

1. Of all the diseases transmitted by animals, does the prevention and treatment of mosquito-borne diseases warrant greater human research efforts? What is the current state of medical development in this area?

(1) Mosquito-borne diseases occupy an important position in preventive medicine, transmitted by mosquitoes, with strong transmission, high incidence and great danger. With the rapid development of urbanization, living environment changes, to mosquito-borne diseases in the city epidemic. In recent years, some of the old mosquito-borne diseases in China continue to recur, and there are new mosquito-borne diseases, so the control of mosquito-borne diseases and mosquito control deserves greater human efforts to study.

(2) In recent years, China's mosquito-borne diseases such as filariasis and malaria have been better controlled, but the bite of mosquitoes on humans and animals, harassment still exists, and some new mosquito-borne infectious diseases such as dengue fever, chikungunya fever and other threats to humans are on the rise, the prevention and control of mosquitoes and their infectious diseases is still a long-term and arduous task.

2. What are the general directions of mosquito-borne disease prevention measures (e.g., for mosquitoes themselves, for human surroundings, etc.)? Which directions are more efficient and feasible and deserve more efforts?

(1) to develop prevention and control plans: prevention and control of mosquito-borne diseases after natural disasters should be fully considered in the disaster area of the population, health and distribution of infectious diseases, endemic diseases and other specific circumstances, focusing on the distribution of animal hosts and vectors and other information, targeted to determine the prevention and control measures.

(2) Strengthen insect monitoring: This is a prerequisite for good prevention and control of insect-borne infectious diseases. We should establish a monitoring system for the growth and decline of vector insects, and keep abreast of the growth and decline of vector insects. Once we find that the species of vector insects have changed, carry pathogens or appear dangerous insect alert, we should promptly study the danger of their threat to human beings and report to the competent government departments, and

instruct the relevant decision-making departments to formulate countermeasures to eliminate the threat of vector insects to human beings as early as possible.

(3) management of the environment: environmental management is a basic measure of mosquito-borne disease prevention and control after a natural disaster, should be carried out in the emergency relief of the health environment at the same time, timely removal of all kinds of stagnant water, puddles, and actively build pro garbage collection sites, if possible to install screen doors, screens and other protective facilities, if necessary, the use of drugs to soak mosquito nets, the breeding ground can not be removed temporarily should also be treated with insecticides.

(4) mosquito repellent and mosquito control: mosquito repellent and mosquito control is an important means of mosquito-borne disease prevention and control after natural disasters. Considering that mosquito vector disease prevention and control is mainly to reduce the density of mosquito vectors or reduce their ability to transmit disease, so the main use of indoor residual spraying, insecticide soaked mosquito nets and other chemical methods of operation. However, although the chemical control is efficient, durable and easy to use, but only the symptomatic measures, and can not completely lift the post-disaster mosquito-borne disease potential.

(5) research and development of new drugs: In recent years, with the widespread use of insecticides, pyrethroids are increasingly serious resistance problems. In addition, long-term application also makes the dose of insecticides increasing, the use of insecticides in some areas of China has increased the concentration of more than 1000 times, not only to produce resistance problems, increasing economic costs, but also easy to pollute the environment, bringing a series of ecological problems. At present, the problem of insecticide resistance has been greatly improved, but should still actively seek sustainable mosquito vector intervention measures, research and development of new safe and environmentally friendly mosquito repellent products, while carrying out large-scale extermination work after natural disasters, it is best to determine the sensitivity level of mosquito vectors in the region to commonly used insecticides, to achieve scientific and rational use of drugs.

(6) Improve group immunity and disease resistance, protect susceptible people:

immunization and drug prevention to improve group immunity and disease resistance. Planned vaccination is an important measure to improve herd resistance, control and eliminate the occurrence and prevalence of insect-borne infectious diseases. Currently, vaccines are available for some insect-borne infectious diseases. But more diseases do not yet have a vaccine. In addition, the application of drug prophylaxis to improve the group resistance to disease, easy to implement, faster, but drug prophylaxis for most viral infectious diseases is ineffective, its application is somewhat limited.

(7) cut off the transmission of insect-borne infectious diseases: the fundamental prevention and control of insect-borne infectious diseases is to completely eliminate the vector. But the vector insect arthropods more species, their breeding habits and ecological habits are also more complex, its prevention and control must be based on the ecological habits of different species, with both the symptoms and the root cause, focusing on the principle of the main, to economic, effective, simple and safe for the purpose, according to the local and timely use of environmental management, chemical control, biological control or other effective means of measures to control the target vector in the insufficient harm To achieve the purpose of eliminating pests and eliminating diseases.

(8) strengthen the source of quarantine work: quarantine of the source of the epidemic is to contact that is in contact with patients, infected animals or contaminated environment, the potential for epidemiological surveillance of infected people, including medical observation, collection of specimens for testing and other means. The purpose of quarantine of the epidemic source is the early detection of patients, to give the appropriate medical treatment, reduce morbidity and avoid death.

In conclusion, natural disasters and mosquito-borne diseases are closely linked, and risk factors should be fully considered to strengthen epidemiological surveillance and prognostic analysis capabilities, and attention should be paid to the search and development of new control strategies and drugs to maximize the threat of mosquito vectors to human health.

3. What is the examination method of each mosquito-borne disease? In the mosquito vector diseases caused by parasitic diseases, Plasmodium, microfilariae check negative

results need to be repeated several times, what is the reason?

