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Basic Fibroblast Growth Factor (bFGF), Human, Recombinant

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Catalog Number:	13256-029
Quantity:	10 µg
Lot Number:	See product label.
Description:	Human bFGF, recombinant is supplied as a lyophilized powder. It is suitable for use in embryonic stem cell maintenance, receptor binding, transmembrane signaling, and other cell biology research applications.
Background:	Basic FGF (heparin binding growth factor-2, basic brain-derived growth factor) is a 17 kDa member of the family of heparin binding growth factors, which also includes acidic FGF (HBGF-1) as well as the oncoproteins Int-2 (HBGF-3), HST/K53 (HBGF-4), and HBGF-5 (1). All are potent inducers of DNA synthesis in a variety of normal diploid mammalian cell types from mesoderm and neuroectoderm as well as in established cell lines (2). Heparin has been shown to potentiate the biological activity of acidic FGF (3), but does not augment the mitogenic activity of bFGF (4, 5). The serum protein α_2-macroglobulin has recently been shown to bind bFGF and may inactivate this and other growth factors *in vivo* (6). Basic FGF has been found in or associated with a variety of solid tissues, tumors, and cultured cells (4, 7). *In vivo*, bFGF has been shown to be a potent angiogenic agent (9, 16).Recent *in vitro* studies show that bFGF can bind to heparin-like molecules in the extracellular matrix (ECM) of endothelial cells (10). The interaction of bFGF with components of the ECM such as type IV collagen and fibronectin, may serve to locally regulate endothelial cell growth and differentiation during angiogenesis (11). Basic FGF and acidic FGF are structurally similar (7) but functionally different (8). There are four cysteine residues in bFGF, two of which are conserved among all members of the HBGF family. The two remaining cysteines are not essential for biological activity (7). Basic FGF has two sequences that are characteristic of heparin-binding domains. However, synthetic peptides including flanking sequences also bind to heparin, suggesting that the heparin-binding activity of bFGF is not restricted to simple domains (12). Basic and acidic FGF are mitogenic for the same cell types, suggesting that they interact with the same receptors (13). Comparison of neuronal and mesenchymal receptors for bFGF reveals size and structure similarities, but functional differences (14). Radioreceptor assays for bFGF demonstrate the existence of saturable, high affinity binding sites on a variety of cell types (K_d = 10–200 pM; 0.2–10 × 10^4 binding sites/cell). Cells also have low affinity binding sites which appear to be cell-associated heparin-like molecules (1). Cell growth regulation by FGFs is complex. Besides its well described mitogenic effects on fibroblasts (10, 11), bFGF has been shown to inhibit EGF receptor binding in murine 3T3 cells (15). Further evidence for complex regulation of FGF activity is suggested by the finding that down regulation of FGF receptors correlates with the transformed phenotype (16).
Purity:	≥ 95% purity by SDS-PAGE
Biological Activity:	ED_{50} range ≤1.0 ng/mL (Specific Activity: >1.0 × 10^6 units/mg), determined by the dose dependent proliferation of BALB/3T3 cells. Determine the optimal concentration for each specific application by an initial dose response assay. Biological activity is also determined by the dose dependent stimulation of thymidine uptake by BaF3 cells expressing FGF receptors.
Endotoxin:	≤ 0.1 ng/µg
Reconstitution Recommendation:	Reconstitute in 100 µL of 10 mM Tris, pH 7.6, to yield a stock solution of 0.1 mg/mL of bFGF. To avoid loss due to adsorption, prepare dilute solutions in appropriate assay buffer containing at least 0.1% BSA just prior to use. Do not store in dilute solution. For longer term storage, aliquot into buffer containing 0.1% BSA and store in polypropylene vials at –20°C. Avoid repeated freezing and thawing. In applications requiring long-term use of this growth factor in cell cultures, refilter material after dilution in BSA-containing buffer, through a 0.22 micron low protein-binding filter.

