

ANNUAL PUBLICATIONS

Department of Maxillofacial Biology Molecular Craniofacial Embryology

1993.1.-2000.3.

I. Staffs and Students (April, 1999)

Professor	Kazuhiro Eto
Associate Professor	Masa-aki Ikeda
Lecturer	Yoko Kawaguchi Ikuko Morio
Assistant professor	Sachiko Iseki Tadahiro Imura Masato Ota
Secretary	Shiori Ogi
Research adviser	Kouichiro Kurisu Hirofumi Doi Noriko Osumi Masako Fujino
Doctoral course students	Kazumasa Kubota Tamaki Suganuma Keiwen Ma Kazusi Aoto Sumrejkanchanakij Piyamas Keigo Araki Solachudin
Research associates	Takao Sato

II. Educational Outline of Graduate Course

The laboratory of Molecular Craniofacial Embryology performs scientific research directed at the analysis of molecular and cellular developmental process in the craniofacial structure including regulation of cell proliferation, differentiation, morphogenesis. Specific offerings for graduate course work include molecular cell biology, biochemistry, cell and tissue culture techniques and immunohistochemistry as well as techniques for manipulations of mammalian post-implantation embryos.

III. Research Subjects

- 1) Molecular and developmental studies focused on the elucidation of normal craniofacial morphogenesis mechanisms and associated anomalies.
- 2) Molecular and cellular studies targeted at understanding mammalian cranial neural crest cells, especially concerning their migration patterns and differentiation potentials.
- 3) Development and improvement of new practical techniques for the manipulation of mammalian post-implantation embryos including whole embryo culture, in utero and exo utero surgery, vital dye labeling and cell injection.
- 4) Function of fibroblast growth factor receptor signalling during skull vault development.
- 5) Molecular Mechanisms for mammalian face development.
- 6) Proliferation and regeneration of terminally differentiated neurons and cardiomyocytes
- 7) Functional analysis of Rb and p300 in cell cycle control and tumorigenesis

IV. Publications (January, 1993-March, 2000)

A. Original Articles

1993

- 1) Gui T., Osumi-Yamashita N., and Eto K.: Proliferation of nasal epithelial and mesenchymal cells during primary palate formation. *J. Craniofac. Genet. Dev. Biol.* 13,250-258,1993.
- 2) Ikeda M.A., and Nevins J. R.: Identification of distinct roles for separate E1A domains in disruption of E2F complexes. *Mol. Cell. Biol* 13, 7029-35, 1993.
- 3) Matsuo T., Osumi-Yamashita N., Noji S., Ohuchi H., Koyama E., Myokai F., Matsuo N., Taniguchi S., Doi H., Iseki S.,

