

PHGY 550
2017
Molecular Physiology of Bone (3 credit course)
SCHEDULE - LECTURES AND DISCUSSIONS
Location: Room 1101 McIntyre Medical Bldg.

LECTURE 1 Dr. Monzur Murshed	September 5 Tuesday 8:35-9:25 AM	Introduction to bone cells, their differentiation and function
	Review article:	Biology of bone and how it orchestrates the form and function of the skeleton. Sommerfeldt DW, Rubin CT. Eur Spine J. 2001 Oct;10 Suppl 2:S86-95. Transcriptional control of skeletogenesis. Karsenty G. Annu Rev Genomics Hum Genet. 2008;9:183-96.
DISCUSSION 1	September 11 Monday 9:00-10:25 AM	Smpd3 Expression in both Chondrocytes and Osteoblasts Is Required for Normal Endochondral Bone Development. Li J, Manickam G, Ray S, Oh CD, Yasuda H, Moffatt P, Murshed M. Mol Cell Biol. 2016 Aug 12;36(17):2282-99.

INFO SESSION	September 11 Monday 8:35-9:00 AM	Course essays – requirements, evaluation criteria etc.
---------------------	--	---

LECTURE 2 Dr. Kerstin Tiedemann	September 12 Tuesday 8:35-9:25 AM	Osteoclast differentiation, function and signaling
	Review article:	<u>Osteoclast differentiation and activation.</u> Boyle WJ, Simonet WS, Lacey DL. Nature. 2003 May 15;423(6937):337-42. <u>A Comprehensive Review of Immunoreceptor Regulation of Osteoclasts.</u> Humphrey MB, Nakamura MC. Clin Rev Allergy Immunol. 2016 Aug;51(1):48-58. doi: 10.1007/s12016-015-8521-8.
DISCUSSION 2	September 18 Monday 8:35-10:25 AM	Differential effects of alendronate and losartan therapy on osteopenia and aortic aneurysm in mice with severe Marfan syndrome. Nistala H, Lee-Arteaga S, Carta L, Cook JR, Smaldone S, Siciliano G, Rifkin AN, Dietz HC, Rifkin DB, Ramirez F. Hum Mol Genet. 2010 Dec 15;19(24):4790-8

LECTURE 3 Dr. Bettina Willie	September 19 Tuesday 8:35-9:25 AM	Osteocytes and skeletal tissue mechanobiology
	Review article:	Bone Structural Adaptation and Wolff's Law; BETTINA WILLIE, GEORG N. DUDA AND RICHARD WEINKAMER (please see the attachment)
DISCUSSION 3	September 25 Monday 8:35-10:25 AM	Targeted ablation of osteocytes induces osteoporosis with defective mechanotransduction. Tatsumi S, Ishii K, Amizuka N, Li M, Kobayashi T, Kohno K, Ito M, Takeshita S, Ikeda K. Cell Metab. 2007 Jun;5(6):464-75.

LECTURE 4 Dr. Svetlana Komarova	September 26 Tuesday 8:35-9:25 AM	Mathematical modeling as a tool to understand complex questions in bone biology
	Review article:	Mathematical modeling in bone biology: from intracellular signaling to tissue mechanics. Pivonka P, Komarova SV. Bone. 2010 Aug;47(2):181-9
DISCUSSION 4	October 02 Monday 8:35-10:25 AM	A minimal mathematical model of calcium homeostasis. Raposo JF, Sobrinho LG, Ferreira HG. J Clin Endocrinol Metab. 2002 Sep;87(9):4330-40

Tuesday, October 3, the first essay is due (Murshed, Tiedemann, Willie and Komarova)

LECTURE 5 Dr. Pierre Moffat	October 03 Tuesday 8:35-9:25 AM	New signaling molecules and their potential therapeutic use in bone disease
	Review article:	Regulatory pathways revealing new approaches to the development of anabolic drugs for osteoporosis. Martin TJ, Sims NA, Ng KW. Osteoporos Int. 2008 Aug;19(8):1125-38.
DISCUSSION 5	October 16 Monday 8:35-10:25 AM	Phosphorylation of GSK-3beta by cGMP-dependent protein kinase II promotes hypertrophic differentiation of murine chondrocytes. Kawasaki Y, Kugimiya F, Chikuda H, Kamekura S, Ikeda T, Kawamura N, Saito T, Shinoda Y, Higashikawa A, Yano F, Ogasawara T, Ogata N, Hoshi K, Hofmann F, Woodgett JR, Nakamura K, Chung UI, Kawaguchi H. J Clin Invest. 2008 Jul;118(7):2506-15.

LECTURE 6 Dr. Monzur Murshed	October 10 Tuesday 8:35-9:25 AM	General discussion and techniques to analyze bone.
--	---------------------------------------	---

LECTURE 7 Dr. Geoffrey Hendy	October 17 Tuesday 8:35-9:25 AM	Calcium –sensing receptor and disorders of calcium metabolism
	Review article:	Diseases associated with the extracellular calcium-sensing receptor. Thakker RV. Cell Calcium. 2004 Mar;35(3):275-82.
DISCUSSION 7	October 23 Monday 8:35-10:25 AM	Acquired hypocalciuric hypercalcemia due to autoantibodies against the calcium-sensing receptor. Pallais JC, Kifor O, Chen YB, Slovik D, Brown EM. N Engl J Med. 2004 Jul 22;351(4):362-9.

