Rotating cell culture of human melanoma tumorspheres as a potential preclinical model for translational research

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· INTRODUCTION

Critical differences at various cellular levels between *in vitro, in vivo* and clinical tumor models are one of the major challenges hindering the progress in cancer diagnosis and therapy. The ***in vitro-in vivo* gap is an unmet biological niche, requiring urgent progress** for refinement of a drug discovery process and clinical trials success rate increase.

· AIM

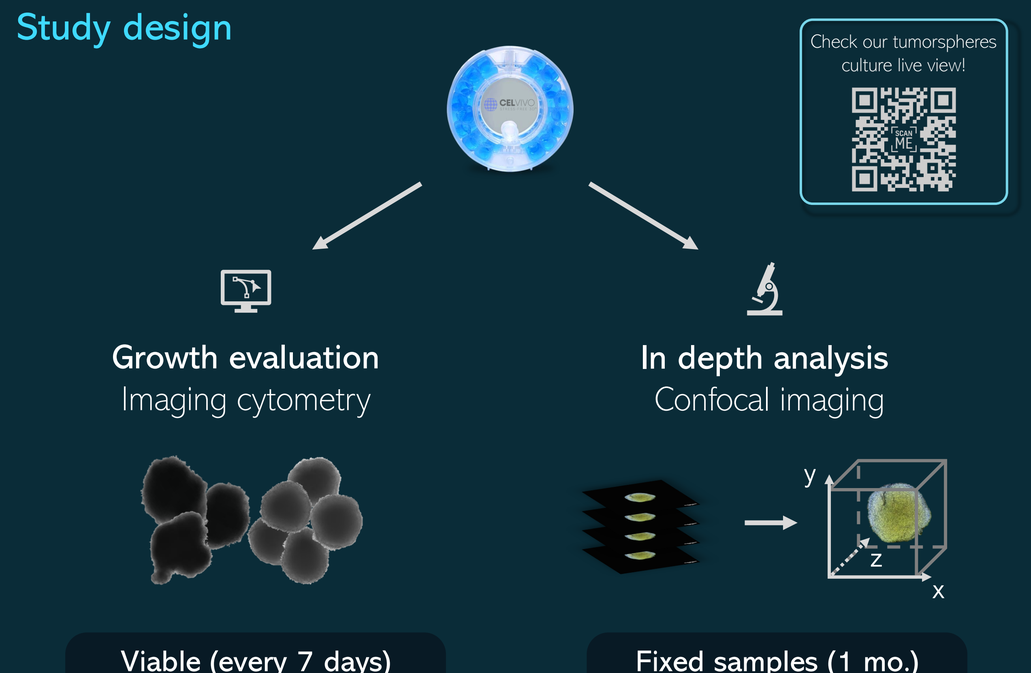
Improvement of *in vitro* research models as fundamental tool for preclinical assessment through bioreactors implementation.

· METHODOLOGY

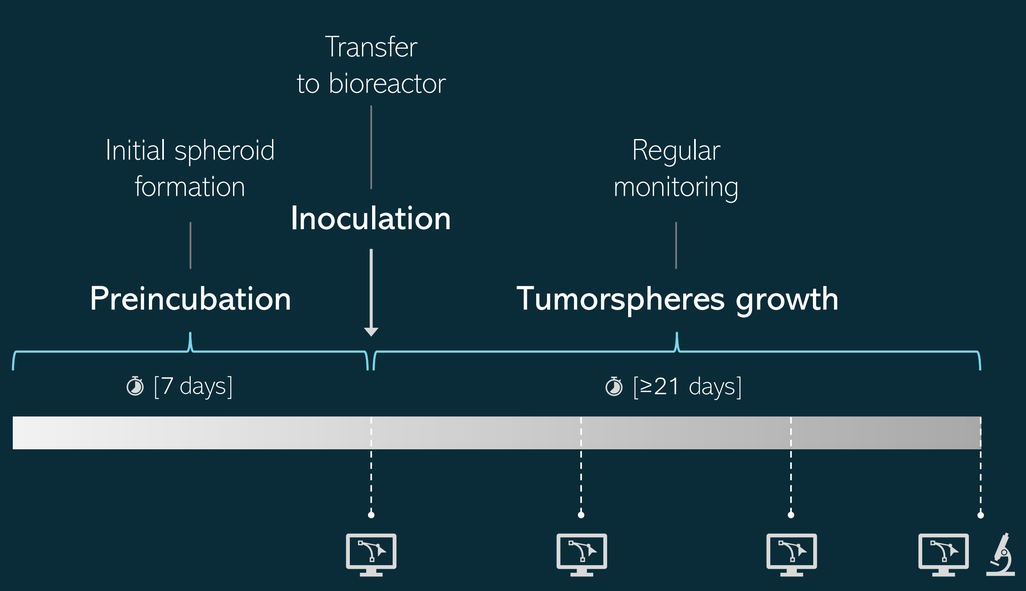
Human **primary** (FM55p) and **metastatic** (WM266-4) **melanoma** cell lines were used as one of many emerging examples requiring the development of accurate tumor models that can be evaluated for various diagnostic and therapeutic protocols.

By implementing one of the **market-leading solution** – a **bioreactor** (ClinoStar®) technology, we aimed to obtain hybrid models combining the properties of spheroids and organoids to achieve a high level of development.

