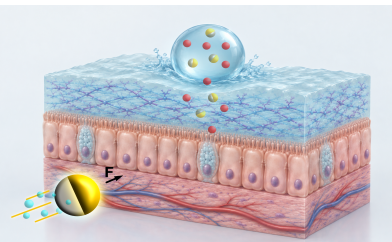


Co-delivery system to overcome mucosal barriers

Mucosal tissues are highly attractive access points for local and systemic drug delivery, but the mucus barrier remains a key limitation for many therapeutic formats. In particular, advanced nanoparticle systems often show strong functional potential yet insufficient transport through mucus. Solutions that improve mucosal penetration may broaden the applicability of next-generation drug delivery platforms and support more patient-friendly administration.



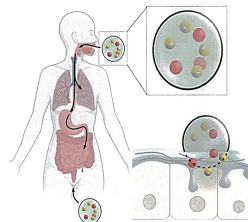
Active micromotors boost nanoparticle transport through mucus

The technology combines passive therapeutic nanoparticles with actively propelled particles in one mucosa-responsive microparticle. Upon contact with the mucosal surface, both particle types are locally released into mucus. The active particles increase passive particle mobility via hydrodynamic coupling, facilitating more efficient penetration into mucosal barriers and potentially enabling more patient-friendly, less invasive local delivery of nanomedicines.

- 01 Enables mucosal delivery of passive nanocarriers otherwise cleared by mucus
- 02 >10-fold increase in passive particle mobility in gastric mucus models
- 03 Improved penetration of passive particles into mucosal barriers
- 04 Platform adaptable to oral, pulmonary, intestinal, nasal, and vaginal delivery

REFERENCES:

- 1 Manuscript in preparation



Co-delivery of active and passive particles to the mucosa. Active and passive particles are embedded together in a microparticle that releases both particle species into the mucosa upon contact with the mucosal surface.

IP RIGHTS

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CHALLENGE

Many nanoparticle drug carriers fail at mucosal interfaces because their transport relies on slow Brownian diffusion. In mucus, passive nanoparticles are hindered by steric constraints and adhesive interactions with the mucin network, leading to poor tissue access and rapid clearance by mucosal turnover. As a result, major administration routes such as oral or pulmonary delivery remain difficult for many nanomedicines.

INNOVATION

This invention uses hydrodynamic coupling between active and passive particles directly in biological mucus to enhance transport of passive nanocarriers. Both particle types are co-embedded in a microparticle that protects the active component from premature activation and enables local co-release at the target mucosa. In proof-of-concept studies, passive particle mobility increased by more than tenfold, with improved penetration of passive particles into mucosal hydrogel barriers.

TRL 08

TRL 07

TRL 06

TRL 05

TRL 04

TRL 03

TRL 02

TRL 01

Technology Readiness Level (TRL)

01 Basic principles observed · 02 Technology concept formulated · 03 Experimental proof of concept · 04 Technology validated in lab · 05 Technology validated in relevant environment · 06 Technology demonstrated in relevant environment · 07 System prototype demonstrated in operational environment · 08 System complete and qualified

