<td></td>
<td>Hypersensitivity</td>
<td>100-6400</td>
</tr>
<tr>
<td>Lyme disease</td>
<td>NR</td>
<td>—</td>
</tr>
</tbody>
</table>

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### INTERNATIONAL TRAVEL AND HEALTH 2002

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Possible adverse reaction</th>
<th>Expected rate per million doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measles/MMR</td>
<td>Febrile seizure</td>
<td>333</td>
</tr>
<tr>
<td></td>
<td>Thrombocytopenic purpura</td>
<td>33-45</td>
</tr>
<tr>
<td></td>
<td>Anaphylaxis</td>
<td>1-50</td>
</tr>
<tr>
<td></td>
<td>Encephalitis</td>
<td>1</td>
</tr>
<tr>
<td>Meningococcal virus</td>
<td>Anaphylaxis</td>
<td>1</td>
</tr>
<tr>
<td>Mumps</td>
<td>Depends on strain—aseptic meningitis</td>
<td>0-500</td>
</tr>
<tr>
<td>Pneumococcal virus</td>
<td>Anaphylaxis</td>
<td>Very rare</td>
</tr>
<tr>
<td>Poliomyelitis (OPV)</td>
<td>Vaccine-associated paralytic poliomyelitis</td>
<td>1.4-3.4</td>
</tr>
<tr>
<td>Poliomyelitis (IPV)</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>Rabies</td>
<td>Animal brain tissue only—neuroparalysis</td>
<td>17-46</td>
</tr>
<tr>
<td>Rubella</td>
<td>Arthralgia/arthritis/arthropathy</td>
<td>None or very rare</td>
</tr>
<tr>
<td>Tetanus</td>
<td>Brachial neuritis</td>
<td>5-10</td>
</tr>
<tr>
<td></td>
<td>Anaphylaxis</td>
<td>1-6</td>
</tr>
<tr>
<td>Tick-borne encephalitis</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>Typhoid fever</td>
<td>Parenteral vaccine—various</td>
<td>Very rare</td>
</tr>
<tr>
<td></td>
<td>Oral vaccine—NR</td>
<td></td>
</tr>
<tr>
<td>Yellow fever</td>
<td>Encephalitis</td>
<td>500-4000 (&lt;6 months)</td>
</tr>
<tr>
<td></td>
<td>Allergy/anaphylaxis</td>
<td>5-20</td>
</tr>
<tr>
<td></td>
<td>Hepatic failure</td>
<td>Rare</td>
</tr>
</tbody>
</table>

* NR = none reported.

**Possible adverse reaction:** Indicates potential reactions that may occur following vaccination. The expected rate per million doses is provided where available. These rates may vary with survey method and should be used as a general guideline.

**Contraindications:**

The main contraindications to the administration of vaccines are summarized in Table 6.5.
### Table 6.5 Contraindications to vaccines

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>A severe adverse event following a dose of vaccine (e.g. anaphylaxis, encephalitis/encephalopathy, or non-febrile convulsions) is a true contraindication to further immunization with the antigen concerned and a subsequent dose should not be given. Current serious illness.</td>
</tr>
<tr>
<td>Live vaccines (MMR, BCG, yellow fever)</td>
<td>Pregnancy. Radiation therapy (i.e. total-body radiation).</td>
</tr>
<tr>
<td>Yellow fever</td>
<td>Egg allergy. Immunodeficiency (from medication, disease or symptomatic HIV infection).</td>
</tr>
<tr>
<td>BCG</td>
<td>Symptomatic HIV infection.</td>
</tr>
<tr>
<td>Influenza, yellow fever</td>
<td>History of anaphylactic reactions following egg ingestion. No vaccines prepared in hen’s egg tissues (i.e. yellow fever and influenza vaccines) should be given. (Vaccine viruses propagated in chicken fibroblast cells, e.g. measles or MMR vaccines, can usually be given however.)</td>
</tr>
<tr>
<td>Pertussis-containing vaccines</td>
<td>A serious reaction to a dose of DTP. The pertussis component should be omitted for subsequent doses and diphtheria and tetanus immunization completed with DT vaccine. Evolving neurological disease (e.g. uncontrolled epilepsy or progressive encephalopathy). Vaccines containing the whole-cell pertussis component should not be given to children with this problem. Acellular vaccine is less reactogenic and is used in many industrialized countries instead of whole-cell pertussis vaccine.</td>
</tr>
</tbody>
</table>

* Generalized urticaria, difficulty in breathing, swelling of the mouth and throat, hypotension or shock.

