Tumor-Associated Macrophages
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Abstract

The stacks platform is a viable and advantageous modality for investigation of the tumor microenvironment. The development and progression of prostate cancer is greatly dependent on tumor-associated macrophages (TAMs). TAMs have roles in both cancer progression and eradication. Stimuli within the tumor microenvironment (TME) direct the TAMs to express unique gene sets and perform specific functions. The TME is comprised of the non-cancerous cells that reside within and around a tumor. These include immune cells such as T cells, B cells, neutrophils, and as stromal cells such as endothelial cells, epithelial cells, and fibroblasts. These cells have roles in both cancer progression and eradication and have more recently become the focus of cancer therapy.

Utilizing the stacks platform we aim to:
- Culture of Primary Tumor and TME Cells
- Utilization of primary cells obtained from patient tissues and cell lines
- Chemotherapies
- Regulatory T cell: a protection for tumour cells.
- Identification of key pathways utilized by TAMs to promote progression of prostate cancer through Co-culture of macrophages and other immune cells, stromal cells, and tumor cells.
- Isolation of each cell population for multiplexed analysis:
  - Distance dependent effects
  - Efficient utilization of primary cells for culture
  - Ability to evaluate:
    - Distance dependent effects
    - Efficient utilization of primary cells for culture
    - Ability to evaluate:
      - Distance dependent effects
      - Efficient utilization of primary cells for culture
- Biological and chemical properties of culture surfaces, cell growth, survival, and function.

Tumor microenvironment

The stacks platform is a reconfigurable open-source culture platform. Cells are cultured in wells located within vertical alignment when plates are stacked on top of each other. In the devise illustrated to the left, the culture wells are 50um in height, allowing for 2D culture. Bottom left: Image of epithelial cells growing in 3D culture (collagen matrix). Epithelial cells in 3D culture grow as an spheroid. Illustration of select physical properties that are altered at the microscale include:
- Efficient utilization of primary cells for culture
- Ability to evaluate:
  - Distance dependent effects
  - Efficient utilization of primary cells for culture
- Biological and chemical properties of culture surfaces, cell growth, survival, and function.

References


Microscale Engineering of the Prostate Cancer Microenvironment for Therapeutic Targeting of Tumor-Associated Macrophages

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