

## BIBLIOGRAPHY

- Abe,E., Yamamoto,M., Taguchi,Y., Lecka-Czernik,B., O'Brien,C.A., Economides,A.N., Stahl,N., Jilka,R.L., and Manolagas,S.C. 2000. Essential requirement of BMPs-2/4 for both osteoblast and osteoclast formation in murine bone marrow cultures from adult mice: antagonism by noggin *J. Bone Miner. Res.* 15, 663-673.
- Alevizopoulos,A. and Mermod,N. 1997. Transforming growth factor-beta: the breaking open of a black box *Bioessays*. 19, 581-591.
- Ameer,G.A., Mahmood,T.A., and Langer,R. 2002. A biodegradable composite scaffold for cell transplantation *J. Orthop. Res.* 20, 16-19.
- Andrades,J.A., Han,B., Becerra,J., Sorgente,N., Hall,F.L., and Nimni,M.E. 1999. A recombinant human TGF-beta1 fusion protein with collagen-binding domain promotes migration, growth, and differentiation of bone marrow mesenchymal cells *Exp. Cell Res.* 250, 485-498.
- Andrew,J.G., Hoyland,J., Andrew,S.M., Freemont,A.J., and Marsh,D. 1993a. Demonstration of TGF-beta 1 mRNA by in situ hybridization in normal human fracture healing *Calcif. Tissue Int.* 52, 74-78.
- Andrew,J.G., Hoyland,J., Freemont,A.J., and Marsh,D. 1993b. Insulinlike growth factor gene expression in human fracture callus *Calcif. Tissue Int.* 53, 97-102.
- Andrew,J.G., Hoyland,J.A., Freemont,A.J., and Marsh,D.R. 1995. Platelet-derived growth factor expression in normally healing human fractures *Bone*. 16, 455-460.

Animal care unit. 1996. "Blood collection and administration of fluids and drug (rat) In <http://www.uiowa.edu/~vpr/reaseach/animal>, The University of Iowa Animal Care Unit. Iowa: The University of Iowa Animal Care Unit Home Page.

Anitua,E. 1999. Plasma rich in growth factors: preliminary results of use in the preparation of future sites for implants *Int. J. Oral Maxillofac. Implants.* 14, 529-535.

Arnaud,E., Morieux,C., Wybier,M., and de Vernejoul,M.C. 1994. Potentiation of transforming growth factor (TGF-beta 1) by natural coral and fibrin in a rabbit cranioplasty model *Calcif. Tissue Int.* 54, 493-498.

Ashton,B.A., Allen,T.D., Howlett,C.R., Eaglesom,C.C., Hattori,A., and Owen,M. 1980. Formation of bone and cartilage by marrow stromal cells in diffusion chambers in vivo *Clin. Orthop.* 294-307.

Aubin,J.E. 1998. Advances in the osteoblast lineage *Biochem. Cell Biol.* 76, 899-910.

Aubin,J.E., Liu,F., Malaval,L., and Gupta,A.K. 1995. Osteoblast and chondroblast differentiation *Bone.* 17, 77S-83S.

Bab,I., Passi-Even,L., Gazit,D., Sekeles,E., Ashton,B.A., Peylan-Ramu,N., Ziv,I., and Ulmansky,M. 1988. Osteogenesis in in vivo diffusion chamber cultures of human marrow cells *Bone Miner.* 4, 373-386.

Barry,F., Boynton,R.E., Liu,B., and Murphy,J.M. 2001. Chondrogenic differentiation of mesenchymal stem cells from bone marrow: differentiation-dependent gene expression of matrix components *Exp. Cell Res.* 268, 189-200.

Baylink,D.J., Finkelman,R.D., and Mohan,S. 1993. Growth factors to stimulate bone formation *J. Bone Miner. Res.* 8 Suppl 2, S565-S572.

Bellows,C.G., Aubin,J.E., Heersche,J.N., and Antosz,M.E. 1986. Mineralized bone nodules formed in vitro from enzymatically released rat calvaria cell populations *Calcif. Tissue Int.* 38, 143-154.

- Beresford,J.N., Joyner,C.J., Devlin,C., and Triffitt,J.T. 1994. The effects of dexamethasone and 1,25-dihydroxyvitamin D3 on osteogenic differentiation of human marrow stromal cells in vitro *Arch. Oral Biol.* 39, 941-947.
- Bhanot,S. and Alex,J.C. 2002. Current applications of platelet gels in facial plastic surgery *Facial. Plast. Surg.* 18, 27-33.
- Bhargava,U., Bar-Lev,M., Bellows,C.G., and Aubin,J.E. 1988. Ultrastructural analysis of bone nodules formed in vitro by isolated fetal rat calvaria cells *Bone*. 9, 155-163.
- Boden,S.D. 1999. Bioactive factors for bone tissue engineering *Clin. Orthop.* S84-S94.
- Bolander,M.E. 1992. Regulation of fracture repair by growth factors *Proc. Soc. Exp. Biol. Med.* 200, 165-170.
- Bostrom,M.P. 1998. Expression of bone morphogenetic proteins in fracture healing *Clin. Orthop.* S116-S123.
- Bostrom,M.P. and Asnis,P. 1998. Transforming growth factor beta in fracture repair *Clin. Orthop.* S124-S131.
- Bostrom,M.P., Saleh,K.J., and Einhorn,T.A. 1999. Osteoinductive growth factors in preclinical fracture and long bone defects models *Orthop. Clin. North Am.* 30, 647-658.
- Bostrom,M.P.G., Boskey,A., Kaufman,J.J., and Einhorn,T.A.. 2000. "Form and function of bone In *Orthopaedic basic sciences*, 327. Buckwalter, J. A., Einhorn, T. A., and Simon, S. R. 2nd. Illinoise: American Academy of Orthopaedic Surgeons.

- Bowen-Pope,D.F., Malpass,T.W., Foster,D.M., and Ross,R. 1984. Platelet-derived growth factor in vivo: levels, activity, and rate of clearance *Blood.* 64, 458-469.
- Boyan,B.D., Caplan,A.I., Heckman,J.D., Lennon,D.P., Ehler,W., and Schwartz,Z. 1999. Osteochondral progenitor cells in acute and chronic canine nonunions *J. Orthop. Res.* 17, 246-255.
- Breen,E.C., Ignatz,R.A., McCabe,L., Stein,J.L., Stein,G.S., and Lian,J.B. 1994. TGF beta alters growth and differentiation related gene expression in proliferating osteoblasts in vitro, preventing development of the mature bone phenotype *J. Cell Physiol.* 160, 323-335.
- Breitbart,A.S., Grande,D.A., Kessler,R., Ryaby,J.T., Fitzsimmons,R.J., and Grant,R.T. 1998. Tissue engineered bone repair of calvarial defects using cultured periosteal cells *Plast. Reconstr. Surg.* 101, 567-574.
- Brighton,C.T., Lorich,D.G., Kupcha,R., Reilly,T.M., Jones,A.R., and Woodbury,R.A. 1992. The pericyte as a possible osteoblast progenitor cell *Clin. Orthop.* 287-299.
- Bruder,S.P. and Fox,B.S. 1999. Tissue engineering of bone. Cell based strategies *Clin. Orthop.* S68-S83.
- Bruder,S.P., Jaiswal,N., Ricalton,N.S., Mosca,J.D., Kraus,K.H., and Kadiyala,S. 1998a. Mesenchymal stem cells in osteobiology and applied bone regeneration *Clin. Orthop.* S247-S256.
- Bruder,S.P., Kraus,K.H., Goldberg,V.M., and Kadiyala,S. 1998b. The effect of implants loaded with autologous mesenchymal stem cells on the healing of canine segmental bone defects *J. Bone Joint Surg. Am.* 80, 985-996.

