

# Characterisation of a Multicellular Tumour Spheroid

## Model of Glioblastoma

Richards, R & Sée, V

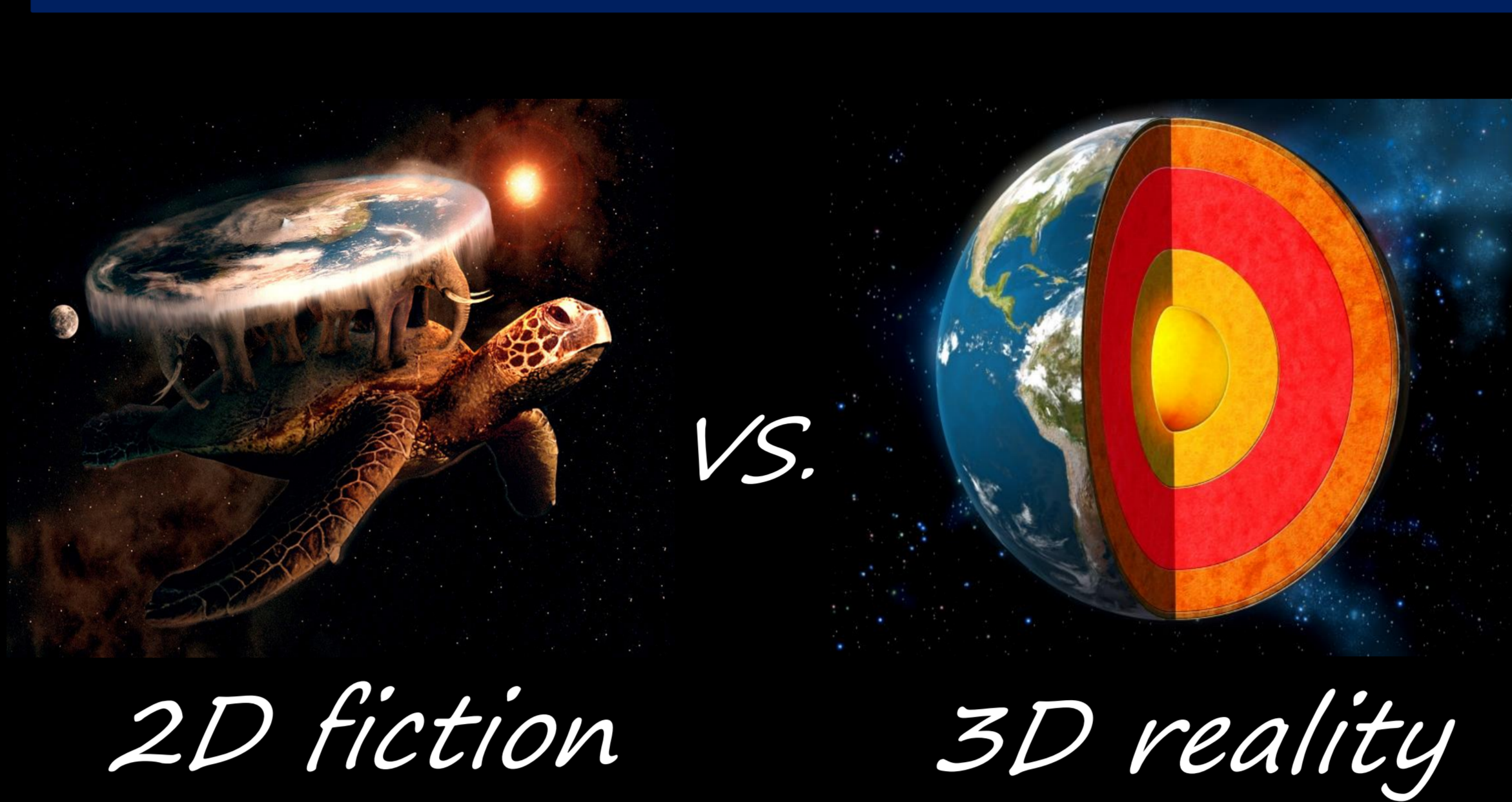


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### Glioblastoma Multiforme (GBM)

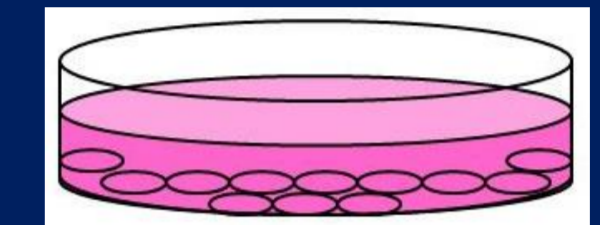
- The most common malignant brain tumour
- Average patient survival is just 12-14 months and has shown little improvement over the last 30 years
- A better understanding of the biology of this disease is needed in order to develop more effective treatments

### The Challenge



### Three Dimensions Are Better Than Two

Most research is conducted using cells that have been cultured in flat plastic dishes.