* In many industrialized countries yellow fever vaccine is administered to individuals with symptomatic HIV infection or who are suffering from other immunodeficiency diseases, provided that their CD4 count is at least 400 cells/mm³ and if they plan to visit areas where epidemic or endemic yellow fever actually occurs.

### Further reading

- WHO information on vaccine preventable diseases: [http://www.who.int/vaccines/](http://www.who.int/vaccines/)
- Global Influenza Surveillance Network (FluNet): [http://oms2.b3e.jussieu.fr/flunet/](http://oms2.b3e.jussieu.fr/flunet/)
International certificate of vaccination

The certificate must be printed in English and French; an additional language may be added. It must be completed in English or French; an additional language may be used.

The international certificate of vaccination is an individual certificate. It should not be used collectively. Separate certificates should be issued for children; the information should not be incorporated in the mother's certificate.

An international certificate is valid only if the yellow fever vaccine used has been approved by WHO and if the vaccinating centre has been designated by the national health administration for the area in which the centre is situated. The date should be recorded in the following sequence: day, month, year, with the month written in letters, e.g. 8 January 2001.

A certificate issued to a child who is unable to write should be signed by a parent or guardian. For illiterates, the signature should be indicated by their mark certified by another person.

Although a nurse may carry out the vaccination under the direct supervision of a qualified medical practitioner, the certificate must be signed by the person authorized by the national health administration. The official stamp of the centre is not an accepted substitute for a personal signature.
CHAPTER 5. VACCINE-PREVENTABLE DISEASES, VACCINES AND VACCINATION

International certificate of vaccination or revaccination against yellow fever
Certificat international de vaccination ou de revaccination contre la fièvre jaune

<table>
<thead>
<tr>
<th>Date</th>
<th>Signature and professional status of vaccinator</th>
<th>Manufacturer and batch no. of vaccine</th>
<th>Official stamp of vaccinating centre</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 January 2001</td>
<td>Dr. John Doe, M.D.</td>
<td>R.I.V. 63007</td>
<td></td>
</tr>
<tr>
<td>123</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This certificate is valid only if the vaccine used has been approved by the World Health Organization and if the vaccinating centre has been designated by the health administration for the territory in which that centre is situated.

The validity of this certificate shall extend for a period of 10 years, beginning 10 days after the date of vaccination or, in the event of a revaccination within such period of 10 years, from the date of that revaccination.

This certificate must be signed in his own hand by a medical practitioner or other person authorized by the national health administration; an official stamp is not an accepted substitute for a signature.

Any amendment of this certificate, or erasure, or failure to complete any part of it, may render it invalid.

Ce certificat n’est valable que si le vaccin employé a été approuvé par l’Organisation mondiale de la Santé et si le centre de vaccination a été habilité par l’administration sanitaire du territoire dans lequel ce centre est situé.

La validité de ce certificat couvre une période de 10 ans commençant 10 jours après la date de la vaccination ou, dans le cas d’une revaccination au cours de cette période de 10 ans, le jour de cette revaccination.

Ce certificat doit être signé de sa propre main par un médecin ou une autre personne habilitée par l’administration sanitaire nationale, un cachet officiel ne pouvant être considéré comme tenant lieu de signature.

Toute correction ou rature sur le certificat ou l’omission d’une quelconque des mentions qu’il comporte peut affecter sa validité.
Country list
Vaccination requirements and malaria situation

Introduction
The information provided for each country includes the name and approximate altitude of the capital city, the requirements for mandatory yellow fever vaccination where these apply, and details concerning the malaria situation and recommended prophylaxis.

