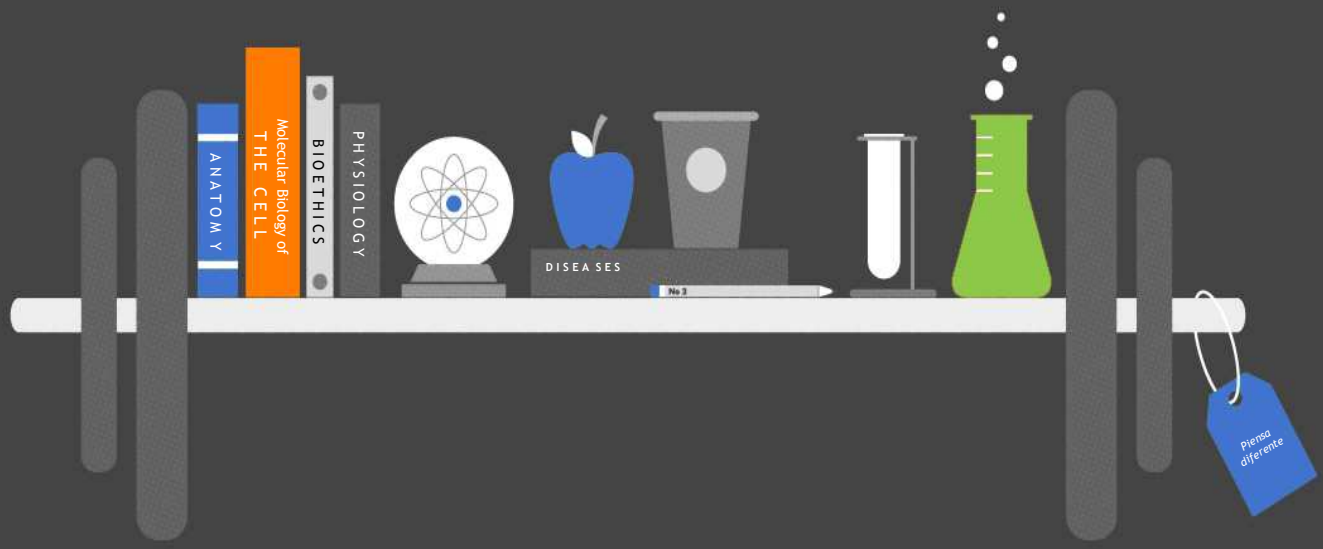
SEMINARIOS CIENTIFICOS

Instituto de Investigación Sanitaria Aragón

Programa Inmunidad, Cáncer y Enfermedades de Origen Infeccioso o Base Molecular



Building and rebuilding the lung: insights from human lung development

Impartido por:

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Presenta:

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Grupo IIS Aragón "Patología Digestiva"

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SEMINARIO BIOMÉDICO

Lunes, 21 de octubre

"Building and rebuilding the lung: insights from human lung development"

Emma Rawlins

Dra. Emma Rawlins is an MRC Senior non-clinical fellow based at the Gurdon Institute, University of Cambridge and her laboratory works on lung developmental and stem cell biology and regeneration. Specific questions addressed include: How are our lungs built and maintained? How does this go wrong in disease? Can we use our insights from developmental biology to induce effective lung regeneration? Or to promote improved maturation of premature lungs? The laboratory uses a combination of human embryonic lung organoids and mouse genetics as model systems. They perform multiple techniques including, in vitro and mouse genetics, lineage-tracing, microscopy, live-imaging, cellular and molecular techniques.

Extensive work on mouse lung morphogenesis has shown that the branching tips of the developing epithelium comprise a multipotent progenitor population. These distal tip progenitors are maintained throughout embryonic development and initially generate bronchiolar-fated and subsequently alveolar-fated progeny. Many of the developmental cues which regulate lung branching, epithelial and mesenchymal differentiation and subsequent maturation have been investigated in the mouse lung. How many of the morphogenetic events and signals are conserved in human lung embryonic development? Can we develop improved models of in vitro human lung development that will facilitate drug screening and disease modelling? And gain insights from lung regeneration? To address these questions, we have been studying human embryonic lung development with a focus on the multipotent distal epithelial progenitor cells. Transcriptional analysis revealed broad similarity between the mouse and human tip epithelial populations, but with some surprising differences. To be able to perform functional experiments, we have developed an organoid-based culture system in which we can grow human embryonic distal tip cells isolated from 6-8 week gestation human lungs. We can self-renew these epithelial tips as karyotypically stable, genetically manipulable, organoids for at least 12 months allowing us to expand the scarce starting material. Moreover, we have developed methods for in vitro and in vivo differentiation of the cells, providing new platforms specifically for the study of human lung development.