Commentary

Chagas Disease — An Underestimated Global Public Health Challenge

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American trypanosomiasis, commonly called Chagas disease (CD), was prevalent once in rural areas of Latin America where poverty is widespread and was considered a silent and poorly visible disease (*1*). It has become a global neglected tropical disease and a significant public health threat worldwide due to globalization over last century. More recently, it has attracted much more attention, and "April 14" has been designated as "World Chagas Disease Day" by the World Health Assembly of 2019 to raise awareness of the disease as a neglected tropical disease, to improve the rates of early treatment and recovery, and to achieve the ambitious goal to interrupt its transmission (*2*).

CD was named after the Brazilian physician Carlos Ribeiro Justiniano Chagas, who discovered the first patient on April 14, 1909 (*3*). The disease is an anthropozoonosis caused by the protozoan parasite *Trypanosoma cruzi*, which belongs to the order Kinetoplastida, family Trypanosomatidae. It affects about 6–8 million people worldwide and causes approximately 50,000 deaths per year, and nearly 100 million people are living in areas at risk of infection worldwide (*1, 4*). In the endemic areas of 21 Latin American countries, CD is mainly transmitted by vector triatomine bugs through the bite of the bugs (trypanosome in feces or urine to infect hosts by wound or mucous membrane), but a few other transmission routes are also possible such as oral transmission by food contaminated with triatomine bugs feces or urine (*5–6*). In recent decades, more cases of CD have been reported in several non-endemic countries such as Canada, the United States, Australia, New Zealand, Spain, Italy, France, United Kingdom, Switzerland, Japan, etc., due to growing population movement (*7–9*). It has been documented that in non-endemic areas CD is mainly transmitted by blood transfusion, organ transplant, mother and infant congenital transmission, laboratory accidents, and other transmission routes (*6*).

CD, caused by human infected with *T. cruzi*, has two successive phases. First, the acute phase is characterized by a high-grade parasitemia after the primary infection, but 95% of cases are asymptomatic. Only 5% of cases are symptomatic with prolonged fever, headache, myalgia, lymphadenitis, hepatomegaly, and splenomegaly manifestations (*10*). Possibly 60%–70% of infected individuals will never develop signs or symptoms in all life, characterizing the indeterminate form (*10*). Second, the remaining 30%–40% infections may progress to the chronic phase with Chagas heart disease (CHD) or gastrointestinal tract after 10–30 years, which can only be cured by surgery or organ transplantation, and the drugs for CD, including benznidazole or nifurtimox, are no longer effective in this stage (*11*). The diagnosis of human CD is difficult because most cases are asymptomatic. Although it is possible to determine the presence of parasites in the peripheral blood by parasitological tests in the acute phase, only 1%–2% of the infected individuals are recognized (*1*). Furthermore, the chronic phase needs confirmation by at least two serological tests based on different principles in order to detect anti-*T. cruzi* IgG antibodies (*1*). Many patients are often diagnosed in late stages of the disease, which causes chronic morbidities, high disabilities and mortalities.

Great efforts have been made in the past decades, and although CD transmission has been controlled effectively both in endemic and non-endemic countries (*4*), many challenges are still facing including low detection rate in the surveillance, lack of effective drugs, complicated zoonotic characteristics, and diversity of transmission routes (*12*). Though China is a non-endemic country and no CD cases have been reported yet, we have to improve our capacity in the surveillance of potential risks of the disease transmission, since the vector exists in China. As shown in results from previous surveys, one of the transmission vectors, *Triatoma rubrofasciata*, has been found in at least five provinces in southern China (*13–14*). By considering the high mobility between China and the world, CD will be possibly introduced in China. We recommended the following preparedness measures that should be taken by all medical institutions in China including (i)

strengthening information dissemination, communication, and health education on CD control especially for medical workers and common people who will work and travel in endemic countries; (ii) paying much more attention to the disease findings by preparing diagnostic techniques in cooperation with international professionals on CD; (iii) improving our surveillance system on potential imported diseases including CD, such as preparing the fast detection tests for serological screening of high risk population and blood products, setting standard operating procedures for vector reservoir surveillance, etc; and (iv) training more technicians on the diagnosis and surveillance of CD, carrying out relevant scientific research, and preserving relevant technologies.

On "World Chagas Disease Day", we would like to call all health workers in China who are working in hospitals or centers for disease control and prevention (CDCs) to monitor CD introduction to non-endemic areas through travelers who come back from the endemic areas and should report to China CDC once suspected cases are found. CD is an underestimated global public health challenge, and we should pay much more attention to the disease's transmission.

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