



Carcinotech Ltd.
Roslin Innovation Centre, Easter Bush Campus,
Midlothian, United Kingdom, EH25 9RG

T: +44 (0) 131 651 9678
E: info@carcinotech.co.uk
W: www.carcinotech.co.uk

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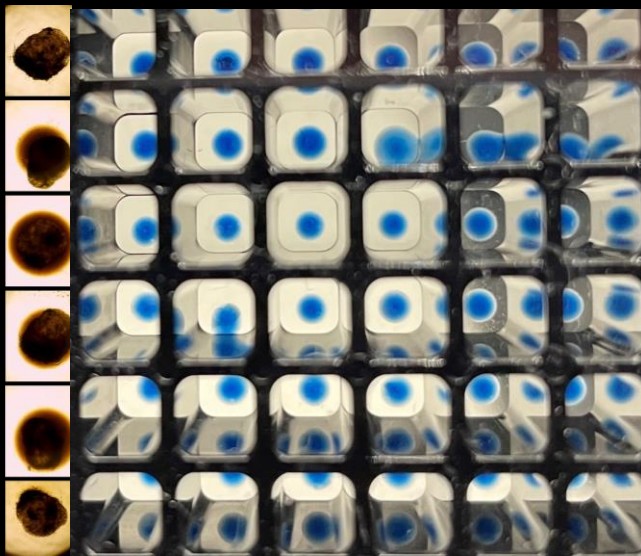
@Carcinotech

OVERVIEW

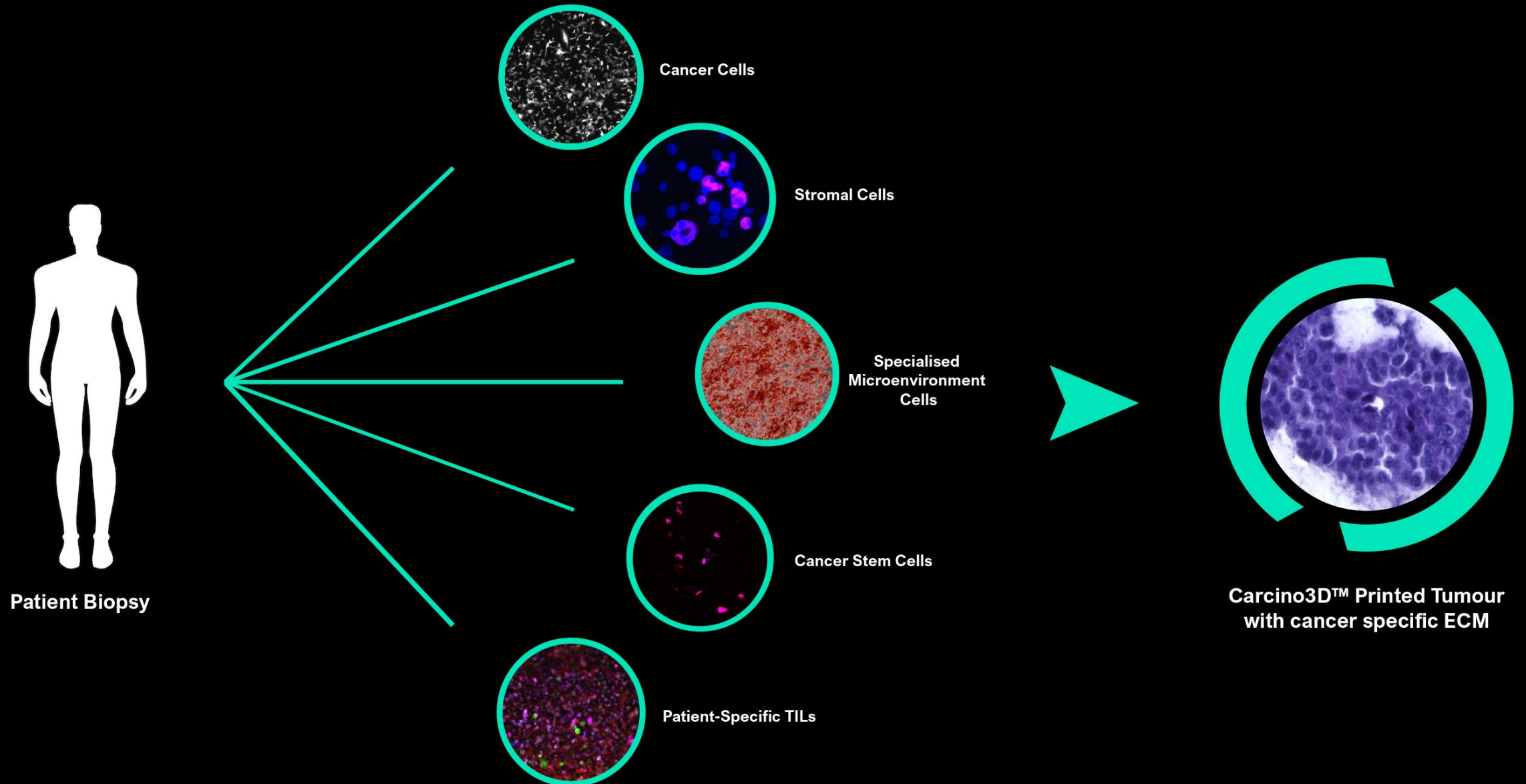
Carcinotech is reinventing cancer research by manufacturing 3D printed living tumours using patient-derived biopsies, primary cells, immune cells and cancer stem cells.

