Developing an *Ex vivo* model of Acanthamoeba Keratitis

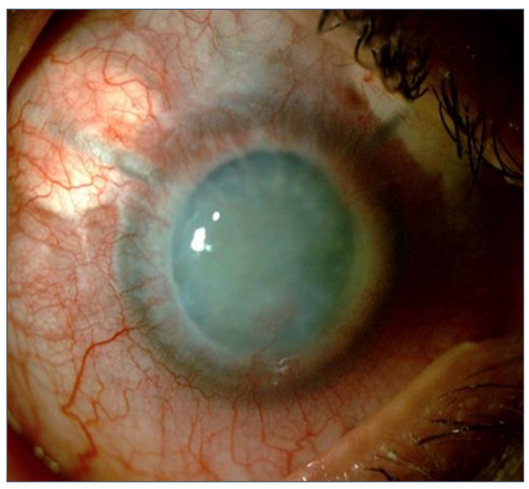
Noor Alantary[1], Dr. Wayne Heaselgrave[1]

1. University of Wolverhampton, Faculty of Science and Engineering
Department of Biomedical Sciences and Physiology

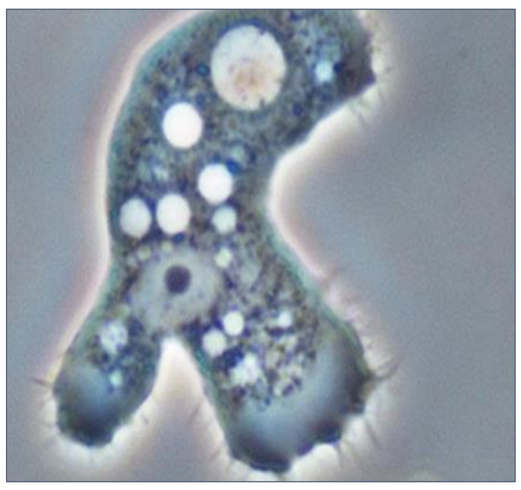
Background

Acanthamoeba is a ubiquitous free-living amoeba with two stages in its life cycle; the trophozoite (active) stage and the cyst (dormant) stage (Lorenzo-Morales et al. 2015). It infects healthy immunocompetent individuals causing a potentially blinding infection of the eye.

Acanthamoeba keratitis is a progressive necrotizing infection (Maghsood et al. 2005; Walochnik et al. 2014) which leads to ulceration of the corneal epithelium, swelling of the stroma and scarring that can result in permanent blindness (Khan 2003, Heaselgrave and Kilvington 2016).



Acanthamoeba keratitis



Acanthamoebic trophozoite

Aim

To establish an *ex vivo* model of Acanthamoeba-keratitis which will give an opportunity to monitor the progression of the disease and the spread of infection from initial attachment to corneal epithelial cells and invasion of the corneal stroma.

