

TODAY YOU CAN HEAL

Corneal ulcers and
infectious keratitis



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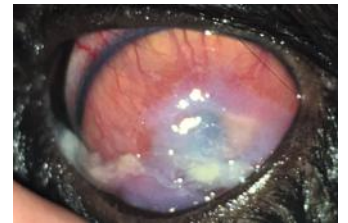
visioengvet@visioeng.com

TODAY YOU CAN HEAL

Corneal ulcers and
infectious keratitis

Infectious keratitis and corneal ulcers can be considered an ophthalmic emergency!

Current available therapies do not guarantee the resolution of the disease and often our animals lose their sight.¹



In the photos, from top to bottom: superficial corneal ulcer in dog, deep corneal ulcer in cat, corneal ulcer in dog and corneal ulcer in cat.

Kind courtesy of A. Marchegiani, P. Cassarani, A. Guandalini, C. Giordano.



World Health
Organization

***Antimicrobial Resistance:
No action today, no cure tomorrow !***

WHO, 2011

Considering the **therapeutic failure** caused by the growing phenomenon of **antibiotic resistance (AMR)**, an effective alternative to current therapies is becoming increasingly necessary for the treatment of corneal ulcers.^{2,3,4}

CORNEAL PHOTOTHERAPY: THE NEW PARADIGM OF ANTIMICROBIAL THERAPY IN VETERINARY MEDICINE



Solutions to unmet needs in eye care

Vetuvir® has been developed by **Vision Engineering Italy srl**, for exclusive use in veterinary medicine.

Corneal phototherapy: Clinically proven efficacy

VETUVIR®

The innovative UV-A
medical device

Riboflavin/UV-A corneal phototherapy for treating ulcerative keratitis in dogs: a prospective, randomized, controlled clinical trial⁵

Andrea Marchegiani ^{1*}, Rodolfo Gialletti ², Maria P Cassarani¹, Matteo Cerquetella¹, Anna Rita Attili¹, Giuseppe Lombardo^{3,4}, Marco Lombardo^{4,5}, Alessandro Fruganti¹, Rolando Arcelli²

Abstract

The purpose of the study was to compare the efficacy of corneal phototherapy with RIBOFLAVIN and UV-A for treating corneal ulcers in dogs in comparison with current antimicrobial topical therapy.

Twenty-five dogs (n = 25) with clinical signs of corneal ulcer or corneal melting were enrolled and randomized to receive corneal phototherapy (n = 16) or topical antimicrobials (n = 9).

Corneal phototherapy was performed by applying an ophthalmic solution of riboflavin (Visioflavin®, Vision Engineering Italy srl) onto the cornea for 20 minutes, followed by UV-A irradiation of the cornea at 30 mW/cm² for 3 minutes using an innovative UV-A device (Vetuvir®, Vision Engineering Italy Srl).

Follow-up visits were performed at enrollment and up to 49 days after treatment. Healing of the ulcerative lesion was determined as a negative fluorescein staining of the cornea. All dogs, except for one in the topical antimicrobial group, completed the follow-up.

Corneal phototherapy achieved complete corneal wound healing in all dogs (16/16; 100%) within 20.5 ± 7.8 days; no damage to the corneal endothelium was found after treatment.

In the topical antimicrobial group, only two dogs (2/8; 25%) achieved complete healing within 21.5 ± 15.6 days; the remaining 6 dogs, due to adisease progression recorded by an objective clinical score, underwent corneal phototherapy at day 14 and achieved complete healing (100% = 6/6) in 15.8 ± 7.0 days.



1 day after Vetruvir®



1 month after Vetruvir®

Corneal phototherapy has been shown to be safe and effective for the treatment of corneal ulcers in dogs and can represent a valid therapeutic option for accelerating corneal healing and clinical resolution of these serious infectious diseases.

THE RANDOMIZED
CONTROLLED
CLINICAL STUDY HAS
DEMONSTRATED THAT
CORNEAL PHOTOTHERAPY
IS EFFECTIVE AND SAFE
FOR THE TREATMENT
OF CORNEAL ULCERS IN
DOGS:

- 1) as first treatment choice;
- 2) in those cases that have not responded to topical antimicrobials (likely caused by antibiotic resistance).



Riboflavin 0,1%

1. Scuola di Bioscienze e Medicina Veterinaria, Università di Camerino;
2. Dipartimento di Medicina Veterinaria, Università di Perugia;
3. CNR-IPCF, Istituto per i Processi Chimico-Fisici;
4. Vision Engineering Italy srl, Roma;
5. Studio Italiano di Oftalmologia, Roma.

