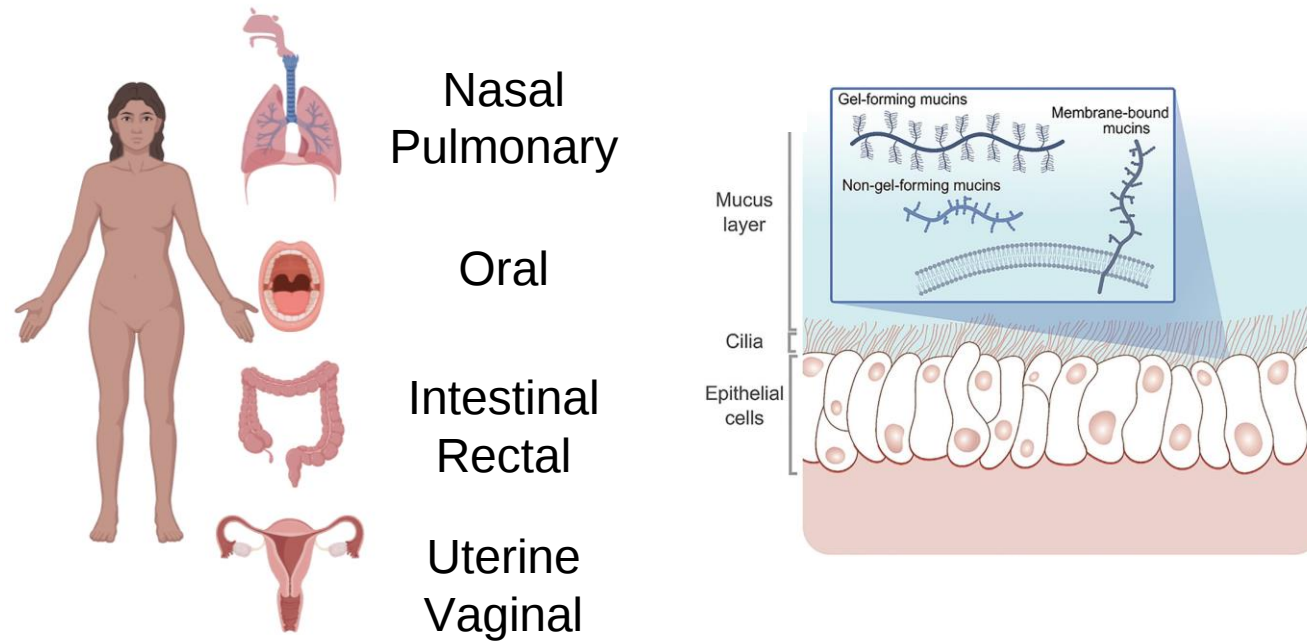


Rapid In Situ Forming PEG Hydrogels for Mucosal Drug Delivery

Taj Yeruva
Postdoctoral Associate
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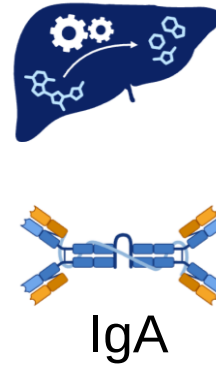
Mucus: A Biological Barrier