- Bruder,S.P., Kurth,A.A., Shea,M., Hayes,W.C., Jaiswal,N., and Kadiyala,S. 1998c. Bone regeneration by implantation of purified, culture-expanded human mesenchymal stem cells *J. Orthop. Res.* 16, 155-162.
- Bryckaert,M.C., Lindroth,M., Lonn,A., Tobelem,G., and Wasteson,A. 1988. Transforming growth factor (TGF beta) decreases the proliferation of human bone marrow fibroblasts by inhibiting the platelet-derived growth factor (PDGF) binding *Exp. Cell Res.* 179, 311-321.
- Bucholz,R.W. 1987. Clinical experience with bone graft substitutes *J. Orthop. Trauma*. 1, 260-262.
- Bucholz,R.W., Carlton,A., and Holmes,R.E. 1987. Hydroxyapatite and tricalcium phosphate bone graft substitutes *Orthop. Clin. North Am.* 18, 323-334.
- Canalis,E. 1983. Effect of hormones and growth factors on alkaline phosphatase activity and collagen synthesis in cultured rat calvariae *Metabolism*. 32, 14-20.
- Canalis,E., Centrella,M., and McCarthy,T.L. 1991. Regulation of insulin-like growth factor-II production in bone cultures *Endocrinology*. 129, 2457-2462.
- Canalis,E. and Lian,J.B. 1988. Effects of bone associated growth factors on DNA, collagen and osteocalcin synthesis in cultured fetal rat calvariae *Bone*. 9, 243-246.
- Canalis,E., McCarthy,T., and Centrella,M. 1988. Isolation and characterization of insulin-like growth factor I (somatomedin-C) from cultures of fetal rat calvariae *Endocrinology*. 122, 22-27.
- Canalis,E., Pash,J., and Varghese,S. 1993. Skeletal growth factors *Crit Rev. Eukaryot. Gene Expr.* 3, 155-166.
- Caplan,A.I. 1991. Mesenchymal stem cells *J. Orthop. Res.* 9, 641-650.

- Caplan,A.I. and Bruder,S.P.. 1 -1-1966. "Cell and molecular engineering of bone regeneration In *Principle of tissue engineering*, 603. Lansa, R. P., Langer, R, and Chick, W. L. California: Academic Press Inc.
- Carlson,E.R. 2000. Bone grafting the jaws in the 21st century: the use of platelet-rich plasma and bone morphogenetic protein Alpha. *Omegan*. 93, 26-30.
- Casabona,F., Martin,I., Muraglia,A., Berrino,P., Santi,P., Cancedda,R., and Quarto,R. 1998. Prefabricated engineered bone flaps: an experimental model of tissue reconstruction in plastic surgery *Plast. Reconstr. Surg.* 101, 577-581.
- Casser-Bette,M., Murray,A.B., Closs,E.I., Erfle,V., and Schmidt,J. 1990. Bone formation by osteoblast-like cells in a three-dimensional cell culture *Calcif. Tissue Int.* 46, 46-56.
- Cassiede,P., Dennis,J.E., Ma,F., and Caplan,A.I. 1996. Osteochondrogenic potential of marrow mesenchymal progenitor cells exposed to TGF-beta 1 or PDGF-BB as assayed in vivo and in vitro *J. Bone Miner. Res.* 11, 1264-1273.
- Centrella,M., Horowitz,M.C., Wozney,J.M., and McCarthy,T.L. 1994. Transforming growth factor-beta gene family members and bone *Endocr. Rev.* 15, 27-39.
- Centrella,M., McCarthy,T.L., and Canalis,E. 1987. Mitogenesis in fetal rat bone cells simultaneously exposed to type beta transforming growth factor and other growth regulators *FASEB J.* 1, 312-317.
- Champagne,C.M., Takebe,J., Offenbacher,S., and Cooper,L.F. 2002. Macrophage cell lines produce osteoinductive signals that include bone morphogenetic protein-2 *Bone*. 30, 26-31.
- Chen,D., Harris,M.A., Rossini,G., Dunstan,C.R., Dallas,S.L., Feng,J.Q., Mundy,G.R., and Harris,S.E. 1997. Bone morphogenetic protein 2 (BMP-2) enhances BMP-3, BMP-4, and bone cell differentiation marker gene expression during the induction of mineralized bone matrix formation in cultures of fetal rat calvarial osteoblasts *Calcif. Tissue Int.* 60, 283-290.

- Cheng,S.L., Yang,J.W., Rifas,L., Zhang,S.F., and Avioli,L.V. 1994. Differentiation of human bone marrow osteogenic stromal cells in vitro: induction of the osteoblast phenotype by dexamethasone *Endocrinology*. 134, 277-286.
- Colter,D.C., Class,R., DiGirolamo,C.M., and Prockop,D.J. 2000. Rapid expansion of recycling stem cells in cultures of plastic-adherent cells from human bone marrow *Proc. Natl. Acad. Sci. U. S. A.* 97, 3213-3218.
- Connolly,J.F., Guse,R., Tiedeman,J., and Dehne,R. 1991. Autologous marrow injection as a substitute for operative grafting of tibial nonunions *Clin. Orthop.* 259-270.
- Dennis,J.E., Haynesworth,S.E., Young,R.G., and Caplan,A.I. 1992. Osteogenesis in marrow-derived mesenchymal cell porous ceramic composites transplanted subcutaneously: effect of fibronectin and laminin on cell retention and rate of osteogenic expression *Cell Transplant.* 1, 23-32.
- Donath,K. and Breuner,G. 1982. A method for the study of undecalcified bones and teeth with attached soft tissues. The Sage-Schliff (sawing and grinding) technique *J. Oral Pathol.* 11, 318-326.
- Egrise,D., Martin,D., Vienne,A., Neve,P., and Schoutens,A. 1992. The number of fibroblastic colonies formed from bone marrow is decreased and the in vitro proliferation rate of trabecular bone cells increased in aged rats *Bone*. 13, 355-361.
- Eichner,A., Brock,J., Heldin,C.H., and Souchelnytskyi,S. 2002. Bone morphogenetic protein-7 (OP1) and transforming growth factor-beta1 modulate 1,25(OH)2-vitamin D3-induced differentiation of human osteoblasts *Exp. Cell Res.* 275, 132-142.

- Einhorn,T.A., Lane,J.M., Burstein,A.H., Kopman,C.R., and Vigorita,V.J. 1984. The healing of segmental bone defects induced by demineralized bone matrix. A radiographic and biomechanical study *J. Bone Joint Surg. Am.* 66, 274-279.
- Ernst,M. and Froesch,E.R. 1987. Osteoblastlike cells in a serum-free methylcellulose medium form colonies: effects of insulin and insulinlike growth factor I *Calcif. Tissue Int.* 40, 27-34.
- Franceschi,R.T. and Iyer,B.S. 1992. Relationship between collagen synthesis and expression of the osteoblast phenotype in MC3T3-E1 cells *J. Bone Miner. Res.* 7, 235-246.
- Franceschi,R.T., Iyer,B.S., and Cui,Y. 1994. Effects of ascorbic acid on collagen matrix formation and osteoblast differentiation in murine MC3T3-E1 cells *J. Bone Miner. Res.* 9, 843-854.
- Friedenstein,A.J., Chailakhjan,R.K., and Lalykina,K.S. 1970. The development of fibroblast colonies in monolayer cultures of guinea-pig bone marrow and spleen cells *Cell Tissue Kinet.* 3, 393-403.
- Friedenstein,A.J., Chailakhyan,R.K., and Gerasimov,U.V. 1987. Bone marrow osteogenic stem cells: in vitro cultivation and transplantation in diffusion chambers *Cell Tissue Kinet.* 20, 263-272.
- Fromigue,O., Marie,P.J., and Lomri,A. 1998. Bone morphogenetic protein-2 and transforming growth factor-beta2 interact to modulate human bone marrow stromal cell proliferation and differentiation *J. Cell Biochem.* 68, 411-426.
- Frost,H.M. 1989. The biology of fracture healing. An overview for clinicians. Part II *Clin. Orthop.* 294-309.
- Froum,S.J., Wallace,S.S., Tarnow,D.P., and Cho,S.C. 2002. Effect of platelet-rich plasma on bone growth and osseointegration in human maxillary sinus grafts: three bilateral case reports *Int. J. Periodontics. Restorative. Dent.* 22, 45-53.

