LEARNING DOMAINS

CLINICAL PRACTICE

COMMUNICATION

SPECIALTY: CONTACT LENS OPTICIANS

PROFESSIONAL GROUPS

Dispensing opticians — CPD PROVIDER — General Optical Council

Optometrists — CPD PROVIDER — General Optical Council

Contact lens opticians — CPD PROVIDER — General Optical Council

CPD CODE: C-111036

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This CPD session is open to all FBDO members and associate member optometrists. Successful completion of this CPD session will provide you with a certificate of completion of one non-interactive CPD point. The multiple-choice questions (MCQs) are available online from Saturday 1 March 2025. Visit **abdo.org.uk**. After member login, scroll down and you will find CPD Online within your personalised dashboard. Six questions will be presented in a random order. Please ensure that your email address and GOC number are up-to-date. The pass mark is 60 per cent.

CPD CODE: C-111036

Cosmetics and the eye

By Tina Arbon Black BSc (Hons) FBDO CL

The impact of cosmetics on the ocular surface was the subject of one of 10 Tear Film and Ocular Surface Society (TFOS) Lifestyle Workshop reports[1], providing an evidenced-based summary of the challenges of both eye cosmetics and procedures that are potentially associated with adverse effects to the ocular surface and periocular tissue.

In 2024, the global eye make-up market reached a valuation of US$18.2bn and is projected to grow to US$26.9bn by 2033[2]. This substantial market expansion is believed to be primarily driven by increasing beauty consciousness, technological advancements, and the influence of social media. This highlights the necessity for dispensing opticians (DOs) and optometrists to keep-up-to-date with the latest eye cosmetic products and procedures – and their potential impact on ocular health.

This article explores some of the more common eye cosmetics and procedures highlighted in the TFOS report, which may lead patients to seek advice or care in High Street optometric practices.

INTRODUCTION

The epidermis of the eyelid skin is the thinnest in the human body[3,4], allowing for easier permeability and increased exposure to potential allergens found in cosmetics such as creams, powders, oils, eyeshadows and eyeliners. Consequently, this leads to a higher risk of developing allergic contact dermatitis (ACD) in the ocular area. This is a delayed Type IV hypersensitivity reaction that peaks 24 to 48 hours after exposure (**Table 1**). ACD is the most common form of dermatitis affecting the eyelids and periorbital skin[5].

EYELASH CURLERS

RISKS: allergy, contact dermatitis and injury

Eyelash curlers may contain nickel, which is the predominant allergen for ACD. Conditions such as asthma and hay fever, which are common comorbidities of atopic diseases, are also associated with increased risk of ACD[7].

A case report by Ramasamy *et al*[8] documented an incident where the breakage of an eyelash curler led to a penetrating corneal laceration, resulting in a tear to the lens capsule and the formation of a traumatic cataract. Although such complications are rare, it highlights the necessity for cautious use of this product.

NOMENCLATURE OF ALLERGIC DISEASES AND HYPERSENSITIVITY REACTIONS	
Type I *Immediate hypersensitivity*	Mediated by IgE antibodies, mast cells and basophils leading to symptoms like urticaria, asthma, and anaphylaxis
Type II *Cytotoxic hypersensitivity*	Mediated by IgG or IgM antibodies that target cells, leading to cell destruction and usually drug induced
Type III *Immune complex hypersensitivity*	Mediated by immune complexes depositing in tissues, causing inflammation, such as in arthritis
Type IV *Delayed hypersensitivity*	Mediated by T cells that provoke an inflammatory reaction like contact dermatitis

TABLE 1: Nomenclature of allergic diseases and hypersensitivity reactions[6]

FIGURE 1: Eye make-up accessories

Eyelash curlers are usually constructed with a latex rubber or silicone covering, both of which also present as allergens[9] (**Figure 1**).

FIGURE 2: Eyelash dye kit

EYELASH DYING/TINTING

RISKS: allergic reaction, dermatitis and blepharoconjunctivitis

This is a semi-permanent procedure reducing the need for mascara. Eyelash tinting kits are unlicensed and readily available online and in High Street stores. Ingredients usually include hair dye, and a hydrogen peroxide developer **(Figures 2 and 3)**. There are a number of allergens present in these products, but toluene-2,5-diamine sulphate and m-aminophenol are known to have a higher allergen factor[10] and both are found in examples of eyelash dye.

