

Application note

StemCultures controlled-release FGF-2 enhances stem cell maintenance, differentiation and organoid cultures

All data and images were collected by StemCultures in collaboration with the Neural Stem Cell Institute: www.neuralsci.org
Correspondence: support@qkine.com

Advantages of controlled-release technology

The components of induced pluripotent stem cell (iPSC) culture media change rapidly over time, meaning iPSCs need frequent media replenishment. This is because most growth factors have a short half-life in culture medium, particularly FGF-2 which has a half-life of FGF2 in culture medium is just 4 hours.

Combined with Qkine high purity and bioactivity growth factors StemCultures revolutionary controlled-release growth factor media additives provide stable, defined growth factor levels for iPSC culture. Their technology improves cell cultures by addressing the short half-life of FGF-2, preventing fluctuations in growth factor levels over time (figure 1).

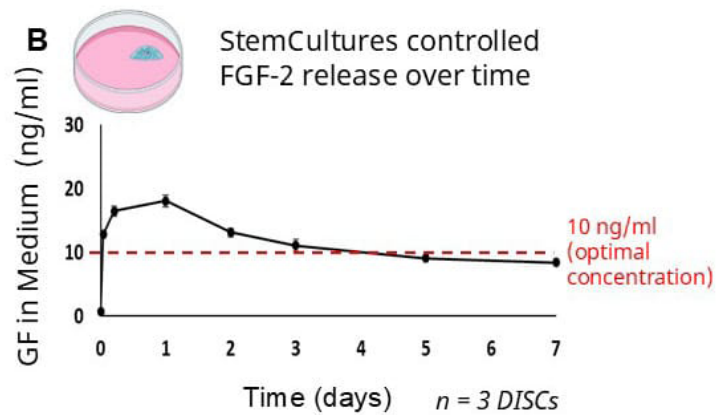
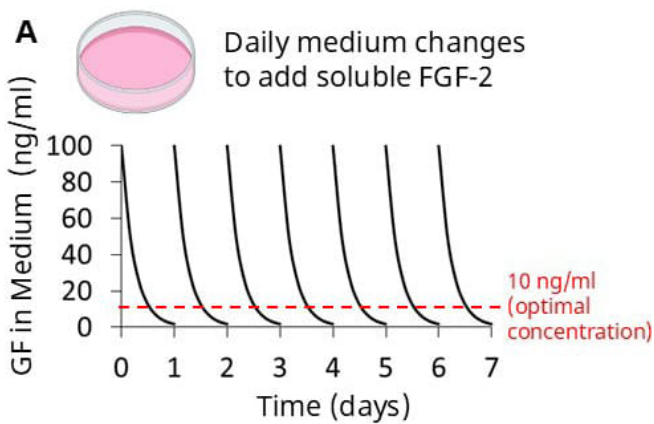
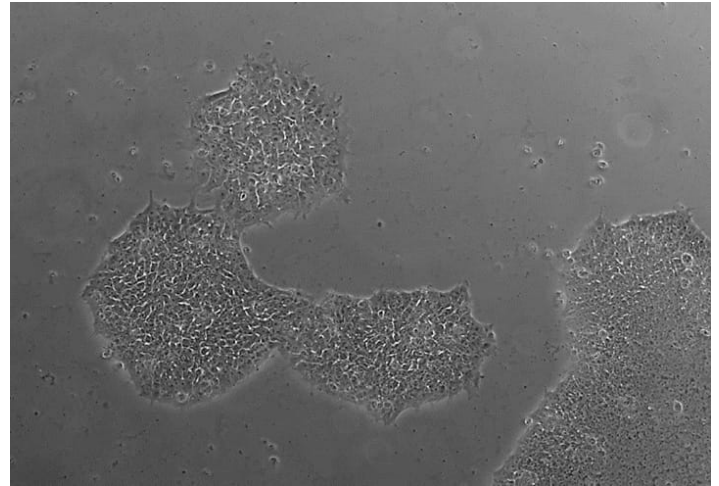


Figure 1. StemCultures controlled release system stabilizes FGF-2 concentration in medium. (A) daily media changes create fluctuations in FGF-2 concentration as it rapidly degrades under cell culture conditions. (B) StemCultures DISCTM device technology gradually releases a consistent level of FGF-2 into the media over 7 days.

