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ORAL PRESENTATIONS

Abstracts

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From Pathology to Precision Oncology: Patient-Derived Tumour and Normal Tissue Models as a Translational Interface

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Topic: 8A: Unlocking Health Insights from Donated Human Tissues

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Keywords: Three-dimensional patient-derived tissue models

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Introduction

Three-dimensional patient-derived tissue models are increasingly recognized as essential tools for bridging the gap between basic cancer research and clinical application. The Translational Tissue Engineering (TTE) group at the D&R Institute of Pathology, Medical University of Graz (BBMRI.at partner), focuses on the development of clinically relevant ex vivo models derived from fresh normal and tumour tissues. By integrating organoid technology with diagnostic pathology, we aim to recapitulate the architectural and functional complexity of human tissues to better understand tumour progression, metastasis, and therapy resistance.

Materials & Methods

Fresh surgical samples from normal and neoplastic tissue are processed immediately after surgical resection and pathological assessment. Tissue dissociation, three-dimensional organoid culture, and standardized quality control procedures are used. Tumour cells, stromal components, and matching normal cells obtained from patients are expanded and cryopreserved within the YouCell platform. Selected healthy cells are reprogrammed into induced pluripotent stem cells (iPSCs) to create autologous comparative models. Tumor characterization included histopathology, immunohistochemistry, genomic profiling, and functional drug response assays.

Results

We successfully established paired tumour-normal models preserving histomorphology, key molecular signatures, and interpatient heterogeneity. Integration of stromal co-culture models enabled functional assessment of microenvironment-driven resistance mechanisms. The linkage of cell models with standardized patient anamnesis and a centralized database infrastructure allowed correlation of clinical parameters with experimental outcomes. Standardized workflows ensured reproducibility, high data quality, and long-term biobanking of patient-specific cell material.

Discussion/Conclusion

The combined TTE–YouCell platform provides a robust translational framework for mechanistic studies, preclinical drug testing, and personalized therapeutic strategies. By linking pathology-driven tissue acquisition with advanced 3D modelling and industry collaboration, we accelerate the transfer of innovative organoid technologies into precision oncology and clinical application.