Pediatric cancer stem cell identified: understanding the origin of ERMS

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As published in the June 1 issue of *Genes & Development*, Dr. Leonard Zon (Children's Hospital Boston) and colleagues have identified the cancer stem cell for rhabdomyosarcoma, the most common soft-tissue sarcoma of childhood.

"Identifying the cancer stem cell and the evolutionarily conserved genetic programs underlying self-renewal in ERMS will likely lead to new insights into how to destroy these cell types in established malignancies," explains Dr. Zon.

Rhabdomyosarcoma (RMS) is an aggressive cancer that arises from a primitive skeletal muscle cell called a "rhabdomyoblast". Depending upon on the histology of the cancerous cells, there are several different subtypes of RMS. Embryonal rhabdomyosarcoma (ERMS) is the most common subtype, usually found in children under 15, in the head and neck region and genitourinary tract.

Dr. Zon and colleagues have developed an animal model to identify and test therapeutic targets of human ERMS. The scientists artificially activated the RAS pathways to induce ERMS in a strain of genetically engineered zebrafish. Some transgenic zebrafish developed visible tumors by 10 days of age.

Through their model, Dr. Zon and colleagues were able to identify both an ERMS tumor-cell-of-origin and a novel genetic signature that underlies ERMS progression in zebrafish and human patients. Cancer

stem cells make up only a small fraction of the overall number of cells in a tumor. However, they are capable of giving rise to other cancer cells, and thereby drive tumor growth and metastasis. To prevent recurrence and progression, effective long-term therapies must target the self-renewing population of cancer stem cells.

“The zebrafish is ideally suited for use in targeted chemical genetic approaches to specifically inactivate cancer pathways we have identified in our study. Identifying drugs that inactivate these pathways in the ERMS cancer stem cell may have far reaching implications for treatment of patients with this disease.”

Source: Cold Spring Harbor Laboratory