Qkíne

FGF2-G3

Thermostable FGF-2 for enhanced stem cell culture

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SO 9001

Introducing Qkine FGF2-G3

FGF2-G3 is a highly bioactive and thermostable (heat stable) engineered form of FGF-2, used to support homogeneous and reproducible stem cell culture while preventing the need for frequent media changes. Wild-type FGF-2 is inherently unstable and prone to proteolytic degradation and aggregation, leading to a short half-life in culture media (<10h), frequent media changes, and variations in culture. FGF2-G3 has been engineered with nine amino acid substitutions to enhance stability without impacting bioactivity. This increases the functional half-life of the protein from <10h (wild-type) to >7 days (FGF2-G3) in culture media. The use of thermostable FGF2-G3 offers an improved alternative solution that saves researchers valuable time and money by reducing media changes.



Innovation & engineering

FGF2-G3, or FGF2-STAB[®], was developed by Dvorak and colleagues at Masaryk University using computer-assisted protein engineering to identify an optimal set of nine amino acid substitutions that stabilize FGF-2. Qkine licensed the patented FGF2-G3 technology from Enantis/Masaryk University and combined the technology with our protein manufacture expertise to make an animal-free, carrier protein-free growth factor with no His-tag, enabling the translation from research to clinical or scale-up applications.



Qkine FGF2-G3 product features

Enjoy weekend-free stem cell culture with thermostable FGF2-G3. Qkine FGF2-G3 can replace wild-type FGF-2 in different applications. It can be used as a core ingredient of common media formulations including mTeSR, StemPRO, and E8, for the regulation of key cellular processes and the maintenance of pluripotency.



Designed to help process development and scale-up

FGF2-G3 in action

In collaboration with DZNE, Germany, the effects of FGF2-G3 were investigated in iPSC culture. The stability of iPSCs with FGF2-G3 was examined in conditioned media for 72 hours and showed a sustained proliferative state with enhanced colony health without daily media changes (Fig.1). FGF2-G3 was also shown to maintain pluripotency with fewer media changes based on pluripotency marker Oct4 expression level (Fig.2). Finally, the formation of embryoid bodies was demonstrated using FGF2-G3 and a weekend-free cell culture method (Fig.3).



1. iPSCs cultured in mTeSR™1 medium + Qkine FGF2-G3 for 3 days without a media change.

2. Oct4+ iPSCs cultured in mTeSR™1 medium + Qkine FGF2-G3 for 5 days without a media change.

3. Embryoid bodies formation in mTeSR™1 medium + Qkine FGF2-G3 for 3 days without a media change.

Image Credit: Joshua Thomas & Felix Buchner, Deutsches Zentrum für Neurodegenerative Erkrankungen (DZNE), Germany

Stringent quality control at every step

All Qkine proteins are manufactured at our ISO9001:2015 certified facility and stringent quality control measures are put in place throughout the whole process. A wide range of analytical techniques are used on every batch to ensure exceptional quality and lot-to-lot consistency. Bioactivity assays and SDS-PAGE gels are just some of the techniques we use to guarantee highly bioactive and pure proteins. If you would like to see all the QC data for a specific batch, please request this via our website.



SDS-PAGE of FGF2-G3 in reduced and non-reduced conditions. Purified recombinant protein (3 µg) was resolved using 15% w/v SDS-PAGE in reduced (+ β -mercaptothanol, R) and non-reduced (NR) conditions and stained with Coomassie Brilliant Blue R250. Recombinant FGF2-G3 migrates as a major band at 17 kDa in non-reducing (NR) conditions. Upon reduction (R), only the 17 kDa band is visible. No contaminating protein bands are present highlighting the purity of the protein. Data from Qk053 lot #104340.

Purity and bioactivity guaranteed

Unprecedented stability without compromise

Thermostable FGF2-G3 retains wild-type bioactivity in conditioned media at 37 °C for more than 7 days. This allows for reproducible and homogeneous, weekend-free stem cell culture. All proteins at Qkine are tested for bioactivity using a calibrated luciferase reporter assay to define the complete dose-response curve for the protein of interest and define its EC50 value.



FGF2-G3 retains bioactivity after 7 days in culture. WT FGF-2 (Qk027) and FGF2-G3 (Qk053) were diluted in conditioned media and incubated at 37 °C. Samples were taken at daily intervals, serially diluted, and then assayed in triplicate in transfected HEK293T cells. Firefly luciferase activity was measured and normalized to the control.



Applications of FGF2-G3

- Cell expansion and media formulation
- Stem cell research (iPSCs, ESCs, MSCs)
- Organoid and spheroid cultures
- Cultured meat technology
- Other biomedical applications

Scan to read the case study

In collaboration with Joshua Thomas, Felix Buchner & Natalia Rodriguez-Muela from DZNE, Germany, we have produced a case study entitled: Bioactive thermostable (heat stable) FGF2-G3 growth factors for iPSCs cultures.



Orders and support

Product code	Description
Qk052	Recombinant FGF2-G3 145 aa protein
Qk053	Recombinant FGF2-G3 154 aa protein

You can buy our growth factors directly via our website or through our distribution partners. If you require any further support, speak directly to our scientists by contacting us below.



Further reading

Dvorak P, Bednar D, Vanacek P, et al. (2018) Computer-assisted engineering of hyperstable fibroblast growth factor 2. *Biotechnol Bioeng*. 115(4):850-862.

Kuo HH, Gao X, DeKeyser JM, et al. (2019) Negligible-Cost and Weekend-Free Chemically Defined Human iPSC Culture. *Stem Cell Reports*. 14(2):256-270.

Benington L, Rajan G, Locher C, Lim LY. (2020) Fibroblast Growth Factor 2-A Review of Stabilisation Approaches for Clinical Applications. Pharmaceutics. 12(6):508.

Setting the standard in bioactive protein manufacturing

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