

Plain language summary

What is the context?

- The human population is aging, which leads to the increased occurrence of degenerative diseases at a global level. Aging affects the eye, like other organs, by a progressive alteration of the corneal endothelium, a vital part of the eye that cannot repair itself, leading to progressive loss of vision and blindness and societal impact.
- The usual treatment of corneal damage is corneal transplantation, but the world faces a dramatic shortage of donor corneas.
- There is a need to develop and validate a suitable and safe biotherapy capable of repairing altered cornea *in situ* and saving vision.
- Platelets are the healing cells of the body. They contain many trophic factors and can release extracellular vesicles contributing to tissue repair; besides, platelet concentrates are a conventional medicine facilitating their repositioning for novel clinical applications.

What is new?

- In this study, we characterized extracellular vesicles isolated from clinical-grade platelet concentrates and evaluated their capacity to protect and repair corneal endothelium cells in *in vitro* models.
- We found that these extracellular vesicles contain many functional molecules, including several vital to cornea's regeneration, were non-toxic, could be internalized, favor cellular proliferation, and exert a range of functional activity to assist the regeneration of the corneal endothelium.

What is the impact?

- This study provides the first evidence that extracellular vesicles isolated from human platelet concentrates exhibit a functional activity that could be valuable as a new biotherapy in the regeneration of corneal endothelial cells.