VENTILATOR AEROSOL DELIVERY SYSTEM

BACKGROUND TO THE INVENTION

[0001] This disclosure relates to a transition adapter for delivery of aerosol from an aerosol generator, and a ventilator aerosol delivery system, which uses a portion of a ventilator's pressurized inspiratory gas flow to carry aerosol from the aerosol generator to a patient.

[0002] Patients, both adult and infants, in respiratory failure or those with respiratory dysfunction are often mechanically ventilated in order to provide suitable rescue and prophylactic therapy. A ventilatory circuit for administering positive pressure ventilation includes a positive pressure generator connected by tubing to a patient interface, such as a mask, nasal prongs, or an endotracheal tube, and an exhalation path, such as tubing that allows discharge of the expired gases, for example, to the ventilator.

[0003] The ventilation gas tube, expiratory flow tube and entrained aerosol tube can be connected to the patient interface *via* an aerosol delivery connector, for example, as disclosed in WO 2009/117422A2.

SUMMARY

[0004] In accordance with an exemplary embodiment, an aerosol transition adapter for delivering an aerosolized active agent to a patient comprises: a housing having a proximal end and a distal end, the proximal end having an aerosol passage for receiving an aerosol produced by a source of aerosol comprising an aerosolized active agent and the distal end having an exit port, the housing having a length between the distal end and the proximal end; a carrier gas connection port for receiving a carrier gas from a gas source, the gas source being a positive pressure generator, which is in communication with a plurality of carrier gas exit ports, the carrier gas exit ports are arranged adjacent to the aerosol passage in a pattern that partially encircles the flow of aerosol; an inner cavity, which is adapted to receive the aerosol from the aerosol passage and the carrier gas from the plurality of carrier gas exit ports and to direct the streams of carrier gas to at least partially encircle and flow in parallel with a main direction of a flow of the aerosol along the length of the housing toward the exit port; and the exit port on the distal end of the housing for delivering the aerosol to a patient in need of aerosolized active agent.

[0005] Herein disclosed is an aerosol delivery system comprising: an aerosol generator for producing an aerosol; a positive pressure generator for producing a pressurized ventilation gas; in one example, a splitter for splitting the pressurized ventilation gas into a carrier gas and a ventilation gas and a conduit from the positive pressure generator to the splitter; an aerosol transition adapter arranged to combine the aerosol produced by the aerosol generator with the carrier gas from the splitter, and wherein the transition adapter divides the carrier gas into a plurality of streams of carrier gas, which are directed to at least partially

CLAIMS:

1. An aerosol transition adapter for delivering an aerosolized active agent to a patient, the aerosol transition adapter comprising:

a housing having a proximal end and a distal end, the proximal end having an aerosol passage for receiving an aerosol produced by a source of aerosol comprising an aerosolized active agent and the distal end having an exit port, the housing having a length between the distal end and the proximal end;

a carrier gas connection port for receiving a carrier gas from a gas source, the gas source being a positive pressure generator, which is in communication with a plurality of carrier gas exit ports, the plurality of carrier gas exit ports are arranged adjacent to the aerosol passage in a pattern that partially encircles the flow of aerosol;

an inner cavity, which is adapted to receive the aerosol from the aerosol passage and the carrier gas from the plurality of carrier gas exit ports and to direct streams of carrier gas to at least partially encircle and flow in parallel with a main direction of a flow of the aerosol along the length of the housing toward the exit port; and

the exit port on the distal end of the housing for delivering the aerosol to a patient in need of an aerosolized active agent.

2. The adapter of claim 1 wherein the inner cavity has a proximal portion having a conical inner wall, which expands outward towards the distal end of the housing, and a distal portion having a tapered inner diameter.

3. The adapter of claim 2 wherein the plurality of carrier gas exit ports are positioned within the proximal portion of the inner cavity at an equidistance from the aerosol passage.

4. The adapter of claim 1 wherein the housing includes a cylindrical proximal member and a cylindrical distal member, and wherein the cylindrical proximal member has a coupling for receiving a carrier gas from the gas source.

5. The adapter of claim 4 wherein an outer diameter of the cylindrical proximal member is less than an outer diameter of the cylindrical distal member.

6. The adapter of claim 1 wherein the gas connection port for receiving the carrier gas from the gas source includes at least one gas entry port for receiving the carrier gas, the at least one gas entry port directing a stream of carrier gas to one or more gas exit ports.

7. The adapter of claim 6 wherein the at least one gas entry port comprises at least three gas entry ports and a corresponding gas exit port for each of the at least three gas entry ports.

8. A method of producing an entrained aerosol comprising:

generating an aerosol;

providing a source of carrier gas from a ventilator; and

combining the aerosol and the carrier gas by dividing the carrier gas into a plurality of streams of carrier gas, which are at least partially encircling and in parallel with the aerosol to form an entrained aerosol.