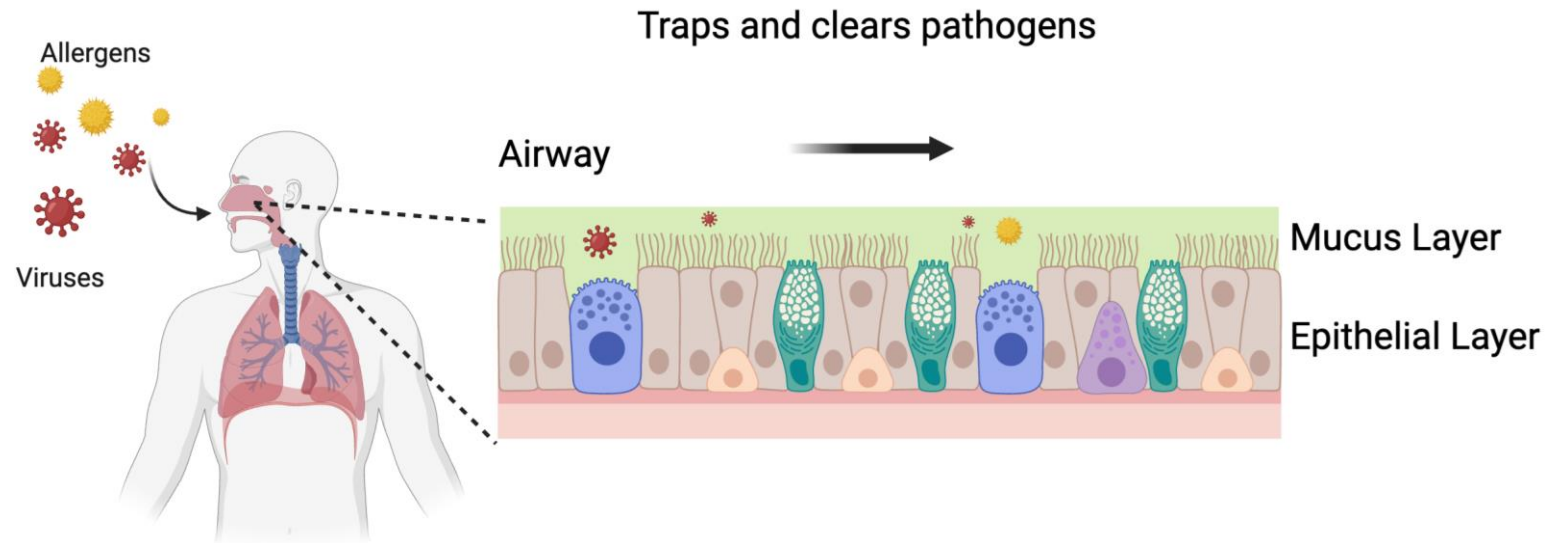
Hazt et.al., 2024 Advances in Colloid and Interface Science

Mucosal Delivery: A Better Way

- Noninvasive
- Avoids hepatic metabolism
- Localized delivery
- No systemic toxicity
- Mucosal immunity

