

## Silent arenavirus infection in individuals living in Colniza, Mato Grosso, Brazil

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Dear Editor,

More than half of all the infectious diseases that affect humans have a zoonotic origin, and as anthropogenic impacts on ecosystems accumulate, the threat of zoonotic disease grows<sup>1</sup>. The exploitation of forests for timber and mining of gold and other minerals in Brazil has multiple environmental impacts including the associated deforestation, migration of populations, dramatic demographic growth, and sudden changes in the socioeconomic structure<sup>2</sup>. This has been highlighted by articles published in the Journal of the Brazilian Society of Tropical Medicine<sup>2-5</sup>. However, we have observed that most of these studies addressing health concerns are focused on malaria, with relatively little attention given to other potential diseases, many of which might be misdiagnosed as malaria.

Arenavirus hemorrhagic fever is a severe emerging disease characterized by systemic and neurological disorders with high lethality rates in South America, where, to date, five species of mammarenavirus have been associated with human disease: Machupo and Chapare (Bolivia), Junín (Argentina), Guanarito (Venezuela), and Sabiá (Brazil) viruses<sup>6</sup>. In Brazil, little is known about this rodent-borne infection; only one fatal case of Brazilian hemorrhagic fever was described in the 1990s, and two other cases of nonfatal laboratory-acquired infections were subsequently confirmed<sup>6,7</sup>.

We conducted a study to estimate the prevalence of anti-arenavirus antibodies among individuals living in Três Fronteiras district, Colniza municipality, Mato Grosso state, Brazil. The

study region is divided into three distinct community clusters, according to occupational activity: (i) mining (where mining companies are concentrated); (ii) extraction and processing of wood; and (iii) village (where subsistence trade predominates). This region has no basic sanitation, electricity or access to other basic amenities. Between 2000 and 2007, Colniza presented one of the highest population growth rates in the period – 15.3%. The municipality has also presented high rates of deforestation, having been identified as one of the top cities responsible for the deforestation of the Amazon rainforest<sup>8</sup>.

One hundred and eight (108) serum samples from a malaria survey conducted in 2013 were tested for anti-mammarenavirus IgG antibodies using ELISA according to Riera et al. (1997)<sup>9</sup> at a 1:100 dilution. Demographic and socioeconomic data were collected during randomized home visits conducted in July 2013 among individuals living in Três Fronteiras district, Colniza municipality via the administration of a structured questionnaire to respondents. The study was approved by the Fundação Oswaldo Cruz/Instituto Oswaldo Cruz Ethical Committee (protocol no. CAAE 61629416.2.1001.5248).

Most of the participants were male (63/108, 58.3%), the mean age was 29 (range: 1–66) years and 67.6% (73/108) self-declared as brown/*pardo* (mixed race). More than half of the study population (81/108, 75.0%) had received <5 years of formal education (elementary school level in Brazil). The main reported work activities were temporarily activities involving mining or agriculture (74/108, 68.5%), followed by vegetal exploration (21/108, 19.1%), and housekeeping (13/108, 12.5%).

Of 108 samples, two (1.85%) tested positive for anti-mammarenavirus IgG; both were females (1- and 35-years-old) and lived in houses made of wood, with daily activities related to housekeeping. Neither of these had current acute malaria infection or known comorbidities. Arenavirus infection can occur in different age groups, as shown by

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Maiztegui (1975)<sup>10</sup>, although most infections caused by South American arenaviruses are reported in individuals between 15 and 40 years old<sup>10</sup>. Regarding studies conducted in Latin America, higher IgG rates have been reported in an indigenous population from Colombia (3.1%)<sup>11</sup>. However, lower prevalence rates (0.5%)<sup>12</sup> were reported in convalescent sera obtained from 220 non-malarial febrile patients from the northern coast of Colombia. The prevalence found in this study was similar to that observed in a study conducted by Machado et al. (2010)<sup>13</sup>, in which five individuals (5/343, 1.4%), also from Mato Grosso state, had antibodies against arenavirus. Recently, in our previous study, we have demonstrated the circulation of arenavirus in *Calomys callidus* rodents in the same region<sup>14</sup>. Although the arenavirus detected in these rodents is unrelated to the human disease, it is important to highlight the increasing evidence of arenavirus infections in humans and rodents in Mato Grosso state<sup>13,14</sup>.

Mining activities and wood exploitation create ecological changes that can contribute to diversity loss and dislocation of wild animals, resulting in frequent contact between humans and rodent reservoirs in various settings (not only at the workplace but also in human habitations, as evidenced by our results). A similar scenario involving deforestation and sociodemographic changes was described during the emergence of Junín and Guanarito viruses in Argentina and Venezuela, respectively<sup>6</sup>. Furthermore, three arenaviruses have been detected in the Brazilian Amazon region: Amapari, Cupixi and Flexal viruses, the latter being implicated in mild disease due to laboratory-acquired infection<sup>6,13</sup>.

Individuals living in areas under the influence of mining settlements and wood exploitation enterprises should be included as a population at risk for arenaviruses, and potentially for other zoonotic infections that occur in the Amazon region. Thus, serological surveys can be helpful when addressing potential hazards associated with arenavirus infections driven by the socio-environmental effects of mining and related activities.

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#### Conflict of interest

The authors declare that there is no conflict of interest.

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