

Assessing the application of CD 133 expression in the diagnosis of early malignancies

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What is CD 133?

- Prominin-1 (CD 133) is a pentaspan transmembrane glycoprotein present in neuronal cells that is known to be overexpressive in malignant forms of cells, particularly in neuronal diseases
- There is yet to be a definitive protocol in the clinical setting to utilize this biomarker as a diagnostic tool
- This literature-based study proposes (1) the application of CD 133 as a biomarker for neurodevelopmental disease and (2) examine why CD 133 is upregulated under pathological states

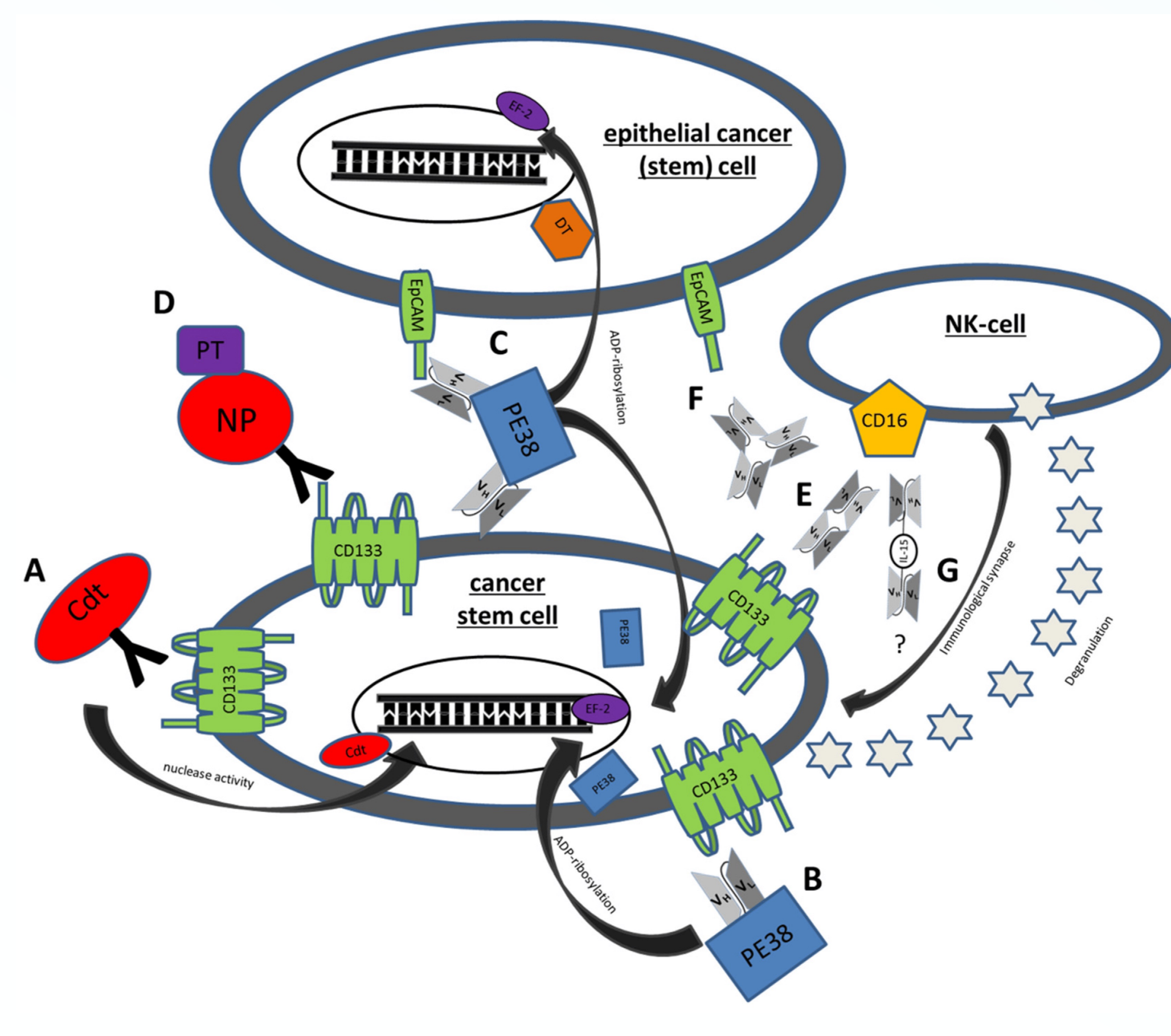


Figure 1. CD 133 present on the cell membrane of cancerous stem cells

Established attributes of CD 133

- In both human and mouse embryonic studies, CD 133 expression is highly associated with healthy stem cell and tumor cells' regeneration, differentiation, and metabolism
- By utilizing CRISPR/Cas9 and RNA sequencing, researchers determined that mRNA and protein contents of CD 133 are similar in human embryonic stem cells (hESCs) and human cancer cells
- CD 133 vesicles are induced by proliferative signaling
- Immunofluorescence assays can further identify the presence/absence of the gene in differing cells