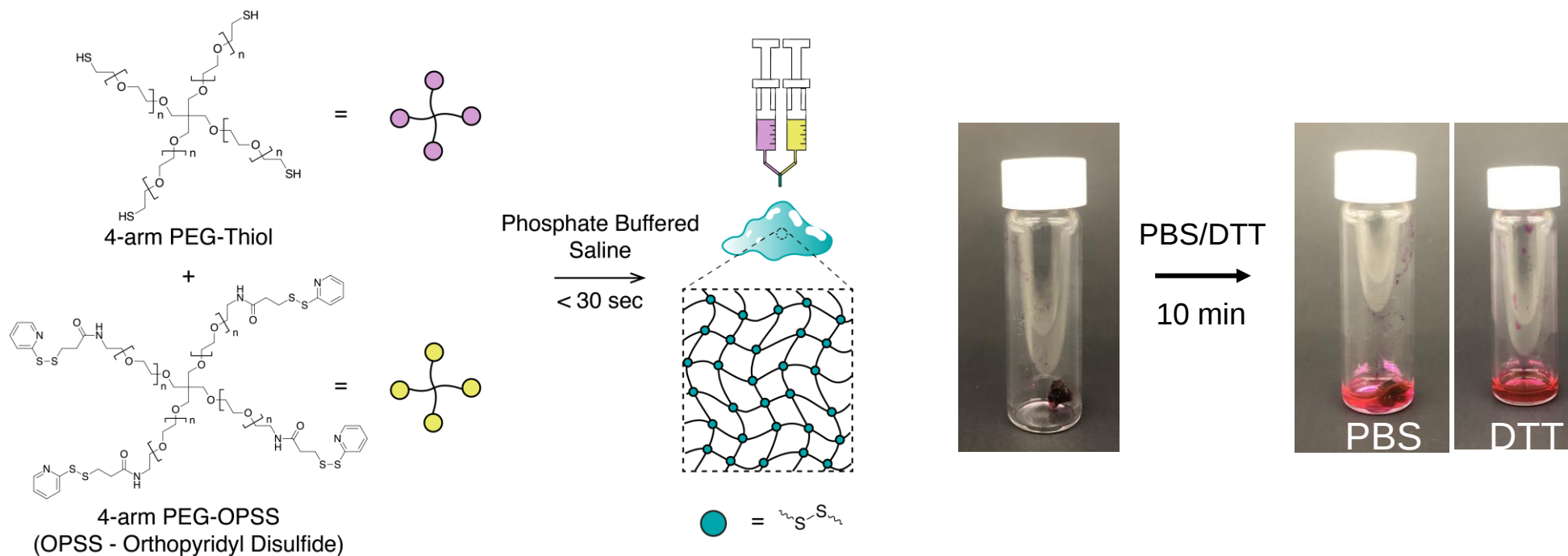


Limitations of Mucosal Delivery



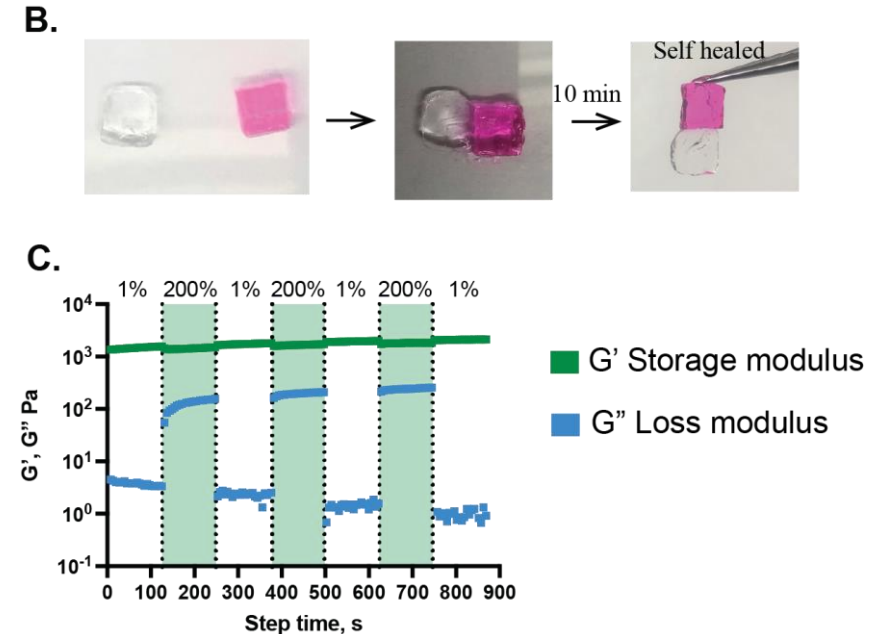
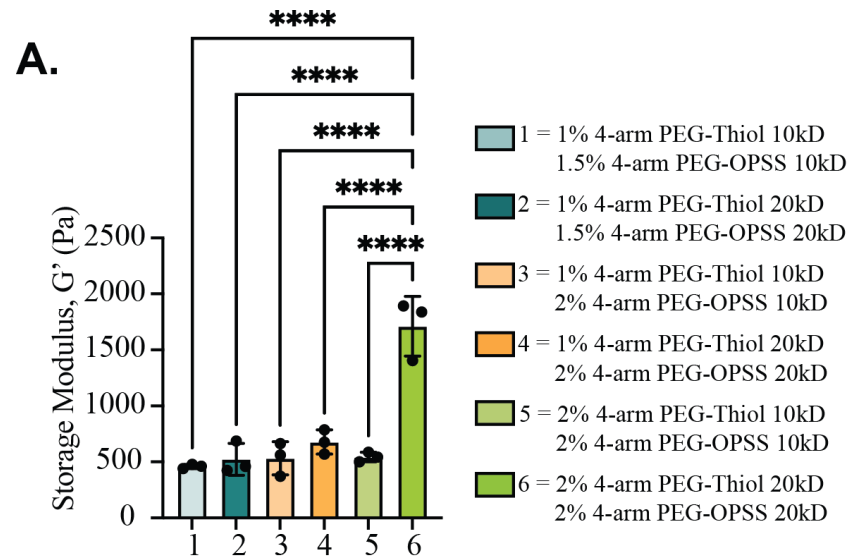
Rapid clearance of mucus every 20 min