- Fujimoto,R., Tanizawa,T., Nishida,S., Yamamoto,N., Soshi,S., Endo,N., and Takahashi,H.E. 1999. Local effects of transforming growth factor-beta1 on rat calvaria: changes depending on the dose and the injection site *J. Bone Miner. Metab.* 17, 11-17.
- Giannobile,W.V., Whitson,S.W., and Lynch,S.E. 1997. Non-coordinate control of bone formation displayed by growth factor combinations with IGF-I *J. Dent. Res.* 76, 1569-1578.
- Gimble,J.M., Robinson,C.E., Wu,X., and Kelly,K.A. 1996. The function of adipocytes in the bone marrow stroma: an update *Bone*. 19, 421-428.
- Globus,R.K., Plouet,J., and Gospodarowicz,D. 1989. Cultured bovine bone cells synthesize basic fibroblast growth factor and store it in their extracellular matrix *Endocrinology*. 124, 1539-1547.
- Glowacki,J., Kaban,L.B., Murray,J.E., Folkman,J., and Mulliken,J.B. 1981. Application of the biological principle of induced osteogenesis for craniofacial defects *Lancet*. 1, 959-962.
- Gori,F., Thomas,T., Hicok,K.C., Spelsberg,T.C., and Riggs,B.L. 1999. Differentiation of human marrow stromal precursor cells: bone morphogenetic protein-2 increases OSF2/CBFA1, enhances osteoblast commitment, and inhibits late adipocyte maturation *J. Bone Miner. Res.* 14, 1522-1535.
- Goshima,J., Goldberg,V.M., and Caplan,A.I. 1991a. Osteogenic potential of culture-expanded rat marrow cells as assayed in vivo with porous calcium phosphate ceramic *Biomaterials*. 12, 253-258.
- Goshima,J., Goldberg,V.M., and Caplan,A.I. 1991b. The origin of bone formed in composite grafts of porous calcium phosphate ceramic loaded with marrow cells *Clin. Orthop.* 274-283.

- Goshima,J., Goldberg,V.M., and Caplan,A.I. 1991c. The osteogenic potential of culture-expanded rat marrow mesenchymal cells assayed in vivo in calcium phosphate ceramic blocks *Clin. Orthop.* 298-311.
- Greenhalgh,D.G. 1996. The role of growth factors in wound healing *J. Trauma*. 41, 159-167.
- Gundle,R., Joyner,C.J., and Triffitt,J.T. 1995. Human bone tissue formation in diffusion chamber culture in vivo by bone-derived cells and marrow stromal fibroblastic cells *Bone*. 16, 597-601.
- Gunsilius,E., Petzer,A., Stockhammer,G., Nussbaumer,W., Schumacher,P., Clausen,J., and Gastl,G. 2000. Thrombocytes are the major source for soluble vascular endothelial growth factor in peripheral blood *Oncology*. 58, 169-174.
- Hanada,K., Dennis,J.E., and Caplan,A.I. 1997. Stimulatory effects of basic fibroblast growth factor and bone morphogenetic protein-2 on osteogenic differentiation of rat bone marrow-derived mesenchymal stem cells *J. Bone Miner. Res.* 12, 1606-1614.
- Harris,S.E., Bonewald,L.F., Harris,M.A., Sabatini,M., Dallas,S., Feng,J.Q., Ghosh-Choudhury,N., Wozney,J., and Mundy,G.R. 1994. Effects of transforming growth factor beta on bone nodule formation and expression of bone morphogenetic protein 2, osteocalcin, osteopontin, alkaline phosphatase, and type I collagen mRNA in long-term cultures of fetal rat calvarial osteoblasts *J. Bone Miner. Res.* 9, 855-863.
- Hay,E., Hott,M., Graulet,A.M., Lomri,A., and Marie,P.J. 1999. Effects of bone morphogenetic protein-2 on human neonatal calvaria cell differentiation *J. Cell Biochem.* 72, 81-93.
- Haynesworth,S.E., Baber,M.A., and Caplan,A.I. 1992a. Cell surface antigens on human marrow-derived mesenchymal cells are detected by monoclonal antibodies *Bone*. 13, 69-80.

- Haynesworth,S.E., Goshima,J., Goldberg,V.M., and Caplan,A.I. 1992b. Characterization of cells with osteogenic potential from human marrow *Bone*. 13, 81-88.
- Hicok,K.C., Thomas,T., Gori,F., Rickard,D.J., Spelsberg,T.C., and Riggs,B.L. 1998. Development and characterization of conditionally immortalized osteoblast precursor cell lines from human bone marrow stroma *J. Bone Miner. Res.* 13, 205-217.
- Hock,J.M. and Canalis,E. 1994. Platelet-derived growth factor enhances bone cell replication, but not differentiated function of osteoblasts *Endocrinology*. 134, 1423-1428.
- Hock,J.M., Centrella,M., and Canalis,E. 1988. Insulin-like growth factor I has independent effects on bone matrix formation and cell replication *Endocrinology*. 122, 254-260.
- Hollinger,J. 1993. Factors for osseous repair and delivery: Part II *J. Craniofac. Surg.* 4, 135-141.
- Hollinger,J. and Wong,M.E. 1996. The integrated processes of hard tissue regeneration with special emphasis on fracture healing *Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod.* 82, 594-606.
- Hollinger,J.O. and Kleinschmidt,J.C. 1990. The critical size defect as an experimental model to test bone repair materials *J. Craniofac. Surg.* 1, 60-68.
- Horner,A., Bord,S., Kemp,P., Grainger,D., and Compston,J.E. 1996. Distribution of platelet-derived growth factor (PDGF) A chain mRNA, protein, and PDGF-alpha receptor in rapidly forming human bone *Bone*. 19, 353-362.
- Hotz,G.. 1-1-1998. "Delivery system for osteoinductive system In *Biological matrices and tissue reconstruction*, 207. Stark, G. B., Horch, R., and Tanczos, E. Heidelberg: Springer Verlag.