Yellow fever vaccination
Yellow fever vaccination is carried out for two different purposes:

- To protect individual travellers who may be exposed to yellow fever infection. Vaccination in these cases is recommended but not mandatory. As yellow fever is frequently fatal for those who have not been vaccinated, vaccination is recommended for all travellers (with few exceptions—see Chapter 6) intending to visit areas where there may be a risk of exposure to yellow fever.
- To protect countries from the risk of importing yellow fever virus. This is mandatory vaccination and is a requirement for entry into the countries concerned.

Travellers should be warned that the requirement for vaccination against yellow fever is not related to the risk of exposure to the disease.

The countries that require proof of vaccination are those where the disease does not occur but where the mosquito vector and non-human primate hosts of yellow fever are present. Consequently, any importation of the virus by an infected traveller could result in its establishment and propagation in the local mosquitoes and primates, leading to a risk of infection for the human population.

1 For the purpose of this publication, the term “country” covers countries, territories and areas.

2 Please note that the requirements for vaccination of infants over 6 months of age by some countries is not in accordance with WHO’s recommendations (see Chapter 6). Travellers should however be informed that the requirement exists for entry into the countries concerned.
INTERNATIONAL TRAVEL AND HEALTH 2002

Proof of vaccination is required for all travellers coming from countries where yellow fever occurs, including transit through such countries. The international yellow fever vaccination certificate becomes valid 10 days after vaccination and remains valid for a period of 10 years.

The fact that a country has no mandatory requirement for vaccination does not imply that there is no risk of yellow fever infection.

In accordance with the International Health Regulations, countries are required to notify all cases of yellow fever to WHO. Such countries are then considered to be "infected areas". This terminology is likely to change in the revised version of the Regulations, but is meantime retained in the following country list to maintain consistency with the official reports provided by the WHO Member States. The list of infected areas is published in the Weekly epidemiological record.

In addition, countries are considered to be "endemic areas" for yellow fever if the virus is present in mosquitoes and non-human primates and there is therefore a potential risk of infection for humans (see map, page 34).

Other

*Routine vaccination* (see Chapter 6). It is recommended that all travellers are fully vaccinated with the appropriate routine vaccines; schedules for booster doses should be followed at the recommended time intervals.

*Cholera*. No country requires a certificate of vaccination against cholera as a condition for entry. For information on selective use of cholera vaccines, see Chapter 6.

*Smallpox*. Since the global eradication of smallpox was certified in 1980, WHO does not recommend smallpox vaccination for travellers.

*Hepatitis A*. Vaccination against hepatitis A is recommended for all travellers to developing countries and to countries with economies in transition.

Information on other vaccines for selective use is given in Chapter 6.

*Infectious diseases*. Information on the main infectious disease threats for travellers, their geographical distribution, and corresponding precautions is provided in Chapter 5.

*Malaria*. General information about the disease, its geographical distribution and details of preventive measures are included in Chapter 7. Specific information for each country is provided in this section, including epidemiological details for all countries with malarious areas (geographical and seasonal distribution, altitude, predominant species, status of resistance). The recommended chemo-
The prophylactic regimen is also indicated. The recommended prophylaxis for each country is decided on the basis of the following factors: the risk of contracting malaria; the prevailing species of malaria parasites in the area; the level and spread of drug resistance reported from the country; and the possible risk of serious side-effects resulting from the use of the various prophylactic drugs.

The following abbreviations are used: CHL = chloroquine; C+P = chloroquine plus proguanil; MEF = mefloquine; DOX = doxycycline.

Please note that altitudes quoted in this list are averages for guidance only.

AFGHANISTAN
Capital Kabul
Altitude 1800 m
Yellow fever: A yellow fever vaccination certificate is required from travellers coming from infected areas.
Malaria: Malaria risk—P. vivax and P. falciparum—exists from May through November below 2000 m. Chloroquine-resistant P. falciparum reported.
Recommended prophylaxis: C+P.

