Vaccination and Malaria Prophylaxis for International Travelers

Mikio Kimura

Address: Infectious Disease Surveillance Center, National Institute of Infectious Diseases, 1-23-1, Toyama, Shinjuku-ku, Tokyo, 162-8640 Japan. TEL: 81-3-5285-1111 (ext. 2043), FAX: 81-3-5285-1129, E-mail: mikio@nih.go.jp

Developing/tropical countries are becoming preferred travel destinations over previously more popular Western/developed countries. This will lead to an increased risk of infectious diseases, including tropical diseases, among international travelers. However, the infectious disease risks could be lessened significantly by appropriate preventive measures, especially by vaccination and malaria prophylaxis.

Vaccination of international travelers is classified into three categories, each beginning with R. The first category is "Routine vaccination." This category represents vaccines belonging to a country's routine immunization program, and these vaccines can differ between countries. As individuals may contract ubiquitous vaccine-preventable diseases even without international travel, periodic booster doses may be required throughout life, e.g., once in 10 years against tetanus. International travel should be regarded as an excellent opportunity to update such routine vaccinations. The second category is "Required vaccination." These vaccines are mandatory for those entering a country that requires them. The representative of this category has been yellow fever vaccine, and in the past also cholera vaccine. Starting several years ago, quadrivalent meningococcal vaccine has become mandatory for those entering Saudi Arabia to attend Hajj, a large-scale pilgrimage for Muslims, and has contributed significantly in reducing meningitis among returned travelers. Students entering U.S. schools may also need to be vaccinated against measles.

The third category is "Recommended vaccination." These vaccines need to be considered primarily based on the risk of contracting the disease. Therefore, epidemiological data concerning the disease incidence among travelers, but not among the indigenous population, should be taken into account. The disease incidence could vary significantly according to travelers' behavior, being not solely dependent on the destination. Yellow fever vaccine may be administered for this category even when not required by the country. Issues that should also be addressed include treatability, seriousness (case fatality rate, sequelae) of the disease, preventive efficacy, adverse effects (AEs), cost of the vaccine, and the interval before departure. We also take into account to what extent the traveler wants to avoid the disease.

In the field of travel medicine, the above vaccination issues have been investigated extensively and the results have been put into practice. In general, many specialists put the highest priority on hepatitis A vaccine. The weekly incidence of hepatitis A among travelers is 1/1,000 and 5/1,000 in sightseeing and non-sightseeing areas, respectively. The case fatality rate is >2% among those aged >40. Next, since the traveler may inadvertently receive blood transfusion and/or medical management with improperly sterilized equipment, hepatitis B vaccine should also have a high priority. Data show that the monthly incidence of hepatitis B is 1/10,000–1/2,000 and 1/1,000 for short-term travelers and long-term expatriates, respectively, with no significant influence by destination but instead by travelers' behavior. The monthly incidence of Japanese encephalitis, rabies and tick-borne encephalitis is usually less than 1/1,000,000; however, travelers to a higher risk should be identified and encouraged to receive the vaccine.

If there is insufficient time before departure, travelers may need to receive multiple simultaneous vaccinations or to follow accelerated vaccination schedules. The former has been investigated for various vaccine combinations and the latter mainly for rabies, hepatitis B, and tick-borne encephalitis vaccines. A mathematical model shows a 25-year efficacy of Western hepatitis A vaccines after its primary course (two doses at 0, 6 mo – 1 yr), and that even if the second dose is delayed until 6 years, an effective booster response could be obtained. Unfortunately, vaccines marketed in Japan differ from those in Western countries and therefore the Western data could not be applied directly to our situation.

Malaria preventive measures should primarily be based on epidemiological data obtained from travelers. South Oceania countries such as Papua New Guinea and the Solomon Islands pose the highest risk of contracting malaria, despite the proportion of falciparum malaria in these areas being smaller than that in sub-Saharan countries. Travelers to malaria endemic areas should be fully compliant with anti-mosquito measures, which rarely produce AEs. However, caution should be taken to minimize possible AEs while using insect repellents and insecticides. Staying in an air-conditioned room and wearing a long-sleeved shirt and long trousers are significantly effective in reducing malaria incidence among travelers.

If the risk of contracting falciparum malaria is significantly high, travelers should also be encouraged to take chemoprophylaxis. This is especially true if there is no reliable medical facility nearby that a traveler with possible malaria can visit without significant delay. On the other hand, travelers should also be aware that no chemoprophylaxis is 100% effective or...
completely free from AEs.

In Japan, mefloquine is the only antimalarial drug approved for preventive use. The drug is regarded to produce neuropsychiatric AEs at a higher rate than other antimalarials and is being gradually replaced by atovaquone/proguanil combination in Western countries. However, literature shows that the incidence of serious AEs due to mefloquine is not higher than with chloroquine/proguanil, a classical drug combination believed to be safe with respect to AEs. It should also be borne in mind that worldwide 15–25 million individuals have already taken mefloquine chemoprophylaxis. Considering these findings, the risk of contracting malaria should be carefully weighed against that of developing AEs.

Stand-by emergency treatment (SBET) is an important option of taking antimalarial drugs based on the decision of a febrile traveler in the absence of a nearby medical facility. In particular, SBET should be prepared when travelers at high risk for malaria do not take chemoprophylaxis. Even having taken chemoprophylaxis, travelers may contract malaria due to drug resistance and therefore, SBET would become necessary. Obviously, SBET as well as chemoprophylaxis involves the use of drugs, and advantages of their use should carefully be weighed against their disadvantages. A recent study by our group highlights inappropriate SBET among Japanese travelers with regard to the time elapsed after entering the malarious area, the accessibility to a medical facility, the medical consultation required even after SBET, and the selection of antimalarials. Thus, educating travelers about appropriate SBET use is pivotal. Rapid malaria diagnostic tests are commercially available outside Japan and have high sensitivity and specificity. However, studies have shown that inappropriate performance and interpretation of the tests are likely to occur among lay travelers especially while they are febrile.

Japanese medical personnel are not well trained in prescribing chemoprophylactic antimalarial drugs. Accordingly, future Japanese guidelines for malaria prophylaxis, in which the author has been deeply involved, could prove useful in improving malaria issues for Japanese travelers.

Decisions about preventive measures for travelers, including vaccination and malaria prophylaxis, can be influenced by various factors and can be conflicting even among specialists. Both the development of travel medicine and the establishment of travelers’ self-responsibilities should be promoted in a coordinated manner.