CLAIMS

1. A method of culturing, comprising:

(a) providing (i) a microfluidic device comprising first and second channels, the first channel comprising lung epithelial cells at an air-liquid interface, and (ii) a solution of bacteria;

(b) introducing the solution into the first channel such that the bacteria contact the lung epithelial cells; and

(c) removing the solution so that the lung epithelial cells and the bacteria are cultured in cell culture media at the air-liquid interface up to 24 hours in absence of flow in the first channel.

2. A method according to Claim 1, in which the lung epithelial cells are small airway cells.

3. A method according to Claim 1, further comprising, prior to step (b) removing mucus from the first channel.

4. A method according to Claim 1, in which the solution of bacteria comprises 2-3 x 10^6 colony forming units (CFUs) in Hank's balanced salt solution (HBSS).

5. A method according to Claim 1, in which the solution is in the first channel for 2 hours.

6. A method according to Claim 1, further comprising, after step (b) and before step (c) removing any non-adherent bacteria.

7. A method according to Claim 1, further comprising flowing culture media in the second channel, but not in the first channel.

8. A method according to Claim 1, in which the lung epithelial cells are fully differentiated mucociliary bronchiolar airway cells.

9. A method according to Claim 1, in which the bacteria are *S. pneumoniae*.

CLAIMS

1. A method of culturing, comprising:

(a) providing

(i) a microfluidic device comprising first and second channels, in which the first channel is an air channel and the second channel is a vascular channel, the first channel comprising lung epithelial cells at an air-liquid interface, and

(ii) a solution of bacteria;

(b) introducing the solution into the first channel such that the bacteria contact the lung epithelial cells; and

(c) removing the solution so that the lung epithelial cells and the bacteria are cultured in cell culture media at the air-liquid interface up to 24 hours in absence of fluid flow in the first channel.

2. A method according to Claim 1, in which the lung epithelial cells are small airway cells.

3. A method according to Claim 1, further comprising, prior to step (b) removing mucus from the first channel.

4. A method according to Claim 1, in which the solution of bacteria comprises 2-3 x 10^6 colony forming units (CFUs) in Hank's balanced salt solution (HBSS).

5. A method according to Claim 1, in which the solution is in the first channel for 2 hours.

6. A method according to Claim 1, further comprising, after step (b) and before step (c) removing any non-adherent bacteria.

7. A method according to Claim 1, further comprising flowing culture media in the second channel, but not in the first channel.

8. A method according to Claim 1, in which the lung epithelial cells are fully differentiated mucociliary bronchiolar airway cells.

9. A method according to Claim 1, in which the bacteria are *S. pneumoniae*.