

The Hebrew University of Jerusalem

Syllabus

Adhesion Molecules & Cell Recognition - 94843

Last update 07-04-2024

HU Credits: 2

Degree/Cycle: 2nd degree (Master)

Responsible Department: Bio-Medical Sciences

Academic year: 0

Semester: 2nd Semester

Teaching Languages: Hebrew

Campus: Ein Karem

Course/Module Coordinator: Prof Rachel Bar-Shavit

Coordinator Email: rachelbar@ekmd.huji.ac.il

Coordinator Office Hours: wednesday 10-12

Teaching Staff:

Prof Rachel Bar-Shavit,
Prof Zvika Granot

Course/Module description:

Molecular and cell biology of cell-cell and cell-ECM interactions. Structure and function of integrins, cadherins, selectins and immunoglobulins. Molecular mechanism of cell signaling: aspects of Outside-in and Inside-out signals. Molecular aspects of physiological and pathological events that take place in vessel walls. Regulation of tumor development, metastatic spread and blood vessel growth. Biotechnological and clinical applications.

Course/Module aims:

- To understand structure and function of cell adhesion molecules
- Signals conveyed by ECM-cell cross-talk
- Development of primary tumors and metastatic spread
- Impact of tumor microenvironment on the tumor

Learning outcomes - On successful completion of this module, students should be able to:

To understand patho- and physiological aspects of cell adhesion molecules (CAM).

Attendance requirements(%):

100%

Teaching arrangement and method of instruction: Lectures given by teachers.
Seminars by students.

Course/Module Content:

1. Overview
2. Integrins
- 3. ECM/Integrins
4. Cadherins
5. CAM and placenta implantation
6. Leukocyte adhesion
7. Implication to medicine
8. Seminars by students participants

Required Reading:

Essential Cell Biology (by: Alberts, Bray, Johnson, Lewis, Raff, Roberts and Walter)

Chapter 15: cell communications
And chapter 19: Tissues
Or its parallel in Molecular Biology of the Cell

Additional Reading Material:

- 1.Xiaocong Pang , Xu He , Zhiwei Qiu , Hanxu Zhang , Ran Xie , Zhiyan Liu 1 2, Yanlun Gu , Nan Zhao , Qian Xiang , Yimin Cui. Targeting integrin pathways: mechanisms and advances in therapy. *Signal Transduct Target Ther.* 2023 Jan 2;8(1):1
- 2.Liu F, Wu Q, Dong Z, Liu K. Integrins in cancer: Emerging mechanisms and therapeutic opportunities. *Pharmacol Ther.* 2023 Jul; 247:108458
- 3.Sulekha Suresh D, Guruvayoorappan C. Molecular principles of tissue invasion and metastasis. *Am J Physiol Cell Physiol.* 2023 May 1;324(5):C971-C991
- 4.Fu-Yang Lin, Jing Li, Yonghua Xie, Jianghai Zhu , Thi Thu Huong Nguyen, Yonghui Zhang, Jieqing Zhu, Timothy A Springer. A general chemical principle for creating closure-stabilizing integrin inhibitors. *Cell.* 2022 Sep 15;185(19):3533-3550.e27
- 5.Weiss F, Lauffenburger D, Friedl P. Towards targeting of shared mechanisms of cancer metastasis and therapy resistance. *Nat Rev Cancer.* 2022 Mar; 22(3):157-173
- 6.Fagerholm SC Integrins in Health and Disease. *N Engl J Med.* 2022. PMID: 36170474
- 7.Mezu-Ndubuisi OJ, Maheshwari. The role of integrins in inflammation and angiogenesis. *Pediatr Res.* 2021, May;89(7):1619-1626
- 8.Eun Jeong Park, Phyo Kyaw Myint , Atsushi Ito , Michael G Appiah, Samuel Darkwah , Eiji Kawamoto, Motomu Shimaoka. Integrin-Ligand Interactions in Inflammation, Cancer, and Metabolic Disease: Insights Into the Multifaceted Roles of an Emerging Ligand Irisin. *Front Cell Dev Biol.* 2020, Oct 26;8:588066, Review
- 9.Inbal Wortzel, Shani Dror, Candia M. Kenific, and David Lyden. Exosome-Mediated Metastasis: Communication from a Distance. *Developmental Cell* 2019, 49, May 6, 347-360
- 10.Kechagia JZ, Ivaska J, Roca-Cusachs P. Integrins as biomechanical sensors of the microenvironment. *Nat Rev Mol Cell Biol.* 2019 Aug;20(8):457-47

Grading Scheme:

Presentation / Poster Presentation / Lecture/ Seminar / Pro-seminar / Research proposal 80 %

Active Participation / Team Assignment 20 %

Additional information:

The course is open for MSc and PhD students