(1) dengue laboratory examination methods include: ① virus isolation: inoculation in *Aedes albopictus* cell line (C6/36) or 1-3 days old mastodon, isolate the virus. ② Viral nucleic acid detection: RT-PCR to detect viral RNA. ③ Specific antibody detection: including complement binding test, enzyme-linked immunosorbent assay (ELISA method) and colloidal gold immunochromatography to detect dengue virus IgM and IgG antibodies. (4) specific antigen detection: ELISA method, colloidal gold method virus NS1 antigen rapid detection reagents.

(2) Filariasis laboratory test methods: ① pathogenic examination: thick and thin blood film method, centrifugal concentration method. (2) Filarial circulating antigen: ELISA kit for detection of filarial circulating antigen. ③Ultrasound examination: the most valuable tool for finding and determining the location of adult filarial worms. ④ Filarial antibody: intradermal test, indirect fluorescent antibody test, ELISA method. ⑤Nucleic acid examination: DNA hybridization test and PCR, etc.

(3) Epidemic B encephalitis: ①Serological diagnosis: ELISA method, neutralization test, indirect immunofluorescence test. (2) Isolation and culture: cell and mouse isolation and culture of encephalitis B virus. (3) Molecular biology methods: RT-PCR, DNA microarray, etc.

(4) Plasmodium examination methods: ①Microscopic method: thick and thin blood smear, simple and economic. ②Immunological methods: indirect fluorescent antibody method, ELISA method, immunochromatographic method. (3) Molecular biology method: conventional PCR, multiplex PCR, nested PCR, RT-PCR, etc.

(5) Zika virus examination methods: ①Nucleic acid detection: detection of viral nucleic acid in blood samples of patients within 5 days of onset, such as RT-PCR amplification. ②Virus isolation: inoculation of specimens in mosquito-derived cells (C6/36) or mammalian cells for isolation and culture, inoculation in the brain of mammary rats, etc., as a confirmatory method. (3) serological testing: including ELISA methods, immunofluorescence, neutralization test, etc.

(6) Plasmodium examination: Plasmodium is a malaria pathogen, transmitted by mosquitoes, and there are three common types of Plasmodium: Plasmodium intercalans,

*Plasmodium trisporus* and *Plasmodium falciparum*. Peripheral blood smear examination for *Plasmodium* is a reliable method to diagnose malaria, and finding both positive for *Plasmodium* can be a reliable basis to confirm the diagnosis. A negative result does not negate the diagnosis, and it needs to be rechecked several times or examined by genetic diagnostic methods. Microfilariae test: Microfilariae are the protozoa of filarial parasites, and there are two kinds of common filarial infections in China, namely, *B. bancrofti* and *B. malayi*, which are transmitted through mosquitoes. Peripheral blood smear examination is the main method of diagnosis, positive results as a basis for diagnosis, negative results need to be repeated several times. Negative results may not be parasites in the blood at this time, should be rechecked after a few hours.

4. What can be improved in the current common methods of detecting insect-borne diseases? What is the direction of development in detecting and treating related diseases and what new technologies are available on the market that you are optimistic about?

Due to the influence of global climate change and livestock trade, the epidemic trend of insect-borne diseases is gradually spreading to higher latitudes around the world, and the genetic characteristics of some animal-borne diseases have changed, resulting in changes in virus virulence and increased pathogenicity, causing serious economic losses. Only from the root cause, to stop the transmission and spread of animal vector diseases, in order to save human beings from the harm of insect-borne diseases. Therefore, it is important to strengthen the investigation and monitoring of the genes of animal vector diseases and the basic research of pathogenesis. With the development of biochip technology, gene microarray technology has become an attractive platform for large scale bioassays with the significant advantages of accuracy, high throughput, rapidity, sensitivity, specificity and ease of operation, and can be used for the detection of almost any molecular interactions. This has laid the foundation for the establishment of high-throughput biochip screening methods for different insect vectors carrying multiple pathogens. It also predicts that this technology will not only greatly advance in the fields of clinical diagnosis and agricultural detection, but also enrich the experimental means

and basic research process in veterinary science.

5. How do you think testing medicine can help control the spread of insect-borne diseases? Is it true that the probability of detecting mosquito-borne diseases increases significantly during periods of high mosquito activity (May-June and September-October)? If so, do you have any relevant advice you would like to give to the general public?

(1) Laboratory medicine has an irreplaceable role in clinical practice, providing clinicians with a basis for diagnosis and treatment by testing specimens of patients' body fluids, blood, excreta, infectious microorganisms, etc. Laboratory medicine has an important role in the detection of insect-borne diseases.

(2) The probability of detecting mosquito-borne diseases increases dramatically every time when mosquitoes are active (May-June and September-October).

(3) summer mosquitoes are rampant, so mosquito-borne diseases are also in a period of high incidence, except for epidemic B encephalitis have B encephalitis vaccination can be prevented, other than no targeted specific drugs for prevention and treatment. So the prevention of mosquito-borne diseases mainly lies in the prevention and control, that is, in the endemic areas of the disease, to avoid the bite of mosquitoes. ① minimize skin exposure, such as outdoor wear long sleeves and long pants, accommodation with mosquito-proof facilities, you can also spray mosquito repellent, etc.; ② eliminate mosquitoes is the most critical. Mosquitoes like dark, wet, so indoor kitchens, bottles and jars, water, grass is the suitable environment for mosquito breeding. So keep the living environment dry, open, dredge the sewer, weed, etc. are the fundamental way to eliminate mosquitoes; ③ timely medical care: strengthen personal protection against mosquito bites. Once the mosquito bite fever, severe headache, nausea, vomiting, drowsiness and other symptoms, to seek early medical care in order to get timely treatment.