ALBANIA
Capital Tirana
Altitude 130 m
Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age coming from infected areas.

ALGERIA
Capital Algiers
Altitude 30 m
Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age coming from infected areas.
Malaria: Malaria risk is limited. One small focus (P. vivax) has been reported in the Illizi Department, but this is isolated and access is difficult.
Recommended prophylaxis: none.

AMERICAN SAMOA
Capital Pago Pago
Altitude 10 m
Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age coming from infected areas.

ANDORRA
Capital Andorra la Vella
Altitude 1410 m
No vaccination requirements for any international traveller.

ANGOLA
Capital Luanda
Altitude 10 m
Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age coming from infected areas.
Malaria: Malaria risk—predominantly due to P. falciparum—exists throughout the year in the whole country. P. falciparum-resistant to chloroquine and sulfadoxine-pyrimethamine reported.
Recommended prophylaxis: MEF.

ANGUILLA
Capital The Valley
Altitude 0 m
Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age coming from infected areas.

ANTIGUA AND BARBUDA
Capital St John’s
Altitude 0 m
Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age coming from infected areas.

ARGENTINA
Capital Buenos Aires
Altitude 30 m
No vaccination requirements for any international traveller.
INTERNATIONAL TRAVEL AND HEALTH 2002

Malaria: Malaria risk—exclusively due to *P. vivax*—is low and is confined to rural areas along the borders with Bolivia (lowlands of Jujuy and Salta provinces) and with Paraguay (lowlands of Corrientes and Misiones provinces).

*Recommended prophylaxis in risk areas:* CHL.

**ARMENIA**

*Capital Yerevan*

*Altitude* 1000 m

No vaccination requirements for any international traveller.

Malaria: Malaria risk—exclusively due to *P. vivax*—exists focally from June through October in some of the villages located in Ararat Valley, mainly in the Masis district. No risk in tourist areas.

*Recommended prophylaxis:* none.

**AUSTRALIA**

*Capital* Canberra

*Altitude* 610 m

Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age entering Australia within 6 days of having stayed overnight or longer in an infected country, as listed in the Weekly epidemiological record.

**AUSTRIA**

*Capital Vienna*

*Altitude* 170 m

No vaccination requirements for any international traveller.

**AZERBAIJAN**

*Capital Baku*

*Altitude* 0 m

No vaccination requirements for any international traveller.

Malaria: Limited malaria risk—exclusively due to *P. vivax*—exists from June through September in lowland areas, mainly in the area between the Kura and the Arax rivers.

*Recommended prophylaxis:* none.

**BAHAMAS**

*Capital Nassau*

*Altitude* 10 m

Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age coming from infected areas.

**BAHRAIN**

*Capital Manama*

*Altitude* 0 m

No vaccination requirements for any international traveller.

**BANGLADESH**

*Capital Dhaka*

*Altitude* 10 m

Yellow fever: Any person (including infants) who arrives by air or sea without a certificate is detained in isolation for a period of up to 6 days if arriving within 6 days of departure from an infected area or having been in transit in such an area, or having come by an aircraft that has been in an infected area and has not been disinfected in accordance with the procedure and formulation laid down in Schedule VI of the Bangladesh Aircraft (Public Health) Rules 1977 (First Amendment) or those recommended by WHO.

The following countries and areas are regarded as infected:


America: Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Guatemala, Guyana, Honduras, Nicaragua, Panama, Peru, Suriname, Trinidad and Tobago, Venezuela.

Note. When a case of yellow fever is reported from any country, that country is regarded by the Government of Bangladesh as infected with yellow fever and is added to the above list.

Malaria: Malaria risk exists throughout the year in the whole country, excluding Dhaka city. *P. falciparum* resistant to chloroquine reported in the south-east; resistance to sulfadoxine–pyrimethamine also reported.