The most common risk with eyelash dyes is again ACD, leading to lid swelling and blepharoconjunctivitis. As dermatitis may develop several days after application, the link between this and the eyelash dye may often be overlooked, so obtaining a detailed history when a patient presents with symptoms is essential.

Another common constituent of black eyelash dye that is known to cause ACD is p-phenylenediamine (PPD)[10]. Although rare, it has also been found to cause xanthelasma palpebrarum, severe blepharoconjunctivitis[11] and eyelid oedema[12].

Reputable hairdressers or beauty salons conduct a patch test several days prior to using any new hair dyes on new clients[13].

COLOR CREAM INGREDIENTS: Water (Aqua), Cetearyl Alcohol, Ethanolamine, PEG-40 Hydrogenated Castor Oil, Cetearyl Alcohol, Toluene-2,5-Diamine Sulfate, Sodium Laureth Sulfate, Hydrogenated Polyisobutene, Resorcinol, Sodium Cetearyl Sulfate, Lavandula Angustifolia (Lavender) Oil, m-Aminophenol, 4-Amino-2-Hydroxytoluene, Biotin

DEVELOPER SOLUTION INGREDIENTS: Water (Aqua), Hydrogen Peroxide, Phosphoric Acid, Oleth-10

FIGURE 3: Eyelash dye ingredients

EYELASH EXTENSIONS

RISKS: allergic contact dermatitis, eyelash base calcification, eyelash loss, conjunctivitis, blepharitis, corneal abrasions and keratitis

This usually involves synthetic eyelashes individually 'glued' to a subject's own eyelashes; this is a very time-consuming process considering there are about 100-150 lashes on the upper lid and 50-75 on the lower lid[14] **(Figure 4)**. The false eyelashes are glued about 1mm from the lid margin and should be adhered to at least one third of the natural eyelashes' length, ensuring they maintain the same curvature as the real eyelashes[15]. This procedure requires reapplication at least every six weeks. There are considerable risks with this procedure – including ACD, eyelash base calcification, eyelash loss, conjunctivitis, blepharitis, corneal abrasions, and keratitis which can arise from the glues that are used[16,17]. The glues used often contain sensitising allergens such as formaldehyde, cyanoacrylate, ammonia, lead and latex[18,19].

Repeated treatments can result in traction alopecia arising from damage to the lash follicle, and sharp fragments of the synthetic lashes can cause corneal abrasions or become embedded in the conjunctiva, leading to an inflammatory response[17]. The application of eyelash extensions can disrupt the natural shedding process and growth of the eyelashes, as well as the blink reflex which in turn can impact corneal integrity[15].

FIGURE 4: Eyelash extensions

To remove the eyelash extension requires solvents, which again are irritants. If these happen to come into contact with the ocular surface, they can lead to chemical conjunctivitis and lamellar keratitis from epithelial damage[20].

Eyelash extensions can disrupt the natural ocular microbiota[21], compromising the eye's defence against opportunistic pathogens. Cultures taken from eyelash extensions have been shown to contain microbes capable of causing serious eye infections[22].

MAGNETIC FALSE EYELASHES

Given the detrimental effects of eyelash glues, an alternative solution is magnetic false eyelashes, which consist of two strips: one positioned above and the other below the natural lashes[23]. The minute magnets embedded within each strip secure them by 'clicking together' around the wearer's natural eyelashes. A recent innovation in this domain is 'magnetic eyeliner,' which allows the false lashes to adhere directly to the eyeliner, thus eliminating the need for a second strip[24].

