

CLAIMS

1. A delivery device for nasal medication, having:

- an ultrasonic energy generator adapted to create a tapered ultrasonic focal zone of concentrated ultrasonic energy;
- ultrasonic energy transmission medium;
- a feeder chamber holding medication;
- an energising chamber smaller than the feeder chamber, remote from the generator, and arranged to hold medication at the focal zone;
- a mesh; and
- a nasal prong;

the device formed so that when it is activated:

- ultrasonic energy travels through the transmission medium towards the mesh; and
- the feeder chamber continuously fills the energising chamber with medication (until the feeder chamber has insufficient medication left to achieve this) so that there is a substantially constant supply of medication within the focal zone able to be energised and forced from the energising chamber so as to contact the mesh, become an aerosol, and leave the device by way of the prong.

2. A device according to claim 1, having a mouthpiece adapted for a human user to blow into and sensing means which, in response to such blowing, causes the medication to be energised and the aerosol to form.

3. A device according to claim 1 or 2, wherein the energising chamber has a volume of 0.1 cm³ to 0.8 cm³.

4. A device according to claim 1 or 2, wherein the energising chamber has a volume of 0.2 cm³ to 0.4 cm³.

5. A device according to any one of the preceding claims, wherein the ultrasonic generator comprises a concave transducer adapted to focus ultrasonic energy on the focal zone when activated, such that medication in the energising chamber becomes acoustically energised and moves towards the mesh.

6. A device according to any one of the preceding claims, formed such that it causes the mesh to vibrate as the medication contacts the mesh so as to assist in creating the aerosol.
7. A device according to any one of the preceding claims, having an exit which is part of the prong.
8. A device according to claim 7, wherein the mesh is integral with the prong.
9. A device according to claim 7 or 8, wherein the mesh is immediately adjacent to the exit so as to prevent or minimise condensation of the aerosol inside the device.
10. A device according to claim 7, 8 or 9 when dependent on claim 2 directly or indirectly, wherein the energising chamber, the generator and exit are at an angle of about 40° to about 80° with respect to the mouthpiece.
11. A device according to claim 7, 8, 9 or 10 when dependent on claim 2 directly or indirectly, wherein the energising chamber, the generator and exit are at an angle of about 50° to about 70° with respect to the mouthpiece.
12. A device according to any one of the preceding claims, wherein the medication is a pharmaceutical or saline solution.
13. A device according to any one of the preceding claims, wherein the feeder chamber has a funnel or flume formed to naturally encourage the medication into the energising chamber.
14. A device according to any one of the preceding claims, wherein the energising chamber has a tapered floor to urge medication to gather at the focal zone.
15. A device according to any one of the preceding claims, wherein the energising chamber has a well to urge medication to gather at the focal zone.
16. A device according to any one of the preceding claims, wherein the feeder chamber plus the energising chamber collectively have sufficient medication for:
 - only 5 or fewer patient doses;

- only 4 or fewer patient doses;
- only 3 or fewer patient doses;
- only 2 or fewer patient doses; or
- only 1 patient dose.

17. A delivery device for nasal medication, having:

- a mouthpiece;
- sensing means;
- an ultrasonic energy generator in the form of a concave transducer adapted to focus ultrasonic energy on a focal zone;
- a feeder chamber holding medication;
- an energising chamber smaller than the feeder chamber;
- a mesh; and
- a nasal prong;

the device formed so that when it is activated the feeder chamber continuously fills the energising chamber with medication (until the feeder chamber has insufficient medication left to achieve this) so that there is a substantially constant supply of medication within the focal zone able to be energised and forced from the energising chamber so as to contact the mesh, become an aerosol, and leave the device by way of the nasal prong;

the sensing means arranged to detect when a user blows into the mouthpiece and to then cause the medication to be energised while the mesh oscillates to produce a pumping action to assist in creating the aerosol;

the feeder chamber having a funnel or flume formed to encourage the medication into the energising chamber; and

the energising chamber having a tapered floor and/or well arranged to urge the medication into the focal zone.

18. A device according to claim 1, formed so that when it is in use the medication, when in the energising chamber, becomes acoustically energised within the focal zone such that an acoustic radiation pressure is produced on an inner face of the mesh, resulting in oscillation of the mesh to produce a micro-pumping action with respect to the medication.

19. The device according to claim 1, wherein the feeder chamber is at one side of the device only, detachably cantilevers outwardly, and is tilted upwardly from, a location between the nasal prong and the ultrasonic energy generator.

20. The device according to claim 1, wherein:

- the tapered ultrasonic focal zone is generally triangular and extends from a floor of the energising chamber to a roof of the energising chamber;
- the ultrasonic energy generator is concave and acoustically energises a charge of the medication within the ultrasonic focal zone to produce an acoustic radiation pressure on an inner face of the mesh so that the mesh oscillates to cause a micro-pumping action of the medication as it moves through the mesh; and
- the feeder chamber is at one side of the device only and detachably cantilevers outwardly from a location between the nasal prong and the ultrasonic energy generator.