CANCER STEM CELL MARKERS IN FOLLICULAR THYROID CARCINOMA

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INTRODUCTION

While thyroid malignancies represent only 2-3% of total cancer diagnoses, incidence and mortality rates for thyroid cancer continue to rise. The reason for this disparity in the incidence and improvement in treatment strategies for thyroid malignancies has not been fully understood. Of particular concern is the fact that follicular thyroid carcinomas have been shown to have a much greater chance for distant metastasis than papillary thyroid carcinomas. While radioactive thyroid ablation and total thyroidectomy, arguing that they have played a role in eliminating the drive for innovation and competition in generating new, more sophisticated therapies. While complication by striking tumor differences between patients. It seems obvious that in order to combat such heterogeneity we must develop more specific, tailored therapies that are capable of fighting tumors on a targeted molecular level.

METHODS

The stem cell theory of carcinogenesis comprising the tumor. Over the last five to ten years, the theory that these cells play important roles in tumor initiation, invasiveness, and distant metastasis has spurred their widespread study and scientific scrutiny. Although the present development of more effective, more tumor-specific chemotherapeutic agents.

RESULTS

Adult Thyroid Stem Cells

We first set out to characterize any adult stem cells present within the thyroid gland. Previous work by Young et al. (2005) demonstrated that CEACAM1(+)/SSEA1(+) cells within wildtype adult mouse thyroid tissue. Inset is nuclear counterstain with Hoechst 33342. Arrows indicate CEACAM(+) cells. D. Immunohistochemistry/Immunofluorescence Frozen tissue sections were prepared for immunohistochemical staining as published previously (Young et al., 2005). For analysis of adult thyroid stem cell populations the following primary antibodies were used: anti-carcinoembryonic antigen-like cell adhesion molecule 1 (CEACAM1, gift of Dr. Henry Young, Mercer University School of Medicine) 1:500 dilution; anti-stage specific embryonic antigen 1 (SSEA1) NovoBioTech clone MC-480, 1:500 dilution; anti-bone morphogenetic protein receptor 1a (BMPR1a, Santa Cruz Biotechnology), 1:50 dilution.

Imaging

Figure 3. Double immunofluorescence staining of wildtype adult mouse thyroid tissue, demonstrating colocalization of CEACAM1 and SSEA1 signal. (A) Hoechst nuclear counterstain. (B) CEACAM1 analysis, with positively staining cells indicated by arrows. (C) SSEA1 analysis, with positively staining cells indicated by arrows. (D) Merge of A, B, and C. Yellow cells, a number of which are indicated by arrows, suggesting that this subpopulation of putative adult thyroid stem cells marked by CEACAM1/SSEA1 coexpression in any postnatal mouse tissue. This further characterization of these cells, using additional molecular cancer markers and embryonic stem cell markers to further address our hypotheses.

DISCUSSION

Cancer stem cells (CSCs) form a unique population of cells within a tumor that are capable of self-renewal and tumorigenic properties, comprising the tumor. The cellular and genetic heterogeneity of moderately to poorly differentiated cancers require the development of cutting edge therapies that can be tailored to the specific needs of each patient. We propose that characterization of positive thyroid cancer stem cells may represent one approach to develop the most effective strategies for this disease, and present preliminary data describing a unique subpopulation of cells within a wildtype adult thyroid gland that may represent cancer stem cells based on a number of criteria. These findings encourage our conviction that these initial observations indicate a novel thyroid cancer stem cell population. Future studies will focus on the development of more effective, more tumor-specific chemotherapeutic agents.

CONCLUSIONS

Cancer stem cells (CSCs) form a unique subpopulation of cells within a tumor that are capable of self-renewal and tumorigenic properties, comprising the tumor. The cellular and genetic heterogeneity of moderately to poorly differentiated cancers require the development of cutting edge therapies that can be tailored to the specific needs of each patient. We propose that characterization of positive thyroid cancer stem cells may represent one approach to develop the most effective strategies for this disease, and present preliminary data describing a unique subpopulation of cells within a wildtype adult thyroid gland that may represent cancer stem cells based on a number of criteria. These findings encourage our conviction that these initial observations indicate a novel thyroid cancer stem cell population. Future studies will focus on the development of more effective, more tumor-specific chemotherapeutic agents.