Benefits of StemCultures controlled release technology

- Stable growth factor levels
- Defined growth factor levels
- Reduced media and labor costs
- Enhanced pluripotency markers
- Reduced spontaneous differentiation
- Improved downstream differentiation efficiency
- Improved iPSC derived organoid formation



StemCultures controlled-release FGF-2 DISC™ devices and StemBeads® FGF-2 improve cell quality and differentiation. FGF-2 DISC™ devices increased expression of pluripotency markers (figure 2) and reduced spontaneous differentiation (figure 3).

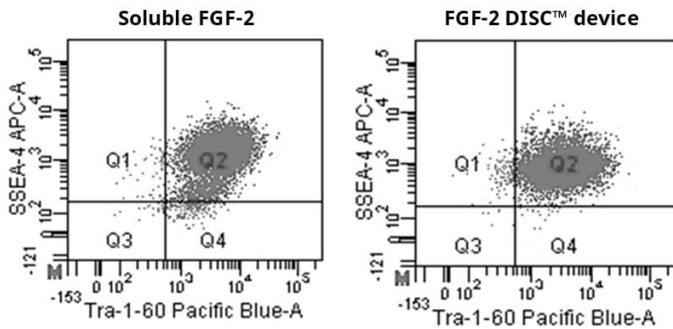


Figure 2. hPSCs grown with FGF-2 DISC™ devices show increased pluripotency markers. Flow cytometry analysis determined increased SSEA4 and Tra-1-60 marker expression with FGF-2 DISC™ devices compared to daily media feeds of soluble FGF-2.

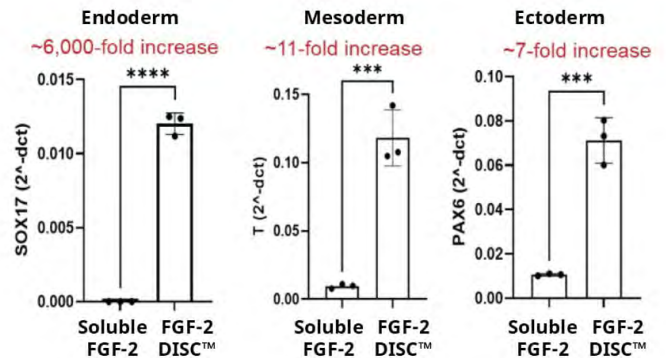


Figure 4. FGF-2 DISC™ Devices increased efficiency of differentiation down endoderm, mesoderm and ectoderm lineages. Increased differentiation marker expression was observed using FGF-2 DISC™ Devices and reduced feeding prior to differentiation compared to soluble FGF-2.

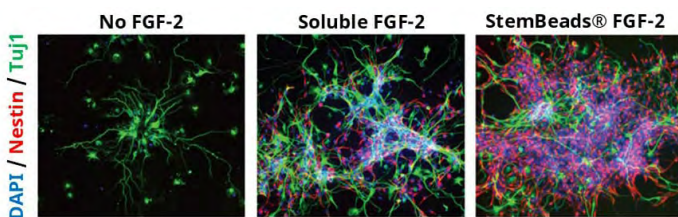


Figure 3. StemBeads® FGF-2 reduced spontaneous differentiation. Mouse neural stem cell grown for one week in StemBeads® FGF-2 supplemented medium show increased progenitor cell staining (Nestin⁺) and decreased neuronal differentiation marker (TUJ1⁺) compared to no FGF-2 or soluble FGF-2.

