

From 50 million to 15 billion human iPS cells within a week

highly reproducible exponential iPS expansion in 10L bioreactors with maintenance of cell quality.

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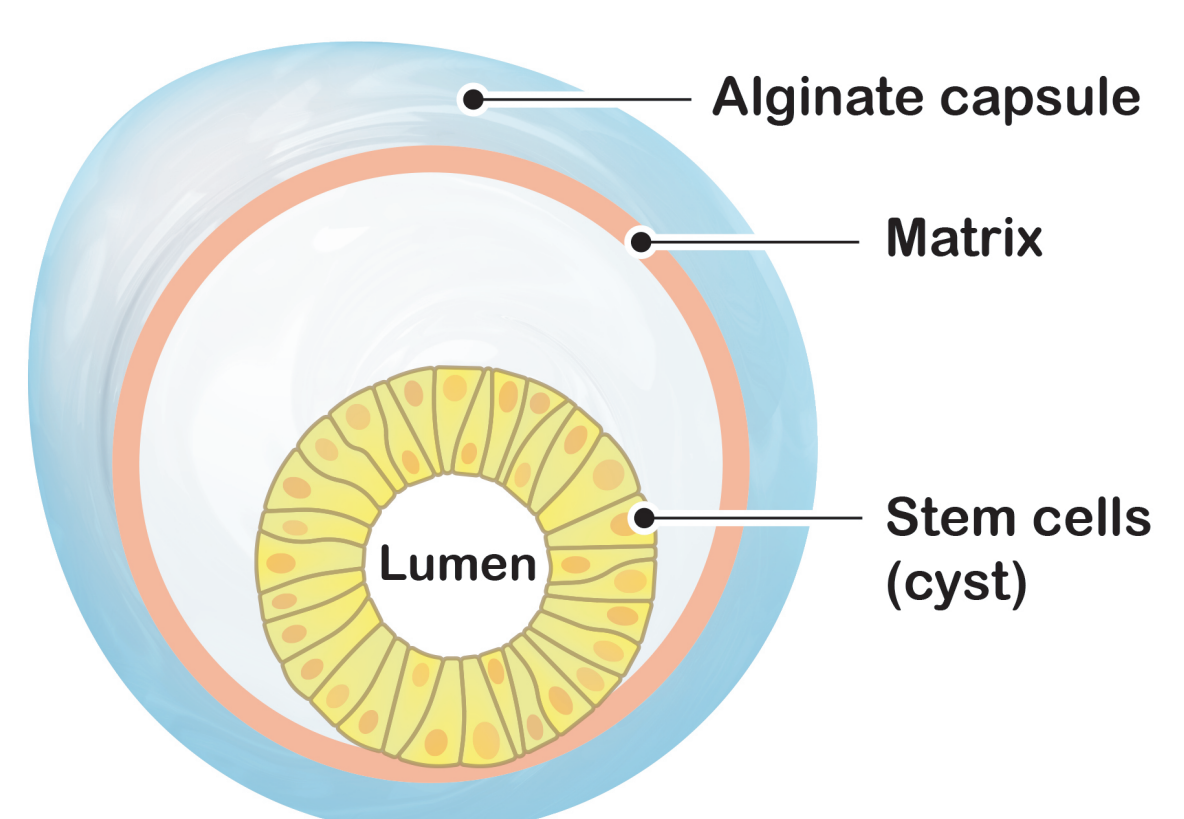
Introduction

So far, only a few teams have publicly shared results showing the successful cultivation of pluripotent stem cells in large-scale bioreactors. Here using new technology based on high-speed cell encapsulation microfluidics, we report a 276-fold amplification of hiPSCs over 6.59 days in a 10L bioreactor with best-in-class cell viability and pluripotency.

