Odontogenesis and its glitches - Role of cancer stem cells
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Commentary:
Odontogenic lesions are a group of heterogenous pathologies derived from oral epithelium, ectomesenchyme and/or mesenchymal elements1. Despite advancements in diagnostics and therapeutics, the molecular pathogenesis and mechanism of their clinical behavior are still unclear. Recently, cancer stem cells (CSC) with properties of pluripotency, self-renewal and continuous differentiation have been encountered in few odontogenic cysts and tumors showing aggressive clinical course2. Few researchers have hypothesized that these CSC may arise from embryonic stem cells that helps in the formation of normal odontogenic apparatus3. CSCs comprises small population (<2%) of tumor mass showing similar characteristic features like embryonic stem cells and are considered as the important factor in growth and metastasis of tumor. CSC exhibit steady proliferation of cell which confers to the recurrence and resistance to routine adjuvant therapies4. In the early developmental stages, embryonic stem cells release certain transcription factors for the maintenance of self-renewal properties. Similarly, CSCs also expresses specific nuclear and membranous transcription factors, which has three important properties such as self-renewal, colony formation and pluripotency. Immunohistochemical localisation of these transcription factors could be helpful in the isolation of CSC in its associated lesions. Numerous pluripotent stem cells markers have been reported in the literature namely OCT4, SOX2, NANOG and c-Myc; out of which SOX2 and OCT4 are reported to detect stemness in normal odontogenesis as well as odontogenic cyst and tumors5. SOX2 (sex- determining region -SRY box 2) is a progenitor nuclear marker that has been explored well in the primitive dental tissue as well as in odontogenic lesions6. Presence of SOX2 has been considered to be very important for the maintenance of stemness by embryonic stem cells and it has a crucial role in self-renewal, proliferation and pluripotency. OCT4 is an another nuclear stem cell marker which is encoded by the POU5F1 gene mostly found in undifferentiated cells that frequently associated in the tumorigenesis. Cytoplasmic expression of OCT4 was reported to be observed in the differentiating cells while the nuclear expression in primitive immature cells exhibiting “stemness”6. CD44 is a membranous glycoprotein molecule involved in cell signalling, proliferation and migration, which makes it a better stem cells marker. It also plays an important role in angiogenesis, growth regulation and cytokine presentation of cells. Upregulation of CD44 has been postulated to have a direct effect on tumor progression and metastatic phenotype in odontogenic tumors as well as in other types of cancers7. These molecular markers can be potentially employed to determine the tumor behavior as well as their prognosis4,5,6,7. Detection of CSC could help in early detection and differentiation of odontogenic carcinomas. Most importantly, immunohistochemical profiling of CSC in aggressive odontogenic lesions could pave way for the development of tailored treatment procedures and better outcomes for the patients. In this poster, we have portrayed the reliability and possible pathway of few stem cell markers which are associated with CSC in vigorous odontogenic cysts and tumors.
References


Keywords: Cancer Stem Cells; Odontogenesis; Odontogenic Lesions; OCT4; SOX2.
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