- Ninomiya Y., Fujiwara M., Watanabe T., and Eto K.: A mutation in the Pax-6 gene in rat small eye is associated with impaired migration of midbrain crest cells. *Nature Genetics*. 3, 299-304, 1993.
 - 4) Ninomiya H., Kishida K., Ohno Y., Tsurumi K., and Eto K.: Effects of cytosine arabinoside on rat and rabbit embryos cultured in vitro. *Toxic. In vitro* 7, 707-717, 1993.
- 1994
- 5) Fujiwara M., Uchida T., Osumi-Yamashita N., and Eto K. : Uchida Rat (rSey) : A new mutant rat with craniofacial abnormalities resembling those of the mouse Sey mutant. *Differentiation* 57, 31-38, 1994.
 - 6) Iimura T., Oida S., Takeda K., Maruoka Y., and Sasaki S.: Changes in homeobox-containing gene expression during ectopic bone formation induced by bone morphogenetic protein. *Biochem. Biophys. Res. Com.* 201(2):980-7, 1994.
 - 7) Iimura T.: Molecular cloning and expression of homeobox-containing genes during hard tissue development. (in Japanese). *J. Stomatological Society, Japan*. 61(4):590-604, 1994.
 - 8) Iimura T., Oida S., Ichijo H., Goseki M., Maruoka Y., Takeda K., and Sasaki S.: Modulation of responses to TGF-beta by 1, 25 dihydroxyvitamin D3 in MG-63 osteoblastic cells: possible involvement of regulation of TGF-beta type II receptor. *Biochem. Biophys. Res. Com.* 204(2):918-23, 1994.
 - 9) Motoyama J., and Eto K.: Antisense c-myc oligonucleotide promotes chondrogenesis and enhances RA responsiveness of mouse limb mesenchymal cells in vitro. *FEBS Letters*. 338, 323-5, 1994.
 - 10) Motoyama J., and Eto K.: Antisense retinoic acid receptor gamma-1 oligonucleotide enhances chondrogenesis of mouse limb mesenchymal cells in vitro. *FEBS Letters*. 338, 319-22, 1994.
 - 11) Ninomiya H., Kishida K., Ohno Y., Tsurumi K., and Eto K.: Effects of trypan blue on rat and rabbit embryos cultured in vitro. *Toxic. In vitro* 8, 109-116, 1994.
 - 12) Osumi-Yamashita N., Ninomiya Y., Doi H., and Eto K. : The contribution of both forebrain and midbrain crest cells to the mesenchyme in the frontonasal mass of mouse embryos. *Dev. Biol.* 164, 409-19, 1994.
 - 13) Takeda K., Oida S., Goseki M., Iimura T., Maruoka Y., Amagasa T., and Sasaki S.: Expression of bone morphogenetic protein genes in the human dental pulp cells. *Bone*. 15(5):467-70, 1994.
 - 14) Takeda K., Oida S., Ichijo H., Iimura T., Maruoka Y., Amagasa T., and Sasaki S.: Molecular cloning of rat bone morphogenetic protein (BMP) type IA receptor and its expression during ectopic bone formation induced by BMP. *Biochem. Biophys. Res. Com.* 204(1):203-9, 1994.
 - 15) Yasui K., Ninomiya Y., Osumi-Yamashita N., Shibana S., and Eto K.: Apical cell escape from the neuroepithelium and cell transformation during terminal lip fusion in the house shrew embryo. *Anat. Embryol.* 189, 463-73, 1994.
- 1995
- 16) Aoki K., Osumi-Yamashita N., Ninomiya Y., and Eto K.: Differential expression of N-CAM, vimentin and MAP1B during initial pathfinding of olfactory receptor neurons in the mouse embryo. *Anat. Embryol.* 192: 211-220, 1995.
 - 17) Goseki M., Oida S., Takeda K., Ogata Y., Iimura T., Maruoka Y., and Sasaki S.: Identification of bone-type alkaline phosphatase mRNA from human periodontal ligament cells. *J. Dent. Res.* 74:319-22, 1995.
 - 18) Iimura T., Oida S., Takeda K., Maruoka Y., Shimokawa H., Ibaraki K., and Sasaki S.: Molecular cloning and sequence of bovine Msx-1 homeobox-containing gene cDNA from a bovine odontoblast library. *DNA Sequence*. 5:233-7, 1995
 - 19) Iseki S., Osumi-Yamashita N., Miyazono K., Franzen P., Ichijo H., Ohtani H., Hayashi Y., and Eto K.: Localization of transforming growth factor-beta type I and type II receptors in mouse development. *Exp. Cell Res.* 219: 339-347, 1995
 - 20) Kasugai S., Oida S., Iimura T., Arai N., Takeda K., Ohya K., and Sasaki S.: Expression of prostaglandin E receptor subtypes in bone: expression of EP2 in bone development. *Bone*. 17:1-4, 1995.
 - 21) Lee Y.M., Osumi-Yamashita N., Ninomiya Y., Moon C.K., Eriksson U., and Eto K.: Retinoic acid stage-dependently alters the migration pattern and identity of hindbrain neural crest cells. *Development* 121, 825-837, 1995.
 - 22) Maruoka Y., Oida S., Iimura T., Takeda K., Asahina I., Enomoto S., and Sasaki S.: Production of functional human bone morphogenetic protein-2 using a baculovirus/Sf-9 insect cell system. *Biochem. Mol. Biol. Int.* 35:957-63, 1995.
 - 23) Oida S., Iimura T., Maruoka Y., Takeda K., and Sasaki S.: Cloning and sequence of bone morphogenetic protein 4 (BMP-4) from a human placental cDNA library. *DNA Sequence*. 5(5):273-5, 1995.
- 1996
- 24) Goseki-Sone M., Oida S., Iimura T., Yamamoto A., Matsumoto H. N., Omi N., Takeda K., Maruoka Y., Ezawa I., and Sasaki S.: Expression of mRNA encoding intestinal type alkaline phosphatase in rat liver and its increase by fat-feeding. *Liver*. 16, 358-364, 1996.
 - 25) Iimura T., Baba O., Maruoka Y., Takeda K., Sasaki S., Shimokawa H., and Oida, S.: Homeobox gene expression during bone formation induced by BMP. *Annls. New York Acad. Sci.* 785, 274-7, 1996.