High-throughput cell encapsulation of 50M hiPS cells

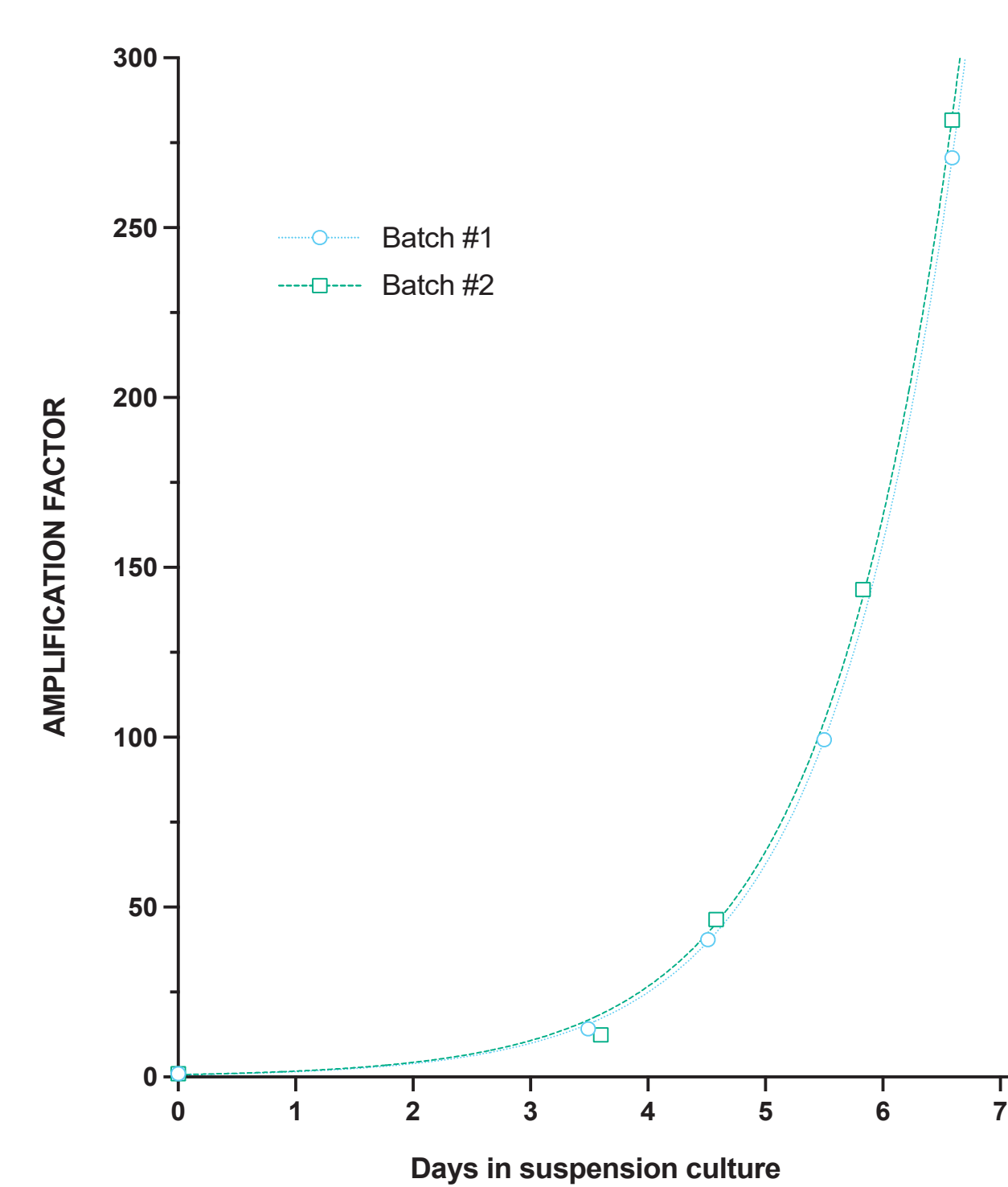


Automated closed system for industrial scale stem cell encapsulation



Core-shell alginate capsule with biomimetic micro-compartment for epiblastoid culture