Carcinotech's advanced printed tumours provide a platform for rapid, ethical, and accurate drug screening, pre-clinical and personalised medicine testing. Working with global partners, leading pharma companies, surgeons, pathologists, clinicians, and industry-leaders, the goal is to accelerate drug screening and enable delivery of more effective cancer treatments to market.

Access to Carcinotech's robotic and automated manufacturing allows for accelerated production, with the printed tumours offering high-throughput capabilities.



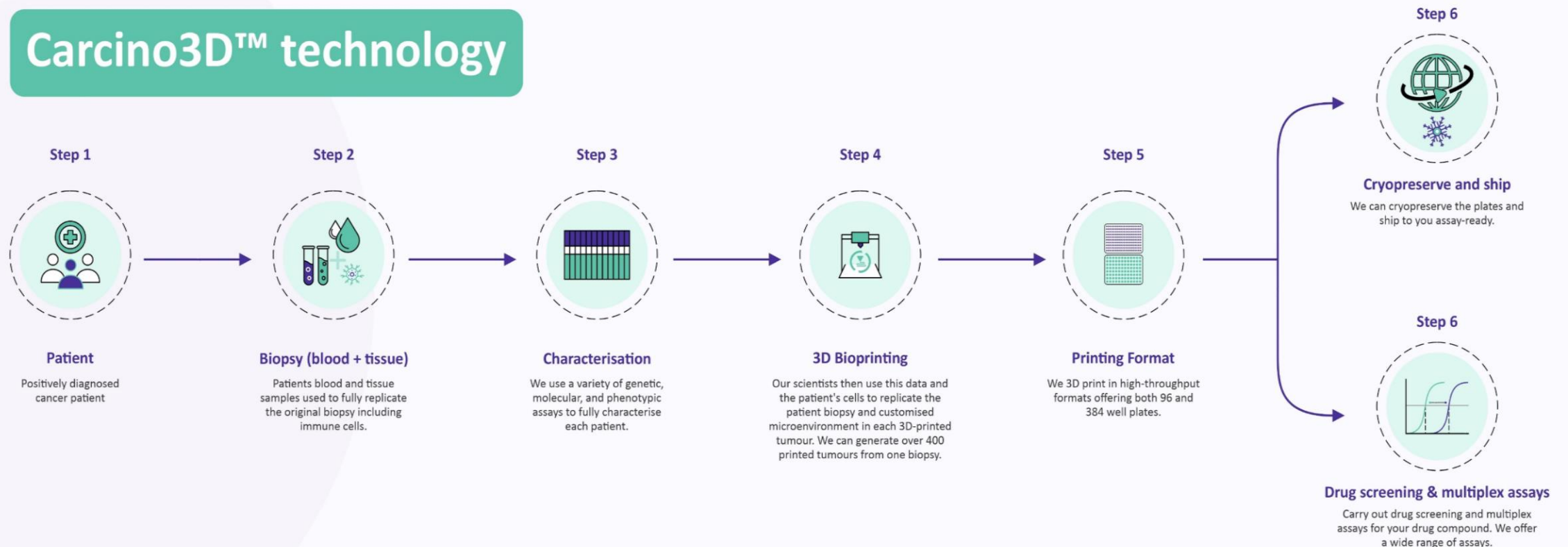
PRINTED TUMOUR COMPOSITION



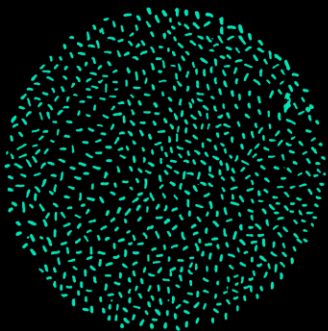
WORKFLOW

Our Carcino3D™ printed tumours offer a platform for in vitro high-throughput, accurate and rapid drug discovery and screening for novel, combinatorial and repurposed drugs. The printed tumours can be used for drug efficacy, drug pathway, and cytotoxicity testing. They are bioengineered to de-risk cancer drug testing and pre-clinical trials offering translational data with respect to cancer heterogeneity and microenvironments. As we obtain patient biopsies and blood from a diverse patient population, we are able to predict immune responses and perform personalised medicine testing predicting the right treatment options for patients.

Carcino3D™ technology



VALUE PROPOSITION



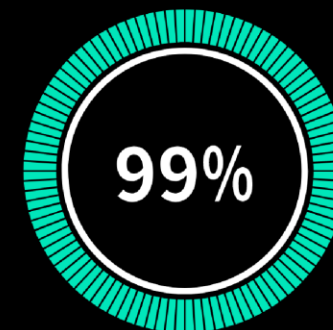
