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Letter to the Editor

It's time to retire the terms artificial tears and rewetting drops: A call for accurate terminology and updated clinical usage in eye care

1. What constitutes the human tears?

The human tear film represents one of the most complex and functionally vital secretions in the body [1,2]. Tear film molecules play an integral role not only in ocular lubrication but also ocular immune defense, corneal epithelial nutrition, and the maintenance of a smooth refractive surface [3]. Despite its seemingly simple nature, the tear film is an intricate and dynamic structure whose complexity remains underappreciated in clinical and commercial settings.

The tear film is composed of two interacting layers, which are the aqueous-mucin layer and the lipid layer [3,4]. The outermost lipid layer contains thousands of lipids species and numerous unique protein species [1,2], comprising a mixture more intricate than those produced by other types of sebaceous glands [5–7]. While many believe this layer is derived primarily from meibomian gland secretions, the precise origin of several lipid classes – particularly phospholipids – remains debated. Lipidomic analyses suggest that alternative sources may contribute to the tear lipid layer, underscoring the complexity of tear film composition [8–10]. The lipid layer can be further broken down to an external non-polar layer, which functions to reduce tear evaporation and an inner amphiphilic lipid layer, which promotes tear film stability by allowing for an interaction between the non-polar lipid layer and the aqueous-mucin layer [11].

Beneath the lipid bi-layer lies the aqueous-mucin layer with the aqueous being produced by the main lacrimal gland and the accessory glands of Krause and Wolfring [12]. While the aqueous is often mistakenly regarded as mere water, this structure contains more than 3000 distinct proteins as well as essential vitamins (including A, C, and B12), minerals (such as sodium, potassium, calcium, and magnesium), and a broad array of bioactive molecules [13,14]. These include growth factors such as nerve growth factor (NGF) and epidermal growth factor (EGF), which promote corneal healing and nerve regeneration; immunoglobulins that provide adaptive immune defense (e.g. Secretory Immunoglobulin A); proteins with anti-inflammatory properties like lactoferrin that help modulate ocular surface inflammation; antimicrobial molecules such as fibronectin, lysozyme, and defensins that inhibit bacterial growth and support innate immunity; as well as albumin, which acts as a carrier protein and contributes to tear film osmotic balance and antioxidant defense [14]. These molecules are essential for antimicrobial defense, modulation of inflammation, epithelial maintenance, neurotrophic support, and wound healing [14]. The aqueous is vital in nourishing the cornea, which, being avascular, relies almost entirely on the tear film and corneal innervation for metabolic support [15,16]. Mucins are complex glycoproteins, with membrane-bound types (e.g., MUC1, MUC4, and MUC16) attached to the cornea, and free-floating mucins (e.g., MUC7, MUC5AC) dispersed within the aqueous [4,17]. The concentration of mucins is highest at the corneal surface with the concentration dissipating towards the lipid layer [4]. These glycoproteins facilitate the stable adhesion of the aqueous layer to the hydrophobic surface of the corneal epithelium, promoting tear film stability, and uniformity across the globe [3]. The mucin layer also plays an important role in trapping debris and pathogens [3].

Together, the tears form a biologically active and highly specialized barrier designed specifically to optimize the needs of the ocular surface. The tears enable smooth and painless blinking, preserve optical clarity, minimize evaporation, provide nutrient and trophic support, and offer anti-inflammatory and antimicrobial protection [3].

Contrary to popular perception shaped by product labeling and simplified descriptions of dry eye disease, the tear film is anything but simple. It is a metabolically active, multifunctional barrier essential to ocular health and vision, and true tears cannot be replicated in the laboratory. These facts highlight two critical issues explored in this editorial: first, the need for more accurate terminology when describing topical lubricating agents, and second, the implications of outdated regulatory language for contact lens users.

2. What do artificial tears and rewetting drops have in common with human tears?

In contrast to the natural tear film, over-the-counter eye drops commonly referred to as "artificial tears" or "rewetting drops" lack the molecular complexity, biological functionality, and structural sophistication of their namesake [18]. These drops are, in fact, lubricating solutions that provide transient relief from ocular surface symptoms, but they do not replicate the tear film's multifaceted functions. The US Food and Drug Administration (FDA) regulates artificial tears in their Part 349 - Ophthalmic Drug Products for Over-the-Counter Human Use monograph (1988) [18,19]. The FDA specifically indicates that artificial tears are topical drops that contain specific types of demulcents or emollients [18,19]. Some formulations also contain osmoprotectants like erythritol or L-carnitine to combat hyperosmolarity, as well as surfactants or lipids designed to slow evaporation [20]. Despite these features, such formulations offer only temporary symptomatic relief and have limited residence time, generally lasting no more than 10–20 minutes depending on blink frequency and ambient conditions. The FDA furthermore defines rewetting/lubricating drops in their Premarket Notification (510(k)) Guidance document for Contact Lens Care Products (1997) [18,19,21]. The FDA indicates that rewetting drops are "an in-eye solution for use with contact lenses" that contains "one or more active ingredients (e.g., ophthalmic demulcents) in sufficient concentration to alleviate symptoms of discomfort from contact lens wear by physical means" [18,21]. These regulatory classifications overall indicate that artificial tears are

