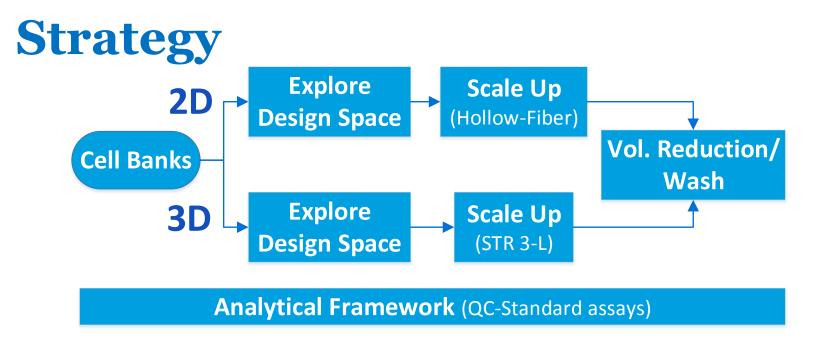
Terri Gaskell, Jahid Hasan, Daria Popova, Mark Bell, Evangelia Rologi, Marcia F. Mata, Iris A. Valero, Rhys Macown, Matthew Smart, Alexia Toufexi, Mudith Jayawardena, Nicole Nicholas, Ricardo P. Baptista

The Cell and Gene Therapy Catapult, 12th floor Guys Hospital, SE1 9RT, London Presenter contact: Terri.Gaskell@ct.catapult.org.uk

Introduction Cost of Goods and process complexity are key challenges for the commercialisation and competitiveness of PSC derived allogeneic therapies. Our Cell Plasticity Platform Programme aimed to design automated processing solutions for the controlled, scalable, and affordable expansion of PSCs in 2D and 3D culture systems. Work is centred around starting materials compliant with industry-standards and development of exemplar processes for scalable expansion with integrated downstream of volume reduction and cell wash.





Quality

Scaling

8

Automation

Flexibility

Cell Banks

Expansion

Shef6.1-LN/E8
P52 (day4)

Nanog

Trai81

OCT-3/4

99.80%

OCT-3/4

17

OCT-3/4

10°

OCT-3/4

10°

OCT-3/4

10°

OCT-3/4

10°

OCT-3/4

10°

OCT-3/4

RCiB10-E8/VTN
P39 (day4)

SSEA4

Nanog

2001m

2001

P17-24 P25-33 P34-46 P47-56

Research-grade banks of exemplar iPSCs (CGT-RCiB10) and ESCs (Shef6.1) adapted to adherent culture in defined reagents have been generated and characterized to industry standards. Stability of iPS cells was tested by monitoring CQA's up to passage P56.

iPSC production
Quantum® Bioreactor

A Predicted
A Harvest

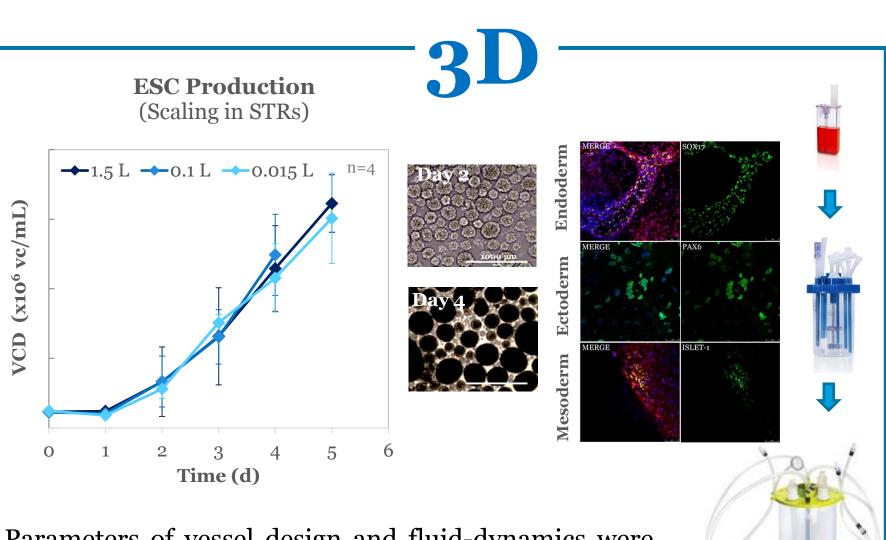
CAPEX
Labour

COGs
Throughput

1 67%

COGs
Throughput

By predicting cell numbers based on a metabolite read-out it was possible to automate and up scale the iPSC expansion in the Quantum bioreactor with efficient usage of medium.



