

Interview with CXO author Nicole Carnt

Author of: Prevalence and seasonal variation of *Acanthamoeba* in domestic tap water in greater Sydney, Australia. *Clin Exp Optom* 2020; 103: 782-786.

Nicole Carnt is Scientia Senior Lecturer at The School of Optometry and Vision Science, UNSW, Sydney, Australia. She graduated from Optometry at UNSW in 1989 and worked in private practice for 10 years in Australia and the UK before taking a position with the Brien Holden Vision Institute in 1999. She completed a PhD on Epidemiology of Contact Lens Related Infection and Inflammation 2008-2012 and is the recipient of many research awards. She was awarded a NHMRC Research Fellowship in 2012 and spent the first 2.5 years at Moorfields Eye Hospital, London investigating the rare but severe corneal infection in contact lens wearers, *Acanthamoeba* keratitis.

What are the key findings from your research on *Acanthamoeba* in domestic tap water?

In this study of 97 samples of Sydney domestic tap water samples, collected in two periods in 2019—winter and summer—we found around 30 per cent in both seasons were contaminated with *Acanthamoeba*. Three quarters of these samples were phylogenetically classified as 'T4 and T5 genotypes' which are pathogenic for *Acanthamoeba* keratitis (AK).

What do you want optometrists to know about your findings?

The high prevalence of *Acanthamoeba* in Sydney domestic water sends an alert to Australian practitioners to advise contact lens wearers of the dangers of water mixing with contact lenses. This is critical as many contact lens wearers do not understand this risk factor for severe infection with *Acanthamoeba*.

The persistence of *Acanthamoeba* in domestic water across the seasons reinforces that clinicians should be vigilant of AK in contact lens wearers throughout the year. This is particularly important as AK can masquerade as herpes simplex keratitis and we have shown that misdiagnosis occurs in around 50 per cent of cases and is associated with a 5x increased risk of a poor outcome.¹

What surprised you while conducting this research?

The prevalence of *Acanthamoeba* in Sydney domestic water was higher than what we expected. In fact, it was similar to what we found in the UK, using the same sampling strategy. In the UK, the water quality and delivery systems have been traditionally more likely to harbour *Acanthamoeba*. We also expected a lower proportion of positive samples in winter as *Acanthamoeba* flourishes in hot conditions and some studies have found that increased number of



cases of AK occur in summer. However, this may be due to greater participation in water sports in summer. In any case, our results show that the level of *Acanthamoeba* in Sydney water is high and it persists throughout the year.

What drew you to this area of research?

During my NHMRC Research Fellowship at Moorfields Eye Hospital in London, I met a patient with severe AK, who was so motivated about the lack of knowledge among contact lens wearers of the danger of mixing water with their lenses, that she designed a 'no water' symbol to be placed on contact lens packaging. Through an industry-funded research project, we have shown that the use of these symbols reduces water exposure in contact lens wearers and case contamination with water borne microbes.

These 'no water' stickers for contact lens packaging are available in the UK, USA and Australia (through CCLSA). My research on water, inspired by this patient campaigner, reinforces the important safety message of not mixing contact lenses with water.

What are you currently working on?

This research has led to a collaboration with Dr Con Petsoglou at Sydney Eye Hospital to determine similarities between isolates of *Acanthamoeba* cultures from corneal scrapes of patients and environmental water samples. We have also teamed-up with Water NSW to collect samples from water catchments and will correlate water factors such as turbidity and mineral content with *Acanthamoeba* presence. We will also collect samples from AK patients' homes and see how these relate to the *Acanthamoeba* causing the infection as well as the source water. An interesting fact about *Acanthamoeba* is that it can host intracellular bacteria, viruses and fungi. Around 20 per cent of AK patients suffer concurrent microbial keratitis, so we are not only looking at the *Acanthamoeba* organism itself, but also its microbiome.

1. Carnt N, Stapleton F: Strategies for the prevention of contact lens-related *Acanthamoeba* keratitis: a review. *Ophthalmic Physiol Opt* 2016, 36: 77-92. doi: 10.1111/opo.12271

