

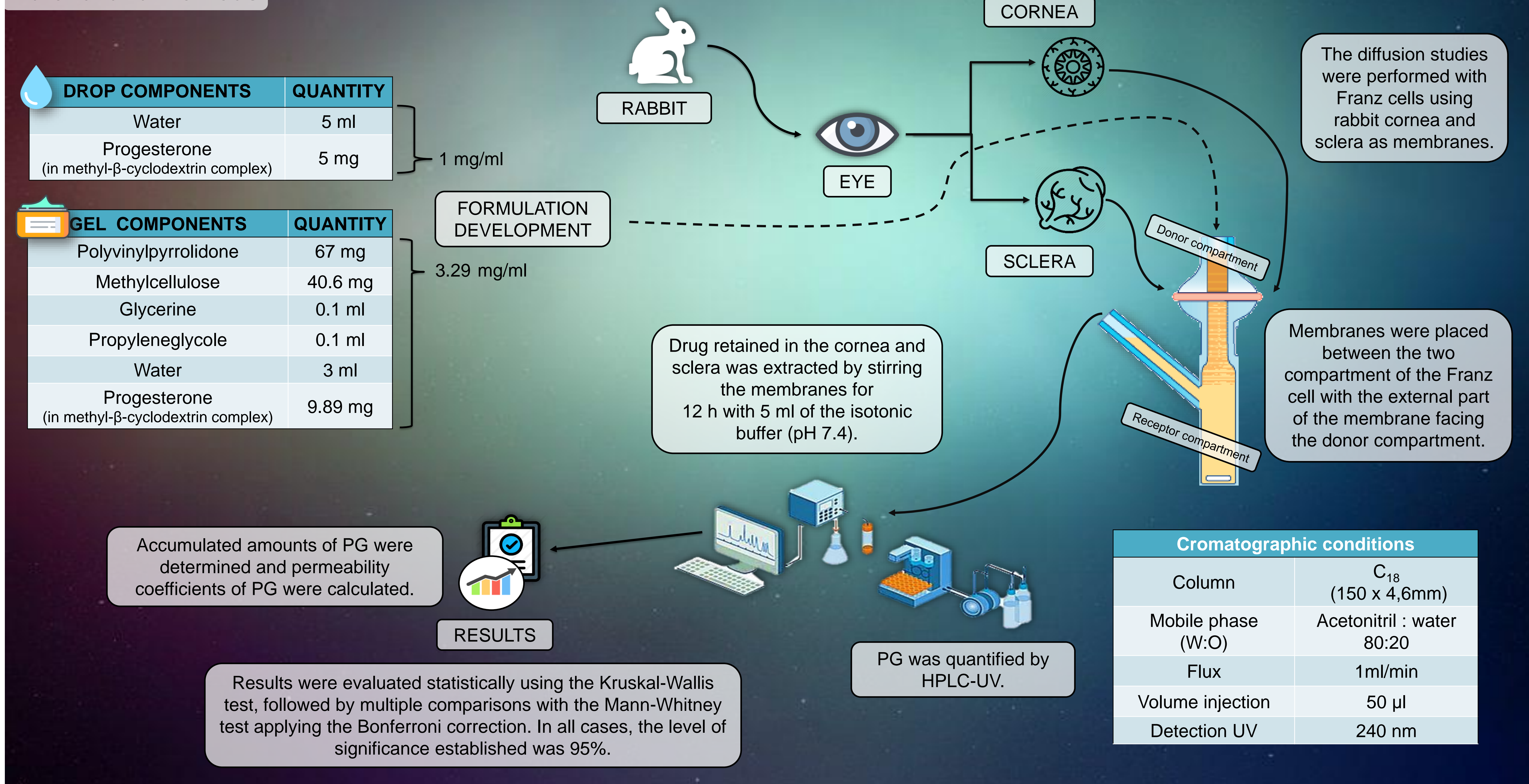
# Ex-vivo diffusion studies of progesterone in rabbit cornea and sclera

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**Introduction:** Retinitis pigmentosa (RP) is a retinal degenerative disease characterized by photoreceptor cell death. In early stages it affects the rod photoreceptors producing peripheral blindness, then cone photoreceptors die producing visual loss<sup>1</sup>. RP is caused by genetic defects. The main symptoms are vision difficulty in night vision and loss of peripheral vision (tunnel vision). Presently no effective treatment is available, but some authors have described that progesterone (PG) could be used in RP<sup>2</sup>.

**Aim:** To formulate eye drops and gel containing PG and to study the absorption of PG from this formulation both in rabbit cornea and sclera.