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contraindicated for contact lens wearers because they are not approved by the FDA for use with contact lenses. Each of these regulatory documents were developed decades ago when harsh preservatives such as benzalkonium chloride (BAK) and thimerosal were the norm [22]. While the FDA indicates that artificial tears are not to be used with contact lenses, artificial tears are commonly used in day-to-day practice to treat symptomatic contact lens wearers, and there is no evidence that modern artificial tears are a danger to contact lens wearers, especially if non-preserved options are prescribed and used four or fewer times per day [18]. This level of safety likely stems from most modern artificial tears utilizing much safer high molecular weight preservatives [22].

More recently, advanced formulations have attempted to expand the biological scope of lubricating drops. For example, Blink® Nourish (Bausch and Lomb; Rochester, NY, USA) includes additional vitamins (such as B12 and C) and amino acids like glycine and L-proline. However, even with these additions, lubricating drops still fall dramatically short of replicating the native tear film. They lack the full spectrum of bioactive proteins, immunoglobulins, neurotrophic factors, mucins, and lipids that confer the natural tear its multifunctional properties.

In terms of biochemical and physiological equivalency, lubricating drops (artificial tears and rewetting drops) deliver far less than one percent of the natural tear's complexity. Their mechanism of action is primarily mechanical rather than biological; they provide temporary moisture and reduce friction, but they do not restore the function or integrity of the ocular surface in the way that natural tears do. The term artificial tear thus presents an inaccurate impression of tear replacement that can be misleading to patients and providers.

Taken together, this reveals two intertwined but distinct concerns: the inaccuracy of current terminology, and the outdated regulatory stance that discourages contact lens wearers from using these products despite modern evidence of safety. Both require reconsideration to ensure clarity in patient care.

3. Terminology matters

Scientific terminology is more than academic nomenclature — it frames understanding, shapes expectations, and influences treatment decisions. The term artificial tear falsely implies that these lubricating solutions are capable of mimicking or replacing the natural tear film, when in fact they do not possess its molecular architecture, biochemical diversity, or physiological functionality. The guidance surrounding rewetting drops furthermore is outdated and regulatorily limits the use of artificial tear with contact lenses.

Such imprecise verbiage has real-world consequences. Patients may reasonably assume that artificial tears provide a one-to-one substitute for their natural tears, leading to misconceptions about the efficacy and limitations of such treatments, and patients may furthermore limit themselves from using artificial tear with their contact lenses when there is strong literature suggesting that artificial tear can benefit contact lens wearers [20,23,24]. Nevertheless, it is unclear if artificial tears are superior to saline solution, and there is no strong evidence that one artificial tears formulation is superior to another [25,26]. Clinicians may likewise inadvertently reinforce this misunderstanding by continuing to use outdated terminology. Furthermore, this language may cause patients to delay seeking prescription therapies or procedural interventions, and it may contribute to providers being less likely to recommend alternative, more effective treatment options.

The continued use of the term artificial tear and the requirement of only using rewetting drops formations with contact lenses is therefore at risk of misleading both patients and practitioners and preventing patients from using proven treatment. And most importantly the use of the term artificial tear inaccurately elevates a simple topical agent to the status of a biological replacement, which is false because artificial tear does not replicate the immunological, nutritional, or regenerative functions of the natural tear film.

4. Recommendations

Over the past two to three decades, our understanding of the tear film has advanced considerably. Beyond its structural layers and immune functions, the tear film is now recognized as a dynamic, integrated barrier between the body and the environment. Advances in proteomics, lipidomics, and systems biology have revealed its complexity far beyond that of a passive fluid [13,14]. To improve scientific clarity and clinical communication, we recommend retiring the terms "artificial tears" and "rewetting drops" from both professional and commercial use. We suggest that the more accurate, more descriptive, and more all-encompassing term "lubricating drop" should be used, because it properly reflects these product's intended function without implying physiological equivalence to natural tears. We further encourage scientific journals, regulatory agencies, and manufacturers to adopt this terminology in publications, labeling, educational materials, and clinical guidelines. Consistency in terminology is essential for evidence-based practice, informed consent, and patient education. By aligning language with function and the scientific literature, we can better set patient expectations and enhance trust in clinical care. This change is more than semantics — precise language enhances clinical decision-making, provides transparency to patients, drives innovation, and advances science. It is incumbent upon the eye care community to lead this shift and establish clearer standards for describing ocular surface treatments.

CRediT authorship contribution statement

Kaleb S. Abbott: Writing – review & editing, Writing – original draft, Project administration, Formal analysis, Conceptualization. **Andrew D. Pucker:** Writing – review & editing, Supervision, Conceptualization.

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