*Recommended prophylaxis:* C+P; in forested areas and south-east, MEF.
<table>
<thead>
<tr>
<th>Country</th>
<th>Capital</th>
<th>Altitude</th>
<th>Yellow fever: A yellow fever vaccination certificate is required from travellers coming from infected areas.</th>
<th>Malaria: Malaria risk exists throughout the year in the southern belt of five districts: Chirang, Samchi, Samdrupjongkhar, Sarpang and Shemgang. P. falciparum resistant to chloroquine and sulfadoxine-pyrimethamine reported.</th>
<th>Recommended prophylaxis in risk areas: C+P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbados</td>
<td>Bridgetown</td>
<td>10 m</td>
<td>No vaccination requirements for any international traveller.</td>
<td>No resistant P. falciparum strains reported.</td>
<td>Recommended prophylaxis in risk areas: CHL.</td>
</tr>
<tr>
<td>Belarus</td>
<td>Minsk</td>
<td>210 m</td>
<td>No vaccination requirements for any international traveller.</td>
<td>No resistant P. falciparum strains reported.</td>
<td>Recommended prophylaxis in risk areas: CHL.</td>
</tr>
<tr>
<td>Belgium</td>
<td>Brussels</td>
<td>80 m</td>
<td>No vaccination requirements for any international traveller.</td>
<td>No resistant P. falciparum strains reported.</td>
<td>Recommended prophylaxis in risk areas: CHL.</td>
</tr>
<tr>
<td>Belize</td>
<td>Belmopan</td>
<td>60 m</td>
<td>No vaccination requirements for any international traveller.</td>
<td>No resistant P. falciparum strains reported.</td>
<td>Recommended prophylaxis in risk areas: CHL.</td>
</tr>
<tr>
<td>Benin</td>
<td>Porto-Novo (constitutional) / Cotonou (seat of Government)</td>
<td>40 m / 50 m</td>
<td>No vaccination requirements for any international traveller.</td>
<td>No resistant P. falciparum strains reported.</td>
<td>Recommended prophylaxis in risk areas: CHL.</td>
</tr>
<tr>
<td>Bolivia</td>
<td>La Paz (administrative) / Sucre (legislative)</td>
<td>3700 m / 2800 m</td>
<td>No vaccination requirements for any international traveller.</td>
<td>No resistant P. falciparum strains reported.</td>
<td>Recommended prophylaxis in risk areas: CHL; in northern departments, MEF.</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>Sarajevo</td>
<td>520 m</td>
<td>No vaccination requirements for any international traveller.</td>
<td>No resistant P. falciparum strains reported.</td>
<td>Recommended prophylaxis in risk areas: CHL.</td>
</tr>
<tr>
<td>Botswana</td>
<td>Gaborone</td>
<td>1000 m</td>
<td>No vaccination requirements for any international traveller.</td>
<td>No resistant P. falciparum strains reported.</td>
<td>Recommended prophylaxis in risk areas: CHL.</td>
</tr>
</tbody>
</table>
Malaria: Malaria risk—predominantly due to P. falciparum—exists from November to May/June in the northern parts of the country: Boteti, Chobe, Ngamiland, Okavango, Tutume districts/sub-districts. Chloroquine-resistant P. falciparum reported.

Recommended prophylaxis in risk areas: MEF.

BRAZIL

Capital Brasilia
Altitude 1000 m
Yellow fever: A yellow fever vaccination certificate is required from travellers over 9 months of age coming from infected areas, unless they are in possession of a waiver stating that immunization is contraindicated on medical grounds. The following countries or areas are regarded as infected:

Africa: Angola, Cameroon, Democratic Republic of the Congo, Gabon, Gambia, Ghana, Guinea, Liberia, Nigeria, Sierra Leone, Sudan.

America: Bolivia, Colombia, Ecuador, Peru.

Vaccination is recommended for travellers to endemic areas, including rural areas in the states of Acre, Amapá, Amazonas, Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Pará, Rondônia, Roraima and Tocantins, and certain areas of Minas Gerais, Para and São Paulo.

