DEVELOPMENT OF NANOMEDICINES TARGETING INFECTION AND INFLAMMATION

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Background: Targeted therapy is an area possessing wide scope for treatment opportunities, with diclofenac being a potential active that can be used as a targeted therapy, particularly in pain management. Effective and targeted delivery of diclofenac is an issue which has been problematic for both patient and health-care professionals. Star-shaped polypeptides (SPs) are polymers which can be potentially used as a carrier to effectively deliver targeted therapies whilst maintaining safety and uniformity. The aim of this project involved investigating the effectiveness of G5 poly(l-lysine) (PLL) as a carrier for diclofenac.

Methods:

UV/Vis absorbance of diclofenac was determined through a Biochrom Libra S22 UV/Vis Spectrophotometer to generate calibration curves as a basis for concentration determination.

DLS Particle size and Zeta (ζ) Potentials were assessed using a Malvern Zetasizer® Nano ZS. For this analysis, 1mg of diclofenac was weighed, dissolved in 1mL of ethanol and was subsequently vortexed for several seconds. Similarly, a 1mg/mL solution of G5-PLL was also prepared using ethanol as the solvent.

NTA particle sizing was assessed using a Malvern NanoSight 300. Three measurements were recorded per sample (each mass ratio) and were performed in triplicate.

Results: The diclofenac absorbance showed linearity between 0.015625mg/mL and 0.125mg/mL with a correlation coefficient (r^2) value of 0.9964.

The particle sizes of diclofenac/G5-PLL complexes varied with different mass ratios analysed. PdI values of 0.5-0.7 were obtained, indicating that samples at different mass ratio are polydisperse, i.e. non uniform distribution size. Zeta Potentials ranged between 22 ± 1.64mV to 9.3 ± 0.46mV Mean particle size were ranged from 175nm and 300nm.

Results showed the samples displayed polydispersity at different mass ratios of diclofenac:G5-PLL.

Conclusions: These results demonstrate the potential for loading SPs with small molecule therapeutics such as diclofenac. With polymers of known age/ stability, accuracy of future sampling is expected to increase. Furthermore, this data will be used to modify the particle size distribution in order to create more monodisperse sample sizes.