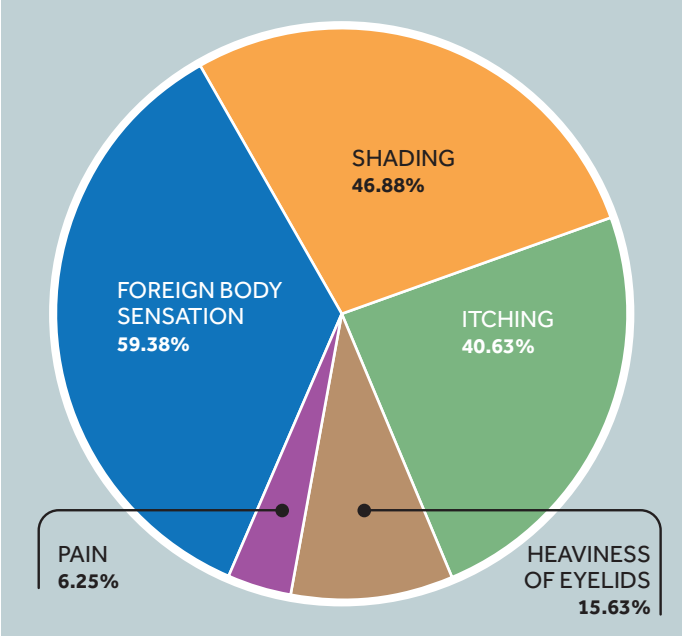

FIGURE 5: Symptoms after fitting with eyelash extensions[15]

Both false eyelashes and eyelash extensions place additional burden on the muscles surrounding the eyelids, resulting in a sensation of heavy lids[15]. **Figure 5** shows the results of a small prospective study of participant symptoms one hour after eyelash extensions were applied[15].

EYELASH PERMING/LASH LIFTS

RISKS: keratoconjunctivitis, contact dermatitis, dry eye disease

This procedure requires applying a chemical to change the curvature of the lashes and lasts for six to eight weeks. Identifying a patient who has undergone a lash lift can be challenging as there are no materials to see. A rod is used to wrap the lashes around then the perming and neutralising solutions are applied. The process takes between 10 and 15 minutes[24]. The chemicals used in this procedure are known to have toxic effects on ocular tissue, including keratoconjunctivitis and contact dermatitis[25].

A study by Amador *et al*[26] highlights the long-term effects of this procedure, emphasising that the primary function of the eyelashes is to divert airflow and control dust, thereby reducing evaporation and minimising the entry of particles into the eye by up to 50 per cent. Consequently, altering the curvature of the lashes can impact the ocular airflow, and contribute to the development of dry eye disease (DED).

PERIOCULAR REJUVENATION

Statistics released by the British Beauty Council reveal that, in 2022, the cosmetic and personal care industry contributed £24.5bn to the UK GDP and generated £6.8bn in tax revenue for HM Treasury[27].

The growing demand for non-surgical cosmetic procedures, driven by the influence of social media, combined with greater accessibility and affordability, has prompted the government to introduce licensing regulations for these procedures under the Health and Care Act 2022 to safeguard public health[28].

BOTULINUM NEUROTOXIN INJECTIONS

RISKS: subcutaneous bleeding and haematoma at injection site, blepharoptosis, pain, dry eye symptoms, lagophthalmos (serious adverse effects are rare, and effects will resolve)

Botulinum neurotoxin injections (BoNT) were first tested in humans in 1980 during a clinical trial involving strabismic adults, where BoNT was injected into the extraocular muscles as an alternative to surgery[29]. The mechanism of action of BoNT, often referred to as Botox, involves the inhibition of acetylcholine release at the neuromuscular junction, resulting in temporary paralysis of the targeted muscle[30].

The clinical effects of BoNT typically become noticeable within one to three days post-injection, with peak efficacy occurring between five and seven days. However, in some cases, the onset of effects may be delayed for up to two to four weeks. The therapeutic effects generally subside within three months.

Many private clinics provide treatments to reduce frown lines or under-eye wrinkles[31]. However, depending on the injection site, these treatments may lead to symptoms of DED. This can result from an incomplete blink, decreased aqueous tear production due to the lacrimal gland being affected, meibomian gland dysfunction, and ultimately disrupting the homeostasis of the tear film[32]. Lagophthalmos, poor blink mechanism and ectropion were also highlighted as consequences of BoNT.

BoNT is used in ophthalmology to support the management of several conditions including nystagmus, blepharospasm and hemifacial spasm. The management of nystagmus is achieved by injecting BoNT either directly into a specific extraocular muscle or into the retrobulbar space. This reduces the motility of all the extraocular muscles, dampening the abnormal involuntary eye movements of nystagmus[33]. A case report of periodic alternating nystagmus treated by BoNT being injected directly into all four rectus muscles, achieved an improvement in visual acuity and oscillopsia[34].

