Quantification of T-cell Migration in Confined and 3D Conditions

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INTRODUCTION

- The immune system plays a crucial role in the defense against pathogens and aberrant cells, such as tumoral cells.
- In order to carry out its function of immune surveillance, migration is one of the fundamental processes required.
- It is essential to characterize this mechanism in physiologically and pathologically relevant scenarios to comprehend the immune response.
- We have adopted a novel microfluidic-based approach that recreates the biomechanical aspects of solid tumors.
- Two different microfluidic geometries were employed:
  1. One of them based on a central chamber which allowed hydrogel polymerization
  2. The other one based on confined microchannels of different widths

AIM

Characterize T-cell migration in:
- 3D conditions
- Confined conditions

MATERIALS AND METHODS

The microfluidic devices were fabricated with polydimethylsiloxane (PDMS) owing to its many advantages, such as:
- Biocompatibility
- Transparency
- Flexibility
- Gas permeability

T-cells were seeded on the microchips, where their migration was quantified via time-lapse microscopy under controlled conditions of:
- Temperature
- Humidity
- CO₂ concentration

RESULTS AND DISCUSSION

- T lymphocytes display higher velocity under confinement compared to 3D migration

CONCLUSIONS

- The results demonstrate that confinement is a key factor in immune migration.
- Its characterization can provide a better understanding of the infiltrating capacity of immune cells in solid tumors, as well as in wounds or other pathological conditions.

REFERENCES


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