Abstract

Understanding the organization of cells and tissues means understanding the principles of life and the etiology of human diseases. Cell and tissue biology have supported major advances in medicine in the last decades, a fact reflected by the endless list of Nobel prizes in “Physiology and Medicine” that recognize essential discoveries in these fields. Cell and tissue biology is also at the basis of synthetic biology, a rapidly expanding field of research which uses engineering principles to design systems for a wide variety of challenges, from the production of improved materials and biosensors, living vaccines or the remediation of contaminated sites, all at the focus of European research policies. This seminar brings together a group of established researchers as well as promising young scientists working in leading centers, who will offer an in depth overview on the current research in cell and tissue biology. The presentations will target not only grade or master students in biology-related disciplines, but also, those with trainings in physics, mathematics, engineering or medicine, who wish to develop interdisciplinary research on the molecular mechanisms of life. The seminars will introduce the students to different exciting topics including unconventional secretion, membrane contact sites, membrane-less compartments, mechanobiology, organoids and organogenesis, and discuss the impact of new technologies on our understanding of biological processes. Round tables on challenges in cell and tissue biology and on why to do a Ph. D. in this field will help the students to make a well-grounded decision about their professional future.

This seminar will be taught in English / El curso será impartido en inglés

Curso *online:* Aula virtual UIMP (http://campusvirtual.uimp.es)

UIMPSantander

@UIMP

www.uimp.es

GOBIERNO DE ESPAÑA
MINISTERIO DE UNIVERSIDADES

INFORMACIÓN GENERAL

Madrid
C/ Isaac Peral, 23
28040 Madrid
Tel. 91 592 06 31 / 91 592 06 33
alumnos@uimp.es

Santander
Campus de Las Llamas
Avda. de los Castros, 42
39005 Santander
Tel. 942 29 87 00 / 942 29 87 10

Horario:
De 9:00 a 14:00 h

Plazas limitadas

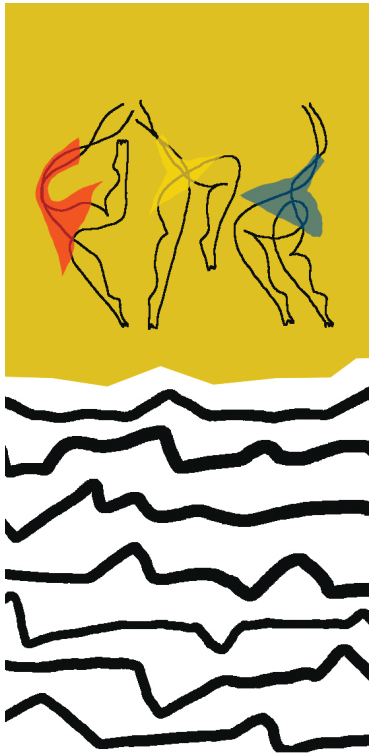
Código 64SR / Tarifa: I / ECTS: 0,5

Patrocinio:

CSIC
Consejo Superior de Investigaciones Científicas

UIMP
Universidad Internacional Menéndez Pelayo

SANTANDER 2020



ENCUENTRO

Understanding the Dynamic Cell and Tissue Compartmentalization

Vivek Malhotra

María Isabel Geli

Del 27 al 29 de julio de 2020

CURSO *ONLINE*
Aula virtual UIMP
(http://campusvirtual.uimp.es)

www.uimp.es

SANTANDER, 2020 Programa académico

ENCUENTRO

Understanding the Dynamic Cell and Tissue Compartmentalization

Dirección
Vivek Malhotra
Center for Genomic Regulation (CRG)
María Isabel Geli
Institute for Molecular Biology of Barcelona (IBMB)

Del 27 al 29 de julio

Lunes 27 de julio

SESSION I:
The Secretory Pathway: New Concepts and Approaches

10:00 h | Welcome and Introduction to the Seminar Series
Vivek Malhotra

10:30 h | Seminar: Building a Machine for Secretion of Bulky Collagens
Vivek Malhotra

12:30 h | Seminar: Cellular Structural Biology of the Exocyst Complex
Oriol Gallego
Experimental and Health Sciences Department University Pompeu Fabra (UPF)

SESSION II:
Phase Separation and Membrane-less Compartments

15:30 h | Seminar: Liquid-Liquid Phase Separation in Biology
Benedetta Bolognesi
Institute of Bioengineering of Catalunya (IBEC)

17:30 h | Round Table: Why to Study for a Ph. D. and Why a Ph. D. in Cell and Tissue Biology
Benedetta Bolognesi
Félix Campelo
Institute of Photonic Sciences (ICFO)
Oriol Gallego
María Isabel Geli

Moderación
Vivek Malhotra

Martes 28 de julio

SESSION III:
Structure and Functions of Membrane Contact Sites

10:00 h | Seminar: Inter-Organelle Communication for Organelle Identity and Function
Félix Campelo