Blepharospasm, defined as involuntary spasms of the periocular muscles, is a form of focal cranial dystonia[33]. Similarly, hemifacial spasm is a neuromuscular disorder characterised by repetitive, involuntary contractions of facial muscles on one side of the face. Due to its proven efficacy and safety profile BoNT is the preferred treatment option. A 12-year retrospective cohort study found side-effects from BoNT occurred in only nine out of 136 participants, with seven experiencing blepharoptosis and two a haematoma[35]. However, it should be noted that the experience and skills of the injector is a key factor in BoNT-induced blepharoptosis[36].

EYE COSMETICS

Cosmetic ingredients serve many functions in eye make-up, acting as an abrasive, absorbent, antimicrobial,

antioxidant, buffer, colourant, emollient, emulsifier, film-former, humectant, pH adjuster, preservative, UV protector, skin conditioner, solvent, surfactant, anticaking, antifoaming, antistatic, bulking, emulsifying, opacifying and viscosity decreasing agent[1]. These ingredients are found in products like eye creams, eyeliners, eyeshadows, eyelash glues, lotions, make-up primers, removers, mascaras, moisturisers, serums and wet wipes.

There are considerable safety concerns associated with these cosmetic ingredients. According to estimates by the United States (US) Food and Drug Administration (FDA), approximately 12,500 chemicals are utilised in cosmetic products, yet fewer than 20 per cent of these have undergone comprehensive safety evaluations[37].

While only 11 substances are prohibited in the US, more than 1,300 chemicals are either restricted or banned within the European Union. These ingredients have the potential to function as allergens, carcinogens, endocrine disruptors, immunosuppressants, irritants, mutagens, and tumour promoters, posing risks to the ocular surface and periorbital tissue. Adverse reactions may arise from the use of these products or from procedures involving ocular cosmetics.

In August 2023, the UK government initiated a request for comprehensive data concerning the safety of cosmetic ingredients, with submissions required by 30 April 2025[38]. The submitted data will be reviewed to inform the potential development of future regulatory policies, and to ensure the safety and efficacy of cosmetic ingredients within the UK market.

EYE SHADOWS

RISKS: ingredients can migrate onto the ocular surface, contain possible allergens and irritants

Eye shadows incorporate pigments to add colour to the eyes and can be in the form of powders, creams or pencils. Each individual product contains a variety of ingredients, some of which may be an allergen and in some cases toxic or harmful. **Table 2** is a summary taken from the TFOS Lifestyle: impact of cosmetics on the ocular surface[1] report for eyeshadow ingredients.

EYESHADOW INGREDIENTS' FUNCTION AND ADVERSE EFFECTS'

INGREDIENT	FUNCTION	ADVERSE EFFECTS
Acrylates	Adhesive, suspending agent and film former	Carcinogenic, allergen
Butylated hydroxyanisole	Antioxidant	Possible carcinogen, Endocrine disruptor, allergen, irritant
Butylene glycol	Humectant, skin-conditioning, viscosity decreasing agent	Irritant
Caffeine	Antioxidant, protects against ultraviolet B	May delay wound healing
Carbon Black (D&C Black No. 2)	Colourant	Carcinogen
Carnauba wax	Emulsifier	Contact dermatitis
Castor oil	Eyelash conditioner	Irritant
Chlorphenesin	Antimicrobial, cosmetic biocide, preservative	Toxic, allergen, irritant, immunosuppressant
Cyclopentasiloxane	Skin conditioning agent	Endocrine disruptor, possibly toxic or harmful
Diamond dust powder	Optical diffusion	Corneal and conjunctival abrasion/trauma
Diazolidinyl urea	Preservative	Formaldehyde-releasing preservative – toxic
Gold	Colourant	Allergy
Imidazolidinyl urea	Preservative	Formaldehyde-releasing preservative – toxic
Methylisothiazolinone	Preservative	Toxic, neurotoxic, allergen
Nylon	Bulking and opacifying agent	Inflammation
Ethylparaben and methylparaben	Preservative	Toxic, endocrine disruptor, allergen, genotoxic
Petrolatum	Skin conditioning agent	May be toxic
Phenoxyethanol	Preservative	Toxic, allergen, irritant
Polymethyl methacrylate	Film former	Toxic or harmful
Quaternium-15	Preservative, anti-static agent	Formaldehyde-releasing preservative – toxic
Sodium benzoate	Preservative	Irritant
Sorbic acid	Preservative	Toxic or allergen
Talc	Bulking agent	May contain asbestos
Triclosan	Cosmetic biocide preservative	Irritant likely toxic or harmful, endocrine disruptor
Triethanol-amine	pH adjuster, surfactant-emulsifying agent, buffer	Allergen, toxic or harmful, irritant prohibited in Europe

