

# Problem

## Serious corneal infections are very common: both animals and humans

- **Animals:**
  - More than 3 million infections per year in US & Europe
  - 40% of cats suffer herpetic corneal infections in their lifetime
  - Infectious Bovine Keratoconjunctivitis (IBK) results in \$150M losses from the US economy each year
- **Humans:**
  - 400,000 cases of microbial keratitis per year in US & Europe
  - 1,000,000 outpatient appointments per year in the US
  - 2,000,000 new cases of human monocular blindness secondary to microbial keratitis globally each year.

## Current treatment is antibiotic eye drops used every 15-30 minutes

- 24-48 hours to start having an effect
- Sometimes may not be effective at all
- Complexities of antimicrobial resistance (AMR), mixed infection, labour intensive treatment & socio-economic impact

## Treatment is difficult with unfortunate sequelae

- Complications include corneal scarring 47-62% , perforation 5-6%, neovascularization 3-18%, thinning 3-14%.
- 10-14% of human patients (developed world) will lose significant vision
- Loss of work and livelihoods in the developing world
- 1/10 dogs are euthanised
- IBK results in cattle herds being euthanised

# Solution

## Product:

**Patented UVC device  
to treat corneal infections**



## Method:

- 5sec treatment twice (4 h apart)
- Repeatable
- Sole therapy or adjunctive
- Safe to use prophylactically in suspected infections

## Efficacy:


- Effective against all bacteria, viruses, fungi, protozoa
- Works without needing to identify the causative agent
- No issues with AMR
- High efficacy against antibiotic resistant bacteria
- Better outcomes in animals and humans than conventional treatment
- Cost effective

# Patient journey

## With Photon 5 second treatment twice

**Initial treatment**

Deliver 5s treatment at presentation  
 Immediate effect on all microorganisms.  
 Significant reduction microbial load.  
 Concurrent use of antibiotic drops.

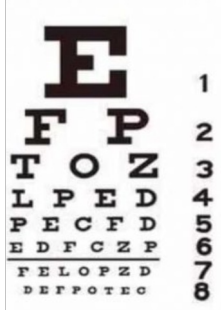


**Ongoing treatment**

Continue antibiotic drops with a manageable regime.

**Outcome**

Improved visual outcomes for patients due to speed, efficacy and universality of Photon UVC.  
 Faster infection control also results in less scarring.



**Diagnosis**

Clinical appearances.  
 Corneal scraping to produce sample for laboratory analysis to determine infective agent.  
 Results take 24-72 hours up to 6 weeks.

## Without Photon 2+ weeks of treatment every 15-30 minutes


**Initial treatment**

2 weeks - 6 months of antibiotic eye drops  
 Initially every 15 min, day and night  
 Corneal scraping for laboratory analysis  
 Not effective for 24-48 hours (patient in pain, infection continues to cause damage). Often associated with a hospital admission.




**Ongoing treatment**

With a good clinical response start titrating down treatment to complete 2 weeks.  
 May need change in treatment depending upon clinical response and laboratory results.  
 If incorrect antibiotics, infection is still active and untreated.



**Outcome**

Even with the best possible current treatment 10-14% of patients lose two lines of vision on a vision chart.  
 May require surgery.  
 In the developing world the severity of sight loss is much worse.





# Product & IP roadmap



v1



v2



Multiple new applications in ophthalmology



Multiple new applications in other fields

**Patent 1**

US and European Patents granted - protection to use UVC 265nm to kill bugs on the cornea.  
 Patent covers wide range of UVC not just 265nm.

**Patent 2**

Second layer patent expanding coverage and scope submitted in the US for worldwide protection.  
 Patent Application Pending  
 Market size increased many times. **Patent filed for expanded use**

# Traction

## Pre-clinical data has established efficacy and safety

*in vitro*, *ex vivo* and *in vivo* studies :

- >99% reduction in microorganism load
- recovery from infection
- no associated damage to corneal cells.

## Planned Clinical Studies (animal)

- University ophthalmic veterinary practices – London, Cambridge and Miami
- Independent ophthalmic veterinary practices – Birmingham, Manchester, Hereford, Chicago, Phnom Penh
- Most ophthalmic practices offer UVA crosslinking for severe infections facilitating similar studies with UVC.

## Planned Clinical Studies (human)

Parallel EU and US studies to commence after animal studies.

- University ophthalmic departments Europe – Birmingham, Milan, Madrid
- Large ophthalmic hospitals India – Hyderabad, Chitrakoot
  - Very high rates of corneal infections
  - Ethics approval obtained

## Commercialization

- Closed £1.5M round in September 2021
- In discussion with
  - Global company for veterinary use
  - Global company for human use
- Aim to supply veterinary market in Mar 2023.

## US FDA certification for human use (not required for animal use)

- Early interaction with FDA