276-fold amplification of hiPSCs in a 10L bioreactor with striking reproducibility

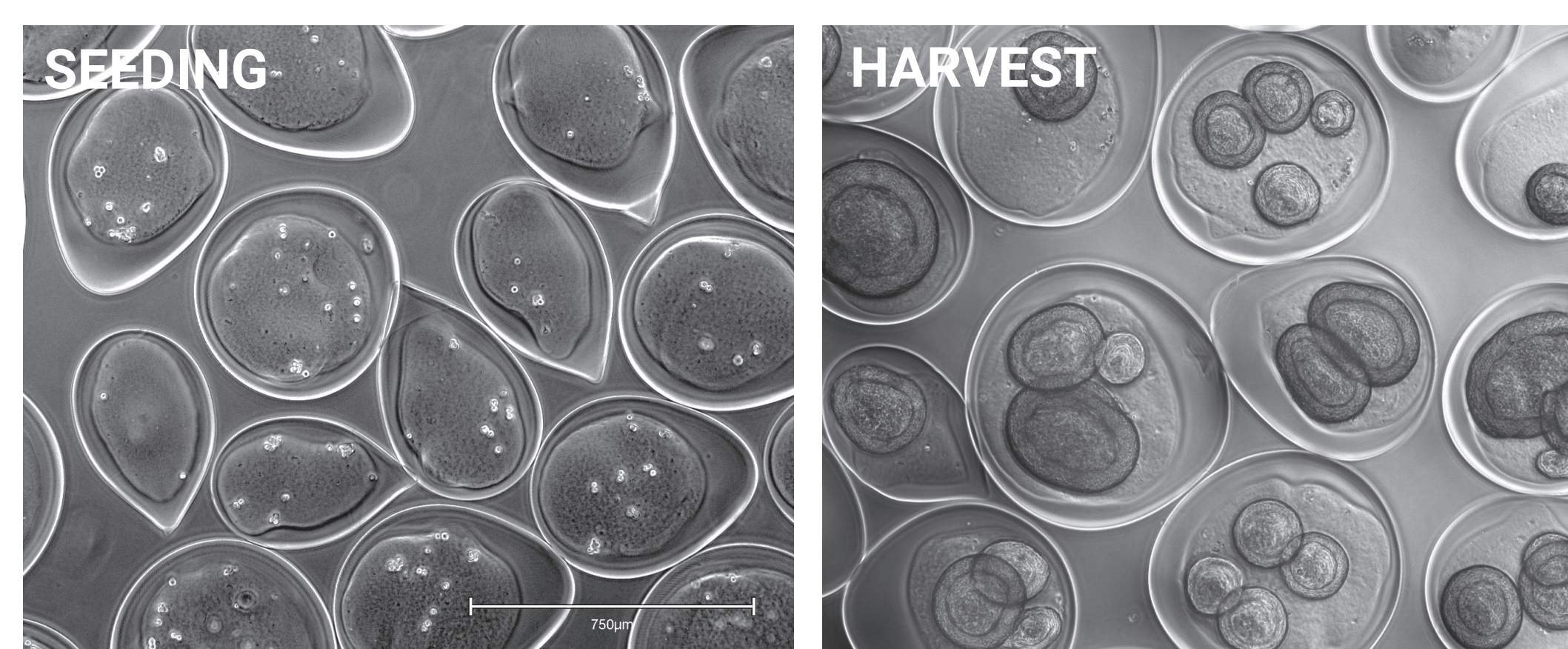


Seeding
50M hiPSCs

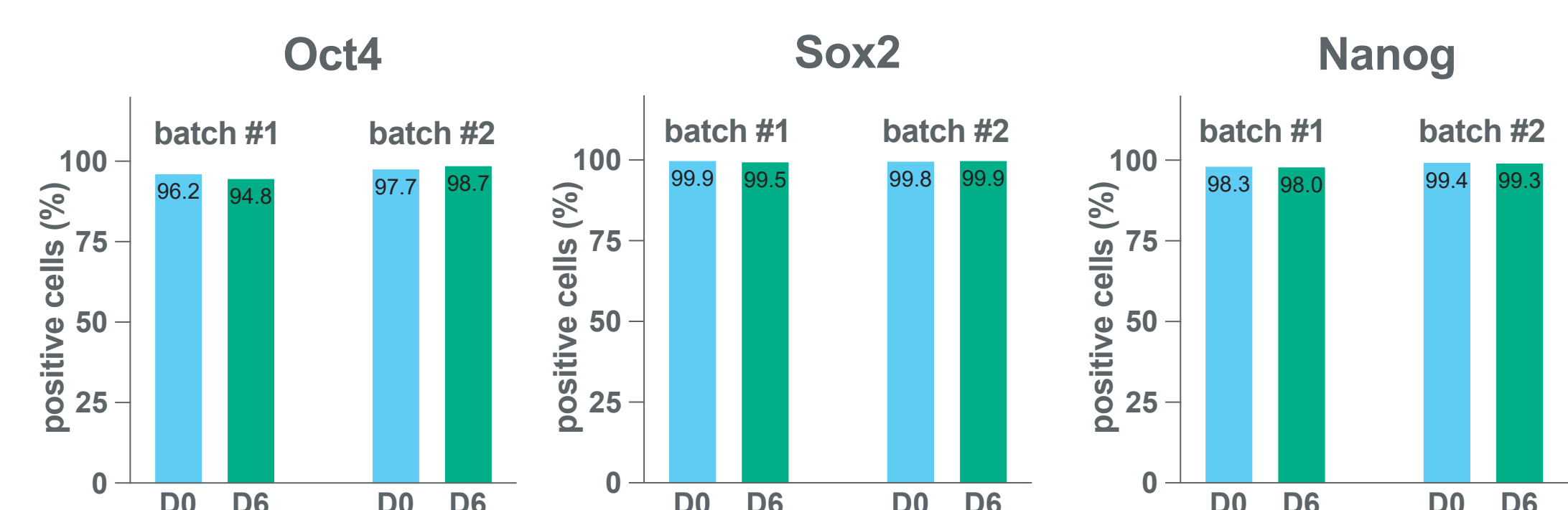
Output
15B hiPSCs

Population doubling time
19h

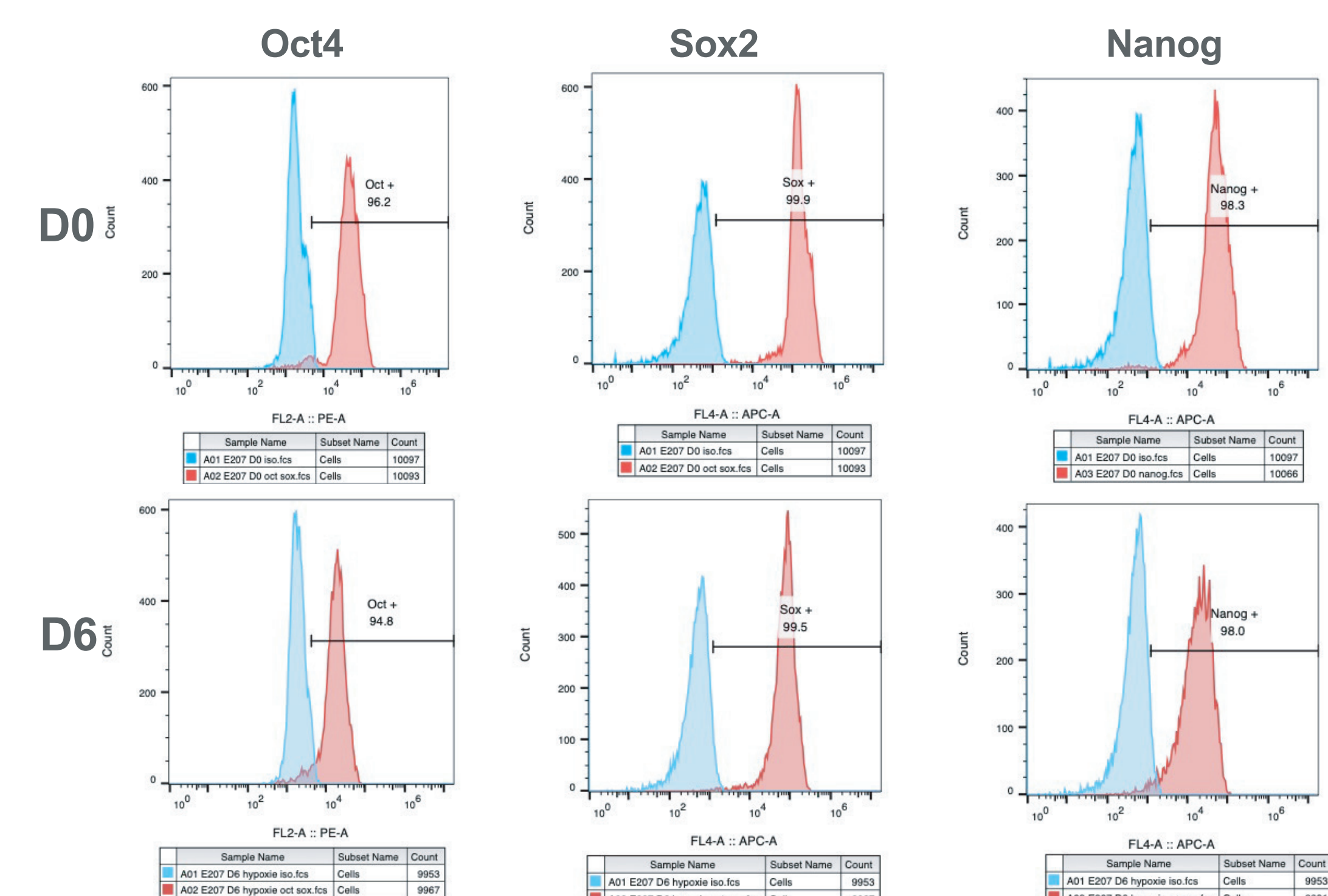
Final viability
98,8%



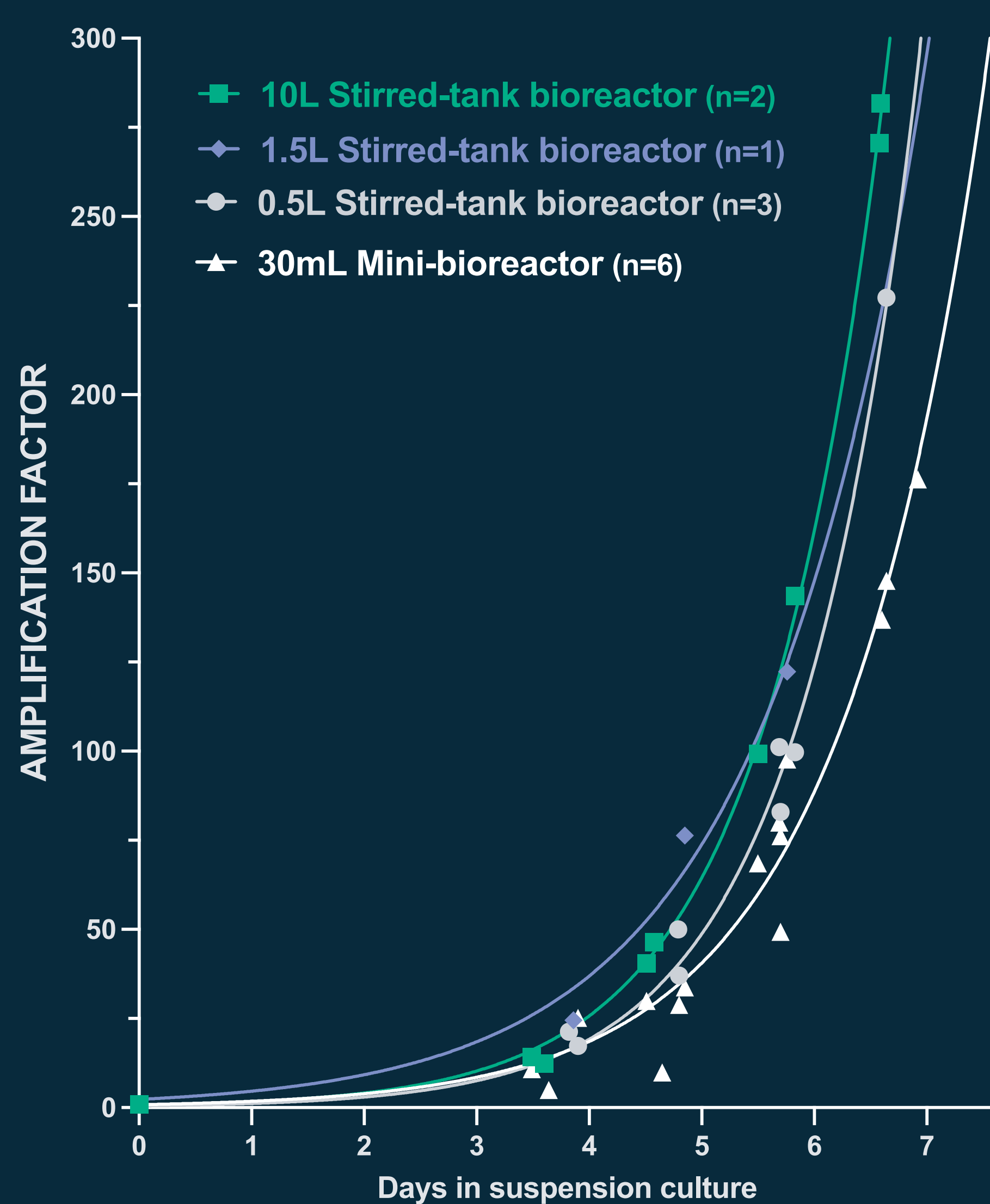
Exponential hiPS cell expansion in bioreactor with conservation of stemness



FACS Plots of Batch #1



C-Stem™ enables ultra-fast scale-up to 10L bioreactor with exponential hiPSC amplification



The same exponential amplification profile was observed across a broad range of bioreactor scales, without optimization, demonstrating that C-Stem™ constitutes a highly scalable and reproducible technology for hiPSC mass-production.

The iPS cell line IMAGINI005 previously characterized¹ at Imagine Institute iPS platform was used.

Conclusion

Here, we report the unprecedented 276-fold amplification of hiPS cells in a 10L bioreactor in 6.59 days, with outstanding reproducibility. Notably, the generated cells exhibit an exceptional quality in terms of stemness and viability. The success of the first runs in a 10L bioreactor, without any optimization, demonstrates the genuine scalability of C-Stem™.

Perspectives

C-Stem™ also enables the differentiation of hiPSCs in bioreactors into functional microtissues ready for transplantation. C-Stem™ technology is currently applied to several iPS-derived cell therapy programs, including the production of dopaminergic neurospheres to treat Parkinson's disease. The next step will be to reach GMP compliance in early 2022, with the view of addressing a broad range of scales, from 500mL to 1000L, for applications demanding a large number of cells, such as stem cell banking and therapies for cardiac or hepatic diseases.

