在在肝脏再生方面的理论,同时选择了国内外目前认为诱导作用最强的 HGF 作为参照,发现 BMP-9 的诱导作用甚至和传统的肝细胞诱导因子 HGF 相当,这一点目前国内外尚少见相关报道,但从我们研究发现 BMP-9 为诱导肝脏干细胞分化的重要信号分子,至于 BMP-9 与 HGF 的协同作用及其在诱导过程中的是否通过是经典 Smad 信号通路传递途径发挥作用将是我们下一步实验的研究重点。

参考文献:

[1] Kan N G, Junghans D, Izpisua-Belmonte J C. Compensatory growth mechanisms regulated by BMP and FGF signaling mediate liver regeneration in zebrafish after partial hepatectomy[J]. FASEB J, 2009, 23(10): 3516-3525.

[2] 武鹏宇, 戴立里, 唐 静, 等. 骨形态发生蛋白-7 对人肝星状细胞转化生长因子 β 信号转导的影响[J]. 第三军医大学学报, 2010, 32(13): 1433-1437.

[3] Kang Q, Sun M H, Cheng H, *et al*. Characterization of the distinct orthotopic bone-forming activity of 14 BMPs using recombinant adenovirus-mediated gene delivery[J]. Gene Ther, 2004, 11(17): 1312-1320.

[4] Urist M R. Bone: formation by autoinduction[J]. Science, 1965, 150(3698): 893-839.

[5] Sanchez A, Fabregat I. Growth factor- and cytokine-driven pathways governing liver stemness and differentiation[J]. World J Gastroenterol, 2010, 16(41): 5148-5161.

[6] Thenappan A, Li Y, Kitisin K, *et al*. Role of transforming growth factor beta signaling and expansion of progenitor cells in regenerating liver[J]. Hepatology, 2010, 51(4): 1373-1382.

[7] He T C, Zhou S, da-Costa L T, *et al*. A simplified system for generating recombinant adenoviruses[J]. Proc Natl Acad Sci U S A, 1998, 95(5): 2509-2514.

[8] Peng Y, Kang Q, Cheng H, *et al*. Transcriptional characterization of bone morphogenetic proteins (BMPs)-mediated osteogenic signaling[J]. J Cell Biochem, 2003, 90(6): 1149-1165.

[9] Luther G, Wagner E R, Zhu G, *et al*. BMP-9 induced osteogenic differentiation of mesenchymal stem cells: molecular mechanism and therapeutic potential[J]. Curr Gene Ther, 2011, 11(3): 229-240.

[10] Sosa I, Cvijanovic O, Celic T, *et al*. Hepatoregenerative role of bone morphogenetic protein-9[J]. Med Sci Monit, 2011, 17(12): HY33-HY35.

[11] Pi L, Ding X, Jorgenson M, *et al*. Connective tissue growth factor with a novel fibronectin binding site promotes cell adhesion and migration during rat oval cell activation[J]. Hepatology, 2008, 47(3): 996-1004.

[12] 金世龙, 刘宝华, 刘宏鸣, 等. 大鼠成体肝卵圆细胞分离培养及诱导分化的初步研究[J]. 第三军医大学学报, 2006, 28(22): 2259-2262.

[13] Chen Q, Kon J, Ooe H, *et al*. Selective proliferation of rat hepatocyte progenitor cells in serum-free culture[J]. Nat Protoc, 2007, 2(5): 1197-1205.

[14] 苏娟, 姚玉成, 王忠华, 等. 干细胞样肝原始细胞的分离和鉴定[J]. 癌变畸变突变, 2000, 12(4): 200-201.

[15] Bi Y, Huang J, He Y, *et al*. Wnt antagonist SFRP3 inhibits the differentiation of mouse hepatic progenitor cells[J]. J Cell Biochem, 2009, 108(1): 295-303.

[16] Huang J, Bi Y, Zhu G H, *et al*. Retinoic acid signalling induces the differentiation of mouse fetal liver-derived hepatic progenitor cells[J]. Liver Int, 2009, 29(10): 1569-1581.

[17] Forte G, Minieri M, Cossa P, *et al*. Hepatocyte growth factor effects on mesenchymal stem cells: proliferation, migration, and differentiation[J]. Stem Cells, 2006, 24(1): 23-33.

[18] Lee B S, Park M, Cha H Y, *et al*. Hepatocyte growth factor induces delayed STAT3 phosphorylation through interleukin-6 expression[J]. Cell Signal, 2009, 21(3): 419-427.

[19] Miller A F, Harvey S A, Thies R S, *et al*. Bone morphogenetic protein-9. An autocrine/paracrine cytokine in the liver[J]. J Biol Chem, 2000, 275(24): 17937-17945.

(**收稿**:2011-12-23;**修回**:2012-03-05)

(编辑 王 红)

声 明

本刊已入编中国知网(包括优先数字出版)和《中国学术期刊》(光盘版)。作者稿件一经录用,将同时被中国知网和《中国学术期刊》(光盘版)等数据库收录;已被本刊录用并经编辑加工的部分稿件,编辑部审查符合条件者将在印刷版期刊出版前以单篇或整期定稿的形式在中国知网平台上优先数字出版。如作者不同意收录或发布,请在投稿本刊时提出声明,否则将视为同意。

本刊编辑部