12:00 h | Seminar: Coupled Sterol Synthesis and Transport at ER-Endocytic Contact Sites
María Isabel Geli

SESSION IV:
Mechanobiology of Cells and Tissues

15:30 h | Seminar: Engineering the Shape and Mechanics of Epithelia
Xavier Trepat
Institute of Bioengineering of Catalunya (IBEC)

17:00 h | Round Table: Challenges in Cell and Tissue Biology
María Bernabeu
The European Molecular Biology Laboratory Barcelona (EMBL Barcelona)
Benedetta Bolognesi
Marta Llimargas
Institute for Molecular Biology of Barcelona (IBMB)
Xavier Trepat

Moderación
Vivek Malhotra

Miércoles 29 de julio

SESSION V:
Building Tissues in Vivo and in Vitro

10:00 h | Seminar: Mechanisms Underlying Tissue Formation: Lessons from Tracheal Morphogenesis in Drosophila
Marta Llimargas

12:00 h | Seminar: Engineering Tissues and Vasculature: Present and Future
María Bernabeu

13:30 h | Concluding Remarks
Vivek Malhotra

LIST OF ARTICLES

- Alberti, S., and Dormann, D. (2019). Liquid-Liquid Phase Separation in Disease. Annu Rev Genet 53, 171-194.
- Arakawa, C., Gunnarsson, C., Howard, C., Bernabeu, M., Phong, K., Yang, E., DeForest, C.A., Smith, J.D., and Zheng, Y. (2020). Biophysical and biomolecular interactions of malaria-infected erythrocytes in engineered human capillaries. Sci Adv 6, eaay7243.
- Encinar Del Dedo, J., Idrissi, F.Z., Fernandez-Golbano, I.M., Garcia, P., Rebollo, E., Krzyzanowski, M.K., Grotsch, H., and Geli, M.I. (2017). ORP-Mediated ER Contact with Endocytic Sites Facilitates Actin Polymerization. Dev Cell43, 588-602.
- Idrissi, F.Z., and Geli, M.I. (2014). Zooming in on the molecular mechanisms of endocytic budding by time-resolved electron microscopy. Cell Mol Life Sci 71, 641-657.
- Irastorza-Azcarate, I., Castano-Diez, D., Devos, D.P., and Gallego, O. (2019). Live-Cell Structural Biology to Solve Biological Mechanisms: The Case of the Exocyst. Structure 27, 886-892.
- Lekszas, C., Foresti, O., Raote, I., Liedtke, D., Konig, E.M., Nanda, I., Vona, B., De Coster, P., Cauwels, R., Malhotra, V., et al. (2020). Biallelic TANGO1 mutations cause a novel syndromal disease due to hampered cellular collagen secretion. eLife 9.e51319.
- Mesmin, B., Kovacs, D., and D'Angelo, G. (2019). Lipid exchange and signaling at ER-Golgi contact sites. Curr Opin Cell Biol 57, 8-15.
- Raote, I., and Malhotra, V. (2019). Protein transport by vesicles and tunnels. J Cell Biol 218, 737-739.
- Rayner, S.G., and Zheng, Y. (2016). Engineered Microvessels for the Study of Human Disease. Journal of Biomech Eng 138.1108011–11080111.
- Roca-Cusachs, P., Conte, V., and Trepat, X. (2017). Quantifying forces in cell biology. Nat Cell Biol 19, 742-751.
- Samakovlis, C., Hacohen, N., Manning, G., Sutherland, D.C., Guillemin, K., and Krasnow, M.A. (1996). Development of the Drosophila tracheal system occurs by a series of morphologically distinct but genetically coupled branching events. Dev 122, 1395-1407.
- Scorrano, L., De Matteis, M.A., Emr, S., Giordano, F., Hajnoczky, G., Kornmann, B., Lackner, L.L., Levine, T.P., Pellegrini, L., Reinisch, K., et al. (2019). Coming together to define membrane contact sites. Nat Commun 10, 1287.
- Schermelleh, L., Ferrand, A., Huser, T., Eggeling, C., Sauer, M., Biehlmaier, O., and Drummen, G.P.C. (2019). Super-resolution microscopy demystified. Nat Cell Biol 21, 72-84.
- Shaye, D.D., Casanova, J., and Llimargas, M. (2008). Modulation of intracellular trafficking regulates cell intercalation in the Drosophila trachea. Nat Cell Biol 10, 964-970.
- Trepat, X., and Sahai, E. (2018). Mesoscale physical principles of collective cell organization. Nat Phys 14, 671-682.
- Yoo, H., Triandafillou, C., and Drummond, D.A. (2019). Cellular sensing by phase separation: Using the process, not just the products. J Biol Chem 294, 7151-7159.