Access to highly innovative 3D-printed tumours developed from patient biopsies where we can generate >400 printed tumours from 1 single patient biopsy. This means pharma companies and CROs can test over 400 compounds for 1 patient in a single test. Currently, efficacy studies involve the use of approximately 50 animals. With our solution pharma and CROs can replace this with printed tumours from 100 patients, providing more accurate and robust data.

We can print 96 tumours in 10 minutes, faster than any of our competitors, and then we are able to predict treatment responses within 21 days of receiving the biopsies (as opposed to 3+ months for standard organoid models). Current pre-clinical testing costs pharma companies and CROs on average \$7 million and 6 years. With our technology pharma and CROs can perform pre-clinical testing for 100 patients, for an estimated \$2.5 million, within 2 years.



We are first to market with the ability to include patient-specific immune cells, meaning we are able to predict the immune response for each drug tested. Current failure rates are 90% at the early drug discovery stage and 80% at the pre-clinical stage. By providing a more representative and quantifiable immune response, we aim to reduce these rates by 5-10%.

As a result of our speed and precision, rare mutations and rare cancers are represented, with ~99% genetic and cellular compositional similarity between original biopsy and printed tumours. This means pharma companies and CROs can test their drug compounds with confidence knowing that mutations and cell types, will be retained.



CARCINO3D™ PRINTED TUMOUR ADVANTAGES

Carcino3D Printed Tumour

Quick to be assay-ready for drug testing



Assay-ready in 7 days

Replicate patients immune cell population



Replicates patients tumour micro-environment (TME)



