

**BIOMED  
SYSTEM**



**COL<sup>®</sup> EYE DROP**

SPECIAL KIT FOR THE PREPARATION  
OF EYE DROPS WITH BLOOD COMPONENTS

# Ocular tissue regeneration with serum and platelet rich plasma



  
**BiomedDevice**



## COL<sup>®</sup> system with PRP or serum: a unique solution in Ophthalmology

Biomed Device helps improve patient care with its innovative products and intelligent solutions for the preparation and preservation of eye drops with blood components, such as serum and platelet rich plasma (PRP).

**The COL<sup>®</sup> System for Ophthalmology has been specifically designed by Biomed Device to offer a complete and simple to use system for ocular pathologies and trauma.**

Biomed Device's clinical know-how permits us to reach excellence in the preparation, delivery and preservation of blood components, and to continually progress towards new and groundbreaking advances.



## How do blood components work in Ophthalmology

Human blood contains serum and platelets, rich in growth factors, which actively participate both in maintaining normal eye activity and in damaged tissue repair. It is successfully used in treating both acute and chronic diseases, as well as dry-eyes disorders.

### **Ocular chronic diseases**

COL<sup>®</sup> is used for the administration of serum eye drops with chemical, trophic and physical characteristics similar to human tears. This natural tears substitute is used in treatment of chronic and dry-eye related ocular disorders.

### **Ocular tissue damage and disorders**

Growth factors found in PRP permit accelerated tissue regeneration, by using a small amount of patient's own blood. Biomed Device, with its COL<sup>®</sup> product line, offers an innovative and unique solution during reconstruction, remodeling and treatment of the ocular surface.



# Rationale of use

## EYE DROPS WITH SERUM

**Human tears** are rich in “natural unique elements” and growth factors, such as vitamins, fibronectin, cytokines, albumin, important for maintaining a healthy corneal and conjunctival epithelium. These components cannot be found in **artificial tear preparations** which often contain preservatives, stabilizers and other additives, which potentially induce allergic reactions. **Eye drops from autologous serum** resolve these drawbacks with their tear-like biochemical characteristics and supply nutritional components (Table I). Therefore it is used “not only to humidify the eye surface, but also to provide nutritional and growth factors necessary to maintain cellular feasibility in the epithelial repair processes, and bactericide components which reduce the risk of contamination and infection”.\*<sup>1</sup>

COMPARATIVE CONCENTRATIONS OF TEARS AND AUTOLOGOUS SERUM OF THE MAIN EPITHELIOTROPIC FACTORS

	EGF (ng/ml) epithelial growth factor	TGF-β (ng/ml) transforming growth factor	VITAMIN A (mg/ml)	LYSOZYME (mg/ml)	FIBRONECTIN (μg/ml)
TEARS	0.2 - 3.0	2 - 10	0.02	1 - 4	21
SERUM	0.5	6 - 33	46	6	205

\*1 López-García J. S., García-Lozano I., Rivas L., Martínez-Garchitorena J., *Use of autologous serum in ophthalmic practice*, Arch Soc Esp Oftalmol 2007; 82: 9-20.

## EYE DROPS WITH PRP: PHYSIOLOGICAL PROCESS

Platelets provide a variable pattern of biomolecules actively participating in each phase of tissue repair.

The process starts from an initial phase of propagation of the inflammatory process to the next phase of cell recall and finally to the release of growth factors (GF). These then trigger mechanisms such as proliferation, differentiation and angiogenesis, leading to wound healing (Fig. 1). PRP regenerating effect is largely related to the presence of growth factors: DGF (Platelet Derived Growth Factor); TGF (Transforming Growth Factor); VEGF (Vascular endothelial growth factor); EGF (Epidermal Growth Factor); FGF (Fibroblast Growth Factor); IGF (Insulin - like Growth Factor).

PRP acts on **inflammation and tissue regeneration** during the healing process (Fig. 2).

Wound healing time is reduced, with the consequent **reduction of pain** and **an improvement of recovery** (Fig. 3).



FIG. 2 DAYS AFTER WOUNDING (LOG. SCALE)

