Developmental Biology

Faculty

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Learning outcomes

1. Interpret experiments and put forward questions from the molecule to the cell/organism level.
2. Acquire basic concepts in Developmental Biology, totipotency, pluripotency, specification, commitment, induction, inhibition and differentiation.
3. Identify the basic signalling pathways, their design, receptors, ligands and downstream targets.
4. Identify the stages of embryonic development.
5. Know the molecular mechanisms that build the vertebrate embryonic body plan, from axis specification, germ layer formation/ gastrulation and the HOX code.
7. Identify major techniques and animal models used in Developmental Biology.
8. Integrate Developmental Biology in Biomedicine.

Syllabus

This course provides an introduction to Developmental Biology, focusing on the basic concepts and common molecular mechanisms that organize development from the egg to the multicellular organism. Emphasis will be made on the major signalling pathways that play reiterative crucial roles during embryonic development like SHH, Notch, Wnt, FGF and BMP. Topics include: molecular mechanisms of axis specification D/V, L/R, A/P; gastrulation, movements and molecular players; germ layer formation; patterning by the HOX genes; illustrating examples of differentiation of each germ layer – neurogenesis and somitogenesis. Finally we will discuss themes more related to biomedicine like regeneration, stem cells and cancer.

Course Structure

Lectures will be based on textbook material and selected papers/reviews from the current literature. The classes will be presented via data show but will be mostly based in the presentation of historical or crucial experiments that illustrate the concepts and contents of the theoretical program. The course will be based on formal classes, discussion sessions, presentation and discussion of papers. The students will be evaluated for their participation in the classes and discussion sessions, as well as for their presentation of papers where the clarity of the presentation, the understanding of the concepts and technologies used will be evaluated.
Main Resources