Tumor suppressor genes vital to regulating blood precursor cells in fruit flies

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UCLA stem cell scientists have shown that common tumor suppressor genes, TSC and PTEN, are vital to regulating the stem cell-like precursor cells that create the blood supply in Drosophila, the common fruit fly.

The researchers examined a signaling pathway called TOR that the cells use to gauge nutrition levels and stress, said study senior author Dr. Julian A. Martinez-Agosto, an assistant professor of human genetics and pediatrics and a researcher with the Eli and Edythe Broad Center of Regenerative Medicine and Stem Cell Research at UCLA.

"We wondered how an organism knows how many blood cells to make and when to make them in the context of injury and repair to tissue. In particular, we wondered how the blood progenitor cells sense that change and know when it's time to make more blood cells," Martinez-Agosto said. "We found that the TOR pathway uses these two genes to regulate its function and, when activated, it expands or increases the number of blood progenitor cells in the fly's blood.'

The study appears Sept. 5, 2012 in the advance online issue of the peer-reviewed journal Development.

Michelle Dragoljovic-Munther, a graduate student in the Martinez-Agosto laboratory and first author of the study, found that cells with increased activity of TOR have a competitive advantage, allowing them to divide and make more of themselves so they can make more blood.

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The precursors, Martinez-Agosto said, were producing ROS all the time and when TOR was activated, the levels increased dramatically. Too much ROS caused them to divide more than normal. If they treated the flies with antioxidants, which reduce ROS levels, the c...
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