# *IN SITU* GEL FORMULATION OF ESMOLOL HYDROCHLORIDE FOR OCULAR DELIVERY: A REPURPOSING STRATEGY

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**ABSTRACT**

This study investigates the repurposing of esmolol hydrochloride for ocular diseases such as cataract by formulating and evaluating a temperature-sensitive *in situ* gel for ocular delivery. The gel was prepared using thermosensitive polymers Poloxamer 407 (Kolliphor® P407), Poloxamer 188 (Kolliphor® P188) and gellan gum, combined with mucoadhesive agents such as HPMC (METHOCEL™) at varying concentrations. Multiple formulations were developed and characterised for clarity, pH, viscosity, gelling temperature, isotonicity, drug content and *in vitro* drug release. HET-CAM testing confirmed the formulation was non-irritant and blood compatibility studies confirmed isotonicity. Among the tested formulations, the optimised formulation (F10) was selected for accelerated stability testing, and it remained stable and effective throughout the study. These results indicate that the optimised *in situ* gel formulation is suitable for ocular drug delivery, supporting the potential repurposing of esmolol hydrochloride for the treatment of cataract.