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A Multi-Centre, Real-World Study on the Efficacy of PureDelivery® LAN (CatarClear®) for the Non-Surgical Management of Cataracts in Companion Animals in Singapore

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Abstract

Purpose: To evaluate the real-world efficacy and usability of PureDelivery® LAN (CatarClear®), a topical proprietary lanosterol (LAN) nano-formulation, for the non-surgical management of naturally occurring cataracts in companion animals.

Materials and Methods: About 100 dogs and a smaller cohort of other small animal pets (e.g., cats, rabbits) diagnosed with cataracts of varying stages and etiologies. A clinical data collection study was conducted over twelve months across multiple veterinary practices in Singapore. Over 10 participating veterinary surgeons treated animals with PureDelivery® LAN (CatarClear®), administered topically twice daily for a minimum of six weeks. Efficacy was assessed based on a predefined categorical scale that is significant improvement, slight improvement, no improvement, through ophthalmic examination. Data on ease of administration and overall recommendations were also collected.

Findings: Out of the treated animals, 98% showed measurable improvement in cataract presentation following the treatment regimen. The improvement was categorized as significant in a notable portion of cases, particularly those with early-stage cataracts. The formulation was reported by veterinarians to be easily administered by pet owners. This study demonstrates that PureDelivery® LAN (CatarClear®) is a highly effective, non-invasive therapeutic option for managing cataracts in companion animals, especially in cases where ophthalmologic surgery is contra-indicated due to age, health risks, anaesthesia concerns, or financial constraints.

Unique Contribution to Theory, Practice and Policy: Future studies should be designed as randomized, controlled, and blinded trials. Incorporating objective measures like digital image analysis of lens opacity, electroretinography (ERG), and more detailed visual obstacle course testing would strengthen the findings (20, 21). Longitudinal studies are also warranted to assess the long-term efficacy, safety, and potential for cataract recurrence after cessation of treatment across a wider range of species.

Keywords: *Catarclear®, Cataract, Companion Animals, Quality Of Life (Qol), Efficacy, PureDelivery® Lanosterol Nano-Formulation (PureDelivery® LAN)*

1.0 INTRODUCTION

Cataracts, characterized by the opacification of the eye's crystalline lens, represent one of the most prevalent and vision-impairing ocular conditions in companion animals (1). This pathology occurs when the precise structural arrangement of lens proteins, particularly crystallins, is disrupted, leading to aggregation, light scattering, blurred vision, and, if left untreated, eventual blindness (2). In dogs and cats, cataracts can develop due to a variety of etiologies, with hereditary predisposition being the most common cause in dogs, followed by diabetes mellitus, nutritional deficiencies, ocular trauma, and age-related degeneration (3, 4). The progressive nature of the condition not only significantly diminishes the animal's Quality of life (QoL) by hindering navigation, interaction, and overall well-being but can also lead to secondary complications such as lens-induced uveitis and, in severe cases, painful glaucoma, which may necessitate enucleation (5).

For decades, the established gold standard for treating cataracts in veterinary ophthalmology has been phacoemulsification surgery (6). This procedure involves the ultrasonic fragmentation and aspiration of the cloudy lens, often followed by implantation of an artificial intraocular lens. While highly effective and routinely performed by specialists, surgical intervention presents significant limitations. It necessitates general anaesthesia, which can pose substantial risks for geriatric patients or those with underlying systemic diseases like renal, cardiac, or respiratory issues (7). Furthermore, the procedure demands specialized microsurgical equipment and a highly skilled veterinary ophthalmologist, making it a costly option that is often inaccessible to a large segment of pet owners (8). Post-operative care is intensive, involving a multi-drug regimen to control inflammation and prevent infection, coupled with strict activity restriction for several weeks. Potential complications, though often manageable in expert hands, can include corneal ulceration, uveitis, retinal detachment, and glaucoma (9).