## Material and methods



**Results and discussion:** The ex-vivo ocular diffusion studies performed with the two formulations of PG show the following results:

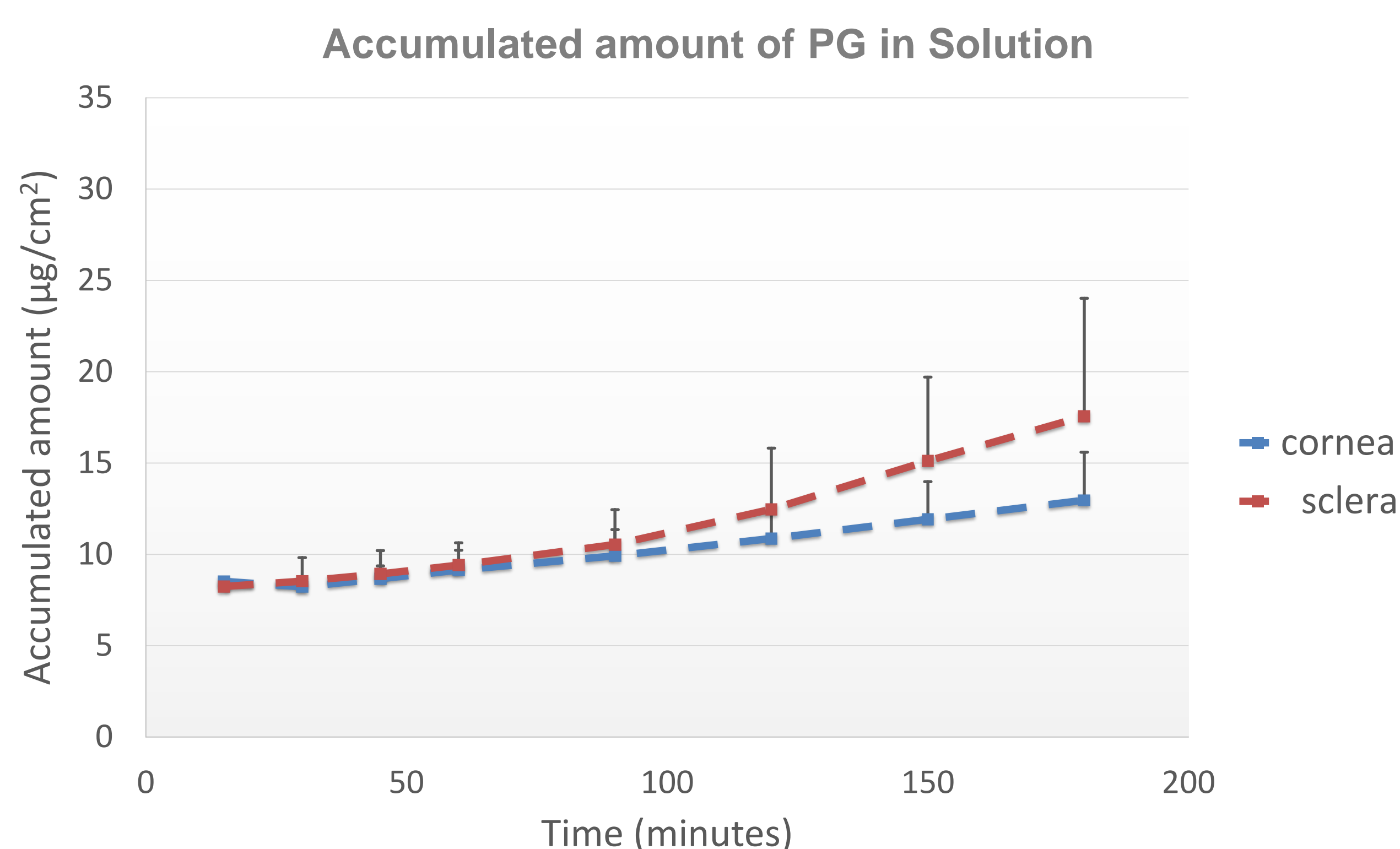


Figure 1: Accumulated amount of PG in the receptor compartment ( $\mu\text{g}/\text{cm}^2$ ; n=7) versus time (minutes) obtained from samples of ex vivo trans-corneal and trans-sclera diffusion of PG solution (1 mg/ml) in the donor compartment.