- Hou,Z., Nguyen,Q., Frenkel,B., Nilsson,S.K., Milne,M., van Wijnen,A.J., Stein,J.L., Quesenberry,P., Lian,J.B., and Stein,G.S. 1999. Osteoblast-specific gene expression after transplantation of marrow cells: implications for skeletal gene therapy *Proc. Natl. Acad. Sci. U. S. A.* 96, 7294-7299.
- Howes,R., Bowness,J.M., Grotendorst,G.R., Martin,G.R., and Reddi,A.H. 1988. Platelet-derived growth factor enhances demineralized bone matrix-induced cartilage and bone formation *Calcif. Tissue Int.* 42, 34-38.
- Hsieh,S.C. and Graves,D.T. 1998. Pulse application of platelet-derived growth factor enhances formation of a mineralizing matrix while continuous application is inhibitory *J. Cell Biochem.* 69, 169-180.
- Hutmacher,D., Kirsch,A., Ackermann,K., and Huerzler,M.. 1999. "State of the art and future perspectives In *Tissue engineering. Applications in Maxillofacial Surgery and Periodontics*, 197. Lynch, S. E., Genco, R. J., and Marx, R. E. Illinoise: Quintessence Publishing.
- Hwang,D.L., Latus,L.J., and Lev-Ran,A. 1992. Effects of platelet-contained growth factors (PDGF, EGF, IGF-I, and TGF-beta) on DNA synthesis in porcine aortic smooth muscle cells in culture *Exp. Cell Res.* 200, 358-360.
- Im,G.I., Kim,D.Y., Shin,J.H., Hyun,C.W., and Cho,W.H. 2001. Repair of cartilage defect in the rabbit with cultured mesenchymal stem cells from bone marrow *J. Bone Joint Surg. Br.* 83, 289-294.
- Inoue,K., Ohgushi,H., Yoshikawa,T., Okumura,M., Sempuku,T., Tamai,S., and Dohi,Y. 1997. The effect of aging on bone formation in porous hydroxyapatite: biochemical and histological analysis *J. Bone Miner. Res.* 12, 989-994.
- Ishaug-Riley,S.L., Crane,G.M., Gurlek,A., Miller,M.J., Yasko,A.W., Yaszemski,M.J., and Mikos,A.G. 1997. Ectopic bone formation by marrow stromal osteoblast transplantation using poly(DL-lactic-co-glycolic acid) foams implanted into the rat mesentery *J. Biomed. Mater. Res.* 36, 1-8.

- Jackson,K.A., Mi,T., and Goodell,M.A. 1999. Hematopoietic potential of stem cells isolated from murine skeletal muscle *Proc. Natl. Acad. Sci. U. S. A.* 96, 14482-14486.
- Jaiswal,N., Haynesworth,S.E., Caplan,A.I., and Bruder,S.P. 1997. Osteogenic differentiation of purified, culture-expanded human mesenchymal stem cells in vitro *J. Cell Biochem.* 64, 295-312.
- Jee,W.S.S.. 1-1-1988. "The Skeletal Tissue In *Cell and Tissue Biology, A Textbook of Histology*. 135. Weiss, L. 6. Muenchen: Urban & Schwarzenberg GmbH.
- Ji,X., Chen,D., Xu,C., Harris,S.E., Mundy,G.R., and Yoneda,T. 2000. Patterns of gene expression associated with BMP-2-induced osteoblast and adipocyte differentiation of mesenchymal progenitor cell 3T3-F442A *J. Bone Miner. Metab.* 18, 132-139.
- Joyce,M.E., Jingushi,S., and Bolander,M.E. 1990a. Transforming growth factor-beta in the regulation of fracture repair *Orthop. Clin. North Am.* 21, 199-209.
- Joyce,M.E., Jingushi,S., Scully,S.P., and Bolander,M.E. 1991. Role of growth factors in fracture healing *Prog. Clin. Biol. Res.* 365, 391-416.
- Joyce,M.E., Roberts,A.B., Sporn,M.B., and Bolander,M.E. 1990b. Transforming growth factor-beta and the initiation of chondrogenesis and osteogenesis in the rat femur *J. Cell Biol.* 110, 2195-2207.
- Joyce,M.E., Terek,R.M., Jingushi,S., and Bolander,M.E. 1990c. Role of transforming growth factor-beta in fracture repair *Ann. N. Y. Acad. Sci.* 593, 107-123.
- Kadiyala,S., Young,R.G., Thiede,M.A., and Bruder,S.P. 1997. Culture expanded canine mesenchymal stem cells possess osteochondrogenic potential in vivo and in vitro *Cell Transplant.* 6, 125-134.
- Kalfas,I.H. 2001. Principle of bone healing *Neurosurg Focus.* 10, 1-4.

- Kassem,M., Kveiborg,M., and Eriksen,E.F. 2000. Production and action of transforming growth factor-beta in human osteoblast cultures: dependence on cell differentiation and modulation by calcitriol *Eur. J. Clin. Invest.* 30, 429-437.
- Kassolis,J.D., Rosen,P.S., and Reynolds,M.A. 2000. Alveolar ridge and sinus augmentation utilizing platelet-rich plasma in combination with freeze-dried bone allograft: case series *J. Periodontol.* 71, 1654-1661.
- Katagiri,T., Yamaguchi,A., Komaki,M., Abe,E., Takahashi,N., Ikeda,T., Rosen,V., Wozney,J.M., Fujisawa-Sehara,A., and Suda,T. 1994. Bone morphogenetic protein-2 converts the differentiation pathway of C2C12 myoblasts into the osteoblast lineage *J. Cell Biol.* 127, 1755-1766.
- Kawasaki,K., Aihara,M., Honmo,J., Sakurai,S., Fujimaki,Y., Sakamoto,K., Fujimaki,E., Wozney,J.M., and Yamaguchi,A. 1998. Effects of recombinant human bone morphogenetic protein-2 on differentiation of cells isolated from human bone, muscle, and skin *Bone*. 23, 223-231.
- Kelly,K.A. and Gimble,J.M. 1998. 1,25-Dihydroxy vitamin D<sub>3</sub> inhibits adipocyte differentiation and gene expression in murine bone marrow stromal cell clones and primary cultures *Endocrinology*. 139, 2622-2628.
- Kim,H.D. and Valentini,R.F. 1997. Human osteoblast response in vitro to platelet-derived growth factor and transforming growth factor-beta delivered from controlled-release polymer rods *Biomaterials*. 18, 1175-1184.
- Kim,K.J., Itoh,T., and Kotake,S. 1997. Effects of recombinant human bone morphogenetic protein-2 on human bone marrow cells cultured with various biomaterials *J. Biomed. Mater. Res.* 35, 279-285.
- Kim,S.G., Chung,C.H., Kim,Y.K., Park,J.C., and Lim,S.C. 2002. Use of particulate dentin-plaster of Paris combination with/without platelet-rich plasma in the treatment of bone defects around implants *Int. J. Oral Maxillofac. Implants*. 17, 86-94.

- Kronemann,N., Bouloumi,A., Bassus,S., Kirchmaier,C.M., Busse,R., and Schini-Kerth,V.B. 1999. Aggregating human platelets stimulate expression of vascular endothelial growth factor in cultured vascular smooth muscle cells through a synergistic effect of transforming growth factor-beta(1) and platelet-derived growth factor(AB) *Circulation.* 100, 855-860.
- Kubler,N.R., Reuther,J.F., Faller,G., Kirchner,T., Ruppert,R., and Sebald,W. 1998. Inductive properties of recombinant human BMP-2 produced in a bacterial expression system *Int. J. Oral Maxillofac. Surg.* 27, 305-309.
- Kuboki,Y., Takita,H., Kobayashi,D., Tsuruga,E., Inoue,M., Murata,M., Nagai,N., Dohi,Y., and Ohgushi,H. 1998. BMP-induced osteogenesis on the surface of hydroxyapatite with geometrically feasible and nonfeasible structures: topology of osteogenesis *J. Biomed. Mater. Res.* 39, 190-199.
- Kubota,K., Sakikawa,C., Katsumata,M., Nakamura,T., and Wakabayashi,K. 2002. Platelet-derived growth factor BB secreted from osteoclasts acts as an osteoblastogenesis inhibitory factor *J. Bone Miner. Res.* 17, 257-265.
- Kusumoto,K., Bessho,K., Fujimura,K., Ogawa,Y., and Iizuka,T. 1997. Intramuscular osteoinduction and bone marrow formation by the implantation of rhBMP-2 with atelopeptide type I collagen *Br. J. Oral Maxillofac. Surg.* 35, 433-437.
- Kuznetsov,S.A., Friedenstein,A.J., and Robey,P.G. 1997. Factors required for bone marrow stromal fibroblast colony formation in vitro *Br. J. Haematol.* 97, 561-570.
- Kveiborg,M., Flyvbjerg,A., Eriksen,E.F., and Kassem,M. 2001. Transforming growth factor-beta1 stimulates the production of insulin-like growth factor-I and insulin-like growth factor-binding protein-3 in human bone marrow stromal osteoblast progenitors *J. Endocrinol.* 169, 549-561.
- Kveiborg,M., Flyvbjerg,A., Rattan,S.I., and Kassem,M. 2000. Changes in the insulin-like growth factor-system may contribute to in vitro age-related impaired osteoblast functions *Exp. Gerontol.* 35, 1061-1074.