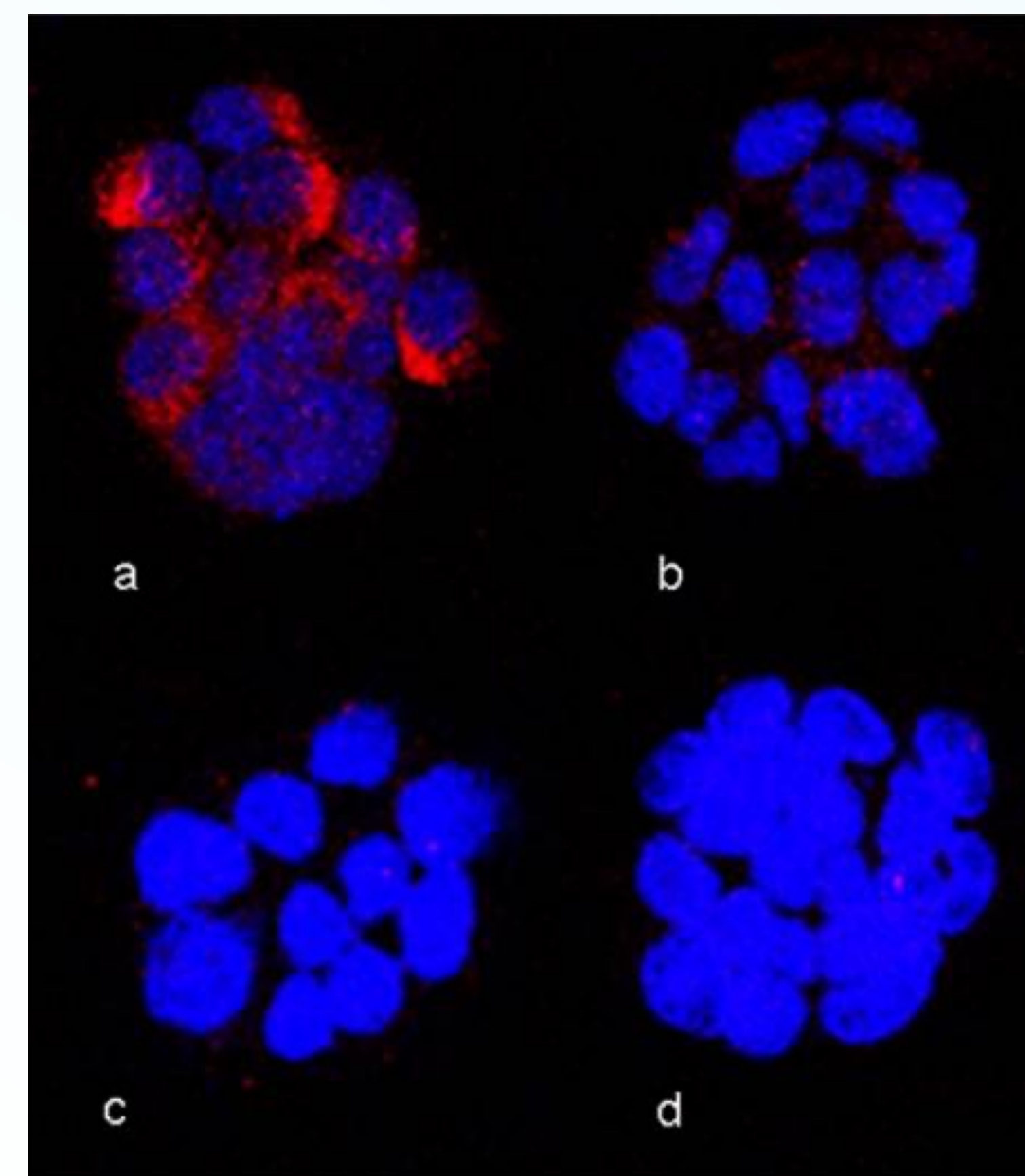


Figure 2. Immunofluorescence staining for the CD133 surface antigen using glioblastoma 0308 stem cells (Lee et al., 2006)