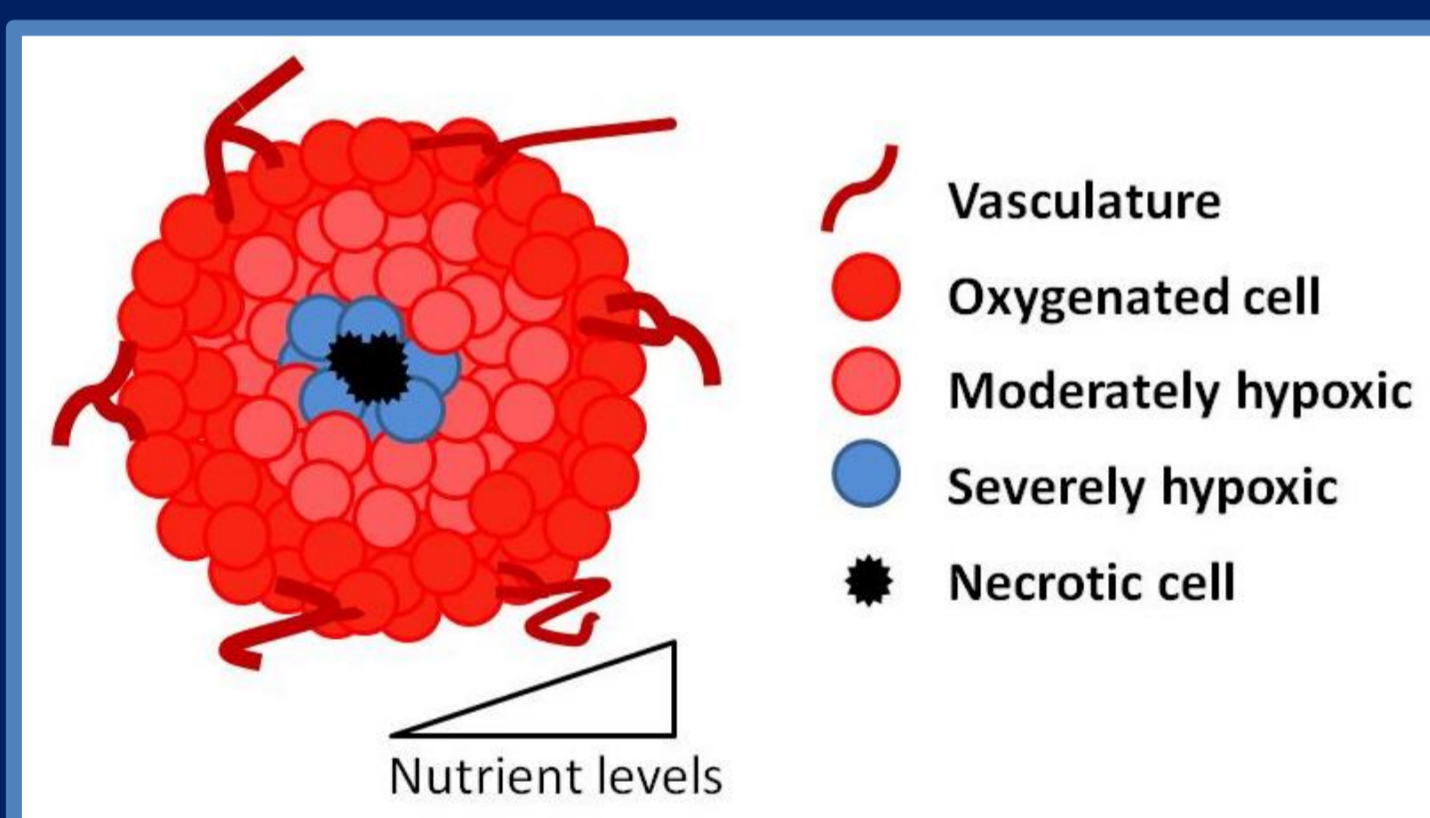


However:

- Genotype of cells cultured in 2D is very different to that of cells cultured in 3D and *in vivo*
- Response to drugs is also altered