Study design

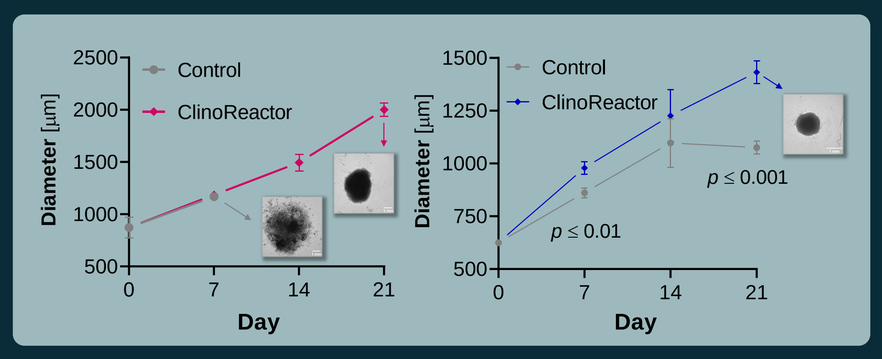


Experiment setup

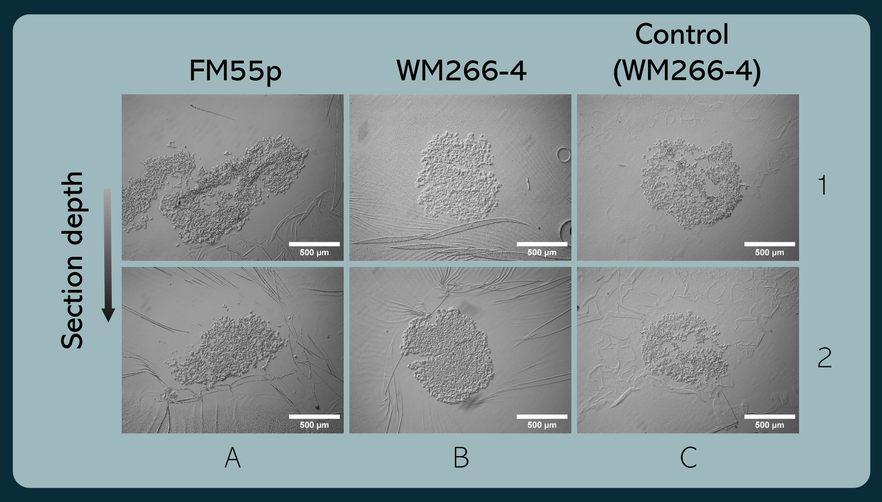


· RESULTS

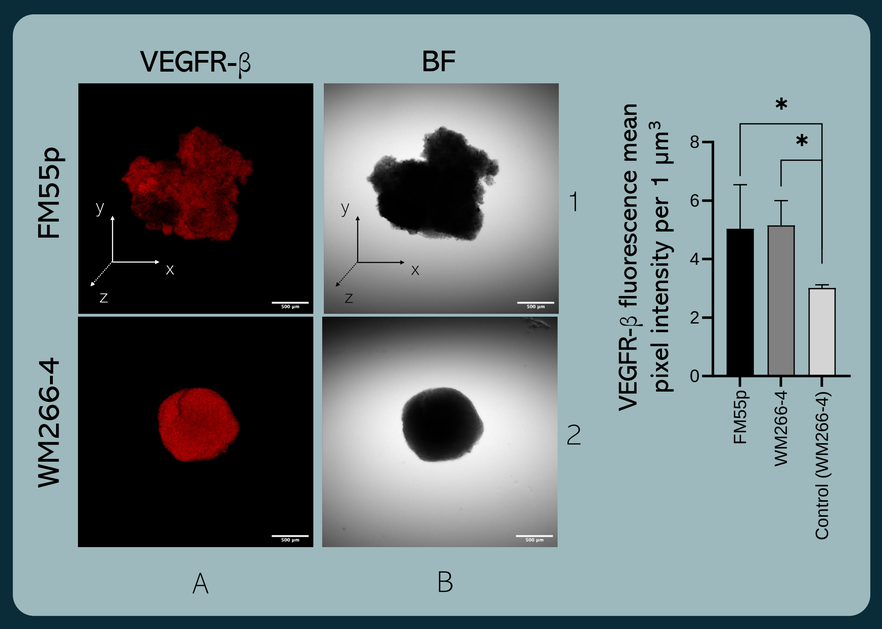
Bioreactor-based tumorspheres reached **>2 mm (!)** diameter and showed growth capability for at **least 1 month**. Control spheroids disintegrated (FM55p) or lost their proliferation capacity (WM266-4) during the experiment.



Prolonged growth was associated with **different internal structure** when compared to control. Our observations suggest, that **collagen production** in tumorspheres **was enhanced**.



Quantitative fluorescence analysis showed that **VEGFR-β expression**, after prior normalization per structure volume, in tumorspheres **was significantly higher** ($p \leq 0.05$) when compared to the control.



· SUMMARY

It is possible to design and develop remarkable biological models which can bridge the gap between *in vitro* and *in vivo* systems and become the basis of cancer research, but…

…additional and complex biochemical studies at various of cellular levels are necessary to consider large-scale implementation of this approach.

Main questions: how effectively these models can mimic tumor tissue and what are the limitations?

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