

## Pankind 2025 Scientific Meeting

### Poster Abstract Form

### Hunting Hidden Tumours: Nanobots for wireless detection of Pancreatic Cancer

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#### Introduction

Early detection of pancreatic cancer remains a major clinical challenge due to the poor sensitivity of conventional diagnostic tools, which frequently fail to detect minimal residual or localized disease. To address this, we are developing a multifunctional nanobot scaffold engineered for wireless biosensing of micro-tumors with downstream drug-delivery capabilities. Here, we evaluate the cellular interactions and uptake of this platform *in vitro* pancreatic cancer models.[1-3]

#### Methods

Ceramic based scaffolds were formulated in a biocompatible aqueous suspension and introduced to pancreatic cancer cultures across both conventional 2D monolayers and physiologically representative 3D tumor spheroids. Scaffold biocompatibility was assessed via standard cytotoxicity assays. Fluorescence microscopy tracked internalization and intracellular trafficking within the tumor microenvironment.

#### Results

Cytotoxicity (Figure 1) assays demonstrated high cell viability across tested concentrations, confirming favorable scaffold biocompatibility. Fluorescence microscopy (Figure 2) confirmed successful cellular uptake and robust internalization of the nanobot scaffolds in both 2D monolayers and throughout the 3D spheroid.

#### Conclusion

These findings establish that the nanobot scaffold reliably associates with and is internalized by pancreatic tumor cells across 2D and 3D architectures. This cellular-level validation provides a critical foundation for functionalizing these scaffolds toward wireless biosensing platforms and dual-action theragnostic, offering a promising avenue for earlier pancreatic cancer intervention.

- [1] H. Wu *et al.*, “Advances in biomarkers and techniques for pancreatic cancer diagnosis,” *Cancer Cell International*, vol. 22, no. 1, p. 220, Jun. 2022, doi: 10.1186/s12935-022-02640-9.
- [2] G. Luo *et al.*, “Roles of CA19-9 in pancreatic cancer: Biomarker, predictor and promoter,” *Biochimica et Biophysica Acta (BBA) - Reviews on Cancer*, vol. 1875, no. 2, p. 188409, Apr. 2021, doi: 10.1016/j.bbcan.2020.188409.
- [3] N. Chacko and R. Ankri, “Non-invasive early-stage cancer detection: current methods and future perspectives,” *Clin Exp Med*, vol. 25, no. 1, p. 17, 2025, doi: 10.1007/s10238-024-01513-x.

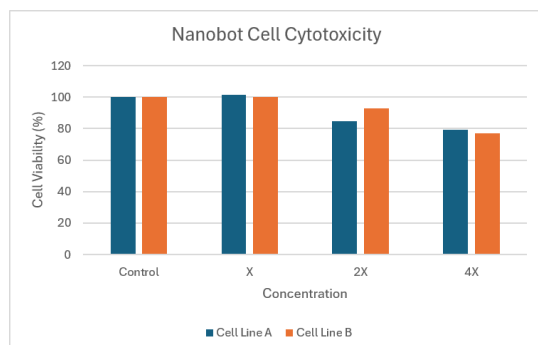


Figure 1: Cytotoxicity of Nanobot

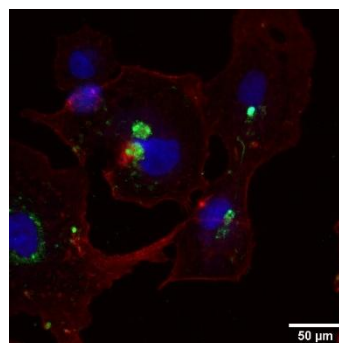


Figure 2: Nanobot Encapsulation into Pancreatic Cancer Cell