- 26) Ikeda M. A, Laszlo J., and Nevins J.R.: A unique role for Rb in controlling E2F accumulation during cell growth and differentiation. *Proc.Natl.Acad.Sci. USA* 93, 3215-3220, 1996.
 - 27) Imai H., Osumi-Yamashita N., Ninomiya Y., and Eto K.: Contribution of early-emigrating midbrain crest cells to the dental mesenchyme of the mandibular molar tooth in rat embryos. *Develop. Biol.* 176, 151-165, 1996.
 - 28) Iseki S., Araga A., Ohuchi H., Nohno T., Yoshioka H., Hayashi Y., and Noji S.: Sonic hedgehog is expressed in epithelial cells during development of whisker, hair and tooth. *Biochem. Biophys. Res. Commun.* 218, 688-693, 1996.
 - 29) Koyama E., Yamaai T., Iseki S., Ohuchi H., Nohno T., Yoshioka H., Hayashi Y., Leatherman J.L., Goldman E.B., Noji S., and Pacifici M.: Polarizing activity, Sonic hedgehog, and tooth development in embryonic and postnatal mouse. *Dev. Dyn.* 206, 59-72, 1996.
 - 30) Oida S., Miyazaki H., Iimura T., Suzuki M., Sasaki S., and Shimokawa H.: Molecular structure of the mouse amelogenin genomic DNA. *DNA sequence.* 6, 307-310, 1996.
 - 31) Osumi-Yamashita N., Ninomiya Y., Doi H., and Eto K.: Rhombomere formation and hindbrain crest cell migration from prorrhombomeric origins in mouse embryos. *Develop. Growth Differ.* 38, 107-118, 1996
- 1997
- 32) Chareonvit S., Osumi N., Ikeda M., and Eto K.: Murine forebrain and midbrain crest cells generate different characteristic derivatives in vitro. *Develop. Growth Differ.*, 39, 493-503, 1997.
 - 33) Iimura T., Takeda K., Goseki M., Maruoka Y., Sasaki S., and Oida S.: Characterization of two length cDNA for human MSX-2 from dental pulp-derived cells. *DNA Sequence.* 8:87-92, 1997.
 - 34) Iseki S., Wilkie A.O.M., Heath J.K., Ishimaru T., Eto K., and Morriss-Kay G.M.: *Fgfr2* and osteopontin domains in the developing skull vault are mutually exclusive and can be altered by locally applied FGF2. *Development* 124, 3375-3384, 1997.
 - 35) Matsumoto H.N., Yamamoto A., Iimura T., Oida S., Ezawa I., Sasaki S., and Goseki-Sone M.: Effects of ovariectomy on intestinal alkaline phosphatase expression in rats. *J. Nutrit.Sci. Vitamin.* 43:529-39, 1997.
 - 36) Ninomiya Y., Adams R., Morris-Kay G.M., and Eto K.: Apoptotic cell death in neuronal differentiation of P19 EC cells: Cell death follows reentry into S phase. *J. Cell. Phys.*, 172, 25-35, 1997.
 - 37) Osumi N., Hirota A., Ohuchi H., Nakafuku M., Iimura T., Kuratani S., Fujiwara M., Noji S., and Eto K.: Pax-6 is involved in specification of the hindbrain motor neuron subtype. *Development* 124, 2961-2967, 1997.
