Poster 9
Evaluating Stability of PLGA-PEG Mesoscale Nanoparticles Under Stressed Conditions

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Purpose
Nanoparticle-mediated drug delivery is an emerging technology, allowing for precise and targeted delivery. The most used nanoparticles are lipid-based and polymeric-based nanoparticles. The stability of nanoparticles (NPs) is one of the most important factors affecting safety and efficacy of the drug. Previous studies demonstrated that polymeric mesoscale nanoparticles (MNPs) exhibit specific renal targeting and the ability to deliver functional therapeutics to the kidneys.

Methods
In this study, PLGA-PEG empty and dye-loaded MNPs were synthesized and stability of these MNPs was evaluated. In particular, we aimed to assess the impact of MNP size and polydispersity (PDI) when exposed to various storage temperatures such as room temperature, -20˚C, and 37˚C for prolonged periods. In addition, we exposed these NPs to successive freeze-thaw cycles to assess the impact of freezing and thawing of NPs on size and PDI.

Results
Results show that the best suitable storage temperature of NPs is -20˚C in terms of stability. 37˚C and room temperature storage conditions yielded an increase in size and PDI, indicating potential aggregation being formed under those storing conditions. Finally, freezing and thawing did not adversely impact the size and PDI of NPs, showing that NPs can withstand up to four freeze-thaw cycles.

Conclusion
This work investigated the storage conditions and stability of polymeric mesoscale nanoparticles. We found that MNPs are stable under cold storage for extended period and withstand several freeze-thaw cycles which will further our ability to formulate and distribute MNPs. We anticipate that future work will investigate the effects of storage conditions on MNP functionality in vitro and in vivo, potentiating future translation to pre-clinical studies.

Keywords: polymeric nanoparticles, stability, storage, kidneys, renal disease