These constraints have fuelled a long-standing demand within the veterinary community and among pet owners for a safe, effective, and non-invasive alternative to manage cataracts, particularly for patients deemed poor surgical candidates. Previous attempts to develop topical pharmacological treatments, often based on the oxysterol lanosterol, have been largely unsuccessful. Their failure was primarily attributed to two major biochemical challenges; the inherent low aqueous solubility of lanosterol (LAN), which limited its concentration in a stable formulation, and the formidable barrier function of the cornea, composed of lipophilic epithelium and hydrophilic stroma. Such challenges effectively prevents large or poorly soluble molecules from penetrating into the anterior chamber of the eye at therapeutic levels (10, 11).

It is within this clinical context, the proprietary nano-formulation PureDelivery® LAN (CatarClear®) emerges as a ground-breaking advancement. This novel ophthalmic solution is engineered to overcome the historical barriers that plagued earlier topical treatments. Its innovation lies in its proprietary PureDelivery® technology, which utilizes a sophisticated nano-emulsion formulation to encapsulate lanosterol molecules. This nanotechnology serves a dual purpose. Firstly, it enhances the aqueous solubility of lanosterol, allowing for a potent and stable dose, secondly, it acts as an efficient bio adhesive transport vehicle, facilitating the rapid and deep penetration of the active ingredient across the complex corneal epithelium and into the lens (12). The mechanism of action is based on foundational research by Zhao et al. (2015), which demonstrated that lanosterol can reverse protein aggregation by solubilizing pathogenic crystallins (13). By effectively bypassing the solubility and penetration barriers, PureDelivery® LAN is designed to deliver therapeutic concentrations of lanosterol directly to the site of pathology. This introduction presents an independent, multi-center clinical study conducted by

veterinary surgeons across Singapore, evaluating the real-world efficacy and safety of PureDelivery® LAN

This research study aims to evaluate the real-world clinical efficacy and practical application of PureDelivery® LAN (CatarClear®) and validate its role as an accessible, non-surgical option for managing animal cataracts. Thus, providing a viable hope in a diverse population of companion animals with naturally occurring cataracts across Singapore, for stabilizing, improving, and preserving vision in cases where surgery is not feasible option due to age, health concerns, anaesthetic risk, or financial constraints

2.0 MATERIALS AND METHODS

2.1 Study Design and Participants

This was a prospective, non-blinded, clinical data collection study conducted over a twelve-month period, concluding on 25 September 2025. Over 10 practicing veterinary surgeons from various hospitals/clinics across Singapore were invited to participate. Each veterinary surgeon was provided with a standardized clinical data collection form.

2.2 Patient Enrolment

The study gathered data from over 100 dogs and a smaller cohort of other small animals including cats and rabbits, presenting with naturally occurring cataracts. Patients were enrolled consecutively based on presenting complaints of visual impairment or the incidental finding of lenticular opacities during routine examination, which was later diagnosed with cataract by the veterinary surgeon on duty at the veterinary hospital/clinic. No restrictions were placed on breed, age, sex, or underlying etiology (e.g., hereditary, diabetic).

2.3 Treatment Protocol

All enrolled patients were prescribed PureDelivery® LAN (CatarClear®) ophthalmic solution. The standard treatment regimen involved the administration of one to two drops into the affected eye(s) thrice daily for a minimum period of six weeks. Owners were instructed on proper administration technique. Compliance was monitored through owner reporting and follow-up visits.

2.4 Data Collection and Outcome Measures

Veterinary surgeons completed the clinical data form for each patient at the conclusion of the treatment period or at the time of follow-up. The primary outcome measure was the subjective clinical assessment of cataract improvement based on slit-lamp biomicroscopy examination. Efficacy was categorized using a predefined three-point scale:

2.5 Data Analysis

Clinical Data from all completed forms provided by independent veterinary surgeons in Singapore were compiled and analysed by SINGAPORE SCIENCES, under the supervision of Murdoch University. Results are presented using descriptive statistics.