~99% similarity between original biopsy mutations and printed tumours



Reduces the need for animal testing



Replaces the need for PDX or In-Vivo Models

Suitable for personalised medicine



Predict treatment responses within 21 days

Reduce variability in large scale testing



>400 printed tumours from 1 patient biopsy

Available in high-throughput formats



96 & 384 well formats ~ 90% consistent

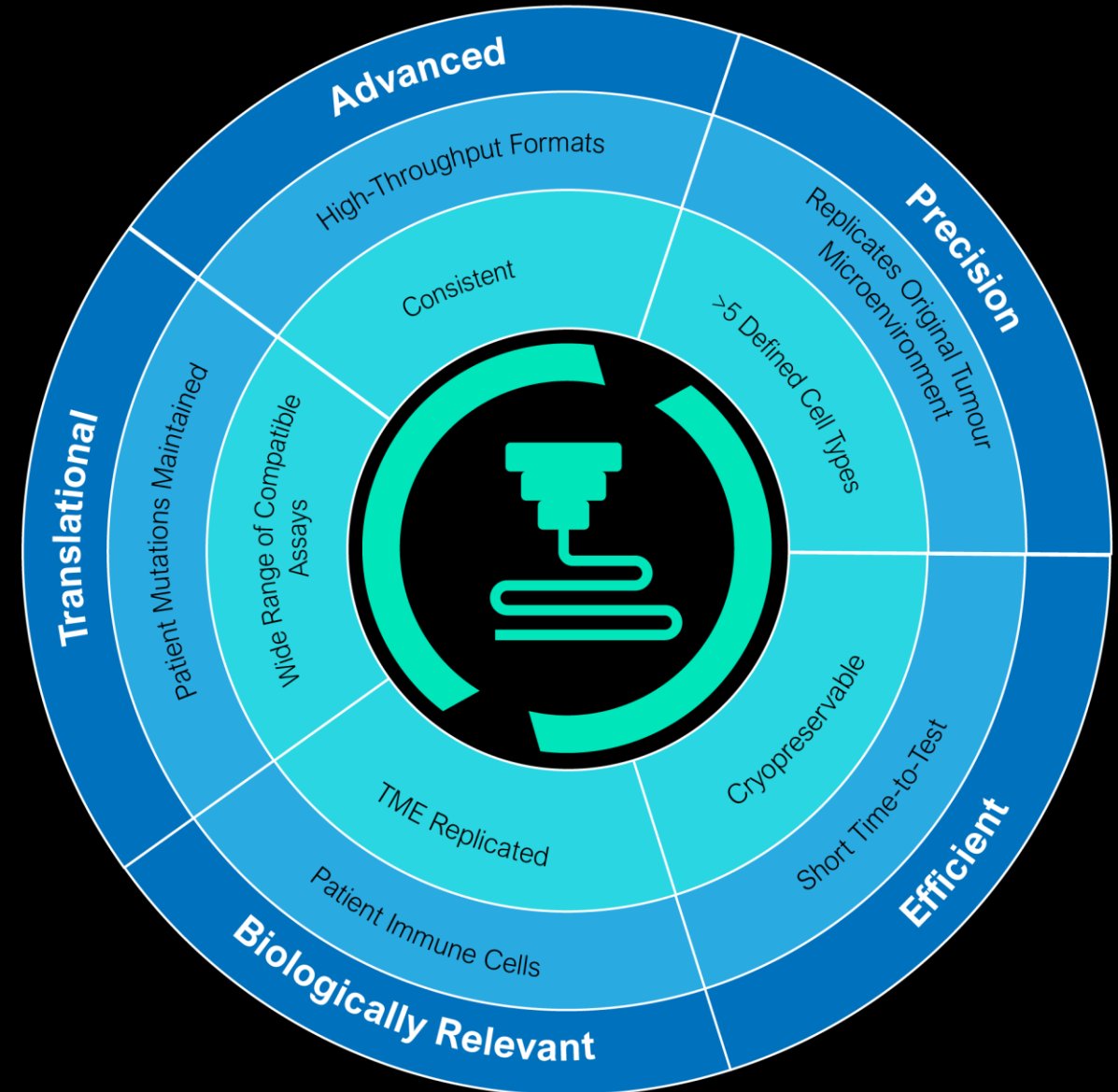
Cryopreservable & can be shipped worldwide



Maintain rare cancer mutations



Suitable for multiplexing and imaging assays



AVAILABLE CARCINO3D™ PRINTED TUMOURS



Carcinotech has developed printed tumours for brain, breast, lung, ovarian and colorectal cancers with characterised patient populations and mutational status. Carcinotech's diverse library of patient populations allows us to develop accurate 3D-printed tumours for precision drug screening. Alongside the five cancers, Carcinotech can offer models of any solid tumours and is also interested in modelling rare cancers.



Lung Cancer

Non-small cell and small cell subtypes available



Brain Cancer

Glioblastoma printed tumours with rare mutations available



Breast Cancer

Triple-negative, HER+2 and luminal A subtypes available



Colorectal Cancer

Adenocarcinoma with MSI status available for each patient



Ovarian Cancer

High-grade serous, endometrioid and clear cell carcinoma available

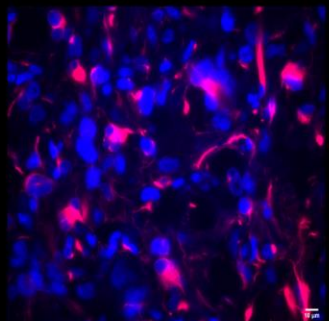


Custom

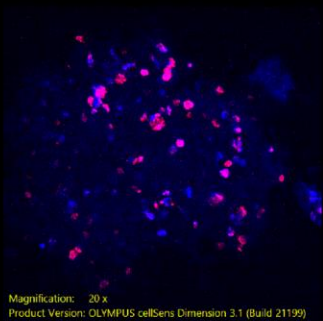
We can work with cancers of your choice and develop printed tumours from other solid tumours and rare cancers