 - 38) Osumi N., Ninomiya Y., and Eto K.: Craniofacial embryology in vitro. *Int. J. Devel. Biol.* 41, 187-194, 1997.
 - 39) Osumi-Yamashita N., Kuratani S., Ninomiya Y., Aoki K., Iseki S., Chareonvit S., Doi H., Fujiwara M., Watanabe T., and Eto K.: Cranial anomaly of homozygous rSey rat is associated with a defect in the migration pathway of midbrain crest cells. *Devel. Growth & Differ.* 39, 53-67, 1997.
- 1998
- 40) Duarte W.R., Kasugai S., Iimura T., Oida S., Takenaga K., Ohya K., and Ishikawa I.: cDNA cloning of S100 calcium-binding proteins from bovine periodontal ligament and their expression in oral tissues. *J. Dent. Res.* 77, 1694-1699, 1998.
 - 41) Goseki-Sone M., Orimo H., Iimura T., Miyazaki H., Oda K., Shibata H., Yanagishita M., Takagi Y., Watanabe H., Shimada T., and Oida S.: Expression of the mutant (1735T-DEL) tissue-nonspecific alkaline phosphatase gene from hypophosphatasia patients. *J. Bone . Mineral Res.* 13, 1827-34, 1998.
 - 42) Imai H., Osumi-Yamashita N., and Eto K. : Contribution of foregut endoderm to tooth Initiation of mandibular Incisor In Rat embryos. *European J. oral Science.* 106, 19-23, 1998.
 - 43) Koyama I., Yakushijin M., Goseki M., Iimura T., Sato T., Sonoda M., Hokari S., and Komoda T.: Partial breakdown of glycosylated alkaline phosphatases mediated by reactive oxygen species. *Clinica Chimica Acta.* 275, 27-41, 1998.
 - 44) Tamamori M., Ito H., Hiroe M., Terada Y., Marumo F., and Ikeda M.A.: Essential roles for G1 cyclin-dependent kinase activity in development of cardiomyocyte hypertrophy. *Am. J. Phys.* 275, 2036-40, 1998.
 - 45) Ohtani K., Tsujimoto A., Ikeda M. A., and Nakamura M.: Regulation of cell growth-dependent expression of mammalian CDC6 gene by the cell cycle transcription factor E2F. *Oncogene*, 17, 1777-1785 , 1998.
 - 46) Ota M., Eto K., Ninomiya Y., and Ikeda M.A.: Accumulation of p300 mediates transcriptional repression of simian virus 40 enhancer in undifferentiated F9 embryonal carcinoma cells. *Cell Growth. Diff.*, 9, 989-997, 1998.
- 1999
- 47) Duarte W.R., Iimura T., Takenaga K., Ohya K., Ishikawa I., and Kasugai S.: Extracellular role of S100A4 calcium-binding protein in the periodontal ligament. *Biochem. Biophys. Res. Com.* 255, 416-20, 1999.
 - 48) Goseki-Sone M., Yamada A., Asahi K., Hirota A., Ezawa I., and Iimura T.: Phosphate depletion enhances tissue-nonspecific alkaline phosphatase gene expression in a cultured mouse marrow stromal cell line ST2. *Biochem. Biophys. Res.Com.* 265, 24-8, 1999.

