

Generation of a Physiologically Relevant Cancer Organoid Biobank



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Project Overview

As part of the Human Cancer Model Initiative, the Sanger Institute aimed to derive a physiologically relevant cancer organoid biobank from various types of cancers, including **colon, oesophageal, pancreatic, mesothelium, ovarian** and **gastric**. To develop new robust models, each line was propagated to a minimum of **25 million cells**, cryopreserved and then underwent quality control assays to assess the fundamental attributes of the disease model generated. Downstream applications included **CRISPR screening, IHC, RNA sequencing, Whole Genome Sequencing, Fluidigm QPCR** and **Drug screening**. The biobank is then made globally accessible through the American Type Culture Collection, **ATCC** biorepository.

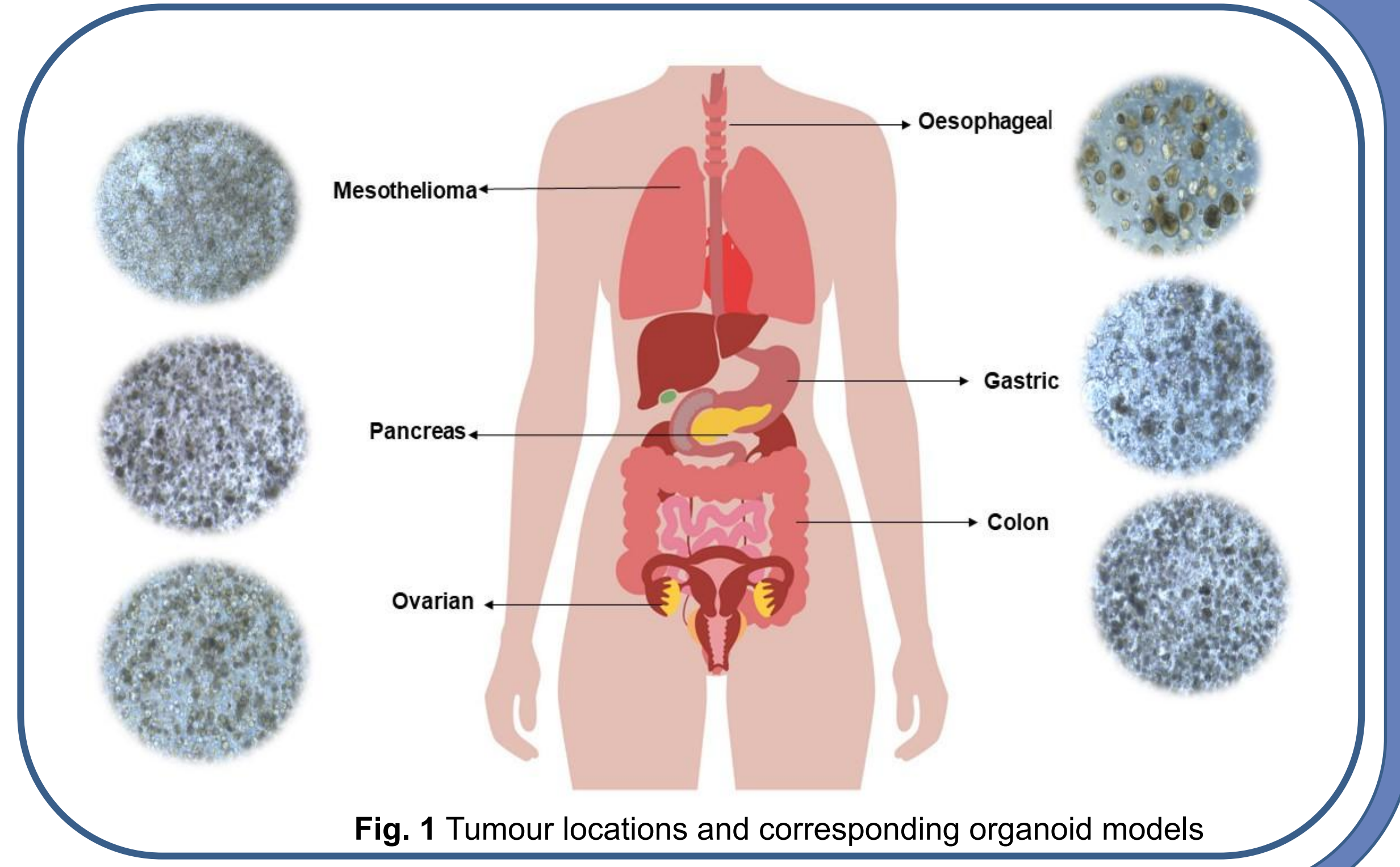


Fig. 1 Tumour locations and corresponding organoid models

Organoid Derivation Pipeline

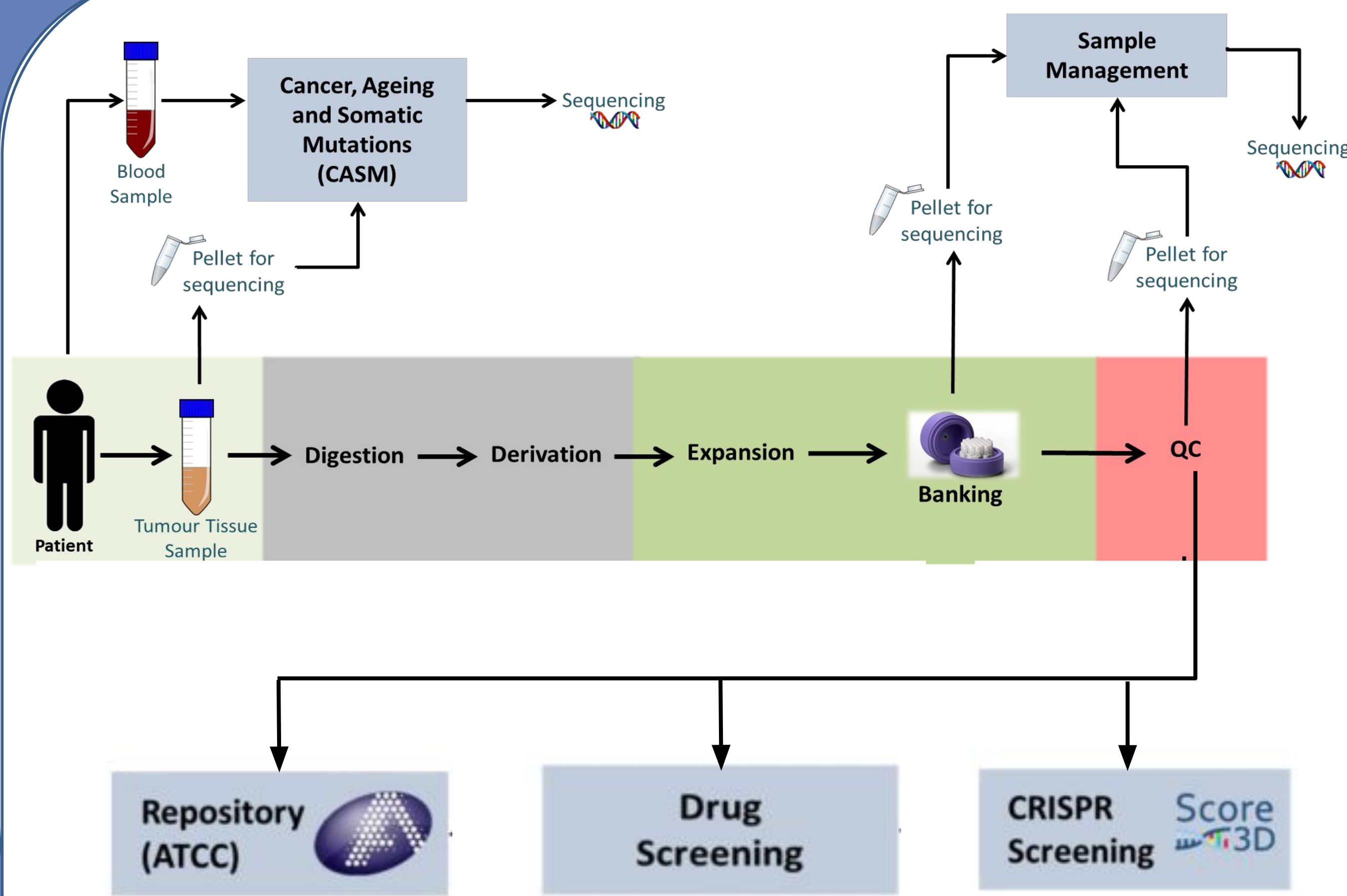


Fig 2. Process diagram of complete organoid pipeline

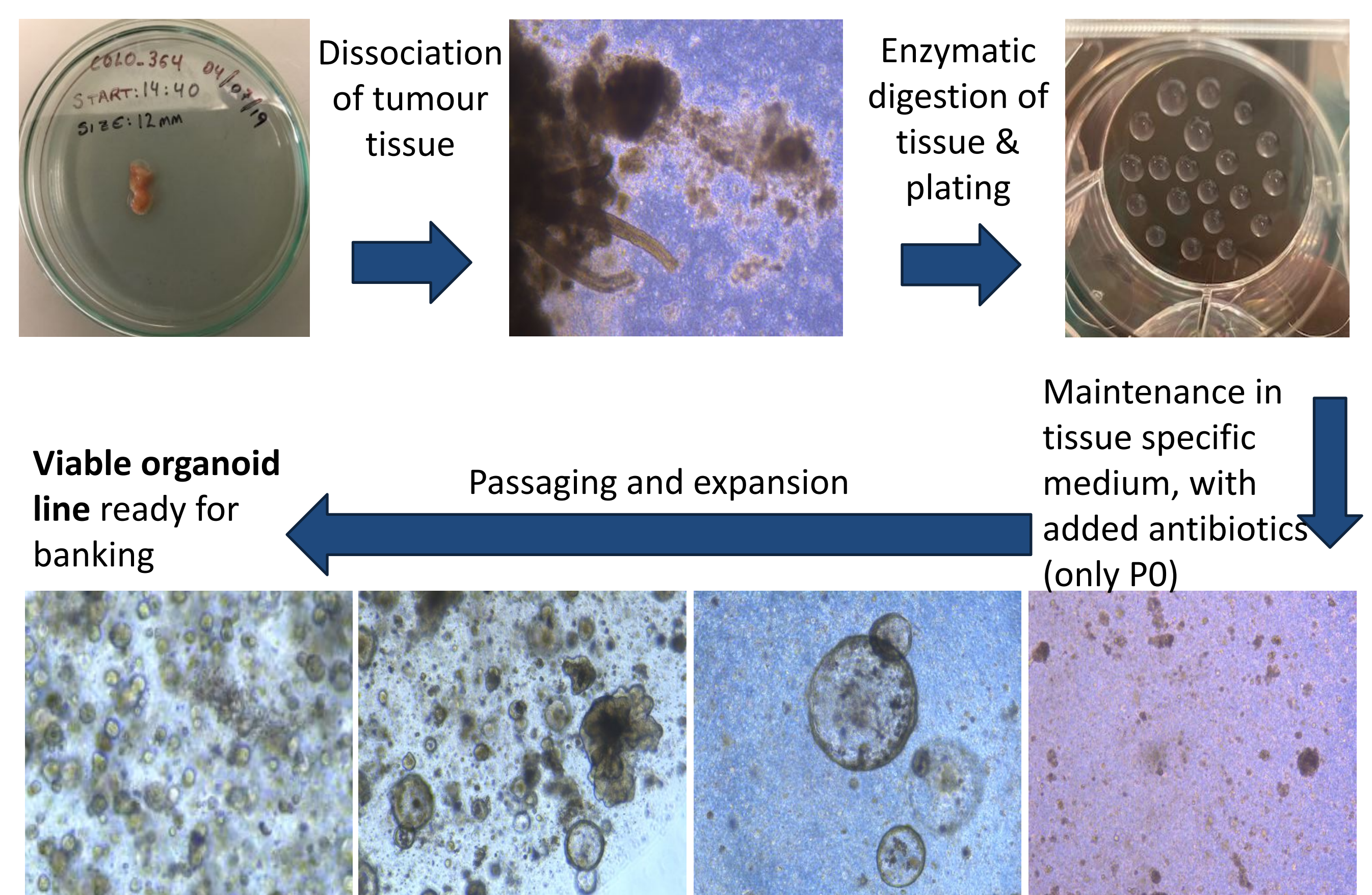


Fig 3. Derivation of patient derived tumour samples

Research and Development

- **Stability of Solid Tumour Tissue in MACS Tissue Storage Solution**- Allow and optimise storage of tissue samples for later processing of fresh tissues.
- Protocol development and optimisation for deriving **ovarian ascites**.
- **IncuCyte SX5 Live Cell Organoid Imaging**- The Implementation of High-Throughput Imaging-Based Proliferation and Viability Assays of 3D Cellular Organoid Models to Optimise the Efficiency of Quality Control.
- **Tissue Dissociation using Gentle MACS**- Testing of tissue dissociator to optimise and standardise digestion process.
- **Automation of organoid plating**- Use of bioprinter to automate processes.