ORIGINAL TUMOUR VS BIOPRINTED TUMOUR

PHENOTYPIC TME Profiling

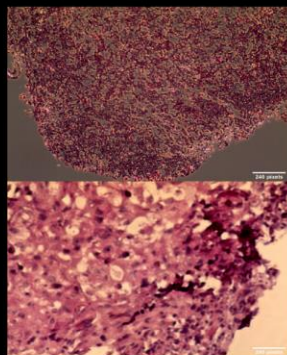


GBM Biopsy clinical sample:
DON001 Biomarker- GFAP
(astrocytes)

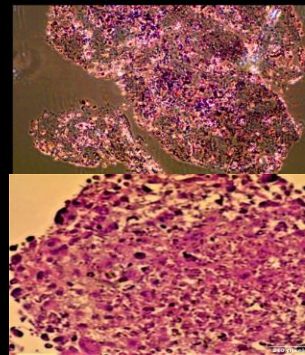


GBM bioprinted tumour
ID: B21_042 Biomarker-
GFAP (astrocytes)

HISTOLOGICAL



GBM Biopsy clinical
sample: DON001

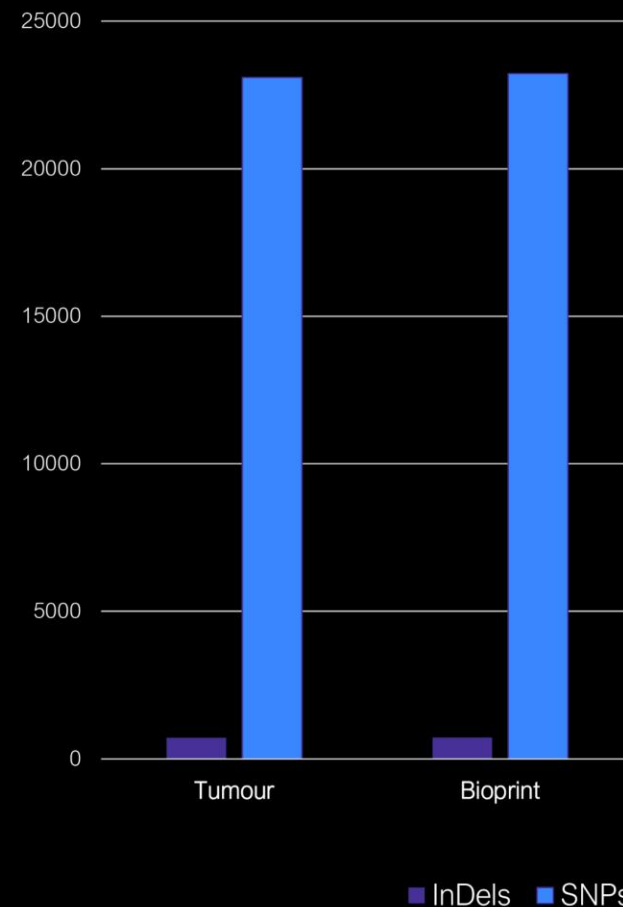


GBM Printed tumour
ID: B21_042

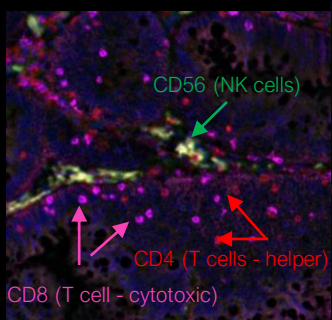
GENETIC

>99% similarity between tumour and 3D-bioprinted tumour

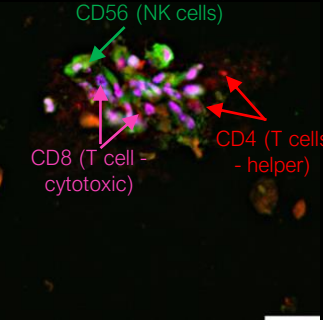
Changes in coding regions



PHENOTYPIC TIL Profiling



Colorectal cancer Biopsy
clinical sample: DON013



Colorectal cancer bioprinted
tumour ID: B017

DAPI (cell nuclei) CD8 (T cell - cytotoxic) CD4 (T cells - helper)

