Universidad de Navarra
Facultad de Ciencias

MÁSTER EN INVESTIGACIÓN BIOMÉDICA
Research Project Proposal
Academic year 2025-2026

Project Nº 24
Title: *Molecular Engineering of Human Pluripotent Cells Toward the 8-Cell-Like Stage*
Department/ Laboratory Dpto Ingeniería Biomédica, CIMA. Laboratorio 1.01
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Summary The main goal of this project is to generate **inducible transgenic human cell lines** capable of converting into **8-cell-like cells (8CLCs)**, a cellular state that mimics the transcriptional and functional features of the human 8-cell embryo stage. This state is associated with **enhanced developmental potential** and may significantly improve the ability of human cells to contribute to interspecies chimeras. To achieve this, we will design genetic constructs enabling the **controlled expression** of key transcription factors known to drive the transition toward the 8CLC state. Human induced pluripotent stem cells (hiPSCs) will be genetically modified by CRISPR/Cas9 system with **inducible expression systems** (e.g., Tet-On), and the conversion into 8CLCs will be validated through transcriptomic, epigenetic, and functional analyses. The project will be structured in the following phases: **Genetic engineering of hiPSCs** to introduce relevant transgenes. **Induction and validation of the 8CLC state**, using RNA sequencing, totipotency markers, and morphological analysis. This innovative approach will improve our understanding of the mechanisms regulating human cellular plasticity and lay the groundwork for generating human-animal chimeras. In the long term, this could facilitate the production of **functional human organs in animal models**, advancing regenerative medicine and transplantation science.
<table><tr><td>yes</td><td></td></tr><tr><td>no</td><td>X</td></tr></table>Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator?