Hyaluronic acid based-micelles for off-label use of imatinib in retinopathies treatment

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The aim of this work was to obtain polymeric micelles able to cross corneal barrier and to improve the permeation of imatinib free base. Micelles were prepared by using hyaluronic acid (HA) derivatives containing ethylenediamine (EDA), chains of hexadecyl (C16), polyethylene glycol (PEG) and/or L-carnitine (CRN). The resulting samples, named as HA-EDA-C16, HA-EDA-C16-PEG and HA-EDA-C16-CRN micelles, were designed to allow a non-invasive way of administration, i.e. topical ocular instillation. These nanocarriers showed an optimal particle size in aqueous media and mucoadhesive properties. Imatinib-loaded micelles were able to interact with corneal barrier and to promote imatinib transcorneal permeation and penetration. An interesting in vitro study was conducted to investigate imatinib inhibitory effect on a choroideal neovascularization process (1). Imatinib was able to inhibit endothelial cell sprouting and to reduce the formation of functional vessels. In addition, imatinib released from polymeric micelles was able to inhibit cell tube formation and to promote cell tube disruption. Obtained results suggested that prepared micelles could represent optimal candidates for off-label use of imatinib in the treatment of retinopathies.

1) Siedlecki, J et al. (2017) Graefe's Arch Clin Exp Ophthalmol 255: 963–972