

The Impact of Emerging Tropical Diseases in Neurology: Challenges to Accurate Diagnosis

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In western countries, the progressive appearance of tropical diseases affecting the central nervous system (CNS) has been associated with increased human migration, global warming, and tourism to tropical regions. At the same time, population growth, urbanisation, and deficiencies in water and sanitation systems lead to a re-emergence in endemic countries. Changes in world ecology have also modified the distribution of vectors involved in the transmission of some parasitary diseases [1].

Several neglected tropical diseases can cause severe disability due to involvement of the CNS. In fact, clinical cases of neuro-schistosomiasis, neurocysticercosis, and chagasic stroke are increasingly detected in western countries [2]. Nevertheless, early diagnosis and treatment may be hampered by the absence of adequate training programs in Tropical Neurology.

American trypanosomiasis or Chagas disease is one of the most important emergent health problems. In Europe and the United States, an increase in the number of asymptomatic *Trypanosoma cruzi*-infected people has been observed in the last decade due to the emigration of thousands of infected individuals from endemic areas [3]. Around 2% of Latin-American immigrants may be infected with *T. cruzi* in the United States [4]. Few patients are aware of being infected, and vertical, transfusional and transplantational routes have accounted for all cases of transmission in nonendemic regions. In Europe, blood transfusion and congenital cases have being reported [5,6]. The association between ischemic stroke and *T. cruzi* infection is well known [7]. Many Chagas disease patients do not know that they harbor the chronic chagasic infection. So, ischemic stroke may be the first manifestation of Chagas disease in both asymptomatic *T. cruzi*-infected patients and also in the chronic stage of the disease [8,9].

Schistosomiasis, a public health problem in many underdeveloped countries, continues to radiate to new geographical areas due to elevated mobility of populations, and the increase of tourism in endemic areas [10]. More than 200 million people worldwide are affected by schistosomiasis. In Europe, several hundreds of travel-associated schistosomiasis cases have been reported. Acute schistosomiasis may be the third most common cause of febrile disease imported from African countries, after malaria and rickettsial infections [11,12].

Neuroschistosomiasis, the infection of the CNS by *Schistosoma spp.*, is a severe complication and neurological symptoms occur as a consequence of the immune reaction around the eggs deposited in the CNS [13,14]. In endemic regions, at least the 5.6% of patients admitted with a non-traumatic myelopathy may have spinal schistosomiasis [15]. Schistosome myeloradiculopathy affects the conus medullaris and/or cauda equine, although transverse myelitis presenting as flaccid areflexic paraplegia can also occur [11]. Cerebral schistosomiasis may present with encephalopathy, headache, focal neurological deficit and seizures [16].

Most emerging viruses are associated with CNS infection. Some

viruses causing encephalitis, such as Japanese encephalitis virus, have increased their geographic area whereas other virus, such as Nipah and Hendra viruses, have spread from animal reservoirs [1]. In the last years, air and sea transportation has introduced insect vectors that may transmit arbovirus into new areas. *Aedes albopictus* has been found in North America and Europe, and recently a strain of Chikungunya virus adapted to *A. albopictus* is spread in Europe [17,18]. In Europe, cases of autochthonous dengue fever and Chikungunya fever in France has been reported [19].

Dengue fever is the second most common mosquito-borne disease affecting human beings after malaria, and every year occur more than 50 million cases of dengue fever resulting in 25,000 fatalities [20]. Neurological manifestations of dengue infection are increasingly recognized and include dengue encephalopathy, dengue encephalitis, immune-mediated syndromes (acute disseminated encephalomyelitis, myelitis, Guillain-Barré syndrome), dengue muscle dysfunction and cerebral hemorrhagic complications [21].

Human T lymphotropic virus-I (HTLV-I) virus can mimic chronic neurological disorders and has been included in the differential diagnosis of primary and progressive multiple sclerosis. Neurological syndromes associated to HTLV-I infection include tropical spastic paraparesis or HTLV-I associated myelopathy, optic neuritis, cerebellar syndrome, axonal neuropathy, cognitive dysfunction and involvement of multiple cranial nerves [22].

A register for tropical diseases affecting the CNS is needed in order to obtain epidemiologic data about their impact in the daily practice of Neurology in western countries. Clinical research and protocols for early diagnosis and treatment should be developed, and a call for research papers in Tropical Neurology is needed. Specific training programs in Tropical Neurology should be developed to cover these deficiencies.

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