EQUIRVIS

Riboflavin 0,22%



An Assay System to Evaluate Riboflavin/UV-A Corneal Phototherapy Efficacy in a Porcine Corneal Organ Culture Model⁶

1. Dipartimento di Medicina Veterinaria, Università di Padova;

2. Dipartimento di Biomedicina Comparata, Università di Padova;

3. Dipartimento di Ingegneria Gestionale, Università di Padova;

4. Dipartimento di Ingegneria Informatica, Università di Padova;

5. School of Engineering, London South Bank University, London;

6. Vision Engineering Italy srl, Roma;

7. Consiglio Nazionale delle Ricerche, Istituto per i Processi Chimico-Fisici, Messina;

8. Fondazione Banca degli Occhi del Veneto, Venezia Zelarino.

Anna Perazzi¹, Chiara Gomiero², Livio Corain³, Ilaria Iacopetti¹, Enrico Grisan^{4,5}, Marco Lombardo⁶, Giuseppe Lombardo⁷, Gianni Salvalaio⁸, Roberta Contin¹, Marco Patruno², Tiziana Martinello² and Antonella Peruffo².

Abstract

The purpose of this study was to analyze the healing process promoted by corneal phototherapy with riboflavin (Visioflavin®, Vision Engineering Italy srl) and UV-A (Vetuviv®, Vision Engineering Italy srl) in porcine corneas with experimentally induced ulcers.

Corneal stromal changes were evaluated by an automated image analysis method. The analysis was performed by dividing the corneal sections into 24 regions of interest (ROI) and integrating data analysis with a "multi-aspect approach".

Three groups of corneas were analyzed:

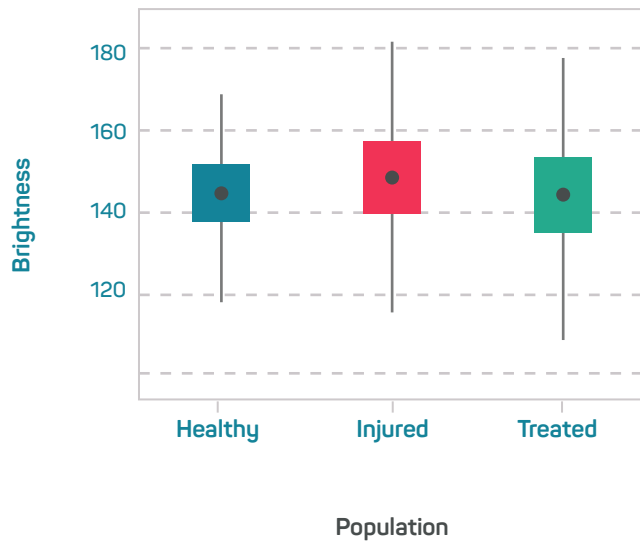
- healthy corneas (controls)
- untreated ulcerated corneas
- corneas ulcerated and treated by corneal phototherapy

The study has shown a significant effect of corneal phototherapy in promoting the healing process of corneal lesions compared to the non treated corneas ($p < 0.001$).

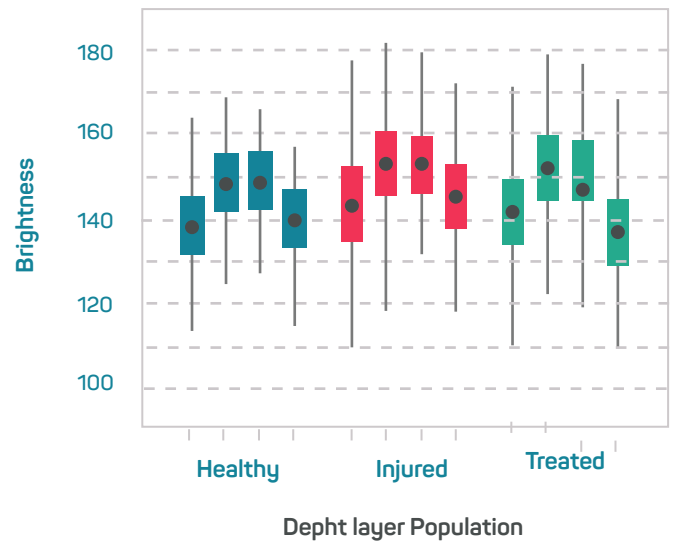
Corneal phototherapy with riboflavin and UV-A has shown to be effective in restoring the stromal integrity in ulcerated corneal tissues. After treatment, the stromal structure reached values comparable to healthy corneas, demonstrating that **corneal phototherapy can restore the physiological structure of the stroma**, which has been damaged by severe experimentally induced ulcers.

In this experimental study, corneal phototherapy has shown to be effective in healing corneal tissues with experimentally induced ulcers

(a) Boxplot of Brightness by Population



(b) Boxplot of Brightness by Depth Layer and Population



Boxplots of the intensity distribution of corneal tissues in the three study groups: healthy controls (blue), cases with untreated ulcer (red) and cases with ulcer treated by Vetuvir (green).

a) boxplots comparing data between study groups;

b) boxplots comparing data between study group and corneal thickness.



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Rome (Italy)

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