### The Tumour Microenvironment

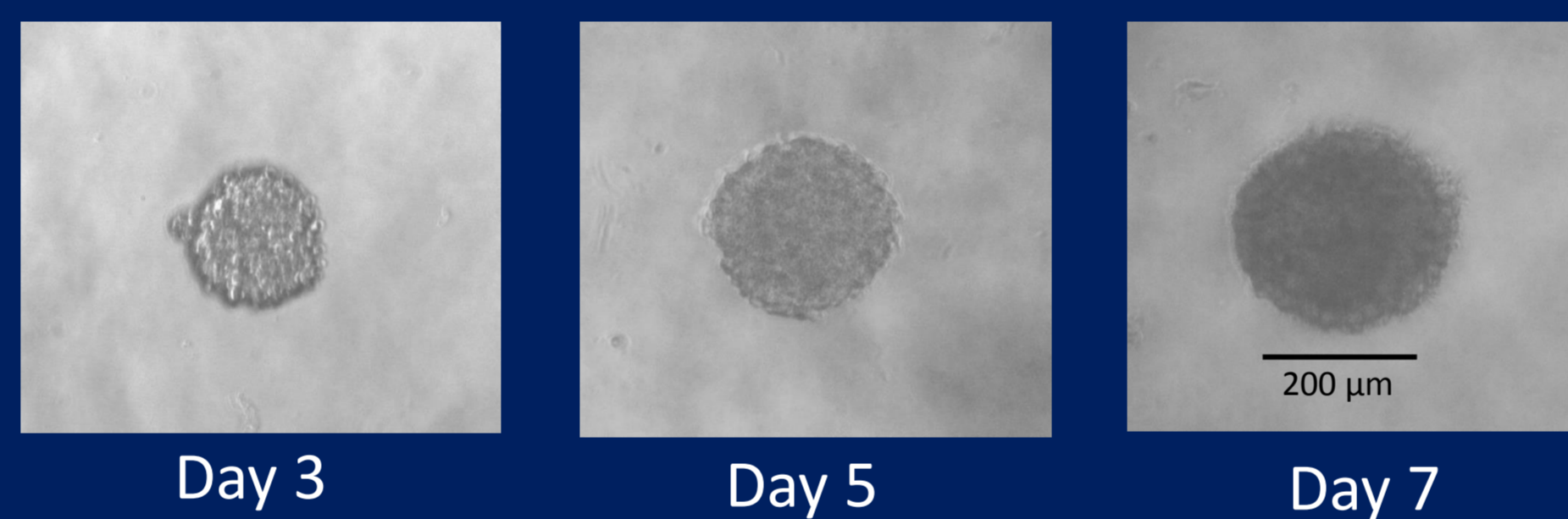
- Tumour cells experience gradients in soluble factors such as oxygen, nutrients, growth factors and cytokines



### The Multicellular Tumour Spheroid (MCTS) Model

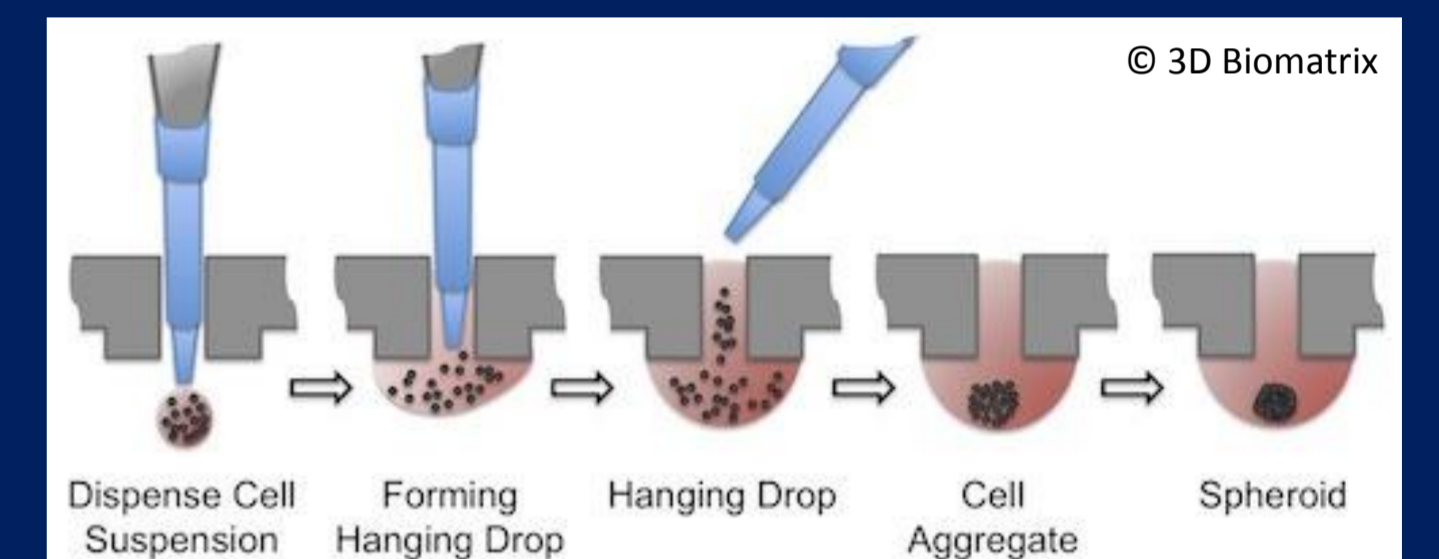
- Cells are grown as a 3D cluster in the absence of any scaffold or exogenous support
- Replicates important aspects of the tumour microenvironment

