

# Molecular Pharmacology

## 1. Staffs and Students

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Assistant Professor:	Tadayoshi Hayata, Ph.D.	
MTT Research Instructor:	Hiroaki Hemmi, Ph.D.	
GCOE Research Instructor:	Takuya Notomi, Ph.D.	
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	Paksinee Kamolratanakul	Tomomi Nakagawa
	Daisuke Miyajima	Takafumi Suzuki
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## 2. Purpose of Education

Osteoporosis is one of the serious diseases in aging societies in the world. Osteoporosis increases risk of fracture that results in loss of quality of life and threatens life of aged people. Therefore, it is crucial to understand how bone mass is regulated by specific factors to establish the therapy and prevention for osteoporosis. Graduate students will study bone metabolism through journal presentation and investigate bone metabolism using mice and tissue culture system by advanced molecular and cellular biological approaches.

## 3. Research Subjects

- 1) Molecular mechanisms of osteoblast and chondrocyte differentiation.
- 2) Mechanism of regulation of bone mass by nervous system.
- 3) Regulation of bone metabolism by mechanical stress.
- 4) Regulation of gene expression by hormones.
- 5) Molecular biology of function and formation of osteoclasts.

## 4. Publications

### Original articles

1. Miyai K, Yoneda M, Hasegawa U, Toita S, Izu Y, Hemmi H, Hayata T, Ezura Y, Mizutani S, Miyazono K, Akiyoshi K, Yamamoto T, Noda M. ANA deficiency enhances bone morphogenetic protein-induced ectopic bone formation via transcriptional events. *J Biol Chem.* 284:10593-600, 2009.
2. Izu Y, Mizoguchi F, Kawamata A, Hayata T, Nakamoto T, Nakashima K, Inagami T, Ezura Y, Noda M. Angiotensin II type 2 receptor blockade increases bone mass. *J Biol Chem.* 284:4857-64, 2009.
3. Ezura Y, Sekiya I, Koga H, Muneta T, Noda M. Methylation status of CpG islands in the promoter regions of signature genes during chondrogenesis of human synovium-derived mesenchymal stem cells. *Arthritis Rheum.* 60:1416-26, 2009.
4. Mizoguchi F, Izu Y, Hayata T, Hemmi H, Nakashima K, Nakamura T, Kato S, Miyasaka N, Ezura Y, Noda M. Osteoclast-specific Dicer gene deficiency suppresses osteoclastic bone resorption. *J Cell Biochem* (in press).
5. Hayata T, Blitz IL, Iwata N, Cho KW. Identification of embryonic pancreatic genes using *Xenopus* DNA microarrays. *Dev Dyn.* 238:1455-66, 2009.
6. Hemmi H, Idoyaga J, Suda K, Suda N, Kennedy K, Noda M, Aderem A, Steinman RM. A new triggering receptor expressed on myeloid cells (Trem) family member, Trem-like 4, binds to dead cells and is a DNAX activation protein 12-linked marker for subsets of mouse macrophages and dendritic cells. *J Immunol.* 182:1278-86, 2009.
7. Hayashi C, Hasegawa U, Saita Y, Hemmi H, Hayata T, Nakashima K, Ezura Y, Amagasa T, Akiyoshi K, Noda M. Osteoblastic bone formation is induced by using nanogel-crosslinking hydrogel as novel scaffold for bone growth factor. *J Cell Physiol.* 220:1-7, 2009.
8. Saita Y, Nakamura T, Mizoguchi F, Nakashima K, Hemmi H, Hayata T, Ezura Y, Kurosawa H, Kato S, Noda M. Combinatory effects of androgen receptor deficiency and hind limb unloading on bone. *Horm Metab Res.* 41:822-8, 2009.
9. Segawa Y, Muneta T, Makino H, Nimura A, Mochizuki T, Ju YJ, Ezura Y, Umezawa A, Sekiya I. Mesenchymal

stem cells derived from synovium, meniscus, anterior cruciate ligament, and articular chondrocytes share similar gene expression profiles. *J Orthop Res.* 27:435-41, 2009.

10. Jung JC, Wang PX, Zhang G, Ezura Y, Fini ME, Birk DE. Collagen fibril growth during chicken tendon development: matrix metalloproteinase-2 and its activation. *Cell Tissue Res.* 336:79-89, 2009.