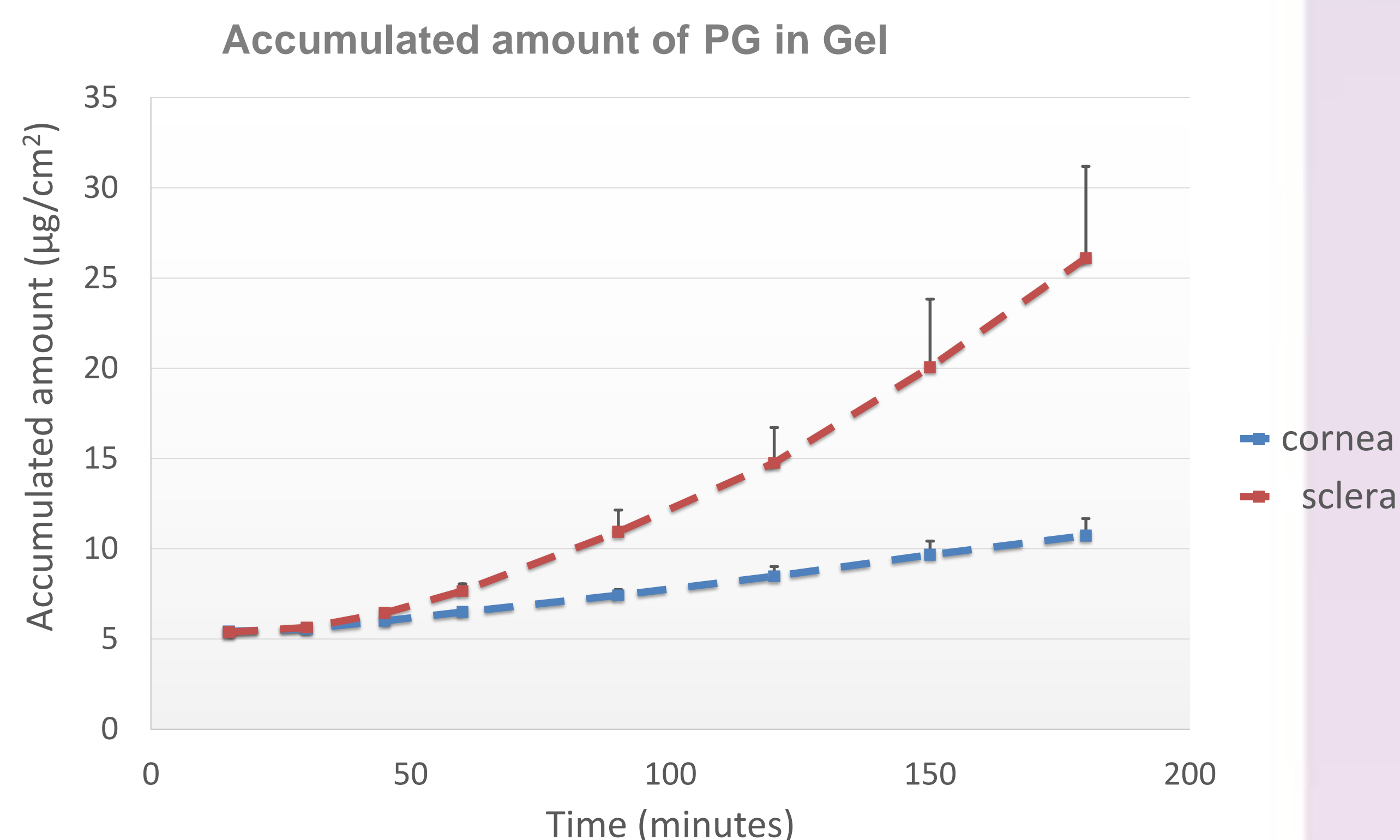


Figure 2: Accumulated amount of PG in the receptor compartment ( $\mu\text{g}/\text{cm}^2$ ; n=5) versus time (minutes) obtained from samples of ex vivo trans-corneal and trans-sclera diffusion of PG gel (3,29 mg/ml) in the donor compartment.

Results of ex vivo absorption studies have revealed that the accumulated amount of PG permeated was much higher in sclera than in cornea (Figure 1 and 2). Differences in the amount of PG accumulated in cornea and sclera were found to be statistically significant ( $p < 0.05$ ; Figure 3).

The permeability coefficients ( $K_p$ ) of PG were calculated in the different conditions assayed (Table 1). PG permeability coefficients for cornea and sclera were calculated and found to be statistically different for the two formulations assayed ( $p < 0.05$ ) (Table 1). As sclera is less complex than cornea, this could be the reason for the greater permeability of PG through the sclera.

