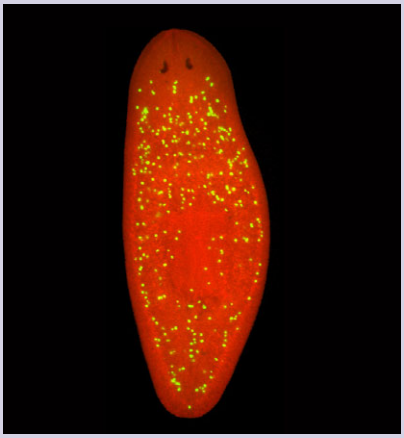

PTEN regulates stem cells in tissue regeneration

PTEN is a key regulator of cell proliferation, differentiation, and motility, and its dysregulation is associated with the occurrence of cancer. Here, Néstor Oviedo and colleagues show that PTEN is also necessary for the regenerative capacity of stem cells in the planarian flatworm *Schmidtea mediterranea*. Planarians are a tractable system for understanding tissue regeneration and stem cell function due to their unique ability to regenerate parts or even whole organisms from just a fraction of viable tissue. Two orthologs of the human *PTEN* gene are identified, *Smed-PTEN-1* and *Smed-PTEN-2*, which are highly expressed in stem cells. Suppression of PTEN protein levels using RNAi, induced hyperproliferation of stem cells causing abnormal growths, significant morphological changes and eventually death. The authors propose that planarian PTEN recapitulates many functions of the human protein, and demonstrate a potential role for PTEN in tissue regeneration.

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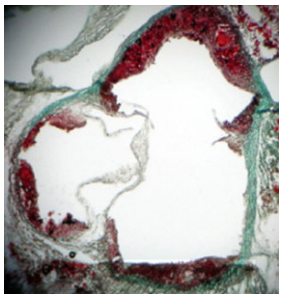
PECAM-1 potentiates atherosclerosis



Atherosclerosis involves the formation of plaques and chronic inflammation in large arteries, which weakens vessel walls and restricts blood flow. PECAM-1 is expressed in many hematopoietic cells and along endothelial cells of the vascular wall, where it binds a subset of myeloid cells and responds to changes in blood flow. In mice with a susceptibility to atherosclerosis ($ApoE^{-/-}$), Hazel Stevens and colleagues found that removing PECAM-1 reduces the amount and extent of atherosclerotic lesions. The authors speculate that the reduced ability of mutant endothelial cells to sense changes in blood flow causes disease resistance of PECAM-$1^{-/-}$ vessels.

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Tumor triggers of the innate immune response

The innate immune response, which is responsible for eliminating infectious pathogens from the body, also provides the first line of defense against endogenously derived cancer cells. Currently, the mechanisms that trigger the innate immune process in cancer are unclear. Using a Drosophila model of tumorigenesis, José Pastor-Pareja and colleagues found that tumorigenesis recruits Drosophila immune cells, known as hemocytes, to areas of breaks in the basement membranes surrounding tumor cells, and stimulates an increase in circulating hemocytes resulting in suppressed tumor growth. Using an aseptic wounding technique, they show that tissue damage can activate JNK signaling and induce expression of JAK/STAT-activating cytokines. This fly study demonstrates a conserved and important role for the innate immune system in recognizing the tissue damage associated with tumor formation and suppressing tumor growth.

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Mitochondrial signaling in Parkinson's disease

The mitochondrial-associated proteins, Pink1 and Parkin, are frequently mutated in Parkinson's disease (PD), but little is known about their regulation and role in pathology. Here, Alexander Whitworth, Jeffrey Lee and colleagues identify two proteases involved in this pathway in Drosophila. They find that the mitochondrial serine protease, Omi/HtrA2, is activated downstream of Pink1, and that Rhomboid-7 (the fly ortholog of human PARL) is required to process the mitochondrial-membrane-tethered forms of Pink and Omi into their soluble forms. PARL is a member of a recently discovered mitochondrial intramembrane protease family, which regulates mitochondrial morphology and apoptosis. The authors suggest that these proteins are involved in pathways linked to the premature death processes induced in the midbrain dopaminergic neurons that lead to PD.

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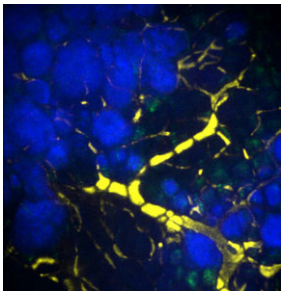
A closer look at tumor microenvironments



Tumors exist within a complex microenvironment that is influenced by the tumor and that affects the ability of the tumor to grow. Although a relationship between inflammation and cancer is known, the distinction between positive and negative effects of inflammatory-mediating white blood cells on tumor progression is unclear. Here, Mikala Egeblad, Andrew Ewald and colleagues describe a new system to visualize the dynamics of white blood cells in the tumor microenvironments of live mice. They use spinning disk confocal microscopy and illustrate distinct activities in different types of myeloid cells and find that location influences stromal cell movement.

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