TEL AVIV UNIVERSITY אוניברסיטת תל אביב

סילבוס מפורט

Course Title

Cellular Responses to Stress in Health and Disease

Lecturers

Profs. Orna Elroy-Stein, Judith Berman, Marcelo Ehrlich, Gerardo Lederkremer

Semester

Semester B

Requirements

Prior knowledge in Cell Biology and Molecular Biology is required

Final Grade

70% Final home exam, 30% active participation in classes and final discussion

Course Structure

Lesson Subjects	Lesson number
Physiological stressors, stress-sensing-response-adaptation; homeostasis; proteostasis; Integrated Stress Response (ISR), eIF2a phosphorylation pathway; translation initiation / regulation.	1 (OES)
uORFs as regulators of translation initiation under stress conditions; How translation regulation is studied; Translation regulation during ISR; The translation angle of UPR; ISRIB;	2 (OES)
tRNA-derived stress-induced RNAs (tiRNAs); the redox angle of protein folding in the ER; ER stress and oxidative stress; ER-mitochondria connection; The MAM compartment; ER-mitochondria Ca flux; UPR-am; mPOS; mtUPR; Mitophagy; Adaptation to Hypoxia	3 (OES)
Protein misfolding and aggregation. Prions. Genesis of ER stress and the unfolded protein response (UPR). Molecular chaperones	4 (GL)
ER-associated degradation (ERAD), IRE1 and ATF6 pathways, RIDD, RESET.	5 (GL)
Late ER stress and apoptosis. Protein misfolding diseases. Therapeutic strategies	6 (GL)
Stress induced mutagenesis in prokaryotes and eukaryotes	7 (JB)
The Environmental Stress response	8 (JB)
Genome responses to stress: APOBEC, Chromothrypsis, Kategis, Aneuploidy, LOH	9 (JB)
The nature and structure of cell autonomous immunity and the antiviral response. What is being recognized as self or non-self? What are the signaling pathways involved? How is the response regulated and what	10 (ME)

happens when regulation is defective? Singleton-Merten and Aicardi-Gutieres Syndromes	
How do cells deal with the apparently contradictory needs of reducing proteins synthesis to stop viral infection, while mounting a protein-expression-based interferon-mediated response? A deeper look into the regulation of PKR, ADAR1 and OAS-RNASEL	11 (ME)
Uniqueness of mitochondria as regulator of innate immune responses. Molecular mechanisms of MAVS regulation.	12 (ME)

Required Reading

Each week the students will be required to familiarize themselves with specific new terms/topics in preparation to the following lecture

Comments