- Landesberg,R., Roy,M., and Glickman,R.S. 2000. Quantification of growth factor levels using a simplified method of platelet-rich plasma gel preparation *J. Oral Maxillofac. Surg.* 58, 297-300.
- Lane,J.M., Tomin,E., and Bostrom,M.P. 1999. Biosynthetic bone grafting *Clin. Orthop.* S107-S117.
- Leboy,P.S., Beresford,J.N., Devlin,C., and Owen,M.E. 1991. Dexamethasone induction of osteoblast mRNAs in rat marrow stromal cell cultures *J. Cell Physiol.* 146, 370-378.
- Lecanda,F., Avioli,L.V., and Cheng,S.L. 1997. Regulation of bone matrix protein expression and induction of differentiation of human osteoblasts and human bone marrow stromal cells by bone morphogenetic protein-2 *J. Cell Biochem.* 67, 386-396.
- Lecoeur,L. and Ouhayoun,J.P. 1997. In vitro induction of osteogenic differentiation from non-osteogenic mesenchymal cells *Biomaterials.* 18, 989-993.
- Lekovic,V., Camargo,P.M., Weinlaender,M., Vasilic,N., and Kenney,E.B. 2002. Comparison of platelet-rich plasma, bovine porous bone mineral, and guided tissue regeneration versus platelet-rich plasma and bovine porous bone mineral in the treatment of intrabony defects: a reentry study *J. Periodontol.* 73, 198-205.
- Lindl,T. and Bauer,J.. 1989. "Spezielle Methoden der Zellbiologie In *Zell und Gewebekultur*, 181. Lindl, T. and Bauer, J. Stuttgart: Gustav Fischer Verlag.
- Liu,P., Oyajobi,B.O., Russell,R.G., and Scutt,A. 1999. Regulation of osteogenic differentiation of human bone marrow stromal cells: interaction between transforming growth factor-beta and 1,25(OH)(2) vitamin D(3) In vitro *Calcif. Tissue Int.* 65, 173-180.

- Lozada,J.L., Caplanis,N., Proussaefs,P., Willardsen,J., and Kammeyer,G. 2001. Platelet-rich plasma application in sinus graft surgery: Part I--Background and processing techniques *J. Oral Implantol.* 27, 38-42.
- Lu,L., Yaszemski,M.J., and Mikos,A.G. 2001. TGF-beta1 release from biodegradable polymer microparticles: its effects on marrow stromal osteoblast function *J. Bone Joint Surg. Am.* 83-A Suppl 1, S82-S91.
- Man,D., Plosker,H., and Winland-Brown,J.E. 2001. The use of autologous platelet-rich plasma (platelet gel) and autologous platelet-poor plasma (fibrin glue) in cosmetic surgery *Plast. Reconstr. Surg.* 107, 229-237.
- Maniatopoulos,C., Sodek,J., and Melcher,A.H. 1988. Bone formation in vitro by stromal cells obtained from bone marrow of young adult rats *Cell Tissue Res.* 254, 317-330.
- Manson,P.N., Crawley,W.A., and Hoopes,J.E. 1986. Frontal cranioplasty: risk factors and choice of cranial vault reconstructive material *Plast. Reconstr. Surg.* 77, 888-904.
- Marden,L.J., Hollinger,J.O., Chaudhari,A., Turek,T., Schaub,R.G., and Ron,E. 1994. Recombinant human bone morphogenetic protein-2 is superior to demineralized bone matrix in repairing craniotomy defects in rats *J. Biomed. Mater. Res.* 28, 1127-1138.
- Marx,R.E., Carlson,E.R., Eichstaedt,R.M., Schimmele,S.R., Strauss,J.E., and Georgeff,K.R. 1998. Platelet-rich plasma: Growth factor enhancement for bone grafts *Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod.* 85, 638-646.
- Merklein,F., Hendrich,C., Noth,U., Kochinki,G., Rader,C.P., Schutze,N., Thull,R., and Eulert,J. 1998. [Standardized tests of bone implant surfaces with an osteoblast cell culture system. I. Orthopedic standard materials] *Biomed. Tech. (Berl.)* 43, 354-359.

- Miyazono,K. and Takaku,F. 1989. Platelet-derived growth factors *Blood Rev.* 3, 269-276.
- Mohan,S. and Baylink,D.J. 1991. Bone growth factors *Clin. Orthop.* 30-48.
- Murata,M., Inoue,M., Arisue,M., Kuboki,Y., and Nagai,N. 1998. Carrier-dependency of cellular differentiation induced by bone morphogenetic protein in ectopic sites *Int. J. Oral Maxillofac. Surg.* 27, 391-396.
- Nakahara,H., Goldberg,V.M., and Caplan,A.I. 1991. Culture-expanded human periosteal-derived cells exhibit osteochondral potential in vivo *J. Orthop. Res.* 9, 465-476.
- Nakamura,T., Kitazawa,T., and Ichihara,A. 1986. Partial purification and characterization of masking protein for beta-type transforming growth factor from rat platelets *Biochem. Biophys. Res. Commun.* 141, 176-184.
- Negishi,Y., Kudo,A., Obinata,A., Kawashima,K., Hirano,H., Yanai,N., Obinata,M., and Endo,H. 2000. Multipotency of a bone marrow stromal cell line, TBR31-2, established from ts-SV40 T antigen gene transgenic mice *Biochem. Biophys. Res. Commun.* 268, 450-455.
- Nehls,V. and Herrmann,R. 1996. The configuration of fibrin clots determines capillary morphogenesis and endothelial cell migration *Microvasc. Res.* 51, 347-364.
- Nilsson,S.K., Dooner,M.S., Weier,H.U., Frenkel,B., Lian,J.B., Stein,G.S., and Quesenberry,P.J. 1999. Cells capable of bone production engraft from whole bone marrow transplants in nonablated mice *J. Exp. Med.* 189, 729-734.
- Noda,M. and Camilliere,J.J. 1989. In vivo stimulation of bone formation by transforming growth factor-beta *Endocrinology.* 124, 2991-2994.

