Parasite-induced genetically driven autoimmune chagas disease

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Researchers have shown that the *Trypanosoma cruzi* agent of Chagas Disease (CD) invades host embryo cells and spreads its mitochondrial DNA (kDNA) minicircles into the host's genome. Dr. Antonio Teixeira and associates at the University of Brasília, Brazil, inoculated virulent typanosomes in fertile chicken eggs and documented the heritability and fixation of the kDNA mutations in the chicks and their progeny. The results, published in the open-access journal *PLoS Neglected Tropical Diseases* on March 29th, show that kDNA-mutated chickens undergo genotype alterations, developing an inflammatory heart condition similar to Chagas disease in humans.

Chagas is one of the most lethal endemic infectious diseases in the Western Hemisphere, and although initially restricted to South America, it is now present in many parts of the world. This insect-born infection can also be transmitted from mother to child and via blood transfusion, and while acute infections are usually acquired in infancy or childhood, chronic Chagas disease kills many of those infected after they reach 40 years of age. The disease attacks the heart and is the most frequent cause of heart failure in endemic regions. While the treatment of Chagas disease with anti-trypanosomal nitroderivatives curtails the parasitic infection, it does not abrogate the destructive heart lesions which can lead to death.

An earlier study by Santos-Buch and Teixeira (1974) showed that immune lymphocytes from chagasic rabbits destroy embryo heart cells in vitro, and that this accelerated rejection of target cells occurred within

10 hours. Control, non-immune lymphocytes adhered to target heart cells 72 hours after incubation. Now, Dr Teixeira's research team describes the origin of the autoimmune rejection of the target heart cells in Chagas disease: "This chicken model was necessary to eliminate any residual active infection, because the birds are resistant to T. cruzi infection upon hatching. The kDNA-mutated chickens develop clinical signs of the heart disease and failure - their hearts are grossly enlarged and microscopic exams reveal that immune lymphocytes adhere to the target cells and lyses."

As Dr. Teixeira explains, this is "the first time that an autoimmune disease has been experimentally reproduced in an animal model, showing specific parasite induced kDNA modifications in coding regions of the host's genome".

More information: Teixeira ARL, Gomes C, Nitz N, Sousa AO, Alves RM, et al. (2011) Trypanosoma cruzi in the Chicken Model: Chagas-Like Heart Disease in the Absence of Parasitism. PLoS Negl Trop Dis 5(3): e1000. doi:10.1371/journal.pntd.0001000

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