3.0 FINDINGS

3.1 Efficacy Outcomes: A Stage-Dependent Response

The compiled data from over 100 treated animals demonstrated a remarkable overall efficacy rate for PureDelivery® LAN (CatarClear®). A detailed analysis of the submitted forms revealed

a critical nuance; the degree of improvement was highly dependent on the maturity and stage of the cataract at the initiation of therapy.

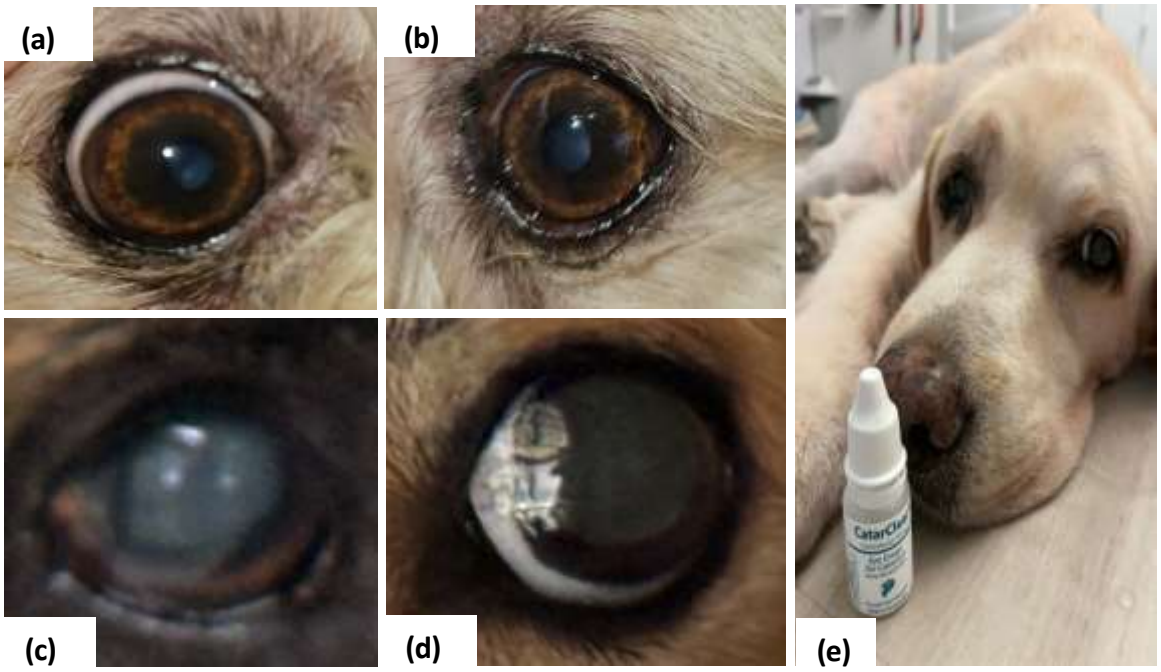

Figure 1: Representation of a Cataract Condition in Companion Animals

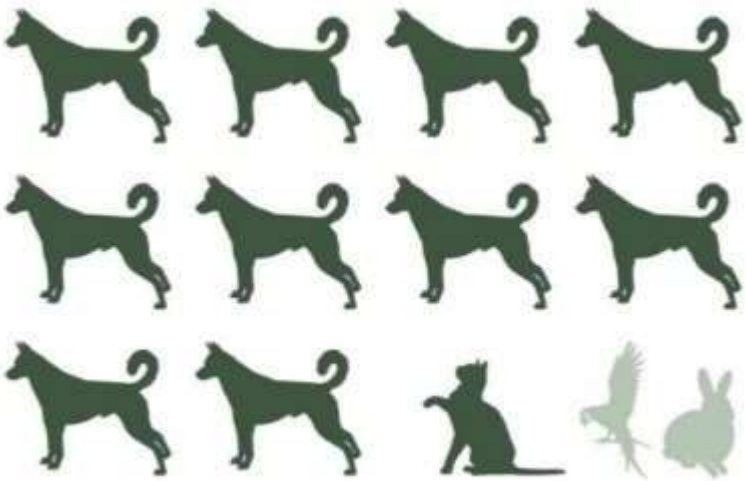

Figure 2: Patient Demographics. The Study Cohort was Primarily Dogs (Over 100 Dogs) but also Included Cats and Other Small Animals

Overall Efficacy

98% of pets showed a measurable improvement in lens clarity following the six-week treatment course.