TABLE 2: TFOS summary of ingredients found in eyeshadows[1]

MASCARA

RISKS: tear film instability, potential corneal injury and keratitis, susceptibility to microbial contamination and contact dermatitis

Mascara is a widely used cosmetic product that has the potential to migrate onto the ocular surface during blinking. Research indicates that mascara can influence both the tear film and the meibomian glands[39]. A cross-sectional study demonstrated a significant association between the use of mascara or eyeliner and a reduction in the lipid layer of the tear film, as well as a decrease in non-invasive tear break-up time (NITBUT), while tear production itself remained unaffected[39].

Additionally, mascara can migrate from the tear reservoir into the lacrimal sac. Scollo *et al*[40] documented a case where this migration triggered an inflammatory response, resulting in secondary nasolacrimal duct obstruction. Furthermore, due to the nature of mascara application, corneal insult is a potential risk, which can subsequently lead to microbial keratitis[41]. Microbial contamination is also a problem in mascara tubes and patients should be advised to discard any opened mascara after three months of use[42] (**Figure 1**).

The ingredients in mascara should also not be overlooked, as they may include ingredients such as antioxidants, emollients, resins, pigments containing nickel, and shellac, all of which have the potential to cause contact dermatitis[1,9].

EYELINER

RISKS: tear film instability, irritation, inflammation, migration onto ocular surface

Eyeliners are applied near or directly on the eyelid margin and are generally available in three main forms: cake, liquid and pencil. Liquid eyeliners often contain agents to control viscosity and maintain stability, while pencil eyeliners are formulated using a mixture of waxes, pigments, minerals or vegetable oils[39]. The high-water content in liquid eyeliners makes them particularly prone to microbial contamination, which necessitates the use of preservatives in their formulations.

Although pencil eyeliners can also be subject to contamination, this risk is minimised by sharpening, which removes the exposed tip and reduces the potential for microbial growth. Ercan[39] suggested that meibomian gland loss seen in some individuals who use eyeliner and mascara may be attributed to the prolonged presence of eyeliner pigments and mascara residue, which either migrate to or are applied directly onto the lid margin. This can lead to obstruction of the meibomian gland orifices and impair delivery of meibum to the ocular surface.

Mascaras and eyeliners are commonly available in both water-resistant and waterproof formulations, necessitating more than water for effective removal. The removal process typically involves the use of products containing surfactants, emulsifiers, or oil-based and oil-free solutions, which can potentially induce ocular irritation, allergic reactions and inflammation[1]. The risk of inflammation is further exacerbated by the simultaneous application of multiple cosmetic products, such as eyeshadow, mascara and eyeliner, which are often used in combination (**Figure 6**).

FIGURE 6: Eyeliner on the lid margin

MAKE-UP APPLICATORS

Eye make-up is typically applied using brushes and sponges. Care is required when using applicators to prevent injury to the ocular surface and periorbital area, as well as mitigating the risk of microbial contamination. Both brushes and sponges can act as reservoirs for microorganisms transferred from the skin, which provides an ideal environment for microbial growth[43]. This concern is particularly significant given that 70-90 per cent of all used make-up products have been shown to be contaminated with bacteria[44].

Interestingly, in a small cross-sectional study 100 brushes and sponges from a beauty salon revealed that all items were contaminated with staphylococcus aureus[45]. Pseudomonas aeruginosa was present in 69.6 per cent of sponges and 81.8 per cent of brushes. Additionally, fungal and yeast colonies were identified in 51.5 per cent of sponges and 30.3 per cent of brushes. To reduce these risks, the use of disposable, single-use applicators is strongly recommended.

