

CLAIMS

1. A method comprising:
 - (1) providing (a) living human tumor cells obtained from a biopsy and (b) a microfluidic device comprising a body having a central microchannel therein; and an at least partially porous membrane positioned within the central microchannel, the membrane configured to separate the central microchannel to form a first central microchannel and a second central microchannel, the membrane comprising a top surface and a bottom surface, the top surface comprising living immune cells
 - (2) introducing the living tumor cells into the microfluidic device under conditions such that at least a portion of the living tumor cells contact with the immune cells;
 - (3) incubating the living tumor cells in the microfluidic device, and
 - (4) determining that the tumor cells continue to express one or more tumor markers.
2. A method according to Claim 1, in which the determining comprises detecting one or more tumor markers 11 days after the introducing of step (2).
3. A method according to Claim 1, further comprising determining whether the immune cells cause tumor cell death.
4. A method according to Claim 1, further comprising (5) introducing a checkpoint inhibitor in the microfluidic device, and (6) determining whether the checkpoint inhibitor causes tumor cell death.
5. A method according to Claim 4, in which the checkpoint inhibitor is an antibody.
6. A method according to Claim 5, in which the antibody binds the PD-1 receptor on the immune cells.
7. A method according to Claim 5, in which the antibody binds the PD-L1 ligand on the tumor cells.
8. A method according to Claim 1, in which immune cells are deposited within a gel layer.
9. A method according to Claim 1, in which the immune cells comprise fibroblasts.
10. A method according to Claim 1, in which the tumor cells comprise melanoma cells.

11. A method according to Claim 10, in which the one or more tumor markers comprises microphthalmia-associated transcription factor.

12. A method comprising:

(1) providing (a) living tumor cells and (b) a microfluidic device comprising an at least partially porous membrane positioned, the membrane comprising a first surface and a second surface, the first surface comprising living epithelial cells;

(2) introducing the living tumor cells into the microfluidic device under conditions such that at least a portion of the living tumor cells contact with the epithelial cells;

(3) incubating the living tumor cells in the microfluidic device, and

(4) determining that the tumor cells continue to express one or more tumor markers.

13. A method according to Claim 12, in which the determining comprises detecting one or more tumor markers 11 days after the introducing of step (2).

14. A method according to Claim 12, in which the tumor cells are from a biopsy.

15. A method according to Claim 12, in which the tumor cells are mammalian tumor cells.

16. A method according to Claim 12, in which the tumor cells are human tumor cells.

17. A method according to Claim 12, further comprising introducing immune cells in the microfluidic device.

18. A method according to Claim 17, further comprising introducing a checkpoint inhibitor in the microfluidic device, and determining whether the checkpoint inhibitor causes tumor cell death.

19. A method according to Claim 18, in which the checkpoint inhibitor is an antibody.

20. A method according to Claim 19, in which the antibody binds the PD-1 receptor on the immune cells.

21. A method according to Claim 19, in which the antibody binds the PD-L1 ligand on the tumor cells.

22. A method according to Claim 17, in which the immune cells comprise fibroblasts.

23. A method according to Claim 12, in which the tumor cells comprise melanoma cells.

24. A method according to Claim 23, in which the one or more tumor markers comprises microphthalmia-associated transcription factor.