Solution: Rapid forming PEG gels



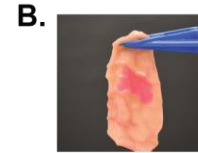
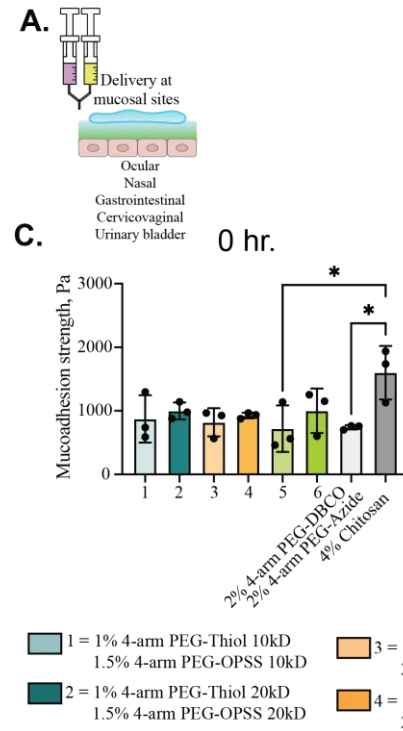
PEG gels form under 30 seconds and are degradable in the presence of reducing agents

PEG gels are viscoelastic and self healing



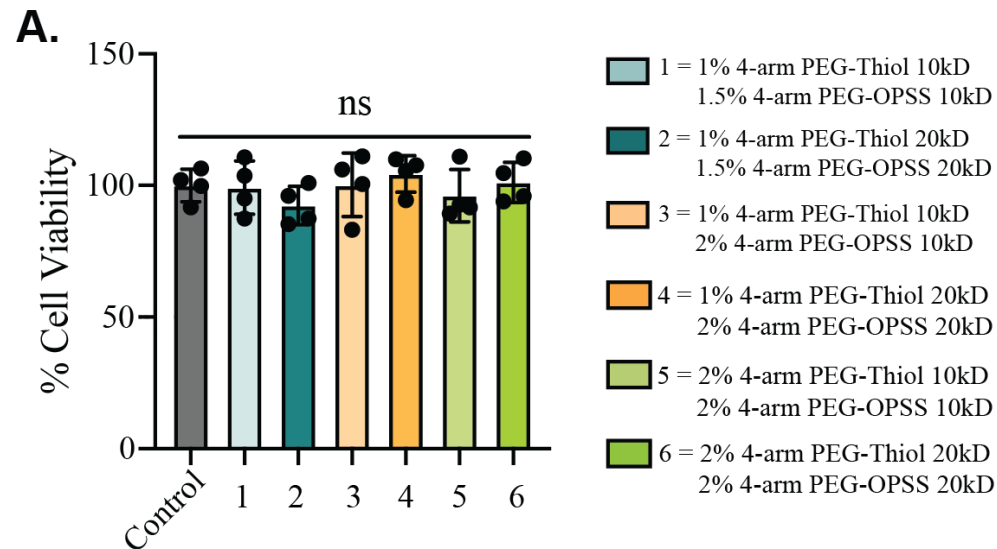
PEG gels have varying elastic modulus and autonomously repair damage