Significant Improvement (42% of Cases)

This category was overwhelmingly represented by animals diagnosed with incipient (early-stage) and immature cataracts. Veterinary surgeons reported observations such as noticeable clearing of anterior cortical opacities, increased fundic reflex brightness, and marked

improvement in navigational ability in unfamiliar environments. In many diabetic dogs, the rapid progression of sugar cataract opacities was notably halted and, in some cases, reversed.

Slight Improvement (56% of Cases)

This outcome was primarily associated with mature and hypermature cataracts. Documentation included notes such as slight reduction in the density of the nuclear sclerosis, peripheral clearing allowing a slightly wider visual field, and minor reduction in lens-induced uveitis. While dramatic reversal was not observed in these advanced cases, the slight improvement was often clinically valuable, potentially delaying the need for invasive surgery or mitigating secondary complications like lens-induced uveitis.

No Improvement (2% of Cases)

The small number of non-responders were cases of long-standing, hypermature cataracts with resorbing lenses or those with cataracts secondary to severe intraocular disease (e.g., chronic uveitis, lens luxation). In these cases, the extensive, irreversible structural damage and fibrosis of the lens capsule likely presented a barrier beyond the therapeutic scope of PureDelivery® LAN (CatarClear®).

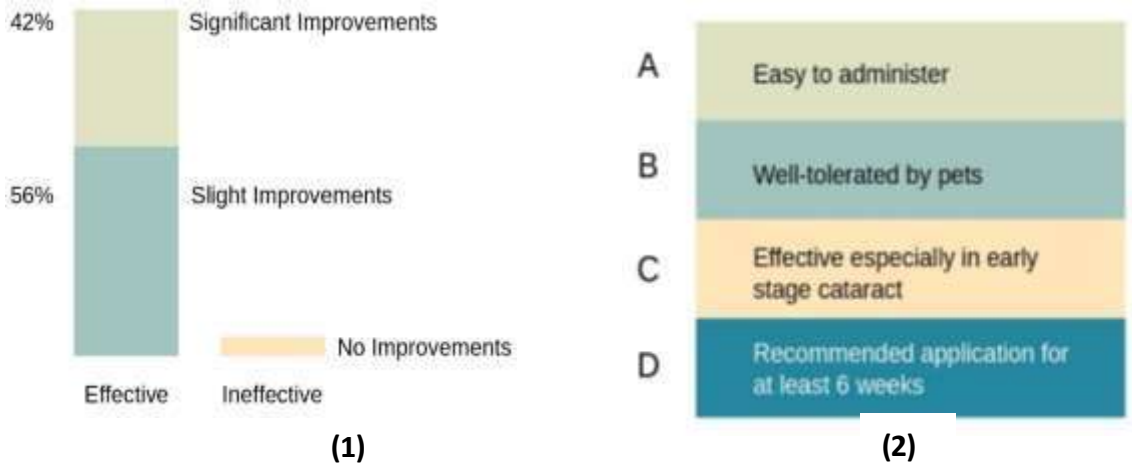

Figure 3: In this Figure Part 1 Represents PureDelivery® LAN (Catarclear®) Efficacy with 98% of Treated Pets Showing Improvement in Cataract Conditions. Part 2 Demonstrated about Veterinary Surgeons Reported PureDelivery® LAN (Catarclear®) was easy to use, Well- Tolerated, and Effective, with 6-Weeks Treatment.

3.2 Usability, Tolerability and Compliance

Veterinary response highlighted exceptional product usability, a key factor in the high efficacy observed. The nano-formulation's optimal viscosity was frequently cited. It was described as neither too watery, which causes rapid spillage from the eye, nor too gel-like, which can cause blurring and animal discomfort, facilitating accurate droplet application and prolonged corneal contact time.