Literature review summary

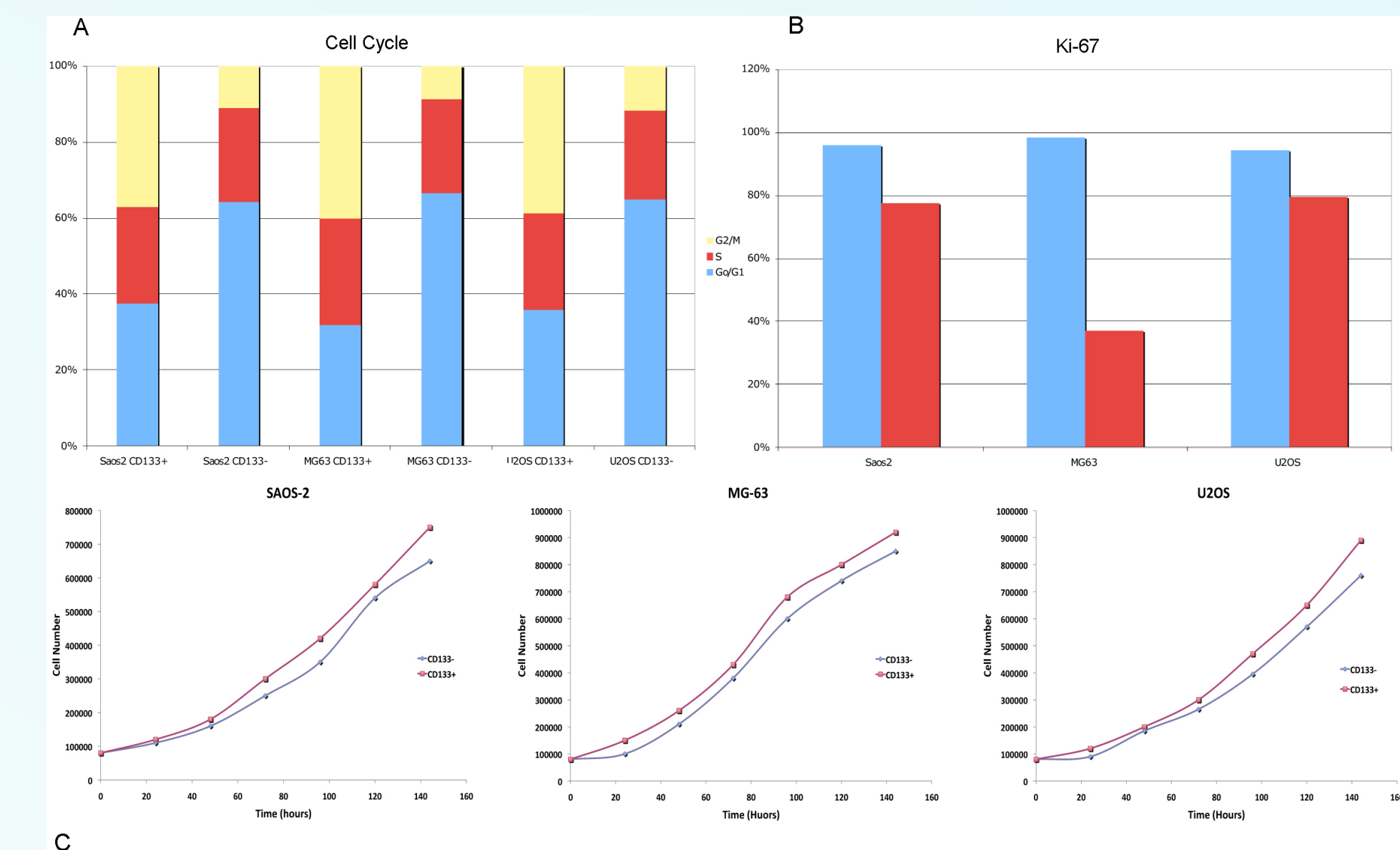


Figure 3. Cell cycle analyses conducted in SAOS2, MG63, and U2OS cell lines in the presence (+) or absence (-) of CD 133 (Tirino et al, 2008)