$K_p \cdot 10^3$ (cm/h)	Solution	Gel
<b>Cornea</b>	$1.86 \pm 1.18$ (n=7)	$0.62 \pm 0.19$ (n=6)
<b>Sclera</b>	$3.38 \pm 2.38$ (n=7)	$2.41 \pm 0.64$ (n=5)

Table 1: Progesterone permeability coefficients in cornea and sclera in the different experiments development with solution and gel.

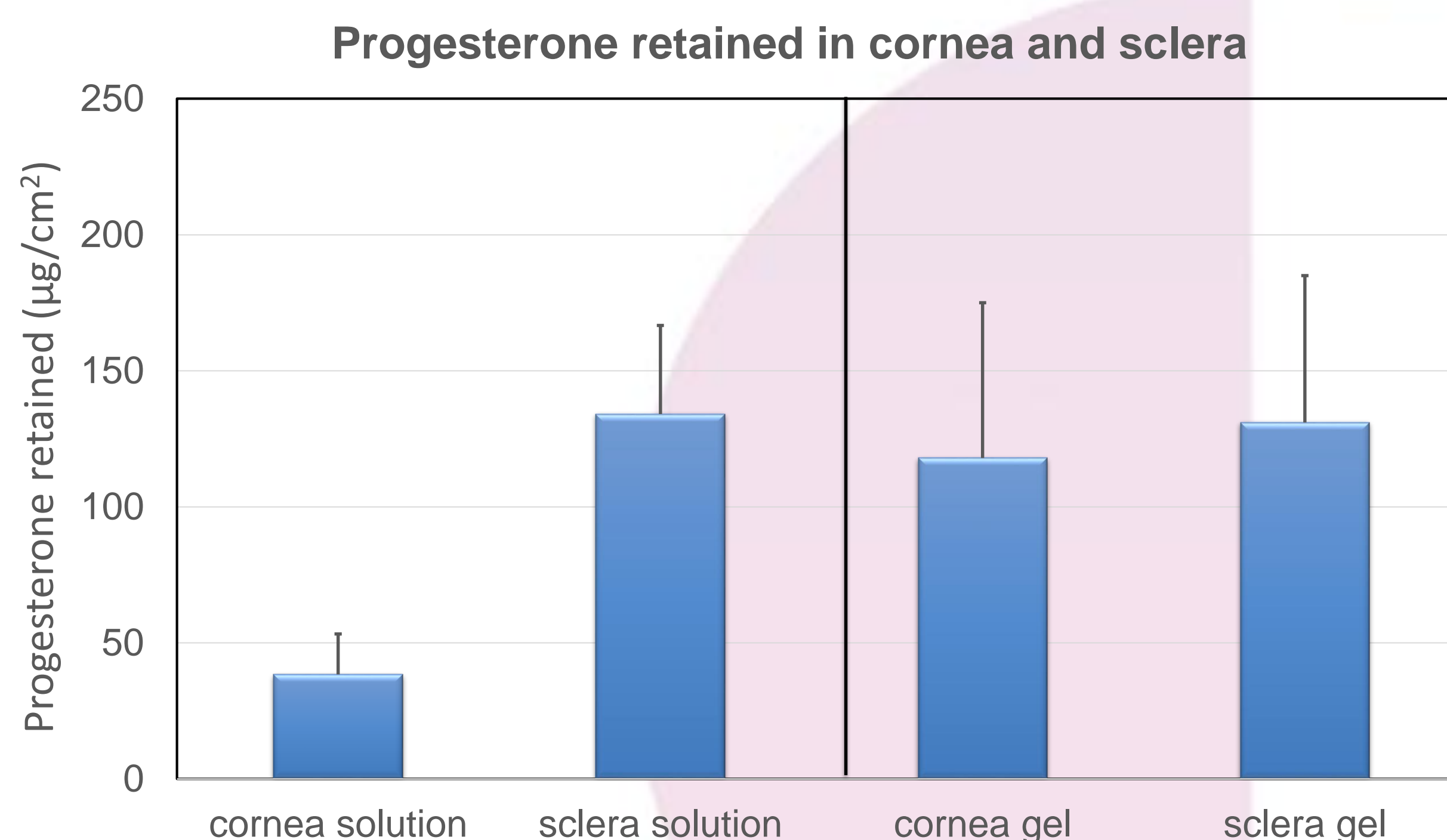


Figure 3: Progesterone retained in cornea and sclera in the different experiments development with solution and gel ( $\mu\text{g}/\text{cm}^2$ ).

## Conclusions:

These preliminary studies show that is possible to develop a pharmaceutical ocular formulation of PG. However, further studies are necessary to optimize the pharmaceutical formulation of PG for RP.

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