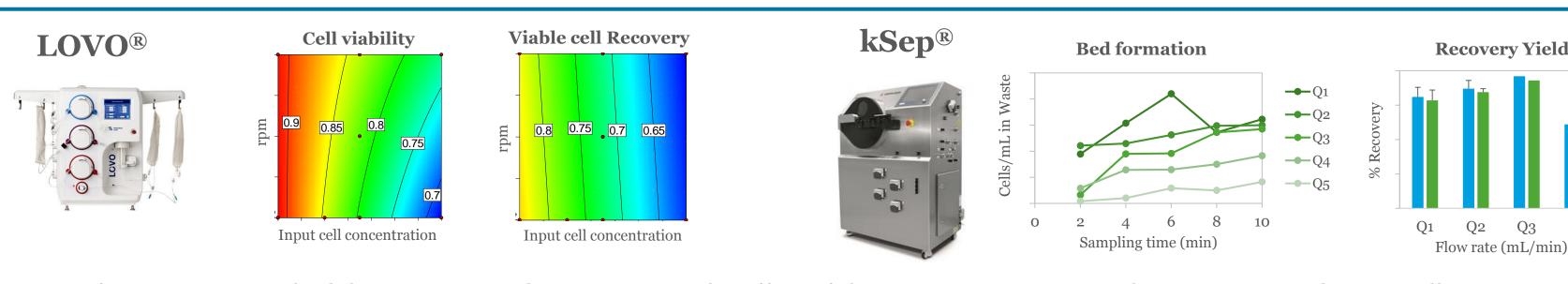
Parameters of vessel design and fluid-dynamics were used to scale up the agitation rate for the aggregate-based culture of ESCs in from 15 mL (ambr®15) to 3-L (CellReady®) STRs.

egateto 3-L

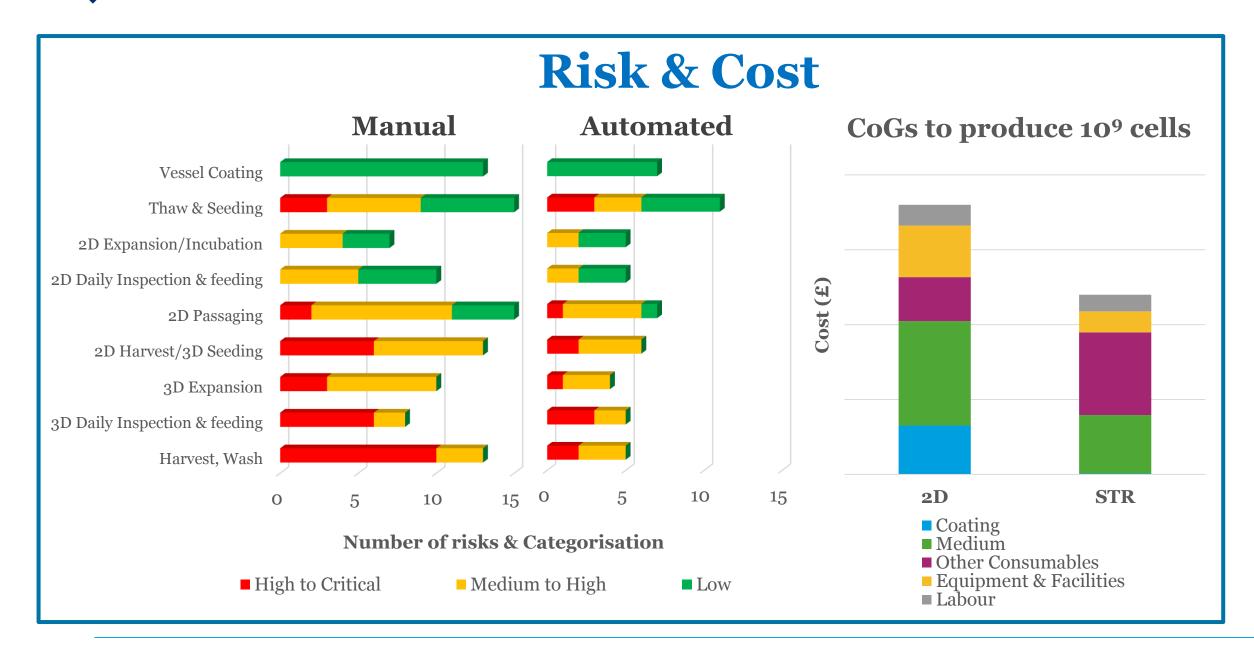
Recovery Yield

■ Total Cells ■ Viable Cells

Downstream



Design-of-Experiment methodologies were used to investigate the effect of the process parameters Filter-spin rate and Input cell concentration on the recovery of viable cells after closed and integrated steps of volume reduction (concentration), wash, and formulation of PSCs with the Lovo® unit. Similarly, bed establishment and processing flow-rates (Q) were screened for achieving >80% recovery of viable cells with the kSep®.



Summary

- ☐ We have established exemplar processes for the scalable and controlled culture of PSCs in single-use hollow-fibre and STR systems.
- ☐ We demonstrate technology feasibility to integrate the steps of volume reduction, wash, and formulation for flexible and rapid downstream processing.
- ☐ Increasing the level of automation reduced process risks and cost
- ☐ Current development strategy is focused on exemplar processes for seamless expansion and differentiation

Cell Bank Expansion Differentiation Recovery

We work with Innovate UK