PEG gels are mucoadhesive



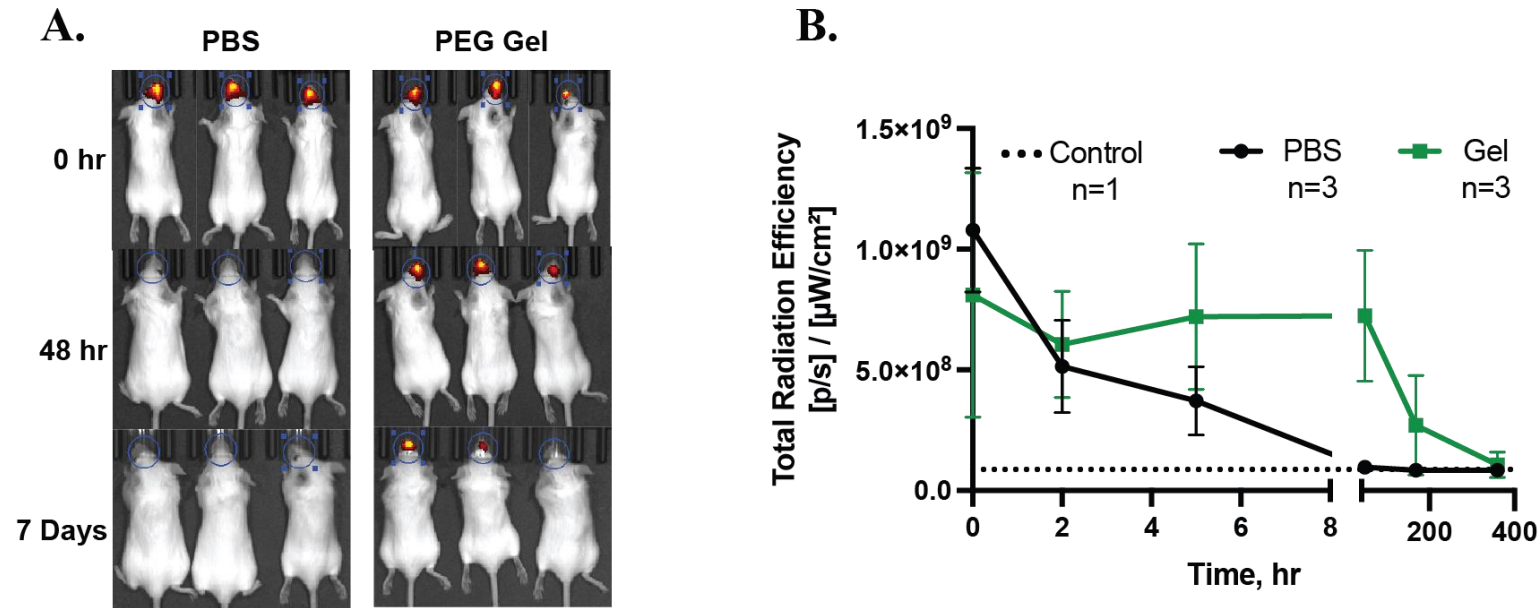
PEG gels spread uniformly and form an adhesive patch

PEG gels are biocompatible and allow controlled release of cargo



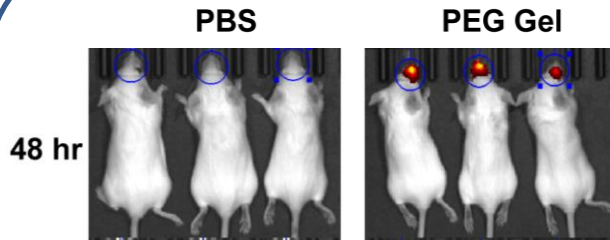
All tested formulations are safe, and release kinetics are dependent on cargo size