- O'Neill,E.M., Zalewski,W.M., Eaton,L.J., Popovsky,M.A., Pivacek,L.E., Ragno,G., and Valeri,C.R. 2001. Autologous platelet-rich plasma isolated using the Haemonetics Cell Saver 5 and Haemonetics MCS+ for the preparation of platelet gel *Vox Sang.* 81, 172-175.
- Ohgushi,H., Dohi,Y., Tamai,S., and Tabata,S. 1993. Osteogenic differentiation of marrow stromal stem cells in porous hydroxyapatite ceramics *J. Biomed. Mater. Res.* 27, 1401-1407.
- Ohgushi,H., Dohi,Y., Yoshikawa,T., Tamai,S., Tabata,S., Okunaga,K., and Shibuya,T. 1996. Osteogenic differentiation of cultured marrow stromal stem cells on the surface of bioactive glass ceramics *J. Biomed. Mater. Res.* 32, 341-348.
- Okada,F., Yamaguchi,K., Ichihara,A., and Nakamura,T. 1989. Purification and structural analysis of a latent form of transforming growth factor-beta from rat platelet *J. Biochem. (Tokyo)*. 106, 304-310.
- Okubo,Y., Bessho,K., Fujimura,K., Konishi,Y., Kusumoto,K., Ogawa,Y., and Iizuka,T. 2000. Osteoinduction by recombinant human bone morphogenetic protein-2 at intramuscular, intermuscular, subcutaneous and intrafatty sites *Int. J. Oral Maxillofac. Surg.* 29, 62-66.
- Omura,S., Mizuki,N., Kawabe,R., Ota,S., Kobayashi,S., and Fujita,K. 1998. A carrier for clinical use of recombinant human BMP-2: dehydrothermally cross-linked composite of fibrillar and denatured atelocollagen sponge *Int. J. Oral Maxillofac. Surg.* 27, 129-134.
- Ong,J.L., Carnes,D.L., and Sogal,A. 1999. Effect of transforming growth factor-beta on osteoblast cells cultured on 3 different hydroxyapatite surfaces *Int. J. Oral Maxillofac. Implants.* 14, 217-225.

- Oreffo,R.O., Kusec,V., Romberg,S., and Triffitt,J.T. 1999. Human bone marrow osteoprogenitors express estrogen receptor-alpha and bone morphogenetic proteins 2 and 4 mRNA during osteoblastic differentiation *J. Cell Biochem.* 75, 382-392.
- Otsuka,E., Yamaguchi,A., Hirose,S., and Hagiwara,H. 1999. Characterization of osteoblastic differentiation of stromal cell line ST2 that is induced by ascorbic acid *Am. J. Physiol.* 277, C132-C138.
- Owen,M. 1980. The origin of bone cells in the postnatal organism *Arthritis Rheum.* 23, 1073-1080.
- Owen,M. 1988. Marrow stromal stem cells *J. Cell Sci. Suppl.* 10, 63-76.
- Owen,M. and Friedenstein,A.J. 1988. Stromal stem cells: marrow-derived osteogenic precursors *Ciba Found. Symp.* 136, 42-60.
- Park,Y.J., Lee,Y.M., Lee,J.Y., Seol,Y.J., Chung,C.P., and Lee,S.J. 2000a. Controlled release of platelet-derived growth factor-BB from chondroitin sulfate-chitosan sponge for guided bone regeneration *J. Control Release.* 67, 385-394.
- Park,Y.J., Lee,Y.M., Park,S.N., Sheen,S.Y., Chung,C.P., and Lee,S.J. 2000b. Platelet derived growth factor releasing chitosan sponge for periodontal bone regeneration *Biomaterials.* 21, 153-159.
- Pereira,R.F., Halford,K.W., O'Hara,M.D., Leeper,D.B., Sokolov,B.P., Pollard,M.D., Bagasra,O., and Prockop,D.J. 1995. Cultured adherent cells from marrow can serve as long-lasting precursor cells for bone, cartilage, and lung in irradiated mice *Proc. Natl. Acad. Sci. U. S. A.* 92, 4857-4861.
- Pereira,R.F., O'Hara,M.D., Laptev,A.V., Halford,K.W., Pollard,M.D., Class,R., Simon,D., Livezey,K., and Prockop,D.J. 1998. Marrow stromal cells as a source of progenitor cells for nonhematopoietic tissues in transgenic mice with a phenotype of osteogenesis imperfecta *Proc. Natl. Acad. Sci. U. S. A.* 95, 1142-1147.

- Petrungaro,P.S. 2001. Using platelet-rich plasma to accelerate soft tissue maturation in esthetic periodontal surgery *Compend. Contin. Educ. Dent.* 22, 729-32, 734, 736.
- Pfeilschifter,J., Oechsner,M., Naumann,A., Gronwald,R.G., Minne,H.W., and Ziegler,R. 1990. Stimulation of bone matrix apposition in vitro by local growth factors: a comparison between insulin-like growth factor I, platelet-derived growth factor, and transforming growth factor beta *Endocrinology*. 127, 69-75.
- Pietersz,R.N., Loos,J.A., and Reesink,H.W. 1987. Survival in vivo of platelets stored for 48 hours in the buffycoat at 4 degrees C compared to platelet rich plasma stored at 22 degrees C *Blut*. 54, 201-206.
- Pircher,R., Jullien,P., and Lawrence,D.A. 1986. Beta-transforming growth factor is stored in human blood platelets as a latent high molecular weight complex *Biochem. Biophys. Res. Commun.* 136, 30-37.
- Pittenger,M.F., Mackay,A.M., Beck,S.C., Jaiswal,R.K., Douglas,R., Mosca,J.D., Moorman,M.A., Simonetti,D.W., Craig,S., and Marshak,D.R. 1999. Multilineage potential of adult human mesenchymal stem cells *Science*. 284, 143-147.
- Price,P.A. 1985. Vitamin K-dependent formation of bone Gla protein (osteocalcin) and its function *Vitam. Horm.* 42, 65-108.
- Prockop,D.J. 1997. Marrow stromal cells as stem cells for nonhematopoietic tissues *Science*. 276, 71-74.
- Puleo,D.A. 1997. Dependence of mesenchymal cell responses on duration of exposure to bone morphogenetic protein-2 in vitro *J. Cell Physiol.* 173, 93-101.

- Rabie,A.B., Chay,S.H., and Wong,A.M. 2000. Healing of autogenous intramembranous bone in the presence and absence of homologous demineralized intramembranous bone *Am. J. Orthod. Dentofacial Orthop.* 117, 288-297.
- Rabie,A.B., Deng,Y.M., Samman,N., and Hagg,U. 1996. The effect of demineralized bone matrix on the healing of intramembranous bone grafts in rabbit skull defects *J. Dent. Res.* 75, 1045-1051.
- Racz,Z. and Thek,M. 1984. Buffy coat or platelet-rich plasma? Comparison of two platelet-processing techniques *Vox Sang.* 47, 108-113.
- Raschke,M., Wildemann,B., Inden,P., Bail,H., Flyvbjerg,A., Hoffmann,J., Haas,N.P., and Schmidmaier,G. 2002. Insulin-like growth factor-1 and transforming growth factor-beta1 accelerates osteotomy healing using polylactide-coated implants as a delivery system: a biomechanical and histological study in minipigs *Bone.* 30, 144-151.
- Reddi,A.H. 1995. Bone morphogenetic proteins, bone marrow stromal cells, and mesenchymal stem cells. Maureen Owen revisited *Clin. Orthop.* 115-119.
- Reddi,A.H. and Huggins,C.B. 1972. Citrate and alkaline phosphatase during transformation of fibroblasts by the matrix and minerals of bone *Proc. Soc. Exp. Biol. Med.* 140, 807-810.
- Rickard,D.J., Sullivan,T.A., Shenker,B.J., Leboy,P.S., and Kazhdan,I. 1994. Induction of rapid osteoblast differentiation in rat bone marrow stromal cell cultures by dexamethasone and BMP-2 *Dev. Biol.* 161, 218-228.
- Ripamonti,U. 1993. Delivery systems for bone morphogenetic proteins. A summary of experimental studies in primate models *Ann. Chir Gynaecol. Suppl.* 207, 13-24.

