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Recent Advances in Gastrointestinal Cancer Stem Cells

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About 50% of the Western population develops an adenomatous polyp by the age of 70, a key step for cancer formation. These ideas have drawn attention to the pathways that control stem-cell proliferation. Among these, the transforming growth factor beta (TGF- β), Myb, Wnt, and Hedgehog pathways are of particular relevance to cancer. Constant proliferation of stem cells is a vital component in gastrointestinal tissues. In these renewing tissues, mutations will most likely result in expansion of the altered stem cells, perpetuating and increasing the chances of additional mutations and tumor progression. This provides a rationale for detecting and analyzing tumor stem cells as being the most effective way to effectively treat cancers such as colon cancer. Recent evidence also suggests a key role for the TGF- β signaling pathway in both gastrointestinal cancer suppression and endoderm, suggesting a dual role for this pathway in tumor suppression as well as progression of differentiation from a stem or progenitor stage. However, many details about colon cancer important for early detection remain poorly understood, including the precise cell(s) of origin, molecular genetics, and the mechanisms responsible for its later highly aggressive clinical picture. We suggest that loss of TGF- β signaling potentially contributes to the events that lead to onset of colorectal cancer, and the TGF- β signaling pathway probably plays an important role in tumor suppressor mechanisms that can be recognized as a potential early marker system in colorectal carcinoma.