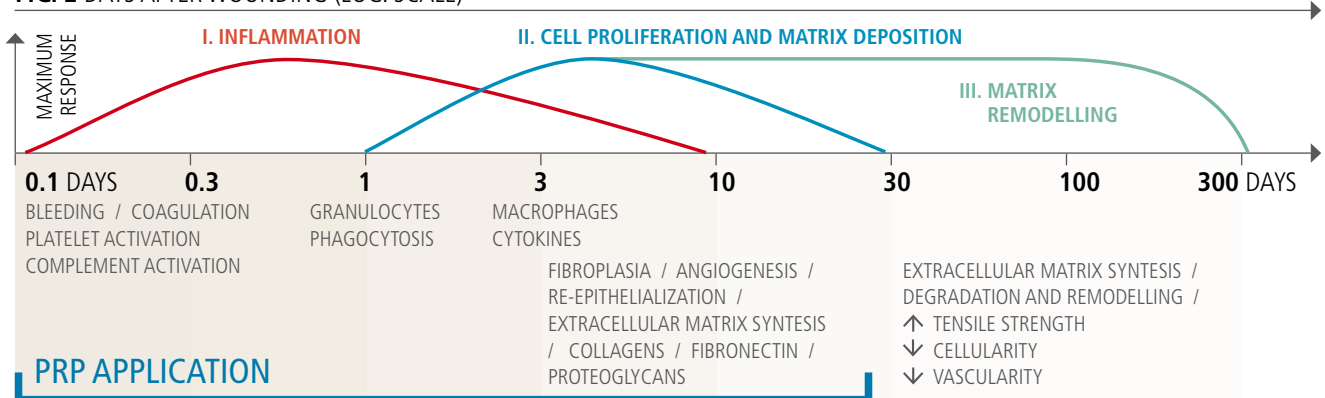


FIG. 3 TIME - BODY RESPONSE TO TISSUE INJURY





# COL<sup>®</sup> is a closed and sterile certified system for serum and PRP eye drops

The most important applications for use of eye drops obtained with COL<sup>®</sup> include the following:

- Corneal lesions and dystrophy
- Neurotrophic keratopathy
- Superficial punctate keratitis
- Keratopathy with loss of epithelial - stromal tissue resulting from chemical or physical traumas
- Sicca Syndrome or Sjögren's Syndrome
- Severe dry eye-related ocular surface disorders
- Ocular GvHD
- Recurrent erosion syndrome

COL<sup>®</sup> system is the first dedicated, certified, closed and sterile circuit for the collection, conservation and application of autologous blood components for ophthalmic use.

All the COL<sup>®</sup> line products are covered by international industrial patents.

**COL<sup>®</sup> is a closed, sterile high performance dedicated system, easy to use for cryoconservation.**



up to  
**50**  
vials

from **45**  
to **80**  
drops

standard  
drops  
**0,031**  
ml

## CHARACTERISTICS OF COL<sup>®</sup> SYSTEMS:

- Filling line suitable for most
- The kit includes thermal container for safe transport of blood components.

# Preparation of autologous blood components with Eye Drops Bags and COL<sup>®</sup>

## SERUM EYE DROPS: FOR EXTENDED USE IN CHRONIC DISEASES

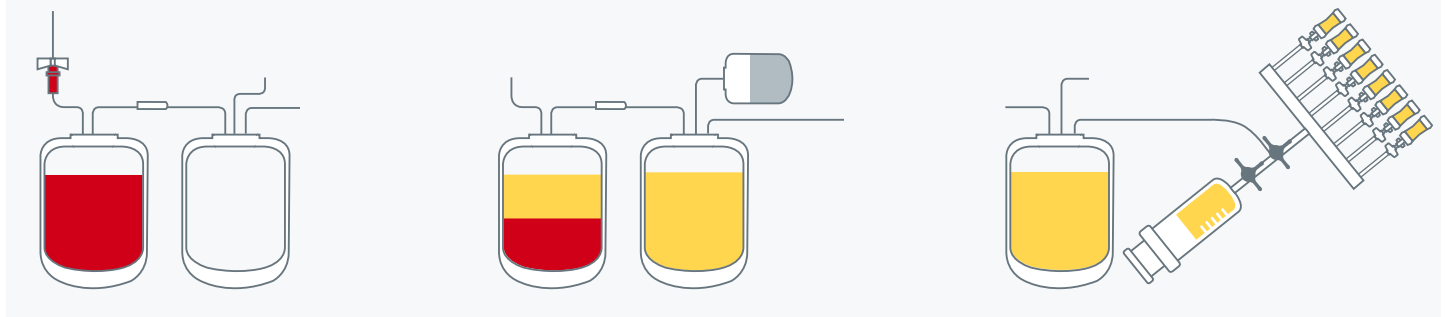
BLOOD WITHDRAW INTO THE 1<sup>ST</sup> BAG, LEFT IT TO COAGULATE



TRANSFER SERUM TO THE 2<sup>ND</sup> BAG THROUGH THE FILTER AND DILUTE IT WITH SALINE FISIOLGIC SOLUTION OR BALANCED SALINE SOLUTION



TRANSFER TO COL<sup>®</sup> AND SEAL IT



## EYE DROPS WITH PRP FOR OCULAR TISSUE REGENERATION

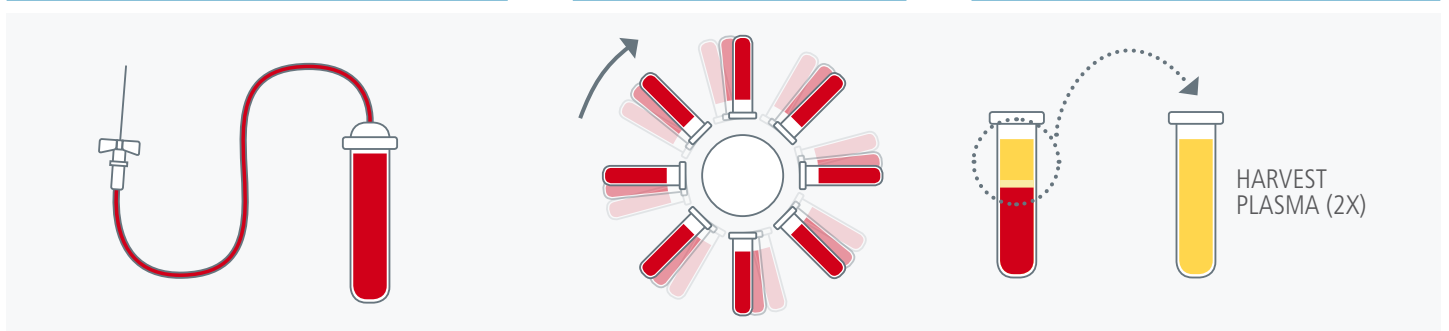
BLOOD WITHDRAW INTO VACUUM TUBE WITH ACD



