A cGMP-applicable Expansion Method for Aggregates of Human Neural Stem and Progenitor Cells Derived From Pluripotent Stem Cells or Fetal Brain Tissue.

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Public Summary:
A cell expansion technique enabling the expansion of a large numbers of cells from a single specimen for research experiments and clinical trials would greatly benefit the stem cell community. Many current expansion methods are laborious and costly and may cause early maturation and aging of stem cells. To overcome these problems, we have developed a simple and inexpensive method referred to as "chopping". This technique allows for the large-scale expansion of suspended, spheroid cultures that maintain constant cell/cell contact and has been used for a variety of stem cell types. Importantly, the chopping procedure has been used under current good manufacturing practice (cGMP), permitting mass quantity production of clinical-grade cell products.

Scientific Abstract:
A cell expansion technique to amass large numbers of cells from a single specimen for research experiments and clinical trials would greatly benefit the stem cell community. Many current expansion methods are laborious and costly, and those involving complete dissociation may cause several stem and progenitor cell types to undergo differentiation or early senescence. To overcome these problems, we have developed an automated mechanical passaging method referred to as "chopping" that is simple and inexpensive. This technique avoids chemical or enzymatic dissociation into single cells and instead allows for the large-scale expansion of suspended, spheroid cultures that maintain constant cell/cell contact. The chopping method has primarily been used for fetal brain-derived neural progenitor cells or neurospheres, and has recently been published for use with neural stem cells derived from embryonic and induced pluripotent stem cells. The procedure involves seeding neurospheres onto a tissue culture Petri dish and subsequently passing a sharp, sterile blade through the cells effectively automating the tedious process of manually mechanically dissociating each sphere. Suspending cells in culture provides a favorable surface area-to-volume ratio; as over 500,000 cells can be grown within a single neurosphere of less than 0.5 mm in diameter. In one T175 flask, over 50 million cells can grow in suspension cultures compared to only 15 million in adherent cultures. Importantly, the chopping procedure has been used under current good manufacturing practice (cGMP), permitting mass quantity production of clinical-grade cell products.