CD56 (NK cells)

DRUG RESISTANCE

GBM CULTURE	Cisplatin IC ₅₀ (Mean ± SEM)
2D CANCER CELLS	12.9 ± 2.5 μM
2D CANCER STEM CELLS	20.1 ± 3.5 μM
3D SPHEROIDS	111.0 ± 16.8 μM
3D PRINTED TUMOUR	> 200 μM

Resistance increase



OUR ASSAYS

Carcino3D™ printed tumours self-form and are ready to test within 7-14 days of printing. These can be manufactured to order, cryopreserved, and delivered assay-ready to your labs. Our team of 3D oncology experts can customise these according to your drug testing needs e.g. specific patient populations, mutation types, drug targets or treatments. Our technology can be used for various assays mentioned below and we also offer these assays if you would like us to test your drug compounds.

Biological

Tumour Invasion/
Migration

Cell-Cell interaction

Cell-ECM interaction

Hypoxia Assessment

Drug Interaction

Drug Pathway
Identification

DNA Damage &
Cytotoxicity

Immunotherapy
Testing

Viability &
Apoptosis

Phenotypic

Immunohistochemistry

Immunofluorescence

Cytokine Analysis

Cell Painting

Genomic

RNA Sequencing

Whole Exome
Sequencing

Whole Genome
Sequencing

CASE STUDIES

Cancer Institute (UK)

■ **GBM**
■ **Ovarian Cancer**

Drug Discovery Project

The Cancer institute were looking for physiologically relevant GBM and Ovarian printed tumours (with a focus on cancer stem cells) for early drug discovery using imaging. Our GBM and Ovarian printed tumours were used for medium-throughput screening.

Successful Outcome

Several successful hits were generated. These were able to move forward to later stages of testing within a couple months, rather than 6-8 months. Positive testimonial from their scientists confirmed the benefits of our advanced offering - over competing organoid technology

Contract Research Organisation (USA)

■ **Breast Cancer**
■ **Colorectal Cancer**

Lead Generation Project

A USA-based CRO approached Carcinotech to develop patient-specific Colorectal and Breast cancer printed tumours in 384 well plates. These printed tumours were frozen and shipped to them for imaging-based drug screening.

Successful Outcome

The CRO were able to screen multiple compounds with a single test for 20 different patients and subtypes of Breast cancer (we provided TNBC, HER2+ and Luminal A subtypes). We also provided MSS and MSI Colorectal cancer subtypes.

They were able to take this forward to later stages of drug testing and generate data with a varied patient population.

Pharma Company (EU)

■ **Rare Mutation Lung
Cancer**

Efficacy Study Project

A major European pharma company had developed a small molecule for NSCLC patients with a specific rare mutation. Only 15% of the population with NSCLC have this mutation. Carcinotech were able to source 13 patient samples and create 2 x 96-well plates of bioprints per patient, with mutations represented in each. Carcinotech performed drug testing in-house and provided data to the company.

Successful Outcome

The pharma company received precision-focused drug testing data for their cancer & mutation of interest, with detailed and in-depth analysis.

The efficacy studies for the project resulted in the pharma company moving one year quicker through pre-clinical testing using the data provided by Carcinotech.

WHY WORK WITH CARCINOTECH

Access to highly innovative 3D printed tumours which are patient derived with high-throughput manufacturing



Decrease your pre-clinical and testing timelines significantly, test drugs ethically with better quality and more disease relevant data



De-Risk your cancer drug testing at the initial stages to avoid failures in clinical trials



Phenotypic screening, cell painting and 3D assay compatible. Compatible with all existing and advanced machines found in laboratories for high-throughput



Potential to have patient-specific drug treatments going through clinical trials



No limit on 3D printed tumours as compared to standard tumour biopsies which are limited (often difficult to source), precious, expensive and invasive



Combinatorial, repurposed drugs tested rapidly, with the ability to offer irradiated models



Immuno-oncology models offered with patient-specific immune cells, and can be used for testing vaccines (including cancer vaccines) and immune therapies



Best customer service offered with our 3D oncology experts and dedicated project managers ready to offer project related support