PEG gels prolong cargo retention *in vivo*

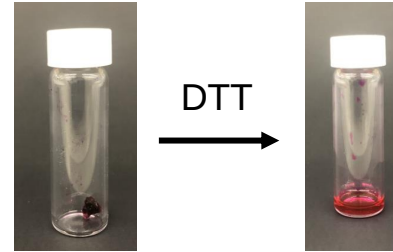


PEG gels retain nanoparticle cargo up to a week in the mice nasal cavity

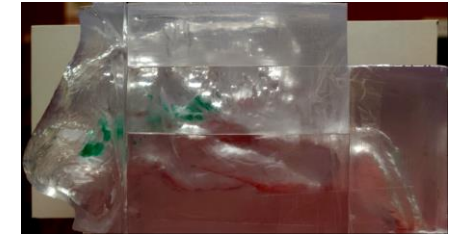
Conclusions



Address rapid drug clearance at mucosal sites



Bio-reducible disulfide crosslinks allow triggerable clearance



Enable local and sustained delivery and warrant clinical translation

Yeruva et.al., 2025 Biomaterials Science

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Luke Zhao
Dr. Sarah Nasr
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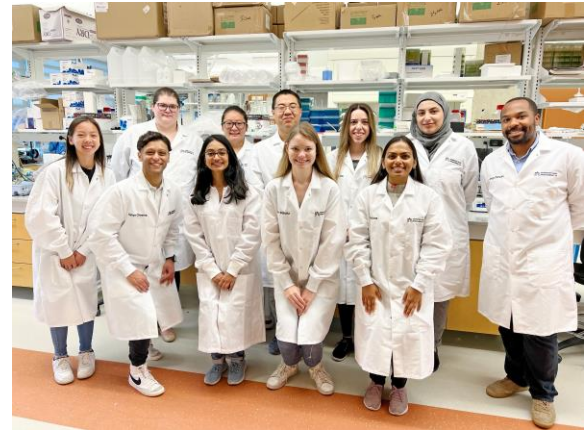
Kofinas Lab

Prof. Peter Kofinas
Robert Morris

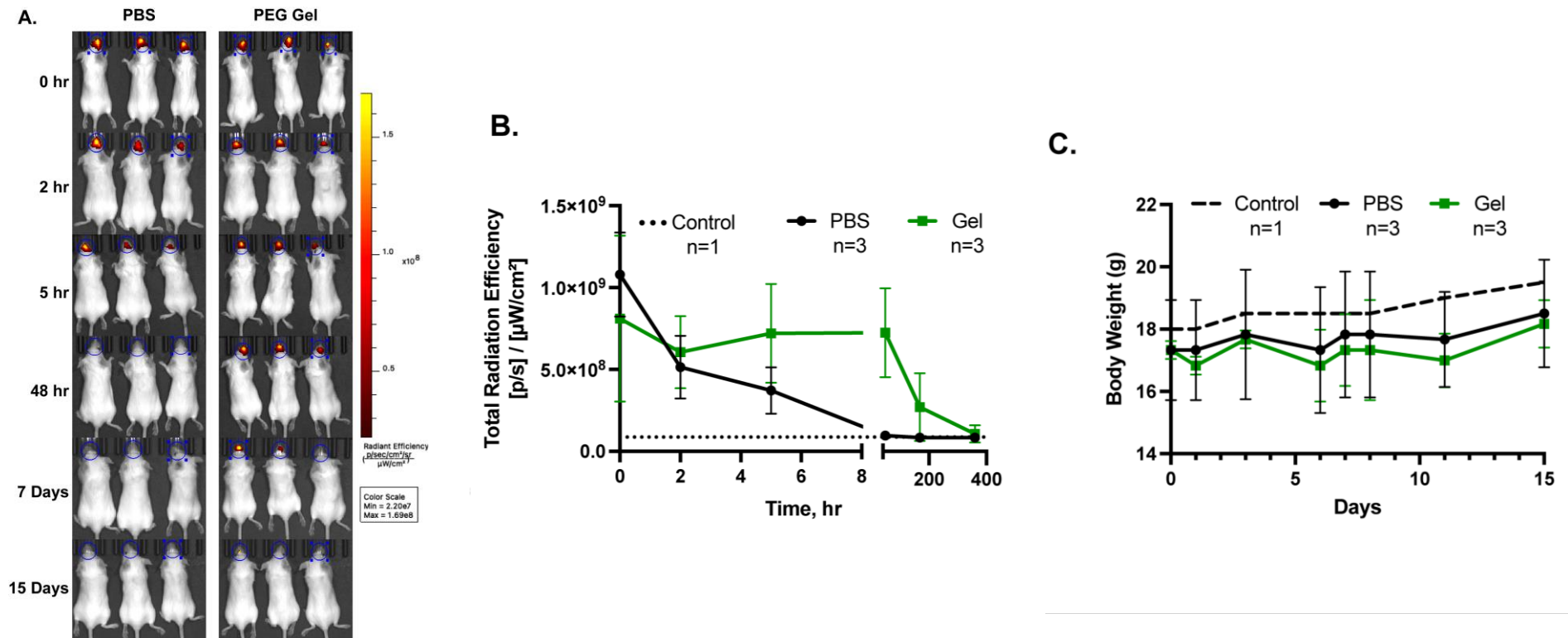


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PEG gels prolong cargo retention *in vivo*



PEG gels retain nanoparticle cargo up to a week in the mice nasal cavity