Mucosomes: bioinspired nanoparticles of glycosylated mucins to re-think mucosal drug delivery

Mucus presents a significant barrier in drug delivery, particularly for therapies requiring prolonged in situ cellular responses. To address this, we developed “mucosomes”, a novel class of nanoparticles inspired by native glycosylated mucins. Synthesized via a proprietary one-pot process using porcine gastric mucin (PGM), mucosomes are approximately 200 nm in diameter and maintain functional glycans. They exhibit stability post-lyophilization and preserve morphology when delivered via a nasal spray. Capable of carrying various small- and macro-molecules, mucosomes reach the intracellular compartment of HeLa cells without cytotoxic or pro-inflammatory effects. In vivo tests confirmed their safety, with primary distribution in the lungs and liver, highlighting their potential to revolutionize drug delivery and gene therapy.