ABSTRACT

Preparation of Plates

Initial, standard 6-well plates were used and the fluidic system installed manually. The fluidic system consisted of microfluidic trans-resistance probes manufactured by Biochip Microsystems (BMS) and was inserted manually into each of the respective MucilAir™ modules. Each well of the 6-well plate was cut into six sections, each corresponding to one of the six sections of the MucilAir™ model. The model was placed in the 6-well plate and the perfusate was added to each well. The breath was adjusted to maintain the desired flow rate.

RESULTS

The delivery of nicotine to the liver compartment was via the release of nicotine from the nicotine delivery system. The nicotine was allowed to diffuse across the dialysis membrane and was carried to the delivery well. A static sample from the delivery well was collected every hour for 6 hrs. The nicotine concentration in the delivery well was determined using a microplate reader. The nicotine concentration was calculated using a standard curve and comparison to a standard sample.

FIGURE 2

Schematic Representation of the MucilAir™ Lung Model Combined With an Integrated Multi-Organ Culture Plate

The MucilAir™ Lung Model was a multi-organ model that consisted of a human lung model in a 6-well plate. The model was designed to mimic the bronchial tree and alveoli. The model was cultured in a media containing 10% FBS and 1% penicillin/streptomycin.

The nicotine concentration in the delivery well was determined using a microplate reader. The nicotine concentration was calculated using a standard curve and comparison to a standard sample.

FIGURE 3

Effective Delivery of Nicotine to the Lung Compartment

Nicotine was first detected in the delivery well at 3 hrs and increased linearly up to 0.3 g/mL by 5 hrs. Nicotine was first detected in the basolateral chamber at 1 hr and reached a maximum concentration (3-4 g/mL) by 5 hrs. Nicotine was first detected in the lumen of the liver compartment at 4 hrs and was present up to 6 hrs.

Nicotine was added to the apical side of the liver chamber (HepG2 cells). Perfusion fluid is circulated through the fluidic system using a micro pump. The fluidic tubing was dependent on the dialysis membrane, cellular uptake, and increased linearly up to 0.3 g/mL by 5 hrs. Nicotine was first detected in the basolateral chamber at 1 hr and reached a maximum concentration (3-4 g/mL) by 5 hrs. Nicotine was first detected in the lumen of the liver compartment at 4 hrs and was present up to 6 hrs.

Nicotine was added to the apical side of the liver chamber (HepG2 cells). Perfusion fluid is circulated through the fluidic system using a micro pump. The fluidic tubing was dependent on the dialysis membrane, cellular uptake, and increased linearly up to 0.3 g/mL by 5 hrs. Nicotine was first detected in the basolateral chamber at 1 hr and reached a maximum concentration (3-4 g/mL) by 5 hrs. Nicotine was first detected in the lumen of the liver compartment at 4 hrs and was present up to 6 hrs.

Nicotine was added to the apical side of the liver chamber (HepG2 cells). Perfusion fluid is circulated through the fluidic system using a micro pump. The fluidic tubing was dependent on the dialysis membrane, cellular uptake, and increased linearly up to 0.3 g/mL by 5 hrs. Nicotine was first detected in the basolateral chamber at 1 hr and reached a maximum concentration (3-4 g/mL) by 5 hrs. Nicotine was first detected in the lumen of the liver compartment at 4 hrs and was present up to 6 hrs.

Nicotine was added to the apical side of the liver chamber (HepG2 cells). Perfusion fluid is circulated through the fluidic system using a micro pump. The fluidic tubing was dependent on the dialysis membrane, cellular uptake, and increased linearly up to 0.3 g/mL by 5 hrs. Nicotine was first detected in the basolateral chamber at 1 hr and reached a maximum concentration (3-4 g/mL) by 5 hrs. Nicotine was first detected in the lumen of the liver compartment at 4 hrs and was present up to 6 hrs.

Nicotine was added to the apical side of the liver chamber (HepG2 cells). Perfusion fluid is circulated through the fluidic system using a micro pump. The fluidic tubing was dependent on the dialysis membrane, cellular uptake, and increased linearly up to 0.3 g/mL by 5 hrs. Nicotine was first detected in the basolateral chamber at 1 hr and reached a maximum concentration (3-4 g/mL) by 5 hrs. Nicotine was first detected in the lumen of the liver compartment at 4 hrs and was present up to 6 hrs.

Nicotine was added to the apical side of the liver chamber (HepG2 cells). Perfusion fluid is circulated through the fluidic system using a micro pump. The fluidic tubing was dependent on the dialysis membrane, cellular uptake, and increased linearly up to 0.3 g/mL by 5 hrs. Nicotine was first detected in the basolateral chamber at 1 hr and reached a maximum concentration (3-4 g/mL) by 5 hrs. Nicotine was first detected in the lumen of the liver compartment at 4 hrs and was present up to 6 hrs.

Nicotine was added to the apical side of the liver chamber (HepG2 cells). Perfusion fluid is circulated through the fluidic system using a micro pump. The fluidic tubing was dependent on the dialysis membrane, cellular uptake, and increased linearly up to 0.3 g/mL by 5 hrs. Nicotine was first detected in the basolateral chamber at 1 hr and reached a maximum concentration (3-4 g/mL) by 5 hrs. Nicotine was first detected in the lumen of the liver compartment at 4 hrs and was present up to 6 hrs.

Nicotine was added to the apical side of the liver chamber (HepG2 cells). Perfusion fluid is circulated through the fluidic system using a micro pump. The fluidic tubing was dependent on the dialysis membrane, cellular uptake, and increased linearly up to 0.3 g/mL by 5 hrs. Nicotine was first detected in the basolateral chamber at 1 hr and reached a maximum concentration (3-4 g/mL) by 5 hrs. Nicotine was first detected in the lumen of the liver compartment at 4 hrs and was present up to 6 hrs.

Nicotine was added to the apical side of the liver chamber (HepG2 cells). Perfusion fluid is circulated through the fluidic system using a micro pump. The fluidic tubing was dependent on the dialysis membrane, cellular uptake, and increased linearly up to 0.3 g/mL by 5 hrs. Nicotine was first detected in the basolateral chamber at 1 hr and reached a maximum concentration (3-4 g/mL) by 5 hrs. Nicotine was first detected in the lumen of the liver compartment at 4 hrs and was present up to 6 hrs.