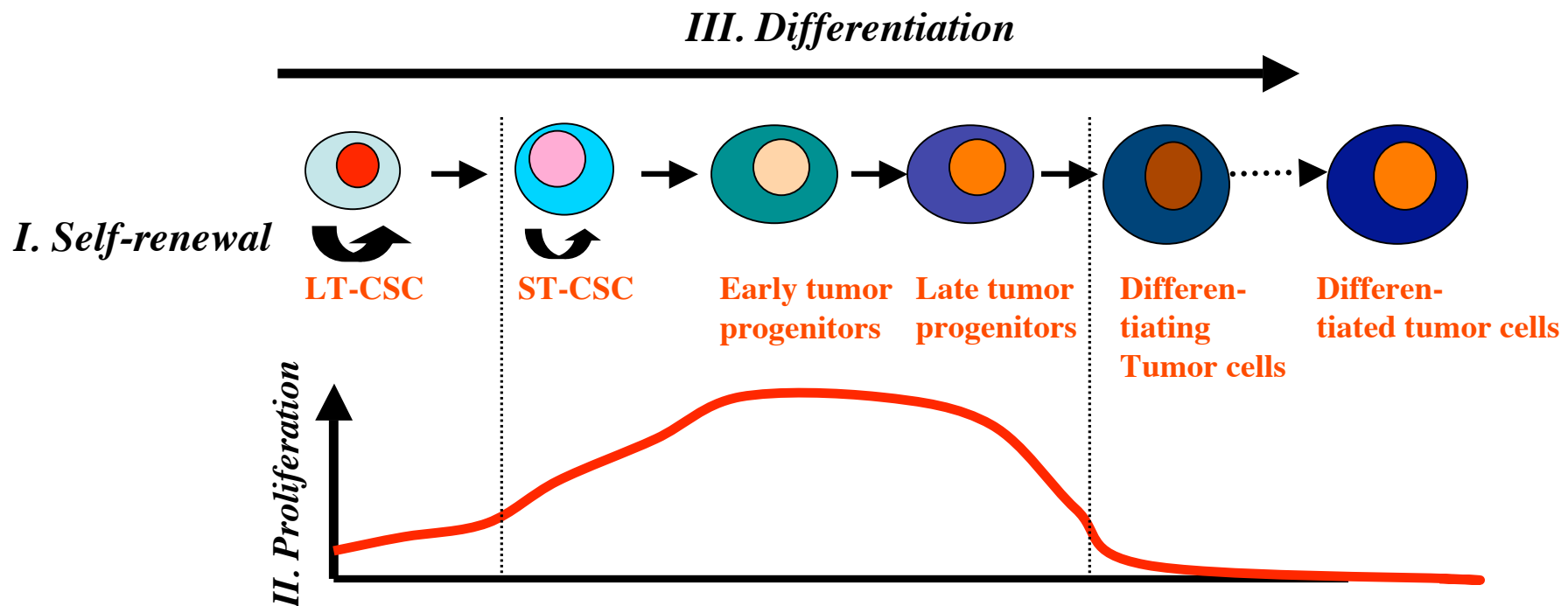


Cancer stem cells (CSCs) are stem-like cancer cells in a tumor (for definition, see [Tang, 2009](#)). Like normal stem cells (SCs) and their progeny in an adult tissue, cells in a tumor may be organized as a hierarchy containing long-term (LT) and short-term (ST) CSCs, early and late progenitors, differentiating and differentiated tumor cells (see illustration below). Cells at different stages of maturation (development) can be numerically, morphologically, antigenically, and genetically different. CSCs may vary significantly in their abundance in different tumors. Putative LT-CSCs are probably the rarest, have the longest self-renewal capability, and possess the highest proliferative capacity but normally divide the slowest in the tumor. The ST-CSCs, on the other hand, might have reduced self-renewal capability and proliferative potential although they might divide more frequently than LT-CSCs. The early and late tumor progenitors might not possess self-renewal capabilities and have significantly reduced proliferative potential but they may be rapidly proliferating. Fully or terminally differentiated tumor cells (e.g., AR<sup>+</sup>, PSA-secreting PCa cells) might or might not have the ability to proliferate. In any given tumor, the ST-CSCs and various tumor progenitors might constitute the majority of the dividing cell compartment (demarcated by the dotted vertical lines). Very often, self-renewal and proliferation or proliferation and proliferative potential are interchangeably used by mistake.



Where do **CSCs** come from? Since normal SCs already possess tremendous proliferative potential and self-renewal machinery, it is reasonable to think that CSC might result from the transformation of normal SC. Evidence supporting this possibility comes from the recent findings that the leukemic SC in AML share similar antigenic markers to the normal HSC and that CD44 identifies not only normal mammary stem/progenitor cells but also putative breast cancer stem/progenitor cells. Similarly, CD133 appears to mark both normal NSC and brain tumor SC. On the hand, it is clear now that progenitor cells can be transformed and endowed with SC properties. This point is not particularly surprising considering that progenitor cells constitute the major dividing population in any tissue/organ. Finally, fully differentiated cells such as hepatocytes might also be transformed and become the source of CSC in hepatocellular carcinomas. For a general review of SCs & CSC theory, see *Stem cells (2008)*.