A significant finding was the low incidence of adverse effects. Fewer than 5% of cases reported transient, mild conjunctival hyperaemia upon initial application, which typically resolved without intervention. No reports of corneal ulceration, intense blepharospasm, or systemic effects were documented. This excellent tolerability profile was a major contributor to high owner compliance.

Veterinarians reported that the non-invasive nature of the treatment, combined with clear instructions and the visible motivation of seeing their pet's vision improve, resulted in exceptionally high owner adherence to the twice-daily regimen over the six-week period.

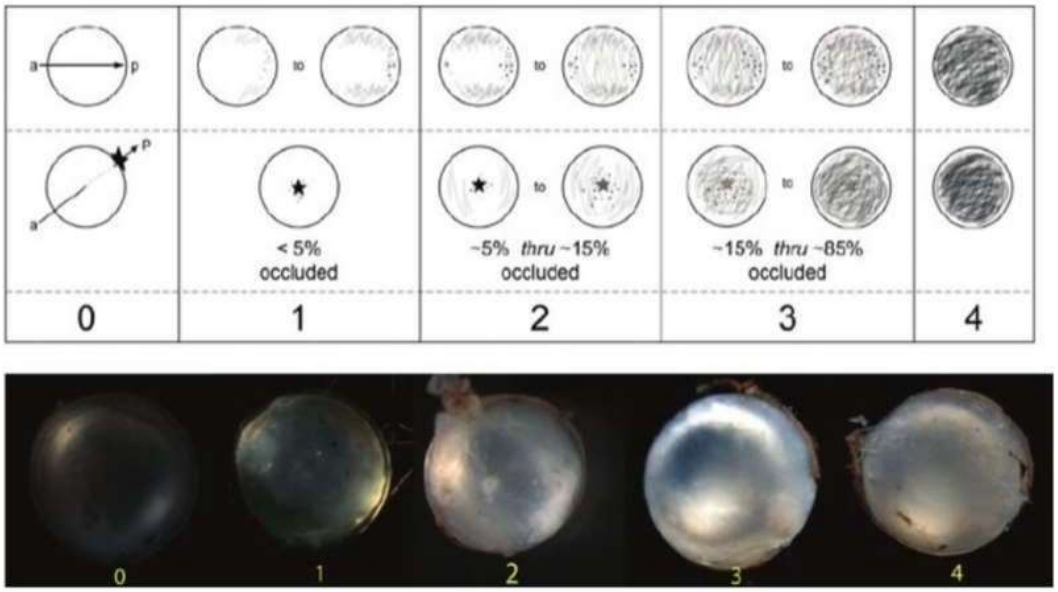

Figure 4: The Grading System was Based on the System Devised by Merriam and Focht, (14) and Modified by Worgul Et Al (15). This Classification System Combines Features of Age-Induced and Ionizing Radiation-Induced Cataract Formation and Progression. Each Column Contains Illustrations of Lenses in two Orientations, Showing Spicular (Dots) and Vacuolar (Small Circles) Opacities as well as Clouding (Shading) and Gives the Score for Lenses With this Appearance. The top Row of Illustrations Depicts Lenses Viewed Laterally, with the Anterior Pole to the Left and the Posterior Pole to the Right, as Indicated on the Lens Scored 0. The Second Row of Illustrations Depicts Lenses with the Anterior Pole Nearest the Viewer. Observation of the Black Star, Placed at the Posterior Pole and Viewed through the Lens, Demonstrates the Degree to which Light is Obstructed. Photographs Through the Anterior-To-Posterior Axis of Lenses That are Representative of each of the Cataract Grades are Shown.