Applications:	• Studies of angiogenesis (8, 11) • Studies of mitogenesis of fibroblasts (10, 11) • Neurite outgrowth studies in PC12 cells (17) • Receptor binding studies (13–16) • Tyrosine phosphorylation studies (18) • Protein kinase phosphorylation (PKC, PKA) (19, 20)
Storage:	Six months at –20°C as received. Up to six months at –20°C when aliquoted into solution containing carrier protein (see Reconsitution Recommendation). **NOTE:** Do not store in dilute aqueous solution. Aviod repeated freeze/thaw.
Expiration Date:	Expires one year from date of receipt when stored as instructed.
References:	1. Burgess, W.H. and Maciag, T. (1989) Annu. Rev. Biochem. 58, 575. 2. Thomas, K.A. (1988) Trends Biochem. Sci. 13, 327. 3. Sudhalter, J., Folkman, J., Svahn, C., Bergendal, K. and D'Amore, P. (1989) J. Biol. Chem. 264, 6892. 4. Thomas, K.A. and Gimenz-Gallego, G. (1986) Trends Biochem. Sci. 11, 81. 5. Shipley, G., Keeble, W., Hendrickson, J., Coffey, R. and Pittelkow, M. (1989) J. Cell. Physiol. 138, 511. 6. Dennis, P., Saksela, O., Harpel, P. and Rifkin, D. (1989) J. Biol. Chem. 264, 7210. 7. Esch, F., Baird, A., Ling. N., Ueno, N., Hill, F., Denoroy, L., Klepper, R., Gospodarowicz, D., Bohlen, P. and Gullemin, R., (1985) Proc. Natl. Acad. Sci. USA 82, 6507. 8. Hayek, A., Culler, F., Beattie, G., Lopez, A., Cuevas, P. and Baird, A. (1987) Biochem. Biophys. Res. Commun. 147, 876. 9. Gospodarowicz, D. (1983) J. Cell Biol. 141, 201. 10. Presta, M., Maier, J. Rusnati, M. and Ragnotti, G. (1989) J. Cell. Physiol. 140, 68. 11. Ingber, D. and Folkman, J. (1989) J. Cell Biol. 109, 317. 12. Rifkin, D. and Moscatelli, D. (1989) J. Cell Biol. 109, 1. 13. Neufeld, G. and Gospodarowicz, D. (1986) J. Biol. Chem. 261, 5631. 14. Walicke, P., Feige, J. and Baird, A. (1989) J. Biol. Chem. 264, 4120. 15. Hicks, K., Friedman, B. and Rosner, M. (1989) Biochem Biophys. Res. Commun. 164, 796. 16. Moscatelli, D. and Quarto, N. (1989) J. Cell Biol. 109, 2519. 17. Neufeld, G., Gospodarowicz, D., Dodge, L. and Fujii, D. (1987) J. Cell. Physiol. 131, 131. 18. Coughlin, S., Barr, P., Cousens, L., Fretto, L. and Williams, L. (1988) J. Biol. Chem. 263, 988. 19. Feige, J. and Baird, A. (1989) Proc. Natl. Acad. Sci. USA 86, 3174. 20. Feige, J., Bradley, J., Fryburg, K., Farris, J., Cousens, L., Barr, P. and Baird, A. (1989) J. Cell Biol. 109, 3105.

Explanation of Symbols

The symbols present on the product label are explained below:

Symbol	Description
REF	Catalog Number
RUO	Research Use Only
	Use by
	Manufacturer
[–]	Without, does not contain
Protect from Light	Protect from light
	Directs the user to consult instructions for use (IFU), accompanying the product.

Symbol	Description
LOT	Batch code
IVD	In vitro diagnostic medical device
	Temperature limitation
EC REP	European Community authorized representative
[+]	With, contains
⚠	Consult accompanying documents

Limited Use Label License: Research Use Only

The purchase of this product conveys to the purchaser the limited, non-transferable right to use the purchased amount of the product only to perform internal research for the sole benefit of the purchaser. No right to resell this product or any of its components is conveyed expressly, by implication, or by estoppel. This product is for internal research purposes only and is not for use in commercial applications of any kind, including, without limitation, quality control and commercial services such as reporting the results of purchaser's activities for a fee or other form of consideration. For information on obtaining additional rights, please contact **outlicensing@lifetech.com** or Out Licensing, Life Technologies, 5791 Van Allen Way, Carlsbad, California 92008.

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