Malaria: Malaria risk—P. vivax (78%), P. falciparum (22%)—is high throughout the year in most forested areas below 900 m within the nine states of the "Legal Amazonia" region (Acre, Amapá, Amazonas, Maranhão (western part), Mato Grosso (northern part), Pará (except Belém City), Rondônia, Roraima and Tocantins). Transmission intensity varies from municipality to municipality, but is very high in jungle areas of mining, lumbering and agricultural settlements less than 5 years old where multidrug-resistant P. falciparum strains are common (> 50%). Intensity of transmission is lower in urban areas, including in large cities such as Porto Velho, Boa Vista, Macapá, Manaus, Santarém and Marabá. In the states outside "Legal Amazonia", malaria transmission risk is negligible or non-existent.

Recommended prophylaxis in risk areas: MEF.

BRITISH VIRGIN ISLANDS

Capital Road Town
Altitude 0 m

No vaccination requirements for any international traveller.

BRUNEI DARUSSALAM

Capital Bandar Seri Begawan
Altitude 0 m
Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age coming from infected areas or having passed through partly or wholly endemic areas within the preceding 6 days. The countries and areas included in the endemic zones are considered as infected areas.

BULGARIA

Capital Sofia
Altitude 570 m
No vaccination requirements for any international traveller.

BURKINA FASO

Capital Ouagadougou
Altitude 320 m
Yellow fever: A yellow fever vaccination certificate is required from all travellers over 1 year of age.

Malaria: Malaria risk—predominantly due to P. falciparum—exists throughout the year in the whole country. Resistance to chloroquine reported.

Recommended prophylaxis: MEF.

BURMA see MYANMAR

BURUNDI

Capital Bujumbura
Altitude 780 m
Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age coming from infected areas.

Malaria: Malaria risk—predominantly due to P. falciparum—exists throughout the year in the whole country. Resistance to chloroquine reported.

Recommended prophylaxis: MEF.

CAMBODIA

Capital Phnom Penh
Altitude 20 m
Yellow fever: A yellow fever vaccination certificate is required from travellers coming from infected areas.

Malaria: Malaria risk—predominantly due to *P. falciparum*—exists throughout the year in the whole country except in the Phnom Penh area and close around Tonle Sap. Malaria does, however, occur in the tourist area of Angkor Wat. *P. falciparum* resistant to chloroquine and sulfadoxine–pyrimethamine reported. Resistance to mefloquine reported in western provinces near the Thai border.

Recommended prophylaxis (including Battambang and Angkor Wat areas): MEF; in western provinces, DOX.

### CAMEROON

**Capital**: Yaoundé  
**Altitude**: 730 m

Yellow fever: A yellow fever vaccination certificate is required from all travellers over 1 year of age.

Malaria: Malaria risk—predominantly due to *P. falciparum*—exists throughout the year in the whole country. *P. falciparum* resistant to chloroquine and sulfadoxine–pyrimethamine reported. Recommended prophylaxis: MEF.

### CANADA

**Capital**: Ottawa  
**Altitude**: 80 m

No vaccination requirements for any international traveller.

### CAPE VERDE

**Capital**: Praia  
**Altitude**: 0 m

Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age coming from countries having notified cases in the last 6 years.

Malaria: Limited malaria risk exists from September through November in São Tiago Island.

Recommended prophylaxis: none.

### CAYMAN ISLANDS

**Capital**: Georgetown  
**Altitude**: 0 m

No vaccination requirements for any international traveller.

### CENTRAL AFRICAN REPUBLIC

**Capital**: Bangui  
**Altitude**: 380 m

Yellow fever: A yellow fever vaccination certificate is required from all travellers over 1 year of age.

Malaria: Malaria risk—predominantly due to *P. falciparum*—exists throughout the year in the whole country. Resistance to chloroquine reported.

Recommended prophylaxis: MEF.

### CHAD

**Capital**: N'Djamena  
**Altitude**: 300 m

Yellow fever: Yellow fever vaccination is recommended for all travellers over 1 year of age.