U87 MCTS



### Methods

- U87 MCTS were created using the hanging drop method



- After one week spheroids were fixed and frozen then sectioned
- Cellular proliferation, survival, hypoxia and metabolic markers were examined using immunofluorescence

### Spheroid Characterisation

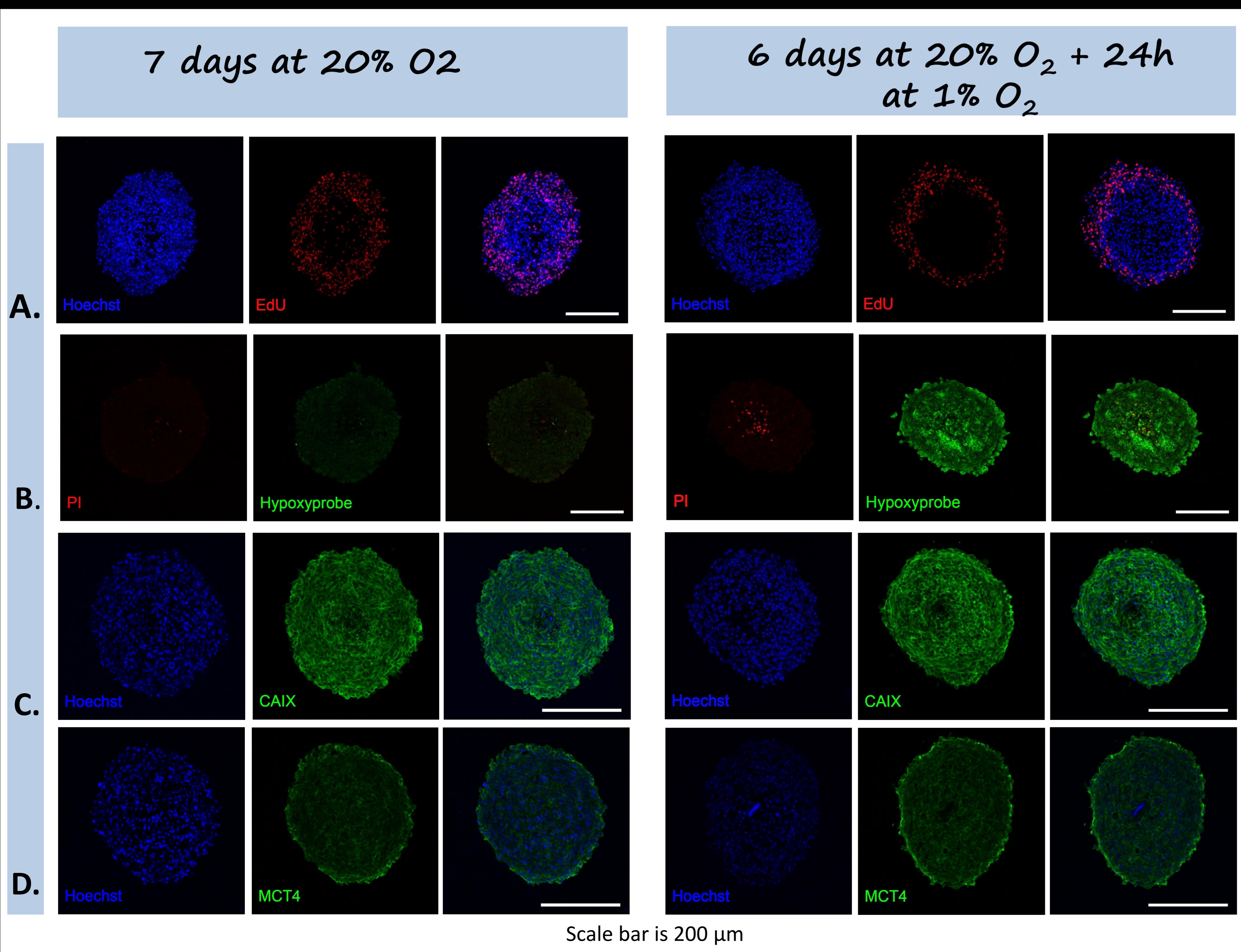


Figure 1. Characterisation of U87 MCTS grown in different oxygen conditions.

- Spheroids show a proliferation gradient which increases in hypoxia.
- Spheroids grown in hypoxia develop a necrotic centre (PI staining).
- Spheroids show homogenous expression of CAIX.
- Spheroids show an increase in expression of the lactate exporter MCT4 in the outermost layer of cells.

### Application of the model

Spheroids will be used to investigate glioblastoma cell migration and invasion in three dimensions using light sheet fluorescence microscopy