An Alternative to the Use of Embryonic Stem Cells

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In this study, I conducted laboratory tests that produced induced pluripotent stem cells (iPS) that could be used as an alternative to the use of embryonic stem cells. Using human buccal cheek cells which were obtained easily, painlessly and non-invasively, I electroporated these cells with Oct 4, NANOG, and Sox2 proteins – which are essential for promoting self-renewal or pluripotency of cells. Subsequently, electroporation-induced, oncogene and virus-free pluripotent stem cells were produced within six days. The produced cells were grown in standard cell culture for weeks then harvested for molecular and immune-histochemical analyses. In this study, I conducted laboratory tests that produced iPS cells for clinical use based on a process established by and with oversight from, Dr. Christopher B. Reid, M.D., Ph.D., director and founder of the iSTEM Scholars Program at Charles Drew University of Science and Medicine. Traditional iPS cell generation was obtained using retrovirally-encoded oncogenes leading to alterations of the host cell genome as well as carcinogenesis (Takahashi K, Yamanaka S., 2006). In the electroporation process, I excluded the c-myc and Krippel-like factor 4 (KLF4) oncogenes, which potentially promotes cancer. My tests and methods used successfully met my objective to produce induced pluripotent stem cells in large amounts easily, painlessly and quickly. The method I used enabled me to confirm an efficiency and effectiveness that I believe will enhance induced pluripotent cells for cellular therapies, drug efficiency and toxicity testing, tissue engineering, and in the treatment of disease.