Weill Cornell Medicine

Improved Cell Culture Media for the Derivation and Maintenance of Murine Embryonic Stem Cells

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Background & Unmet Need

- Cell culture media are vital for the maintenance and derivation of stem cells
- Current state of the art cell culture media, two inhibitor/LIF (2i/LIF), do not enable long term culture of murine embryonic stem cells (mESCs)
- Prolonged culture of mESCs in current media compositions result in aneuploidy, lost DNA methylation, impaired developmental potential, and the inability to derive fully potent female mESCs
- **Unmet Need:** A serum-free mESC 2i/LIF cell culture media that maintains the genomic stability and developmental potency of mESCs over long term culture

Technology Overview

- **The Technology:** Novel serum-free cell culture media that improves genomic stability and promotes full potency in mESCs, and the mESCs that are derived using it
- **The Discovery:** Lipid supplementation to 2i/LIF cell culture media results positive long term culture outcomes in mESCs
- **PoC Data:** This media reduces the incidence of abnormal numbers of chromosomes, preserves DNA methylation, maintains mESC developmental potential, and allows the derivation of fully potent female mESCs through preservation of X-chromosomes beyond 40 cell passages
- mESCs cultured in this media can be used to produce fertile all-ESC adults, providing a platform that is readily available for the development of specific genetic lines for R&D of various therapeutics

Inventors:
Duancheng Wen, Ph.D.
Liangwen Zhong, Ph.D.

Patents:
Provisional Filed

Publications:
Zhong et al. *Biorxiv*. 2022

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Technology Applications

- mESC expansion and differentiation for cell therapeutics
- mESC differentiation into organoids for pharmaceutical development and testing
- Genetic manipulation of mESC lines and mouse model constructs for pharmaceutical development and testing

Technology Advantages

- Promotes long term genomic stability and full potency maintenance for mESCs in both sexes and non-permissive strains
- Supports de novo derivation of mESCs from both male and female blastocysts
- Maintains mESCs in naive or formative pluripotent states

Supporting Data / Figures

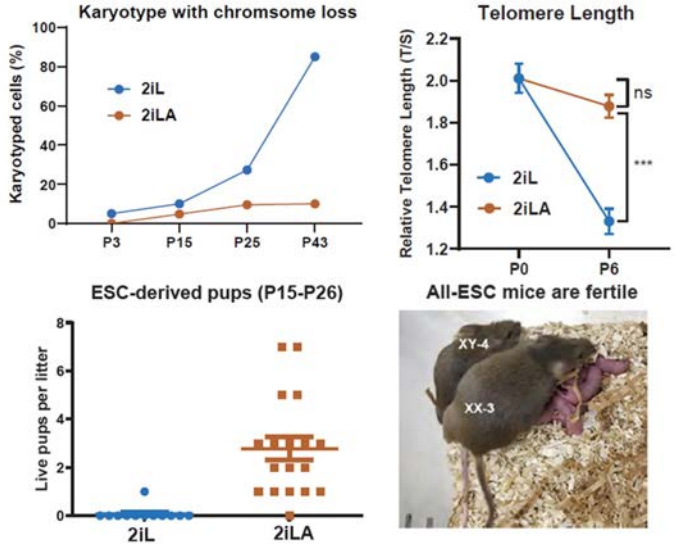

Figure 1: Cornell developed 2iLA cell culture media reduces chromosome loss and telomere shortening and improves live pups per litter compared with industry standard 2iL cell culture media.

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