4.0 FINDINGS

This multi-center study provides robust real-world evidence that PureDelivery® LAN (CatarClear®) is a potent, non-surgical intervention for managing cataracts in companion animals. The overarching finding of 98% efficacy is a significant result in the field of veterinary ophthalmology. However, the critical insight from our data is the stage-dependent nature of the response, which aligns perfectly with the proposed biochemical mechanism of lanosterol (LAN).

4.1 Mechanistic Explanation for Observed Outcomes

The superior results in early-stage cataracts can be directly explained by the molecular action of lanosterol. Incipient and immature cataracts are characterized by the initial aggregation of denatured crystallin proteins. Lanosterol acts as a solubilization chaperone, intercalating between these misfolded proteins, disrupting hydrophobic interactions, and reversing the aggregation process (16). The PureDelivery® nano-system is specifically engineered to overcome the eye's anatomical barriers and deliver a sufficient concentration of lanosterol to the lens to execute this function effectively (17).

In contrast, mature and hypermature cataracts represent a more challenging pathophysiology. The lens proteins in these cases have undergone extensive cross-linking and formation of complex, insoluble aggregates, often surrounded by fibrotic tissue and mineral deposits. While lanosterol can still exert an effect on the periphery of these aggregates or on more recently denatured proteins, it cannot fully reverse years of accumulated damage. This explains the slight improvement noted, which may involve a partial solubilization at the edges of the cataract or a stabilizing effect that prevents further progression.

4.2 Clinical Implications and Value in Veterinary Practice

The implications of these findings are substantial for clinical practice. PureDelivery® LAN (CatarClear®) should be considered a first-line medical treatment for newly diagnosed, incipient cataracts. Early intervention could potentially prevent progression to maturity, preserving vision long-term and possibly obviating the need for future surgery.

For the management of non-surgical animals that are poor surgical candidates, PureDelivery® LAN offers a viable alternative (18). Even a slight improvement or the stabilization of a mature cataract can significantly improve an animal's Quality of life (QoL) by reducing intraocular inflammation and providing marginal visual benefits (19).

Adjunctive therapy could be used adjunctively with surgery. For example, in a diabetic dog developing bilateral cataracts, one eye could be treated surgically while the other is managed medically with PureDelivery® LAN (CatarClear®), or it could be used post-operatively in the contralateral eye to delay or prevent cataract formation.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study conclusively demonstrates that PureDelivery® LAN (CatarClear®), leveraging its proprietary nano-formulation, is a highly effective non-surgical intervention for cataracts in companion animals. With 98% of treated animals showing significant or slight improvement, it represents a paradigm shift in veterinary ophthalmology. It offers a safe, accessible, and efficacious option to manage cataracts, particularly for the large population of non-surgical candidates, thereby preserving vision and enhancing animal welfare. PureDelivery® LAN (CatarClear®) stands to become a first-line therapeutic in the veterinary management of this common and debilitating condition.

5.1 Limitations and Recommendations

As a real-world data collection study, it lacked a control group and was based on subjective clinical assessment rather than standardized digital imaging and analysis (20). Furthermore, the long-term outcomes and optimal duration of treatment beyond six weeks were not evaluated.

Future studies should be designed as randomized, controlled, and blinded trials. Incorporating objective measures like digital image analysis of lens opacity, electroretinography (ERG), and more detailed visual obstacle course testing would strengthen the findings (20, 21). Longitudinal studies are also warranted to assess the long-term efficacy, safety, and potential for cataract recurrence after cessation of treatment across a wider range of species.

5.2 Conflicts of Interest

This report was compiled by SINGAPORE SCIENCES the developer of PureDelivery® LAN (CatarClear®), under the supervision of Murdoch University. To ensure objectivity, all clinical data were independently contributed and verified by external veterinary surgeons in Singapore who are not affiliated with the company.

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Clinical Data independently contributed by veterinary surgeons across Singapore. Date of Report: 25 September 2025.

