Future priorities in tackling infections due to brain-eating amoebae

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Abstract

Brain-eating amoebae (*Acanthamoeba* spp., *Balamuthia mandrillaris* and *Naegleria fowleri*) can cause opportunistic infections involving the central nervous system. It is troubling that the mortality rate is more than 90% despite advances in antimicrobial chemotherapy over the last few decades. Here, we describe urgent key priorities for improving outcomes from infections due to brain-eating amoebae.

Dear Editor

Whilst brain infections due to pathogenic free-living amoebae are rare, the mortality remains very high leading almost always to death.[1-4] Defining the global burden of infections due to brain-eating amoebae presents a major challenge, as infections are rare but insidious in nature leading to inherent difficulty in their diagnosis due to a global lack of capacity for diagnostics especially in developing countries. Lack of effective drugs and/or their delivery to the site of infection results in mortality rate of more than 95%, highlighting global failure in tackling this infection over the past several decades. Despite exceptionally high mortality rate, brain-eating amoebae have not had the expected level of focus from the global community. There is a need for renewed efforts for:

(i) Better epidemiology date involving collaborative efforts between basic scientists and clinical researchers to accelerate translational medicine.

(ii) Improved laboratory and point-of-care testing. It is obvious that, without point-of-care testing, these infections will remain difficult to diagnose, and treat, and their true global burden will remain undetermined.

(iii) Better access to drugs. Access to established medicines, as well as development of new medicines. Access, in particular to Miltefosine is particularly, and liposomal amphotericin B (Ambisome) remains very

expensive in many countries. Acceleration of vaccination programmes should be a key priority, but will be challenging due to the rarity of the disease.

(iv) Capacity building for pathogenic free-living amoebae. Whilst there are several groups working in the area of brain-eating amoebae, better cohesion and extension within basic scientists and practicing physicians will enable more rapid progress in this area.

(v) Funding for development of diagnosis, treatment strategies, and implementation programmes, especially in resource-limited settings. In this regard, establishment of advocacy groups and public engagement will lead to infrastructure development programme for disease surveillance and to devise treatment strategies.

(vi) Fundamental research in genomics-based studies of amoebal evolution, parasite-host interactions, and resistance in the host including metabolic adaptation and understanding the innate and acquired immune responses remain priority areas.

Although there are some encouraging novel therapies on the horizon including intranasal delivery of antiamoebic molecules to bypass blood-brain barrier selectivity,[5] there is an urgent need in delivering novel diagnostic and therapeutic strategies to limit mortality from these infections. However, engagement of major funding bodies and governmental and non-governmental agencies is needed to enable substantial reductions in the unacceptably high mortality from infections due to brain-eating amoebae.

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