1<sup>ST</sup> CENTRIFUGE: LOW SPEED



HARVEST PLASMA AND PRP



2<sup>ND</sup> CENTRIFUGE MEDIUM - HIGH SPEED



REMOVE PLASMA IN ECCESS AND RESUSPEND HIGH CONCENTRATED PRP TO OBTAIN THE FINAL PRODUCT READY TO BE USED OR DILUTE WITH SALINE FISIOLGIC SOLUTION OR BALANCED SALINE SOLUTION. TRANSFER TO COL.



The entire process of PRP preparation should be carried out in a clean and sterile place with aseptic technique.

# Biomed System range of products

- PRP BASIC PREPARATION KIT SYSTEMS
- PRP CENTRIFUGE AND LAB EQUIPMENT
- COL<sup>®</sup> OPHTHALMOLOGY LINE
- EYE DROP BAGS FOR SERUM PREPARATION

---

## REFERENCES:

- *[Autologous serum in treatment of dry eye] Review* · Babic G. S., Cekic S. · Med Pregl. 2012 Nov-Dec; 65 (11-12): 511-15 · Serbian
- *Allogeneic serum eye drops for the treatment of dry eye patients with chronic graft-versus-host disease* · Na KS, Kim MS · J Ocul Pharmacol Ther. 2012 Oct; 28 (5): 479-83 · Epub 2012 Jun 25
- *Autologous platelet lysate for treatment of refractory ocular GVHD* · Pezzotta S., Del Fante C., Scudeller L., Cervio M., Antoniazzi E. R., Perotti C. · Bone Marrow Transplant. 2012 Dec; 47 (12): 1558-63 · DOI: 10.1038/bmt.2012.64 · Epub 2012 Apr 23
- *Blood components for topical use in tissue regeneration: evaluation of corneal lesions treated with platelet lysate and considerations on repair mechanisms* · Vecchio S., W. Geremicca , C. Fonte · Blood Transfus 2010; 8: 107-12 · DOI: 10.2450/2009.0091-09
- *Comparison of autologous serum eye drops with different diluents.* · Cho YK, Huang W, Kim GY, Lim BS · Curr Eye Res. 2013 Jan; 38(1): 9-17 · DOI: 10.3109/02713683.2012.720340 · Epub 2012 Aug 28
- *Effect of autologous platelet-rich plasma on persistent corneal epithelial defect after infectious keratitis* · Kim KM, Shin YT, Kim HK · Jpn J Ophthalmol. 2012 Nov; 56(6):544-50 · DOI: 10.1007/s10384-012-0175-y · Epub 2012 Sep 13
- *The role of "eye platelet rich plasma" (E-PRP) for wound healing in ophthalmology* · Alio J. L., Arnalich Montiel F., Rodriguez A. E. · Curr Pharm Biotechnol. 2012 Jun; 13(7):1257-65
- *The use of platelet-rich plasma for the topical treatment of corneal lesions* · Vecchio S., E. Santilli, A. R. D. Ettoris, V. Musuraca, P. Leonardo, P. Maltese, W. Geremicca, G. Schipani · Blood Transfus 2006; 4: 133-40
- *Topical autologous platelet-rich plasma eyedrops for acute corneal chemical injury* · Panda A., Jain M., Vanathi M., Velpandian T., Khokhar S., Dada T. · Cornea. 2012 Sep; 31 (9):989-93 · DOI: 10.1097/ICO.0b013e3182114661
- *Use of autologous serum in the treatment of ocular surface disorders* · Jeng BH. · Arch Ophthalmol. 2011 Dec; 129(12): 1610-2 · DOI: 10.1001/archophthalmol.2011.336



BIOMED DEVICE S.R.L.  
via Vittorio Bottego, 239  
41126 Modena - Italy  
tel. +39.059.343929  
fax +39.059.4550010  
e.mail info@biomeddevice.it  
www.biomeddevice.it

All products are  certified  
in accordance with European Directives.

Biomed Device is a certified company:



**UNI EN ISO 9001:2008**  
**UNI EN ISO 13485:2012**

Biomed Device products are medical devices and not available to the general public, and must be used only by authorized personnel.  
Biomed Device reserves the right to change the products at any time, in line with technical innovation and product improvement.  
This informative material is for the exclusive use of authorized personnel.