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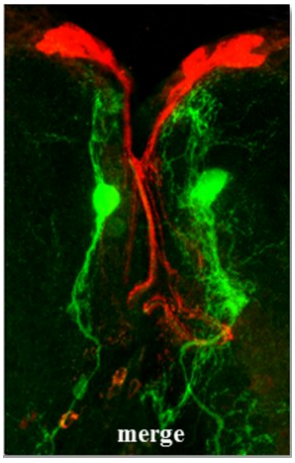
Body and organ size are intrinsic properties of living organisms and are intimately linked to the developmental program to produce fit individuals with proper proportions. The regulation of organ size integrates both systemic and organ-specific processes and deregulation of these processes leads to severe medical conditions including cancer. We study these regulations in the context of Drosophila development, where the merge between genetic and physiological approaches allows deciphering the principles of organ growth with a high level of sophistication.

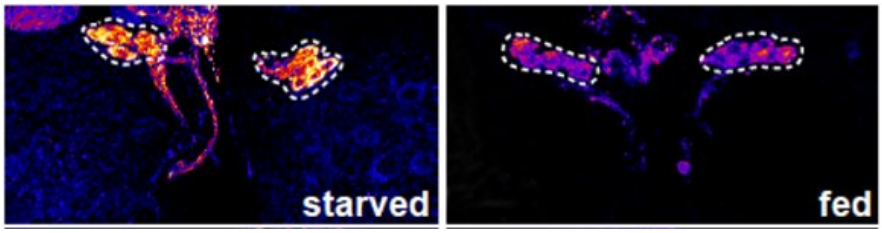
During the development of multicellular organisms, the precise control of growth is essential for ensuring the emergence of adults with correct body size and proper organ proportions. These species-specific features condition many traits of adult life such as fitness and survival. They rely on an intricate series of both short range (morphogens) and long range (hormones) signals. While short range-acting morphogens control organ shapes and relative sizes, long range signalling molecules, mostly hormones, act as relays to adjust body growth in response to environmental changes.

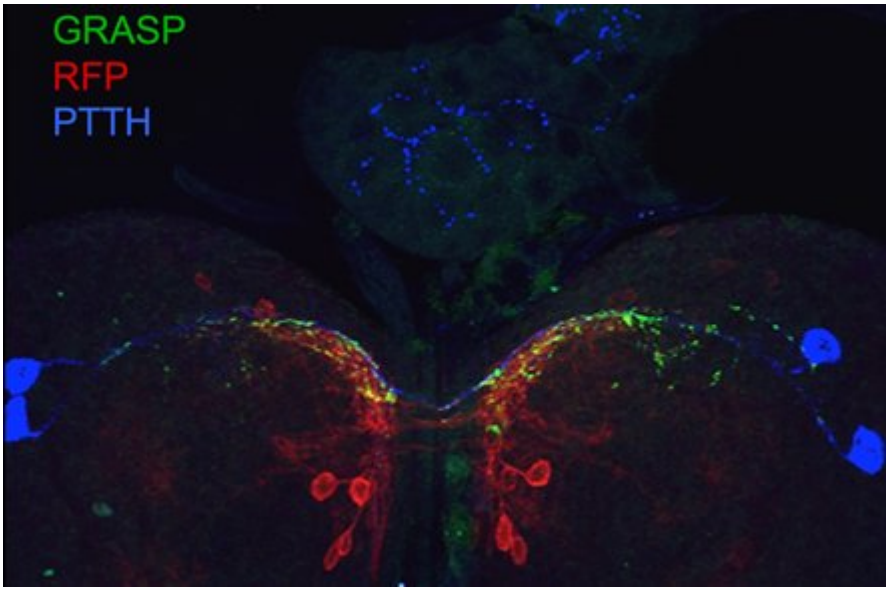


We use the development of Drosophila to decipher some of the mechanisms adapting organ and body growth to nutritional environment. We are particularly interested in understanding cross-talks between metabolic organs like the liver/fat and the brain that allow precise adaptation of organ and body growth to nutrients availability.

We also study how organ growth is coupled to the developmental transitions, in particular to the termination of growth at the end of the juvenile period. Our previous work has illustrated the importance of a novel hormonal checkpoint ensuring that organs complete their growth program before exiting the juvenile period. This work opens toward the exploration of novel mechanisms of organ growth coordination in condition of normal tissue growth, as well as tissue injury and repair.

It is also relevant to apply these general principles of cross-organ communication to our understanding of tumor physiology. Although tumors initially develop surrounded by healthy tissues, they can exert a systemic modification of the host physiology. Conversely, the physiology of the host can influence the ability of a tumor to develop and acquire malignant features. We use Drosophila as a paradigm to explore the mechanisms of tumor-host interactions.





Publications clés

Année de publication : 2019

Laura Boulan*, Ditte Andersen, Julien Colombani, Emilie Boone, Pierre Léopold*, (*corr. authors) (2019 Apr 23)
Inter-Organ Growth Coordination Is Mediated by the Xrp1-Dilp8 Axis in Drosophila.
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AstA Signaling Functions as an Evolutionary Conserved Mechanism Timing Juvenile to Adult Transition.
Current biology : CB : 813-822.e4 : DOI : 10.1016/j.cub.2019.01.053

Année de publication : 2018

Eleonora Meschi, Pierre Léopold*, Renald Delanoue, (*Corr. author) (2018 Dec 10)
An EGF-Responsive Neural Circuit Couples Insulin Secretion with Nutrition in Drosophila.
Developmental cell : DOI : 10.1016/j.devcel.2018.11.029

MaryJane Shimell, Xueyang Pan, Francisco A Martin, Arpan C Ghosh, Pierre Leopold, Michael B

O'Connor, Nuria M Romero (2018 Feb 23)
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Renald Delanoue, Eleonora Meschi, Neha Agrawal, Alessandra Mauri, Yonit Tsatskis, Helen McNeill, Pierre Léopold (2016 Oct 7)
Drosophila insulin release is triggered by adipose Stunted ligand to brain Methuselah receptor.
Science (New York, N.Y.) : 1553-1556

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