- 49) Goseki-Sone M., Iimura T., Takeda K., Nifuji A., Ogata Y., Yanagishita M., and Oida S.: Expression of mRNA encoding tissue-nonspecific alkaline phosphatase in human dental tissues. *Calcified Tissue International*. 64, 160-2, 1999.
- 50) Imai H., Iimura T., Ota M., and Eto K.: The Contribution of Cranial Neural Crest Cells and Foregut Endoderm to Tooth Initiation in Rat Embryos: The Application of Long-term Mandibular Culture. *Jpn. J. Oral Biol.*, 41: 268-281. 1999 (in Japanese).
- 51) Iseki S., Wilkie A.O.M., and Morriss-Kay G.M.: *Fgfr1* and *fgfr2* have distinct differentiation- and proliferation-related roles in the developing mouse skull vault. *Development* 126, 5611-20. 1999.
- 52) Ishiguro S.: Molecular cloning, expression of rat *Msx-1* and *Msx-2* during early embryo genesis and roles for mandibular chondrogenesis. *Kokubyo Gakkai Zasshi - J. Stomatological Society* 66:33-45, 1999. (in Japanese)
- 53) Kuroda S., Kasugai S., Oida S., Iimura T., Ohya K., and Ohyama T.: Anabolic effect of aminoterminally truncated fibroblast growth factor 4 (FGF4) on bone. *Bone*. 25, 431-7, 1999.
- 54) Miyazaki H., Fukuda M., Ishijima Y., Takagi Y., Iimura T., Negishi A., Hirayama R., Ishikawa N., Amagasa T., and Kimura N.: Overexpression of nm23-H2/NDP kinase B in a human oral squamous cell carcinoma cell line results in reduced metastasis, differentiated phenotype in the metastatic site, and growth factor-independent proliferative activity in culture. *Clinic. Cancer Res.* 5,4301-7, 1999.
- 55) Johnson D., Iseki S., Wilkie A.O.M., and Morriss-Kay G.M.: Expression patterns of *Twist* and *Fgfr1*, -2 and -3 in the developing mouse coronal suture suggest a key role for *Twist* in suture initiation and biogenesis. *Mech. Dev.* 91, 341-5, 2000.
- 56) Kawaguchi Y., Morio I., Suda H., and Eto K.: Toward a more global approach in dentistry: educating international students, *Dentistry in Japan*, 35,160-168, 1999.
- 57) Kawaguchi Y., Morio I., Suda H., and Eto K.: Education of international students at faculty of dentistry, Tokyo Medical and Dental University, part 2: the results of the questionnaire to the faculty. *J. Jap. Asso. Dent. Edu.* 15 (2): 245-251, 2000 (in Japanese).
- 58) Morio I., Kawaguchi Y., Suda H., and Eto K.: Education of international students at faculty of dentistry, Tokyo Medical and Dental University, part 1: the results of the questionnaire to international students. *J. Jap. Asso. Dent. Edu.* 15 (1): 103-109, 1999 (in Japanese).
- 59) Morio I., Kawaguchi Y., Suda H., and Eto K.: Educating overseas students -just another responsibility or a chance to grow for faculty ? -Europ. *J. Dent. Edu.* 4, 128-132, 2000.
- 60) Ohtani K., Iwanaga R., Nakamura M., Ikeda M. A., Yabuta N., Tsuruga H., and Nojima H.: Cell Growth-Regulated Expression of mammalian MCM5 and MCM6 Genes Mediated by the Transcription Factor E2F. *Oncogene*. 18, 2299-2309,1999.
- 61) Oldridge M., McDonald-McGinn D.M., Zackai E.H., Twigg S.R.F., Johnson D., Iseki S., Morriss-Kay G.M., Wall S.A., Jiang W., Wang Jabs E., and Wilkie A.O.M.: *De novo Alu* element insertions in *FGFR2* identify a distinct pathological basis for Apert syndrome. *Am. J. Hum. Genet.* 64, 446-461. 1999.
- 62) Watanabe H., Goseki-Sone M., Iimura T., Oida S., Orimo H., and Ishikawa I.: Molecular diagnosis of hypophosphatasia with severe periodontitis. *J. Periodont.* 70, 688-91, 1999.