- Across several cellular populations, cells containing the CD 133 have a significantly higher proliferation rate than those without the gene
- High CD 133 expression is also strongly correlated to proliferative biomarkers such as p16, Cyclin E, and Ki 67
- CD 133 serves as a basis in the fate of a cell by its dynamic nature to properly repair damaged tissues or form tumors by dysregulating proliferative processes

Further implications

- CD 133 shows to be a promising diagnostic tool in distinguishing malignant and healthy tissue
- Samples of human tissue in early cancer stages are likely to contain high levels of CD 133, ultimately leading to a sooner diagnosis and treatment

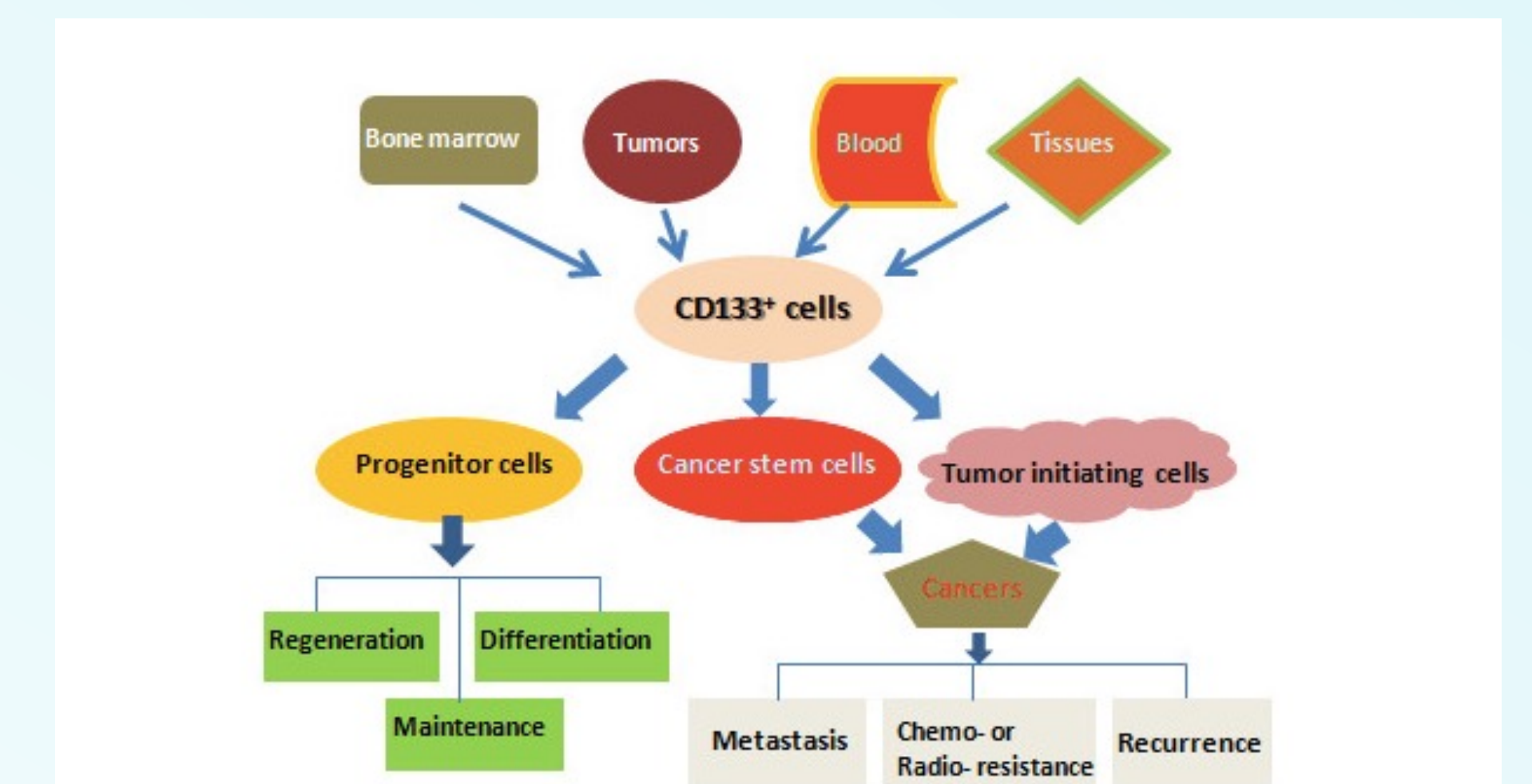


Figure 4. Functional outline and fate of CD 133+ cells

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