Malaria: Malaria risk—predominantly due to *P. falciparum*—exists throughout the year in the whole country. Resistance to chloroquine reported.

Recommended prophylaxis: MEF.

### CHILE

**Capital**: Santiago  
**Altitude**: 520 m

No vaccination requirements for any international traveller.

### CHINA

**Capital**: Beijing  
**Altitude**: 60 m

Yellow fever: A yellow fever vaccination certificate is required from travellers coming from infected areas.

Malaria: Malaria risk—including *P. falciparum* malaria—occurs in Hainan and Yunnan. Multidrug-resistant *P. falciparum* has been reported. Risk of *P. vivax* malaria exists in Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Xizang (only along the valley of the Zangbo river in the extreme south-east) and Yunnan. Very low malaria risk (*P. vivax* only) exists in Anhui, Hubei, Hunan, Jiangsu, Jiangxi and Shandong. The risk may be higher in areas of local outbreaks. Where transmission exists, it occurs only in remote rural communities below 1500 m; from July to November north of latitude 33°N, from May to December between 33°N and 25°N, and throughout the year.
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south of 25°N. There is no malaria risk in urban areas nor in the densely populated plain areas. In general, tourists do not need to take malaria prophylaxis unless they plan to stay in remote rural areas in the provinces listed above.

Recommended prophylaxis in risk areas: CHL; in Hainan and Yunnan, MEF.

CHINA, HONG KONG SAR
Capital: Hong Kong
Altitude: 30 m
No vaccination requirements for any international traveller.

CHINA, MACAO SAR
Capital: Macao
Altitude: 10 m
No vaccination requirements for any international traveller.

CHRISTMAS ISLAND
(Indian Ocean)
Capital: The Settlement
Altitude: 0 m
Same requirements as mainland Australia.

COLOMBIA
Capital: Bogotá
Altitude: 2600 m
Yellow fever: Vaccination is recommended for travellers who may visit the following areas considered to be endemic for yellow fever: middle valley of the Magdalena river, eastern and western foothills of the Cordillera Oriental from the frontier with Ecuador to that with Venezuela, Urabá, foothills of the Sierra Nevada, eastern plains (Oriquía) and Amazonia.
Malaria: Malaria risk—P. falciparum (37%), P. vivax (53%)—is high throughout the year in rural/jungle areas below 800 m, especially in municipalities of the regions of Amazonas, Oriquía, Pacífico and Urabá-Bajo Cauca. Transmission intensity varies from department to department, with the highest risk in Amazonas, Chocó, Córdoba, Guainía, Guaviare, Putumayo and Vichada. Chloroquine-resistant P. falciparum exists in Amazonas, Pacífico and Urabá-Bajo Cauca. Resistance to sulfadoxine-pyrimethamine reported.

Recommended prophylaxis in risk areas: C+P; in Amazona, Pacífico and Urabá-Bajo Cauca, MEF.

COMOROS
Capital: Moroni
Altitude: 10 m
No vaccination requirements for any international traveller.
Malaria: Malaria risk—predominantly due to P. falciparum—exists throughout the year in the whole country. Resistance to chloroquine reported.
Recommended prophylaxis: MEF.

COOK ISLANDS
Capital: Avarua
Altitude: 210 m
No vaccination requirements for any international traveller.

COSTA RICA
Capital: San José
Altitude: 1160 m
COUNTRY LIST: VACCINATION REQUIREMENTS AND MALARIA SITUATION

No vaccination requirements for any international traveller.  

**Malaria:** Malaria risk—almost exclusively due to *P. vivax*—is moderate throughout the year in the cantons of Los Chiles (Alajuela Province) and Matina and Talamanca (Limón Province). Lower transmission risk exists in cantons in the provinces of Alajuela, Guanacaste and Heredia, and in other cantons in Limón Province. Negligible or no risk of malaria transmission exists in the other cantons of the country.

*Recommended prophylaxis in risk areas:* CHL.

**COTE D’IVOIRE**

Capital: Yamoussoukro / Abidjan (seat of Government)
Altitude: 220 m / 50 m

Yellow fever: A yellow fever vaccination certificate is required from all travellers over 1 year of age.