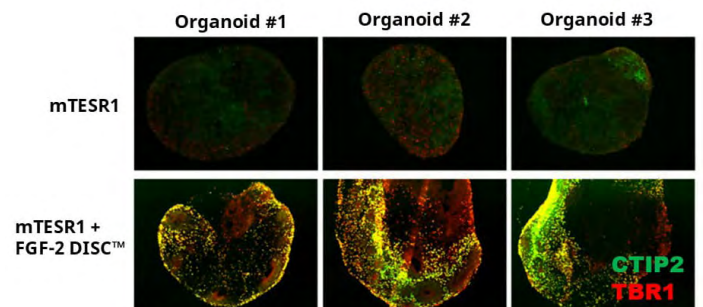
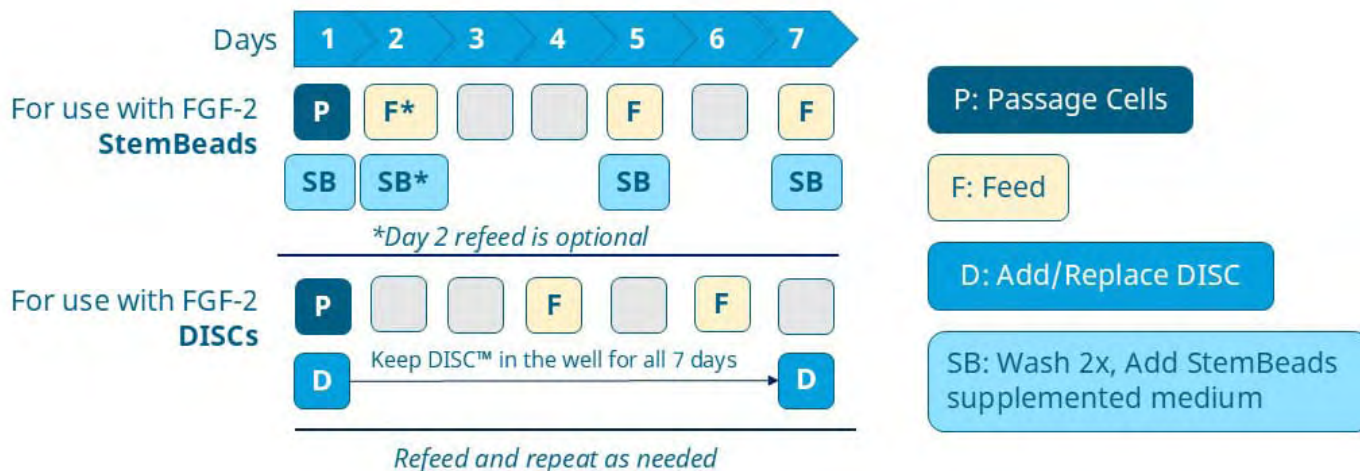


Figure 5. Cerebral organoids were more successfully generated from iPSCs cultured with FGF-2 DISC™ devices. hPSC lines that did not generate well-patterned cerebral organoids after growth with daily mTeSR1 were recovered by switching to growth in mTeSR1 with an FGF-2 DISC™, expressing higher levels of the cerebral markers CTIP2 and TBR1.

StemCultures controlled-release FGF-2 DISC™ devices improved differentiation down germ layer lineages (figure 4). They also support the differentiation of cerebral organoids from iPSC (figure 5).

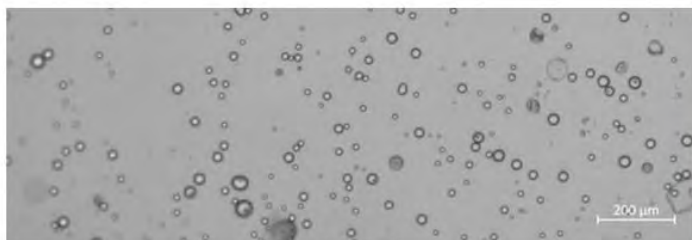
How to use controlled release technology

Suggested feeding schedule for using [StemBeads® Qkine DISC™ device FGF-2 154 aa](#) an [StemBeads® Qkine FGF-2 154 aa DISC™ device \(mini\)](#).



Note: Different cell lines, culture densities, and media may require adjusted schedules, please see product information sheets for more detailed instructions.

Product Selection:



StemBeads®

StemBeads® 15 µm biodegradable PLGA microbeads.



DISC™ device

Biocompatible DISC™ hydrogel carrier loaded with StemBeads®.

Further information

[StemCultures](#) controlled-release StemBeads® and DISC™ devices contain microencapsulated Qkine growth factors. StemCultures patented technology allows controlled release of Qkine high purity and bioactivity growth factors for the most consistent and reproducible stem cell culture and differentiation.

Qkine growth factors are manufactured to the highest quality standards and are free from animal-derived contaminants, delivering low endotoxicity and high purity. At Qkine, we are committed to raising the standards of growth factors, cytokines and related proteins to better support long-term and complex cell cultures. We are a science-led team, please reach out with any questions or requests to support@qkine.com.



To explore our high-purity, animal-free bioactive proteins visit [qkine.com](https://www.qkine.com)

Qkine products are for research use and ex vivo cell manufacturing use only

Qkine Ltd, Unit 1, Murdoch House, Garlic Row, Cambridge, CB5 8HW
www.qkine.com | +44 (0) 1223 491 486 | +1 866 877 2185

Qkine products are for research use only and not for diagnostic or therapeutic use.

