

The HumanKine[®] Advantage

Independent research demonstrates HEK293 derived BMP-2 is more active and stable than either E.coli or CHO derived BMP-2

Bone morphogenetic protein-2 (BMP-2) can be isolated from bone or expressed recombinantly for use as a growth-factor to induce osteogenic differentiation of osteoblasts and their precursors. Experimentally, BMP-2 can be used in stem cell cultures to induce osteogenesis but is also the sole osteoinductive factor currently approved for clinical use by the FDA. Human BMP-2 is synthesized as a 396 amino acid (aa) preproprotein that contains a 23 aa signal sequence, a 259 aa pro-peptide, and a 114 aa mature region. Maturation of BMP-2 is a complex process that involves cleavage of pre-pro peptide; removal of signaling peptide; dimerization of the pro-peptide and proteolytic activation that enables mature BMP-2 to form active disulfide linked homodimer. Reduction of disulfide bonds result in loss of biological activity. It is known to increase alkaline phosphatase (ALP) expression through modulation of the Wnt signalling pathway; meaning ALP bio-assay detection can be used to calculate the bioactivity of recombinant human BMP-2.

Due to its importance in the stem cell research and clinical fields several companies are offering recombinant human BMP-2 for sale as a growth factor. Independent research conducted by Fung et al. in 2019 indicate that of the commercially available BMP-2 proteins tested, Proteintech's HumanKine (previously named HumanZyme) HEK293 derived BMP-2 was the most active, and most stable product when compared with competitor BMP-2 derived from E.coli or CHO expression systems.

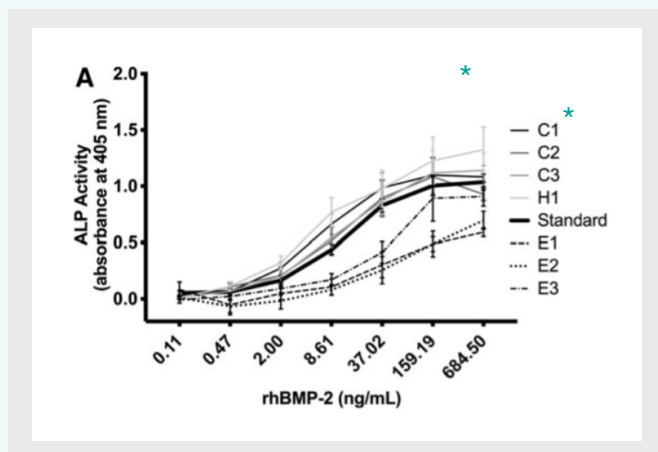
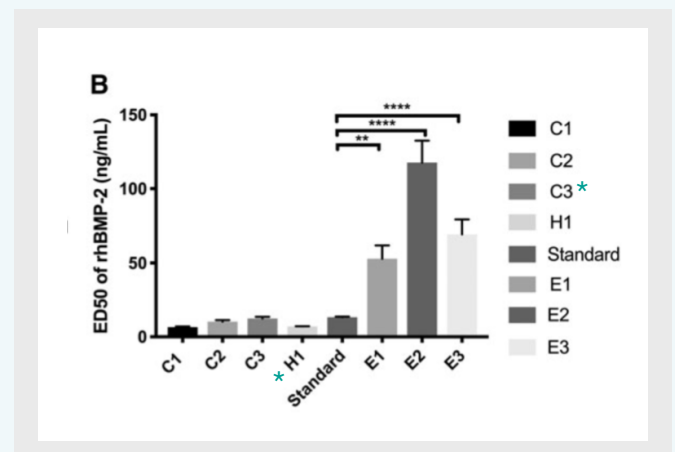


Figure 1. Bioactivity comparison of commercially available rhBMP-2 (A) RhBMP-2 dose-response curves obtained by incubating W-17-20 cells with rhBMP-2-containing medium for 24h at the concentration range of 0.1-684.5 ng/mL. The international rhBMP-2 standard is indicated by the bolded line.