- Ripamonti,U., Crooks,J., and Rueger,D.C. 2001. Induction of bone formation by recombinant human osteogenic protein-1 and sintered porous hydroxyapatite in adult primates *Plast. Reconstr. Surg.* 107, 977-988.
- Risteli,L. and Risteli,J. 1993. Biochemical markers of bone metabolism *Ann. Med.* 25, 385-393.
- Risto,O., Wahlstrom,O., Abdiu,A., and Walz,T. 1991. Effect of platelet derived growth factor on heterotopic bone formation in rats *Acta Orthop. Scand.* 62, 49-51.
- Rosenberg,E.S. and Torosian,J. 2000. Sinus grafting using platelet-rich plasma--initial case presentation *Pract. Periodontics. Aesthet. Dent.* 12, 843-850.
- Rosner,B.. 1995a. "Descriptive statistics In *Foundamentals of Biostatistics*, 5. Rosner, B. 4. Washington: Wadsworth Publishing Company.
- Rosner,B.. 1995b. "Hypothesis testing: Two sample interference In *Foundamentals of Biostatistics*, 251. Rosner, B. 4. Washington: Wadsworth Publishing Company.
- Rozycki,M.D. and Edelstein,S.J.. 1996. "Protein extraction and solubilization In *Protein methods*, Boilag, D. M., Rozycki, M. D., and Edelstein, S. J. 2. Jhon Wiley & Sons, Ltd.
- Rydziel,S. and Canalis,E. 1996. Expression and growth factor regulation of platelet-derived growth factor B transcripts in primary osteoblast cell cultures *Endocrinology*. 137, 4115-4119.
- Sampath,T.K. and Reddi,A.H. 1981. Dissociative extraction and reconstitution of extracellular matrix components involved in local bone differentiation *Proc. Natl. Acad. Sci. U. S. A.* 78, 7599-7603.
- Sampath,T.K. and Reddi,A.H. 1984. Importance of geometry of the extracellular matrix in endochondral bone differentiation *J. Cell Biol.* 98, 2192-2197.

- Sawai,T., Niimi,A., Takahashi,H., and Ueda,M. 1996. Histologic study of the effect of hyperbaric oxygen therapy on autogenous free bone grafts *J. Oral Maxillofac. Surg.* 54, 975-981.
- Scammell,B.E. and Roach,H.I. 1996. A new role for the chondrocyte in fracture repair: endochondral ossification includes direct bone formation by former chondrocytes *J. Bone Miner. Res.* 11, 737-745.
- Schaffer,D.J., Munder,B., and Stark,G.B.. 1998. "Primary human osteoblast cultures on different biomaterials-Tissue-engineering for bone reconstruction In *Biological matrces and tissue reconstruction*, 263. Stark, G. B., Horch, R., and Tanczos, E. Heidelberg: Springer-Verlag.
- Schmid,C., Steiner,T., and Froesch,E.R. 1984. Insulin-like growth factor I supports differentiation of cultured osteoblast-like cells *FEBS Lett.* 173, 48-52.
- Sekiya,I., Vuoristo,J.T., Larson,B.L., and Prockop,D.J. 2002. In vitro cartilage formation b y human adult s tem c ells from b one m arrow s troma d efines the sequence of cellular and molecular events during chondrogenesis *Proc. Natl. Acad. Sci. U. S. A.* 99, 4397-4402.
- Shanaman,R., Filstein,M.R., and Danesh-Meyer,M.J. 2001. Localized ridge augmentation using GBR and platelet-rich plasma: case reports *Int. J. Periodontics. Restorative. Dent.* 21, 345-355.
- Shapiro,I.M., Golub,E.E., Kakuta,S., Hazelgrove,J., Haverty,J., Chance,B., and Frasca,P. 1982. Initiation of endochondral calcification is related to changes in the redox state of hypertrophic chondrocytes *Science.* 217, 950-952.
- Shea,L.D., Wang,D., Franceschi,R.T., and Mooney,D.J. 2000. Engineered bone development from a pre-osteoblast cell line on three-dimensional scaffolds *Tissue Eng.* 6, 605-617.

- Si,X., Jin,Y., Yang,L., Tipoe,G.L., and White,F.H. 1997. Expression of BMP-2 and TGF-beta 1 mRNA during healing of the rabbit mandible *Eur. J. Oral Sci.* 105, 325-330.
- Slater,M., Patava,J., Kingham,K., and Mason,R.S. 1995. Involvement of platelets in stimulating osteogenic activity *J. Orthop. Res.* 13, 655-663.
- Solheim,E. 1998. Growth factors in bone *Int. Orthop.* 22, 410-416.
- Sonnleitner,D., Huemer,P., and Sullivan,D.Y. 2000. A simplified technique for producing platelet-rich plasma and platelet concentrate for intraoral bone grafting techniques: a technical note *Int. J. Oral Maxillofac. Implants.* 15, 879-882.
- Spector,J.A., Luchs,J.S., Mehrara,B.J., Greenwald,J.A., Smith,L.P., and Longaker,M.T. 2001. Expression of bone morphogenetic proteins during membranous bone healing *Plast. Reconstr. Surg.* 107, 124-134.
- Spinella-Jaegle,S., Roman-Roman,S., Faucheu,C., Dunn,F.W., Kawai,S., Gallea,S., Stiot,V., Blanchet,A.M., Courtois,B., Baron,R., and Rawadi,G. 2001. Opposite effects of bone morphogenetic protein-2 and transforming growth factor-beta1 on osteoblast differentiation *Bone.* 29, 323-330.
- Stein,G.S., Lian,J.B., and Owen,T.A. 1990. Relationship of cell growth to the regulation of tissue-specific gene expression during osteoblast differentiation *FASEB J.* 4, 3111-3123.
- Steinbrech,D.S., Mehrara,B.J., Rowe,N.M., Dudziak,M.E., Luchs,J.S., Saadeh,P.B., Gittes,G.K., and Longaker,M.T. 2000a. Gene expression of TGF-beta, TGF-beta receptor, and extracellular matrix proteins during membranous bone healing in rats *Plast. Reconstr. Surg.* 105, 2028-2038.
- Steinbrech,D.S., Mehrara,B.J., Rowe,N.M., Dudziak,M.E., Saadeh,P.B., Gittes,G.K., and Longaker,M.T. 1999. Gene expression of insulin-like growth factors I and II in rat membranous osteotomy healing *Ann. Plast. Surg.* 42, 481-487.

- Steinbrech,D.S., Mehrara,B.J., Saadeh,P.B., Greenwald,J.A., Spector,J.A., Gittes,G.K., and Longaker,M.T. 2000b. Hypoxia increases insulinlike growth factor gene expression in rat osteoblasts *Ann. Plast. Surg.* 44, 529-534.
- Stephan,E.B., Renjen,R., Lynch,S.E., and Dziak,R. 2000. Platelet-derived growth factor enhancement of a mineral-collagen bone substitute *J. Periodontol.* 71, 1887-1892.
- Suda,T., Shinki,T., and Takahashi,N. 1990. The role of vitamin D in bone and intestinal cell differentiation *Annu. Rev. Nutr.* 10, 195-211.
- Ten Cate,A.R.. 1994. "Hard tissue formation and destruction In *Oral histology, Development, Structure and Function*, 111. Ten Cate, A. R. 4th . St. Louis: Mosby.
- Terheyden,H., Jepsen,S., Moller,B., Tucker,M.M., and Rueger,D.C. 1999. Sinus floor augmentation with simultaneous placement of dental implants using a combination of deproteinized bone xenografts and recombinant human osteogenic protein-1. A histometric study in miniature pigs *Clin. Oral Implants. Res.* 10, 510-521.
- Theise,N.D., Badve,S., Saxena,R., Henegariu,O., Sell,S., Crawford,J.M., and Krause,D.S. 2000a. Derivation of hepatocytes from bone marrow cells in mice after radiation-induced myeloablation *Hepatology*. 31, 235-240.
- Theise,N.D., Nimmakayalu,M., Gardner,R., Illei,P.B., Morgan,G., Teperman,L., Henegariu,O., and Krause,D.S. 2000b. Liver from bone marrow in humans *Hepatology*. 32, 11-16.
- Thomson,J.A., Itskovitz-Eldor,J., Shapiro,S.S., Waknitz,M.A., Swiergiel,J.J., Marshall,V.S., and Jones,J.M. 1998. Embryonic stem cell lines derived from human blastocysts *Science*. 282, 1145-1147.