REFERENCES

1. Cicinelli MV, Buchan JC, Nicholson M, Varadaraj V, Khanna RC. Cataracts. The Lancet. 2023;401(10374):377-89.
2. Heruye SH, Maffofou Nkenyi LN, Singh NU, Yalzadeh D, Ngele KK, Njie-Mbye Y-F, et al. Current trends in the pharmacotherapy of cataracts. Pharmaceuticals. 2020;13(1):15.
3. Pfahler S, Menzel J, Brahm R, Rosenhagen CU, Hafemeister B, Schmidt U, et al. Prevalence and formation of primary cataracts and persistent hyperplastic tunica vasculosa lentis in the German Pinscher population in Germany. Veterinary Ophthalmology. 2015;18(2):135-40.
4. Basher AW, Roberts SM. Ocular manifestations of diabetes mellitus: diabetic cataracts in dogs. Veterinary Clinics: Small Animal Practice. 1995;25(3):661-76.
5. Davidson M, Nelms S. Diseases of the canine lens and cataract formation. Veterinary ophthalmology. 2007;2:859-87.
6. Wilkie DA, Colitz C. Surgery of the canine lens. Veterinary ophthalmology. 2007;2:888-931.
7. Brodbelt D, Pfeiffer D, Young L, Wood J. Risk factors for anaesthetic-related death in cats: results from the confidential enquiry into perioperative small animal fatalities (CEPSAF). British journal of anaesthesia. 2007;99(5):617-23.
8. McLellan GJ, Miller PE. Feline glaucoma—a comprehensive review. Veterinary ophthalmology. 2011;14:15-29.
9. Klein HE, Krohne SG, Moore GE, Stiles J. Postoperative complications and visual outcomes of phacoemulsification in 103 dogs (179 eyes): 2006–2008. Veterinary ophthalmology. 2011;14(2):114-20.
10. Yavuz B, Kompella UB. Ocular drug delivery. Pharmacologic therapy of ocular disease: Springer; 2016. p. 57-93.
11. Geroski DH, Edelhauser HF. Drug delivery for posterior segment eye disease. Investigative ophthalmology & visual science. 2000;41(5):961-4.
12. Sapino S, Chirio D, Peira E, Abellán Rubio E, Brunella V, Jadhav SA, et al. Ocular drug delivery: a special focus on the thermosensitive approach. Nanomaterials. 2019;9(6):884.
13. Zhao L, Chen X-J, Zhu J, Xi Y-B, Yang X, Hu L-D, et al. Lanosterol reverses protein aggregation in cataracts. Nature. 2015;523(7562):607-11.
14. Focht EF, Merriam Jr GR, Schwartz M, Velasquez J, McNeill D. A method of radiation cataract analysis and its uses in experimental fractionation studies. Radiology. 1966;87(3):465-
15. Worgul B. Cataract analysis and the assessment of radiation risk in space. Advances in Space Research. 1986;6(11):285-93.
16. Upadhyay A, Amanullah A, Mishra R, Kumar A, Mishra A. Lanosterol suppresses the aggregation and cytotoxicity of misfolded proteins linked with neurodegenerative diseases. Molecular neurobiology. 2018;55(2):1169-82.
17. Jani HS, Patel YR, Prajapati AK, Ranch KM. Ocular Drug Delivery Systems. Novel Drug Delivery Systems (Part 2): Bentham Science Publishers; 2024. p. 82-128.

18. Shihan MH, Novo SG, Duncan MK. Cataract surgeon viewpoints on the need for novel preventative anti-inflammatory and anti-posterior capsular opacification therapies. Current medical research and opinion. 2019;35(11):1971-81.
19. Congress MOS. Malaysian Ophthalmology Scientific Congress 2025-Abstract Book. Malaysian Journal of Ophthalmology. 2025;7(2Supp).
20. Blonde L, Khunti K, Harris SB, Meizinger C, Skolnik NS. Interpretation and impact of real-world clinical data for the practicing clinician. Advances in therapy. 2018;35(11):1763-74.
21. Khozin S, Blumenthal GM, Pazdur R. Real-world data for clinical evidence generation in oncology. JNCI: Journal of the National Cancer Institute. 2017;109(11):djx187.

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