Resveratrol reverses heart damage in mice with Chagas disease

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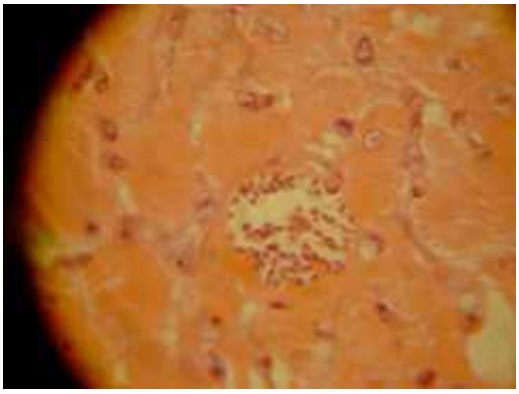

Trypanosoma cruzi. Credit: Michael Wunderli, Flickr

Resveratrol is the antioxidant found in red wine and famous as a food supplement capable of mimicking the effects of exercise and low calorie diets in the heart. Now Vilar-Pereira and colleagues show that treatment with resveratrol reverses heart damage and improves heart function in mice with Chagas disease, in a new study published in *PLOS Pathogens*. The findings open up a new potential pathway to better treatments in humans.

Chagas disease is caused by the parasite *Trypanosoma cruzi*, which is spread by insects that feed on blood, mostly in Latin America. Initial infection brings several weeks of mild symptoms, and most patients never experience symptoms again. However, one third of people with

Chagas disease eventually develop chronic Chagas cardiomyopathy, in which *T. cruzi* damages heart tissue and may eventually cause arrhythmias and heart failure.

Currently, there is no effective treatment to reverse heart damage in chronic Chagas cardiomyopathy. Based on previous evidence that *T. cruzi* harms the heart through oxidative stress, the group lead by Claudia N. Paiva from Universidade Federal do Rio de Janeiro, tested whether the antioxidant supplement resveratrol could combat this condition.

In the study, mice were infected with *T. cruzi*, and they quickly transitioned from initial symptoms to a chronic stage of heart damage. The researchers then treated the mice with resveratrol and monitored their hearts with electro- and echocardiography.

Resveratrol reversed mouse heart dysfunction in several measurable ways, including improvement of heart pumping efficiency and the heart electrical cycle. It also reduced oxidative damage and decreased amounts of *T. cruzi* in the heart. These effects occurred even in mice treated late after infection (120-160 days after infection).

The scientists also found that the substances metformin and tempol had similar restorative effects, but did not reduce amounts of *T. cruzi* in the heart. These results allowed the researchers to pinpoint the particular cellular pathways at play during resveratrol treatment and also suggest that food supplements or medicaments for other diseases could be repurposed for the specific treatment of Chagas heart disease, a disease to which only drugs transposed from other heart diseases are available.

The results of this research indicate that tuning the heart to a healthy state might be the best strategy to teach the body how to live together with a parasite the immune system fails to eliminate, minimizing the harm.

Clinical studies are needed to determine whether resveratrol and similar substances may have beneficial effects in people with Chagas disease. Because resveratrol has already been evaluated for safety in other contexts, the authors hope that such clinical studies could begin in the near future.

More information: Vilar-Pereira G, Carneiro VC, Mata-Santos H, Vicentino ARR, Ramos IP, Giarola NLL, et al. (2016) Resveratrol Reverses Functional Chagas Heart Disease in Mice. *PLoS Pathog* 12(10): e1005947. DOI: 10.1371/journal.ppat.1005947