LECTURE 8 Dr. Geoffrey Hendy	October 24 Tuesday 8:35-9:25 AM	Calcium sensing receptor as a drug target
	Review article:	Calcimimetic and calcilytic drugs: just for parathyroid cells? Nemeth EF. Cell Calcium. 2004 Mar;35(3):283-9.

DISCUSSION 8	October 30 Monday 8:35-10:25 AM	Cinacalcet HCl reduces hypercalcemia in primary hyperparathyroidism across a wide spectrum of disease severity. Peacock M, Bilezikian JP, Bolognese MA, Borofsky M, Scumpia S, Sterling LR, Cheng S, Shoback D. <i>J Clin Endocrinol Metab.</i> 2011 Jan;96(1):E9-18.
---------------------	---------------------------------------	---

LECTURE 9 Dr. Frank Rauch	October 31 Tuesday 8:35-9:25 AM	Osteogenesis Imperfecta
	Review article:	<u>Osteogenesis imperfecta.</u> Forlino A, Marini JC. <i>Lancet.</i> 2016 Apr 16;387(10028):1657-71.
DISCUSSION 9	November 6 Monday 8:35-10:25 AM	Attenuated BMP1 function compromises osteogenesis, leading to bone fragility in humans and zebrafish. Asharani PV, Keupp K, Semler O, Wang W, Li Y, Thiele H, Yigit G, Pohl E, Becker J, Frommolt P, Sonntag C, Altmüller J, Zimmermann K, Greenspan DS, Akarsu NA, Netzer C, Schönau E, Wirth R, Hammerschmidt M, Nürnberg P, Wollnik B, Carney TJ. <i>Am J Hum Genet.</i> 2012 Apr 6;90(4):661-74.

Tuesday, November 7, the second essay is due (Hendy, Moffatt and Rauch)

LECTURE 10 Dr. Juliana Marulanda/ Dr. Monzur Murshed	November 7 Tuesday 8:35-9:25 AM	Diseases associated with abnormal skeletal tissue mineralization
	Review article:	Molecular determinants of extracellular matrix mineralization in bone and blood vessels. Murshed M, McKee MD. <i>Curr Opin Nephrol Hypertens.</i> 2010 Jul;19(4):359-65.
DISCUSSION 10	November 13 Monday 8:35-10:25 AM	Matrix Gla protein deficiency impairs nasal septum growth, causing midface hypoplasia. Marulanda J, Eimar H, McKee MD, Berkvens M, Nelea V, Roman H, Borrás T, Tamimi F, Ferron M, Murshed M. <i>J Biol Chem.</i> 2017 Jul 7;292(27):11400-11412.

LECTURE 11 Dr. Mathieu Ferron	November 14 Tuesday 8:35-9:25 AM	Reciprocal regulation of bone and energy metabolism
	Review article:	Regulation of energy metabolism by the skeleton: osteocalcin and beyond. Ferron M, Lacombe J. <i>Arch Biochem Biophys.</i> 2014 Nov 1;561:137-46.
DISCUSSION 11	November 20 Monday 8:35-10:25 AM	Glucose Uptake and Runx2 Synergize to Orchestrate Osteoblast Differentiation and Bone Formation. Wei J, Shimazu J, Makinstoglu MP, Maurizi A, Kajimura D, Zong H, Takarada T, Iezaki T, Pessin JE, Hinoi E, Karsenty G. <i>Cell.</i> 2015 Jun 18;161(7):1576-91.

LECTURE 12 Dr. Laura Stone	November 21 Tuesday 8:35-9:25 AM	Bone pain
	Review article:	The neurobiology of skeletal pain. Mantyh PW. Eur J Neurosci. 2014 Feb;39(3):508-19
DISCUSSION 13	November 27 Monday 8:35-10:25 AM	Morphine treatment accelerates sarcoma-induced bone pain, bone loss, and spontaneous fracture in a murine model of bone cancer. King T, Vardanyan A, Majuta L, Melemedjian O, Nagle R, Cress AE, Vanderah TW, Lai J, Porreca F. Pain. 2007 Nov;132(1-2):154-68.

LECTURE 13 Dr. Peter Siegel	November 28 Tuesday 8:35-9:25 AM	Cancer and Bone
	Review article:	Cancer to bone: a fatal attraction. Weilbaecher KN, Guise TA, McCauley LK. Nat Rev Cancer. 2011 Jun;11(6):411-25
DISCUSSION 12	December 4 Monday 8:35-10:25 AM	The osteogenic niche promotes early-stage bone colonization of disseminated breast cancer cells. Wang H, Yu C, Gao X, Welte T, Muscarella AM, Tian L, Zhao H, Zhao Z, Du S, Tao J, Lee B, Westbrook TF, Wong ST, Jin X, Rosen JM, Osborne CK, Zhang XH. Cancer Cell. 2015 Feb 9;27(2):193-210

Monday, December 4, the third essay is due (Siegel, Stone, Marulanda/Murshed and Ferron)