PATIENT EDUCATION

Eyecare practitioners play a critical role in educating patients about the potential risks associated with eyecare products and procedures, particularly among contact lens wearers who already have an increased risk of ocular complications. It is essential for practitioners to remain

DO
Always wash hands before handling contact lenses and applying make-up
Always remove all make-up before sleeping
Always conduct a patch test before using a new product
Discard products as per manufacturer's guidelines
Where possible use disposable applicators and use only once
Regularly clean and replace brushes, sponges, and other cosmetic applicators to reduce microbial load
Store cosmetics in a clean, dry environment to prevent microbial growth
Insert contact lenses before applying make-up

NEVER
Never share make-up products
Never apply eyeliner directly on the lid margin
Never wear eye make-up during episodes of ocular infection or irritation
Never use saliva or water to wet applicators, as this introduces bacteria and contaminants

TABLE 3: Patient advice information

informed about the safety and hygiene practices related to cosmetic products and applicators, as well as to provide evidence-based guidance to patients on mitigating these risks.

Anecdotally, in a secondary school local to the author, eyelash extensions have been an issue with children aged as young as 13 years. Beyond the health risks previously discussed, these extensions are prohibited under school policy, leading to students being sent home and missing lessons. Students are required to remain off school until the extensions are removed, further disrupting their education.

It is important to have discussions with patients and parents regarding lifestyle, eye cosmetics and procedures – and to document conversations within the patient record including any advice or recommendations. Meticulous contemporaneous record keeping is a professional requirement for all optical registrants and essential to all practitioners who are also involved in a patient's care[46]. There are also some excellent evidenced-based dry eye questionnaires, such as the Ocular Surface Disease Index and Dry Eye Questionnaire, which help to build a picture of a patient's ocular health[47].

Ideally, cosmetic products should be discussed with new contact lens patients, and relevant information included in leaflets about contact lens use. However, in a cross-sectional survey of contact lens wearers, only 37.4 per cent of participants applied make-up after lens insertion[48]. Alarmingly, this study also found that 34.9 per cent of respondents felt handwashing prior to contact lens handling was unnecessary.

There is clearly work to be done in educating patients on the correct behaviours, as well as in continually reinforcing a consistent message. Providing written materials specifically addressing this topic would be helpful for all staff members – and **Table 2** provides some helpful tips for patients.

The General Optical Council requires all registrants to keep up-to-date with the latest clinical evidence[49], which is particularly important considering the growth in eye cosmetics and procedures. Social media platforms such as TikTok, widely used by children, prominently feature beauty-related content[50]. This exposes young people to 'online influencers' promoting products through commercially biased messaging, which concerningly could pressure teenagers into using cosmetic eye products or procedures.

The growing use of eye cosmetics represents both challenges and opportunities for DOs and optometrists. The primary challenges involve managing the potential adverse effects and risks to ocular health associated with these products and procedures. The opportunities are to enhance patient care through education, expanding lifestyle discussions, providing specialist guidance on cosmetic use, and integrating preventive strategies into routine eyecare (**Table 3**).

REFERENCES

References can be found when completing this CPD module. For a PDF of this article with references email, abdocpd@abdo.org.uk

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LEARNING OUTCOMES FOR THIS CPD ARTICLE

DOMAIN: Communication

2.1: *Communicate effectively with patients and parents/carers the adverse effects that can occur with cosmetic eye product and procedures, using professional judgement to adapt language and communication approach accordingly.*

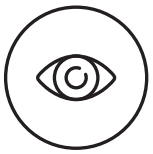
DOMAIN: Clinical practice

5.3: *Critically appraise the latest clinical research, considering current good practice regarding the impact of cosmetic eye products and procedures on the ocular surface to inform the care you provide.*

DOMAIN: Contact lens specialty

Critically appraise the latest clinical research on the adverse effects of cosmetic eye products and procedures on the ocular surface and adnexa applying this to the care you provide relevant to knowledge, skills, and scope of practice.

COMMUNICATION



CLINICAL PRACTICE

CONTACT LENS SPECIALTY

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