

Nurture Your Eyes with Autologous Serum

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Autologous serum eye drops (ASED) are many things: effective, well tolerated and full of substances that artificial tears can't replicate. Eye drops derived from a patient's own blood have gained therapeutic standing over the intervening decades, helping many dry-eye patients live better lives. Autologous serum (AS) was one of the fluids used in a 1975 study

testing the ability of a perfusion pump to keep chemically burned eyes moist.¹

The Production

Preparation protocols for ASED vary, but they all share these fundamental steps: This includes testing for hepatitis B (HBV) and C (HCV), syphilis, and HIV serology. The patient then donates blood; the blood is allowed to stand for 24–48 h at 4°C to allow clotting, and then centrifuged at 4000 rpm for 10 min. The serum is separated from the blood and diluted with in a laminar flow cabinet. Most drops are 20% serum, although some patients use 25%, 50%, or even 100% serum drops. Preservatives usually are not added to AS, thus reducing the risk of preservative induced toxicity associated with other dry eye treatments. However, lack of preservatives theoretically increases the risk of ocular infection. AS can be stored for less than one month at 4°C while in use, and for up to three months at 20°C.²

The Benefits

ASED are thought to alleviate dry eye by supplying tear components.

Serum contains bioactive agents that may promote healthy cell growth and healing of the ocular surface, including albumin, vitamin A, nerve and epidermal growth factors, and immunoglobulins, some in higher concentrations than in natural tears. These epitheliotropic factors are thought to be responsible for the therapeutic effect of serum observed on ocular surface disorders.³

Fox was the first to use serum to treat human dry eyes.⁴ However, the recent renaissance of this therapy began when Tsubota in 1999 described its successful use in eyes with persistent epithelial defects.²

Studies have concluded that the topical use of autologous platelet-rich plasma as monotherapy is an effective treatment to improve signs and symptoms in patients suffering from moderate to severe chronic dry eye disease. Improvements of the dry eye disease subjective symptoms, corneal fluorescein staining (CFS), and corrected distance visual acuity (BCVA) were evaluated.⁵

The Indications

ASED have been recommended for treatment of patients with several ocular surface disturbances, such as:

- Sjögren's syndrome related tear deficiency,
- Non-Sjögren's tear deficiency associated with graft versus host disease,
- Neurotrophic keratitis,
- Persistent epithelial defects,
- Superior limbic kerato conjunctivitis,
- Recurrent erosion syndrome,
- Chemical burns,
- and Postoperative dry eye induced by LASIK.

People treated with 20% to 50% AS four to eight times a day have reported subjective improvement in dry eye symptoms.

Recent studies identified selenium compounds, e.g., Selenoprotein P (SeP) and Se-lactoferrin as candidates for treatment of dry eye. Tear SeP is a key molecule to protect the ocular surface cells against environmental oxidative stress.⁶

Matsumoto showed that AS contains nerve growth factor and SP levels that are several times higher than the levels in tears and harbors IGF-1.⁷ In neurotropic keratopathy in which neural factors such as acetylcholine or SP are depleted from the cornea, 20% AS drops are believed to suffice them.

The rationale of using AS in chemical burns derives from the fact that it contains antiproteases such as alpha 2 macroglobulin (which reduces collagenase) and vitamin A (which modulates the normal growth and differentiation of the epithelium).^{8,9}

In localised tear film deficiency disorder like Superior limbic kerato conjunctivitis, a prospective cohort study in which 20% serum eye drops were used as additional therapy, showed improvement all patients. Tear break up time increased significantly and conjunctival squamous metaplasia was

reduced.¹⁰

The Add Ons

Among overall blood derived eye drops, both autologous (from the patients themselves) and homologous (from donors) products exist, with different advantages and disadvantages. Homologous sources including allogeneic serum obtained from healthy donors, and umbilical cord blood serum collected at the time of delivery, are efficient alternatives, especially when autologous serum therapy is contraindicated or not appropriate.¹¹

Use of standardized and quality-controlled cord blood serum (CBS) eye drops represent a promising therapeutic approach in the healing of severely injured corneal epithelium and in subjective symptom relief. These drops can be obtained as readily available and quality-controlled blood derivative from cord blood banks on a routine basis.¹²

Mesenchymal stem cells from umbilical cord blood can be used to regenerate corneal tissue and retinal nerve cells, umbilical cord serum might be applied for tissue engineering and regenerative medicine in the future.¹³

Though blood derived products have come out as a pool of various epitheliotropic factors they also contain TGF-β. It is known to have antiproliferative effects, and high concentrations of TGF-β may suppress wound healing of the ocular surface epithelium.¹⁴ This observation contributed to use of a diluted solution of serum to maintain TGF-β levels that are comparable with those of tears.

Conclusion

Strict guidelines for good manufacturing, quality control and documentation must be established and maintained before and throughout the therapeutic use of autologous serum eye drops. Meanwhile, the use of serum eye drops remains an experimental approach. Therefore, all applicable legislative restrictions should be carefully considered and well documented and informed consent should be obtained from each patient.

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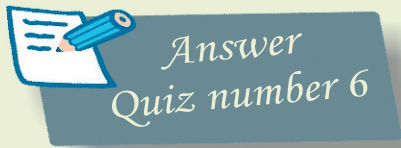
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*Answer
Quiz number 6*

1. Digits	2. Music	3. River	4. Fog	5. Silence
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