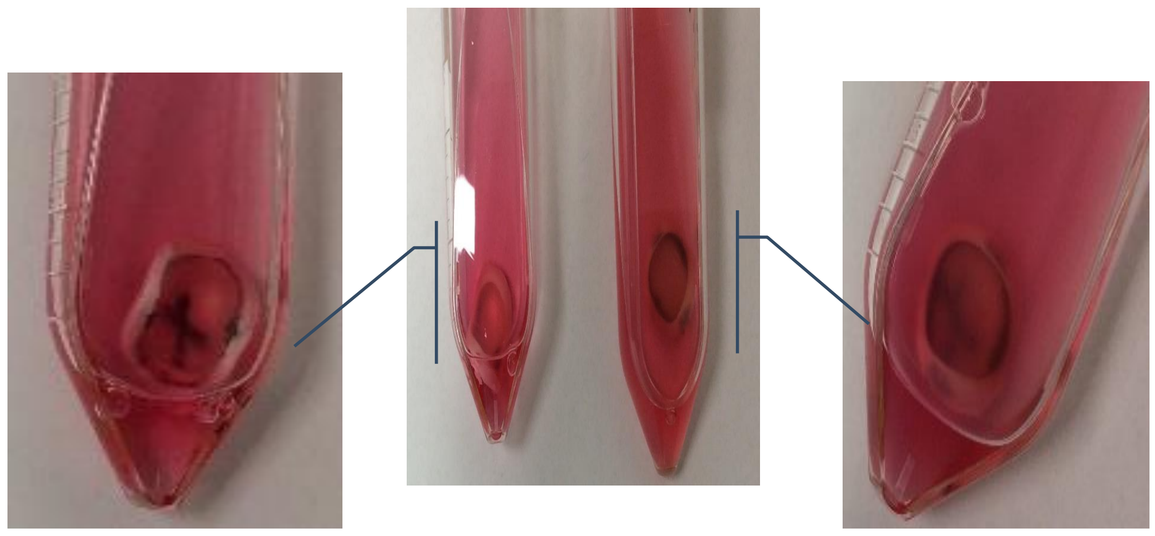
Methods

Corneas were harvested -in a sterile field- from freshly slaughtered Porcine (pig) eye globes. They were transferred to a corneal storage medium supplemented with gentamycin, penicillin, streptomycin and amphotericin B, maintained at 37^{o} C.

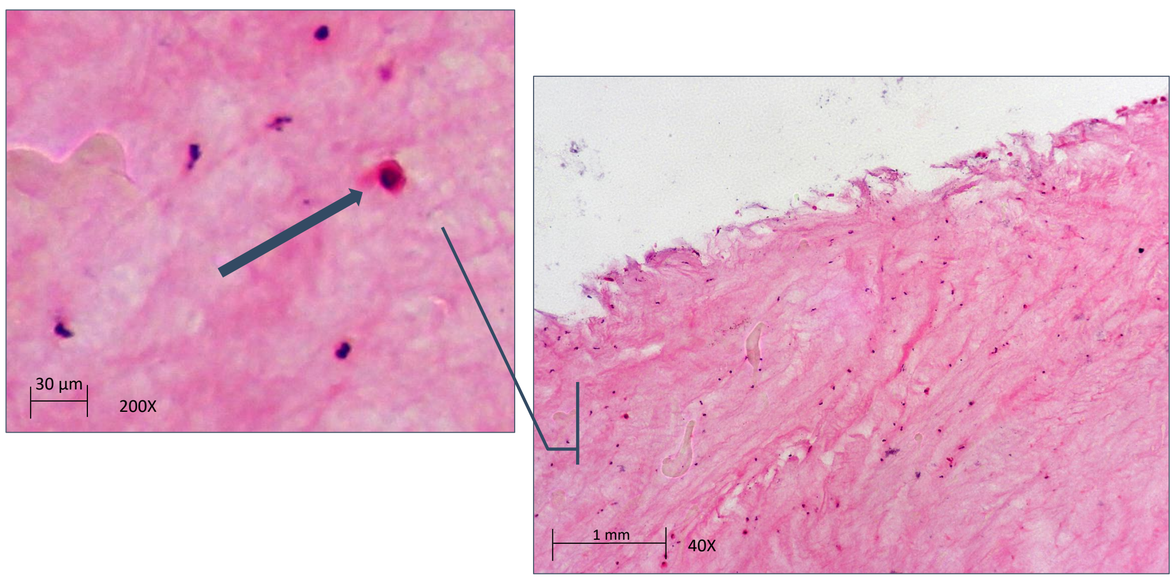
the second step included examining the specimens to ensure sterility, then they were injected with acanthamoebic trophozoites. Macroscopic changes were noted by direct inspection of the specimens, while histological techniques and light microscope were used to detect microscopic changes.

Results

At the macroscopic level, loss of corneal transparency was noted. At the microscopic level, corneal epithelial defect, swelling of the stroma, stromal infiltration with inflammatory cells, amoebic trophozoites were observed.



Healthy vs. infected cornea demonstrating the loss of corneal transparency



Pathological findings: defective epithelium, swelling of the stroma, infiltration by inflammatory cells, acanthamoebic trophozoites

Conclusion

Ex vivo induced Acanthamoeba keratitis model

- once established- will give a unique opportunity to monitor the progression of infection in the absence of the host immune response and can be used to study the efficacy and toxicity of many drugs used to treat Acanthamoeba keratitis.

References

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