ABET Addendum

Team #32 - Tiffany Zhang

Project/Device: Predictive modeling of heart failure using chamber specific engineered heart tissue, combining a biotechnology process with a Netflux computational model.

Desired Needs

• Create lineage specific hiPSC derived cardiac tissues using fibroblasts and cardiomyocytes.
• Generate stretch and RNA seq data to study chamber specific remodeling.
• Build a Netflux model to simulate signaling and guide future knockout studies.

Major Constraints

• **Safety and regulatory:** sterile technique, biohazard handling, chemical safety, sharps precautions, SDS handling, and lab protocol compliance.
• **Risks:** contamination, failed differentiation, low viability, ECM variability, delayed validation data, and model error.
• **Manufacturability and QC:** cell culture is slow, costly, variable, and equipment dependent

Engineering Standards

• Experimental work used documented protocols, cell line tracking, imaging, assays, and gene expression analysis.
• Computational work used defined inputs, reproducible Netflux simulations, baseline comparisons, knockout testing, and sensitivity analysis.

Ethical, Environmental, and Societal Concerns

• **Ethical:** human derived iPSC lines required responsible handling and careful reporting without overstating unvalidated predictions.
• **Environmental:** biological waste, chemical waste, plastics, and reagents were disposed of through approved lab procedures.
• **Societal:** the platform must be validated before use in biomedical or drug screening decisions.

Active Teamwork and Leadership

• Split work into experimental/computational subprojects with shared goals/mentor feedback.
• We used delegated tasks, progress updates, troubleshooting, and feedback to meet deadlines.

Motivation, Initiative, and Persistence

• Long culture timelines, biological variability, and model complexity required careful planning, troubleshooting, and independent learning.
• Motivated by the goal of identifying chamber specific remodeling mechanisms

Innovation and Entrepreneurial Ideas

• The innovation is combining engineered cardiac tissue with chamber specific computational models.
• In silico knockouts can reduce bench testing cost and help select better experimental targets.
• Future versions could include macrophages, vascular cells, disease inputs, and drug screening workflows.