- Toquet,J., Rohanizadeh,R., Guicheux,J., Couillaud,S., Passuti,N., Daculsi,G., and Heymann,D. 1999. Osteogenic potential in vitro of human bone marrow cells cultured on macroporous biphasic calcium phosphate ceramic *J. Biomed. Mater. Res.* 44, 98-108.
- Triffitt,J.T. 1987. Initiation and enhancement of bone formation. A review *Acta Orthop. Scand.* 58, 673-684.
- Tsuji,T., Hughes,F.J., McCulloch,C.A., and Melcher,A.H. 1990. Effects of donor age on osteogenic cells of rat bone marrow in vitro *Mech. Ageing Dev.* 51, 121-132.
- Tuncay,O.C., Ho,D., and Barker,M.K. 1994. Oxygen tension regulates osteoblast function *Am. J. Orthod. Dentofacial Orthop.* 105, 457-463.
- Uludag,H., D'Augusta,D., Palmer,R., Timony,G., and Wozney,J. 1999. Characterization of rhBMP-2 pharmacokinetics implanted with biomaterial carriers in the rat ectopic model *J. Biomed. Mater. Res.* 46, 193-202.
- Vikjaer,D., Blom,S., Hjorting-Hansen,E., and Pinholt,E.M. 1997. Effect of platelet-derived growth factor-BB on bone formation in calvarial defects: an experimental study in rabbits *Eur. J. Oral Sci.* 105, 59-66.
- Vukicevic,S., Luyten,F.P., Kleinman,H.K., and Reddi,A.H. 1990a. Differentiation of canalicular cell processes in bone cells by basement membrane matrix components: regulation by discrete domains of laminin *Cell.* 63, 437-445.
- Vukicevic,S., Paralkar,V.M., Cunningham,N.S., Gutkind,J.S., and Reddi,A.H. 1990b. Autoradiographic localization of osteogenin binding sites in cartilage and bone during rat embryonic development *Dev. Biol.* 140, 209-214.
- Wada,Y., Kataoka,H., Yokose,S., Ishizuya,T., Miyazono,K., Gao,Y.H., Shibasaki,Y., and Yamaguchi,A. 1998. Changes in osteoblast phenotype during differentiation of enzymatically isolated rat calvaria cells *Bone.* 22, 479-485.

- Wald,H.L., Sarakinos,G., Lyman,M.D., Mikos,A.G., Vacanti,J.P., and Langer,R. 1993. Cell seeding in porous transplantation devices *Biomaterials.* 14, 270-278.
- Wang,D., Christensen,K., Chawla,K., Xiao,G., Krebsbach,P.H., and Franceschi,R.T. 1999. Isolation and characterization of MC3T3-E1 preosteoblast subclones with distinct in vitro and in vivo differentiation/mineralization potential *J. Bone Miner. Res.* 14, 893-903.
- Wang,J. and Glimcher,M.J. 1999. Characterization of matrix-induced osteogenesis in rat calvarial bone defects: I. Differences in the cellular response to demineralized bone matrix implanted in calvarial defects and in subcutaneous sites *Calcif. Tissue Int.* 65, 156-165.
- Weibrich,G., Kleis,W.K., and Hafner,G. 2002a. Growth factor levels in the platelet-rich plasma produced by 2 different methods: curasan-type PRP kit versus PCCS PRP system *Int. J. Oral Maxillofac. Implants.* 17, 184-190.
- Weibrich,G., Kleis,W.K., Hafner,G., and Hitzler,W.E. 2002b. Growth factor levels in platelet-rich plasma and correlations with donor age, sex, and platelet count *J. Craniomaxillofac. Surg.* 30, 97-102.
- Weibrich,G., Kleis,W.K., Kunz-Kostomanolakis,M., Loos,A.H., and Wagner,W. 2001. Correlation of platelet concentration in platelet-rich plasma to the extraction method, age, sex, and platelet count of the donor *Int. J. Oral Maxillofac. Implants.* 16, 693-699.
- Worster,A.A., Brower-Toland,B.D., Fortier,L.A., Bent,S.J., Williams,J., and Nixon,A.J. 2001. Chondrocytic differentiation of mesenchymal stem cells sequentially exposed to transforming growth factor-beta1 in monolayer and insulin-like growth factor-I in a three-dimensional matrix *J. Orthop. Res.* 19, 738-749.
- Wozney,J.M. 1992. The bone morphogenetic protein family and osteogenesis *Mol. Reprod. Dev.* 32, 160-167.

- Yamagiwa,H., Endo,N., Tokunaga,K., Hayami,T., Hatano,H., and Takahashi,H.E. 2001. In vivo bone-forming capacity of human bone marrow-derived stromal cells is stimulated by recombinant human bone morphogenetic protein-2 *J. Bone Miner. Metab.* 19, 20-28.
- Ye,Q., Zund,G., Benedikt,P., Jockenhoevel,S., Hoerstrup,S.P., Sakyama,S., Hubbell,J.A., and Turina,M. 2000. Fibrin gel as a three dimensional matrix in cardiovascular tissue engineering *Eur. J. Cardiothorac. Surg.* 17, 587-591.
- Yoo,J.U. and Johnstone,B. 1998. The role of osteochondral progenitor cells in fracture repair *Clin. Orthop.* S73-S81.
- Yoshida,K., Bessho,K., Fujimura,K., Kusumoto,K., Ogawa,Y., Tani,Y., and Iizuka,T. 1998. Osteoinduction capability of recombinant human bone morphogenetic protein-2 in intramuscular and subcutaneous sites: an experimental study *J. Craniomaxillofac. Surg.* 26, 112-115.
- Yoshikawa,T., Ohgushi,H., Dohi,Y., and Davies,J.E. 1997. Viable bone formation in porous hydroxyapatite: marrow cell-derived in vitro bone on the surface of ceramics *Biomed. Mater. Eng.* 7, 49-58.
- Yu,X., Hsieh,S.C., Bao,W., and Graves,D.T. 1997. Temporal expression of PDGF receptors and PDGF regulatory effects on osteoblastic cells in mineralizing cultures *Am. J. Physiol.* 272, C1709-C1716.
- Zellin,G., Beck,S., Hardwick,R., and Linde,A. 1998. Opposite effects of recombinant human transforming growth factor-beta 1 on bone regeneration in vivo: effects of exclusion of periosteal cells by microporous membrane *Bone*. 22, 613-620.
- Zhen,X., Bonjour,J.P., and Caverzasio,J. 1997. Platelet-derived growth factor stimulates sodium-dependent Pi transport in osteoblastic cells via phospholipase C $\gamma$  and phosphatidylinositol 3'-kinase *J. Bone Miner. Res.* 12, 36-44.

- Zimmermann,R., Jakubietz,R., Jakubietz,M., Strasser,E., Schlegel,A., Wiltfang,J., and Eckstein,R. 2001. Different preparation methods to obtain platelet components as a source of growth factors for local application *Transfusion*. 41, 1217-1224.
- Zohar,R., Cheifetz,S., McCulloch,C.A., and Sodek,J. 1998. Analysis of intracellular osteopontin as a marker of osteoblastic cell differentiation and mesenchymal cell migration *Eur. J. Oral Sci.* 106 Suppl 1, 401-407.