**Malaria:** Malaria risk—predominantly due to *P. falciparum*—exists throughout the year in the whole country. Chloroquine-resistant *P. falciparum* reported.

*Recommended prophylaxis:* MEF.

**CROATIA**

Capital: Zagreb
Altitude: 140 m

No vaccination requirements for any international traveller.

**CUBA**

Capital: Havana
Altitude: 30 m

No vaccination requirements for any international traveller.

**CYPRUS**

Capital: Nicosia
Altitude: 140 m

No vaccination requirements for any international traveller.

**CZECH REPUBLIC**

Capital: Prague
Altitude: 250 m

No vaccination requirements for any international traveller.

**DENMARK**

Capital: Copenhagen
Altitude: 0 m

No vaccination requirements for any international traveller.

**DJIBOUTI**

Capital: Djibouti
Altitude: 0 m

Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age coming from infected areas.

**Malaria:** Malaria risk—predominantly due to *P. falciparum*—exists throughout the year in the whole country. Chloroquine-resistant *P. falciparum* reported.

*Recommended prophylaxis:* MEF.

**DOMINICA**

Capital: Roseau
Altitude: 0 m

Yellow fever: A yellow fever vaccination certificate is required from travellers over 1 year of age coming from infected areas.

**DOMINICAN REPUBLIC**

Capital: Santo Domingo
Altitude: 380 m

No vaccination requirements for any international traveller.

**Malaria:** Low malaria risk—exclusively due to *P. falciparum*—exists throughout the year, especially in rural areas of the western provinces such as Casteñuelas, Hondo Valle and Pepillo Salcedo. There is no evidence of *P. falciparum* resistance to any antimalarial drug.

*Recommended prophylaxis in risk areas:* CHL.

**EAST TIMOR**

Capital: Dili
Altitude: 0 m

No vaccination requirements for any international traveller.

**Malaria:** Malaria risk—predominantly due to *P. falciparum*—exists throughout the year in the whole territory. *P. falciparum* resistant to chloroquine and sulfadoxine–pyrimethamine reported.

*Recommended prophylaxis:* MEF or DOX.
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**ECUADOR**

**Capital:** Quito

**Altitude:** 2800 m

**Yellow fever:** A yellow fever vaccination certificate is required from travellers over 1 year of age coming from infected areas.

**Malaria:** Malaria risk—*P. falciparum* (57%), *P. vivax* (43%)—exists throughout the year below 1500 m, with some risk in Cotopaxi, Loja, and Los Ríos. Higher transmission risk is found in El Oro, Esmeraldas, and Manabí. There is no risk in Guayaquil or Quito. A high proportion of *P. falciparum* cases in Esmeraldas Province are reportedly resistant to chloroquine.

Recommended prophylaxis in risk areas: CHL; in Esmeraldas province, MEF.

**EQUATORIAL GUINEA**

**Capital:** Malabo

**Altitude:** 380 m

**Yellow fever:** A yellow fever vaccination certificate is required from travellers coming from infected areas.

**Malaria:** Malaria risk—predominantly due to *P. falciparum*—exists throughout the year in the whole country. Resistance to chloroquine and sulfadoxine-pyrimethamine reported.

Recommended prophylaxis: MEF.

**ERITREA**

**Capital:** Asmara

**Altitude:** 2400 m

**Yellow fever:** A yellow fever vaccination certificate is required from travellers coming from infected areas.

**Malaria:** Malaria risk—predominantly due to *P. falciparum*—exists throughout the year in the whole country below 2200 m. There is no risk in Asmara. Chloroquine-resistant *P. falciparum* reported.

Recommended prophylaxis: MEF.

**ESTONIA**

**Capital:** Tallinn

**Altitude:** 40 m

No vaccination requirements for any international traveller.

**ETHIOPIA**

**Capital:** Addis Ababa

**Altitude:** 2400 m

Recommended prophylaxis: none.