B. Books

- 1) Iimura T., and Eto K.: Introduction to Molecular Craniofacial Embryology (in Japanese). The Quintessence Vol. 19, No.1, p3-9, 2000.
- 2) Iimura T., and Eto K.: Early Development, Gastrulation and Anterior Specification (in Japanese). The Quintessence Vol. 19, No.2, p3-10, 2000
- 3) Iimura T., and Eto K.: Maxillofacial Embryogenesis (I), Face Morphogenesis, Regulated by Cell Proliferation and Cell Death (in Japanese). The Quintessence Vol. 19, No.3, p3-9, 2000
- 4) Ikeda M.: Transcription factor E2F-Rb families and targets of DNA tumor viruses. *Exp. Med. Supplement*. 13: 126-131, 1995.
- 5) Kuratani S. and Osumi N.:The neural crest cells - that support body plan in vertebrates. UP-biology, Tokyo University press, 1997.
- 6) Osumi-Yamashita N., Ninomiya Y., and Eto K.: The whole embryo culture techniques of mammalian embryos for studies of neurogenesis.
- 7) Imai H., Iimura T., Ota M., and Eto K.: The long-term culture for mammalian craniofacial development. The current protocols for molecular biological studies of morphogenesis , 187-191, 1997. (in Japanese)
- 8) Ohtani K., and Ikeda M.: Cell growth control by the E2F transcription factor. *Tanpakushitsu Kakusan Koso - Protein, Nucleic Acid, Enzyme*. 42(10 Suppl):1603-11, 1997. (in Japanese)
- 9) Goseki-Sone M., Orimo H., Iimura T., Takagi Y., Watanabe H., Taketa K., Sato S., Mayanagi H., Shimada T.,and Oida S.:

Hypophosphatasia: identification of five novel missense mutations (G507A, G705A, A748G, T1155C, G1320A) in the tissue-nonspecific alkaline phosphatase gene among Japanese patients. *Human Mutation*. Suppl 1:S263-7, 1998.

- 10) Ikeda M.A., Ota M., Nakajima Y., and Ryuufuku M.: Multi-reporter assay system combined with luciferase assay and b-gal assay. *Cell Technology*, supplement. 334-346.1998. (in Japanese)
- 11) Ota M., and Eto K.: Development of Epidermis system. Translation of human embryology, second edition. By William Larsen, Translated by Eizo Aikawa et al. Nishimura Co.,Ltd. p415-430, 1999. (in Japanese)

C. Review Articles

- 1) Ninomiya, Y., Osumi-Yamashita, N., Imai, H., and Eto, K.: Micromanipulation and culture of postimplantation of rodent embryos. *Exp.Med.* 12: 93-103, 1994. (in Japanese)
- 2) Osumi-Yamashita, N.: Pax genes and mutant animals. [Manual disease model mice] (Edited by Yamamura K., Katuki M. and Aizawa S.), Nakayama Pub., 75-81,1994. (in Japanese)
- 3) Maruyama M., Waga S., Wada T., Ikeda M., and Matsumoto K. : The current view of molecular biology of DNA tumor virus. *Tanpakushitsu Kakusan Koso - Protein, Nucleic Acid, Enzyme*. 39:252-61, 1994. (in Japanese)
- 4) Eto K., and Osumi-Yamashita N.: Whole embryo culture and the study of post-implantation mammalian development. *Develop. Growth Differ.* 37, 123-132, 1995.
- 5) Osumi-Yamashita, N.: Retinoic acid and mammalian craniofacial morphogenesis. *J. Biosci.* 21, 313-327, 1996.
- 6) Osumi-Yamashita, N.: Malformations of peripheral nervous system in Pax6 mutant rats.. *AD&D* 7: 104-107, 1996.
- 7) Osumi, N.: Molecular organogenesis of sense organs. *Exp.Med.*, supplement. 14: 186-192, 1996.
- 8) Osumi, N.: Neural crest cells and craniofacial morphogenesis. *The Cell*, 29: 415-421, 1997. (in Japanese)
- 9) Imai H., and Eto K.: Neural crest cells and tooth bud formation. *Kokubyo Gakkai Zasshi - J. Stomatological Society* 64: 388, 1997. (in Japanese)
- 10) Osumi-Yamashita N., Ninomiya Y., and Eto K.: Craniofacial embryology in vitro. *Int. J. Devel. Biol.* 41, 187-194, 1997.
- 11) Iseki S. and Eto K.: Skull development and craniosynostosis. *Seitai no kagaku*, 50(2), 145-151, 1999. (in Japanese)