The Effect of Toxoplasma Gondii on Soleus Muscle Capillary Development

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Funded by CHW under the Internships in Global Health Program

Introduction

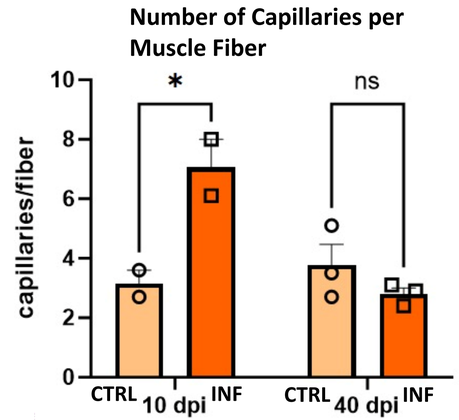
- Toxoplasma gondii parasite is widespread, affecting 25-30% of the world and 50-80% of Brazil
- Spread commonly through undercooked meat, contaminated water, and sexual contact
- Infection can be asymptomatic or cause issues with the eyes, muscles, and brain
- Congenital infection is especially dangerous and is linked to many birth defects
- Toxoplasmosis is linked to decreased athletic performance, muscle pain, and inflammation
- Understanding how toxoplasmosis affects muscle tissue may help us address these and other symptoms to advance health globally

Methods

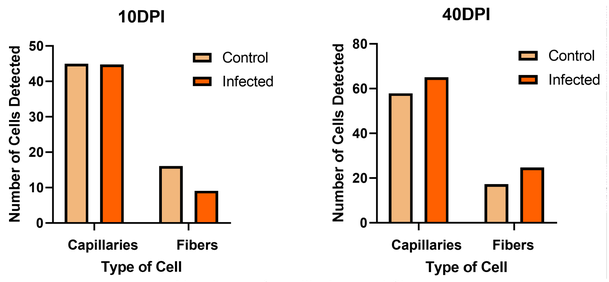
- 10 adult mice were used in this study, half were randomly chosen to be infected with toxoplasma
- After 10 days, 2 of each type were sacrificed and after 40 days 3 of each type were sacrificed
- Soleus muscle (in the leg) was collected and analyzed with CellCounter

Results

- At 10 days post-control/infection, the number of capillaries per fiber were significantly higher in the infected muscle than in the control muscle
- At 40 days, there was no significant difference shown between control and infected muscle tissue capillary to fiber ratio
- There were always more capillaries than muscle fibers

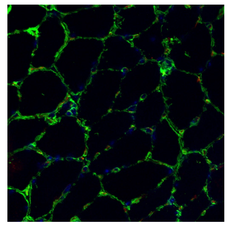


Mice 10 days post-infection and 40 days post-infection and their ratios of capillaries per fiber

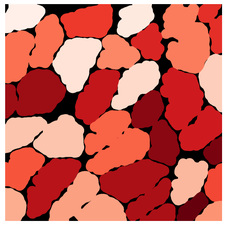


Numbers of capillaries and fibers

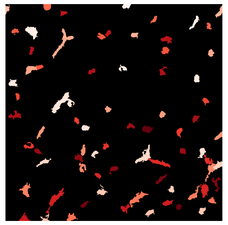
- The difference in ratio in 10DPI appears from the above figures to relate to a decrease in number of muscle fibers in the muscle tissue



Soleus muscle tissue from infected mouse 2 at 40DPI, dyed with laminin in green, isolectin B4 in red, and Dapi in blue



Soleus muscle fibers identified by the CellCounter project, drawn from the image's green channel



Soleus capillaries identified by the CellCounter project, drawn from the image's red channel

Discussion

- At 10 days post-infection, there were fewer muscle fibers in the infected muscle tissue, likely killed because of the infection
- At 40 DPI, there was no significant difference
- CellCounter has potential to standardize and mechanize mass analysis of images

Next Steps

- Repeating the experiments with more mice will show whether the 10DPI significant change and 40DPI lack thereof are consistent
- More image sets with a new type of leg muscle – the tibialis anterior – will show whether this change is shown in all muscles

Acknowledgements

Thank you to the Oswaldo Cruz Foundation for allowing me to learn and conduct this research with Bárbara Gomes, Daniel Adesse, Carol Moreira, and Paloma Vieira. Thank you to the Center for Health and Wellbeing for funding this research and my trip through the Global Health Program.