(B) Quantification of ED50 values based on (A). Data presented as average + SE (n=3). One-way analysis of variance was performed on ED50 data. **p<0.01, ***p<0.0001.

Data from Fung et al., 2019.

Figure 1 indicates that Proteintech's HumanKine recombinant human BMP-2 (H1) leads to increased expression of ALP at the same concentration when compared to either international standard (Standard) or competitor BMP-2 derived from E.coli or CHO expression systems (above). This is confirmed by H1 having the lowest ED50 when compared to those same competitor products (right), and thus, the highest activity.

The HumanKine® Advantage

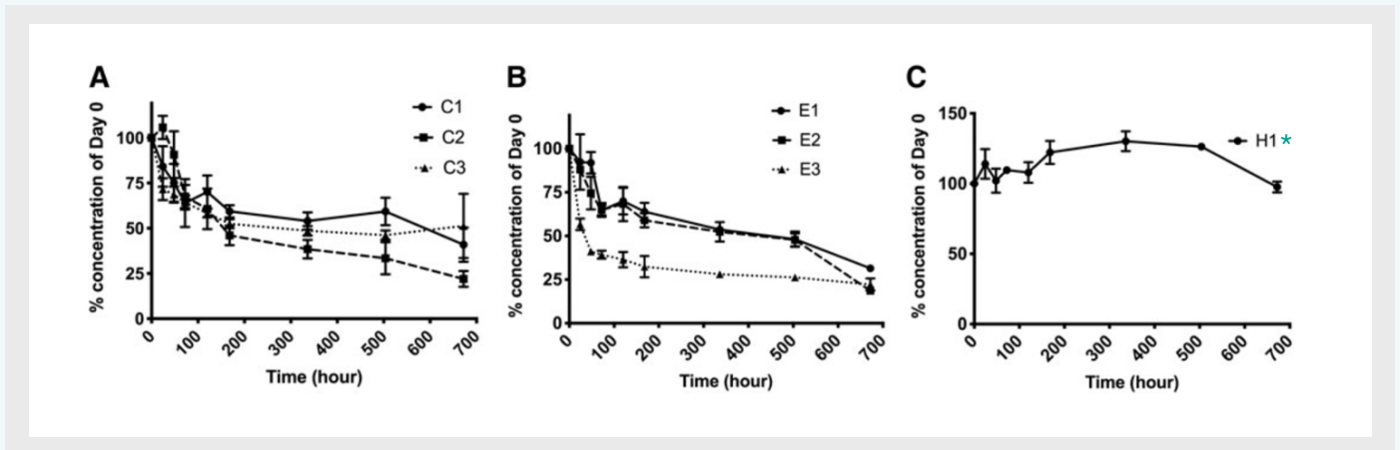


Figure 2. Stability of commercially available rhBMP-2 at 37°C. Concentration of CHO cell-derived rhBMP-2 (A), E. Coli derived rhBMP-2 (B) and HEK-derived rhBMP-2 (C) at the indicated time points. The concentration was quantified by LISA and normalized to that of day 0. Data are presented as average + SE (n=3) HEK, human embryonic kidney.

Data from Fung et al., 2019.

Figure 2 again demonstrates the superiority of the HumanKine BMP-2 as it has consistent stability (% concentration of Day 0) over the 700-hour time-course (C); whereas the competitor product's % concentration of Day 0 declines rapidly throughout the same time course, indicating lower stability at 37°C (A)(B).

Proteintech HumanKine cytokines and growth factors are all HEK293 human cell derived.

This means all HumanKine recombinant proteins are animal component free, xeno free and tag free, with native human glycosylation and folding, leading to increased activity and stability, as seen above. We are also proud to offer our HumanKine range as GMP grade (ISO 13485 certified).

References:

Fung SL, Wu X, Maceren JP, Mao Y, Kohn J. In Vitro Evaluation of Recombinant Bone Morphogenetic Protein-2 Bioactivity for Regenerative Medicine. *Tissue Eng Part C Methods*. 2019 Sep;25(9):553-559. doi: 10.1089/ten.TEC.2019.0156. PMID: 31418333; PMCID: PMC6761583.