Project Update

After successfully banking **280** cancer organoid models the project reached its completion in October 2023. The focus was then shifted to deriving models from Ovarian, Gastric and Mesothelioma for enriching the existing under-represented biobank. Having achieved the milestone, the project is now focusing on sending QC-passed models to ATCC and also returning models back to host clinical sites.

Lines Banked so far: 280

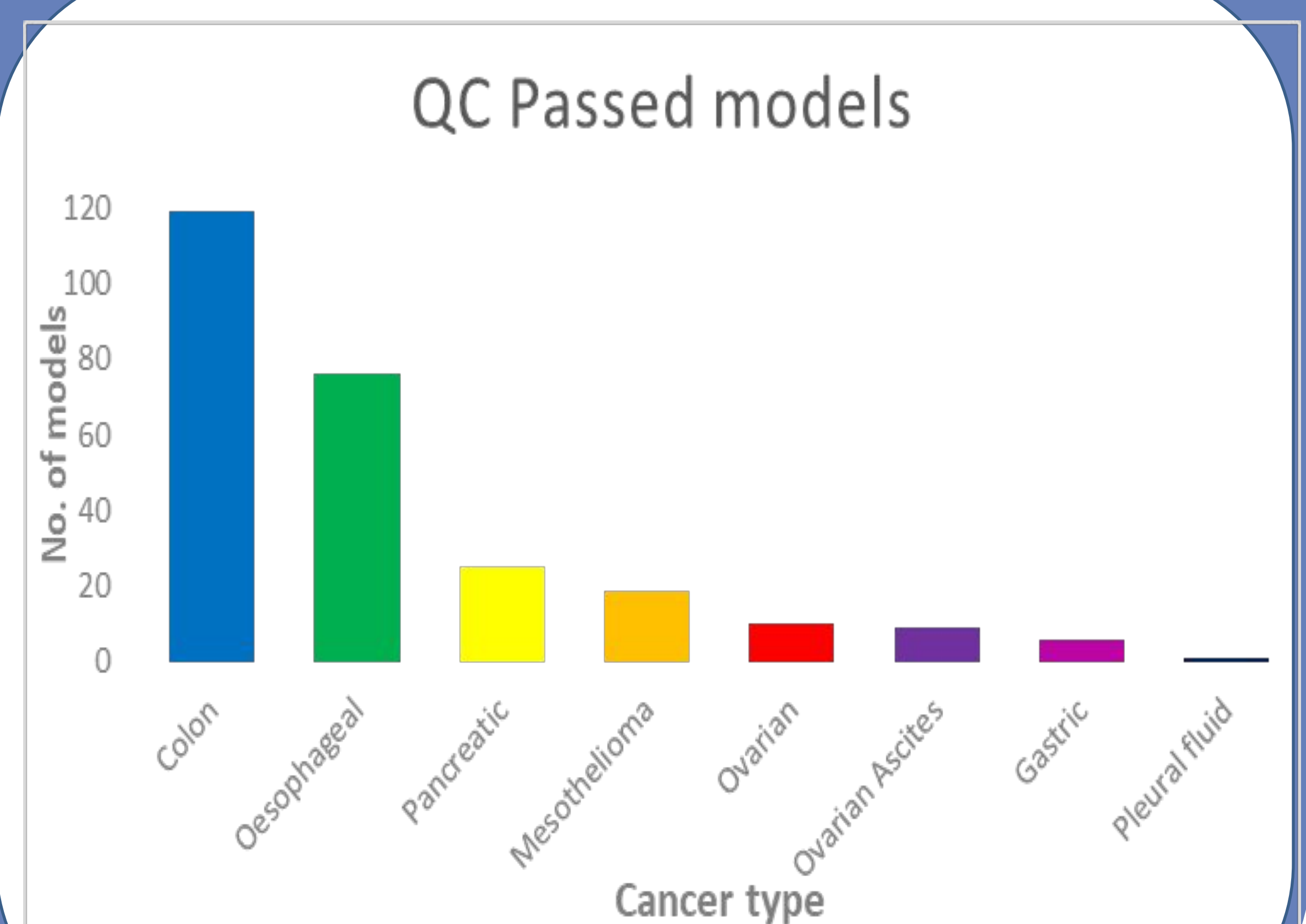


Fig. 4 Total Banked organoid lines

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