Equivalence of conventionally-derived and parthenote-derived human embryonic stem cells.

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Public Summary:
BACKGROUND: As human embryonic stem cell (hESC) lines can be derived via multiple means, it is important to determine particular characteristics of individual lines that may dictate the applications to which they are best suited. The objective of this work was to determine points of equivalence and differences between conventionally-derived hESC and parthenote-derived hESC lines (phESC) in the undifferentiated state and during neural differentiation. METHODOLOGY/PRINCIPAL FINDINGS: hESC and phESC were exposed to the same expansion conditions and subsequent neural and retinal pigmented epithelium (RPE) differentiation protocols. Growth rates and gross morphology were recorded during expansion. RTPCR for developmentally relevant genes and global DNA methylation profiling were used to compare gene expression and epigenetic characteristics. Parthenote lines proliferated more slowly than conventional hESC lines and yielded lower quantities of less mature differentiated cells in a neural progenitor cell (NPC) differentiation protocol. However, the cell lines performed similarly in a RPE differentiation protocol. The DNA methylation analysis showed similar general profiles, but the two cell types differed in methylation of imprinted genes. There were no major differences in gene expression between the lines before differentiation, but when differentiated into NPCs, the two cell types differed in expression of extracellular matrix (ECM) genes. CONCLUSIONS/SIGNIFICANCE: These data show that hESC and phESC are similar in the undifferentiated state, and both cell types are capable of differentiation along neural lineages. The differences between the cell types, in proliferation and extent of differentiation, may be linked, in part, to the observed differences in ECM synthesis and methylation of imprinted genes.

Scientific Abstract:
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