BME449 Tissue Engineering

Lecture #4
Biocompatibility

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Scaffold Properties

Biocompatibility

- First step is *in vitro* cytotoxicity
- Usually done with fibroblasts

Cytotoxity assay methods:

Direct contact

Agar overlay

MEM extraction

Biocompatibility

MEM Extraction

- Positive and negative controls are often included in the assays to ensure the operation and suitability of the test system.
- The negative control of choice: high-density polyethylene material.
- The positive controls: low-molecular-weight organotin-stabilized poly (vinyl chloride), gum rubber, and dilute solutions of toxic chemicals, such as phenol and benzalkonium chloride.

Biocompatibility

Direct Contact

- monolayer, confluent cell culture
- Usually cell lines are used
- 24 hours, 37°C
- hematoxylin blue: stains live adherent cells
- toxicity=dead/live

Biocompatibility

Agar Diffusion

- Agar diffusion
  - agar layer between cells and biomaterial
  - agar: gel-like polymer derived from red alga
  - chemicals diffuse through agar
  - use special stain to label healthy cells
  - areola of unstained dead cells around the biomaterial

Biocompatibility

MEM Extraction

- Incubate the scaffold 24h at 37C in cell culture medium.
- Filter the medium
- Apply this extract of the scaffolds in the confluent monolayer cells
- Calculate the cytotoxicity index according to ISO

Biocompatibility

Comparison of Methods

Student discussions