Claims

1. A cartridge for a dry powder inhaler comprising:

a container; and

a lid including an undersurface,

wherein the cartridge is configured to include a dosing position and a containment position, wherein the cartridge includes an internal volume, and wherein the lid includes a deflector or stem on the undersurface which is configured to be within the internal volume in the dosing position, and

wherein the deflector or stem is configured to direct airflow entering the cartridge from a direction parallel to the lid to a substantially downward direction to a direction substantially parallel to the lid to a direction substantially perpendicular to the lid to exit the container.

2. The cartridge of claim 1, wherein in a containment position, the internal volume is sealed from the deflector or stem.

3. The cartridge of claim 1, wherein the container includes a dry powder.

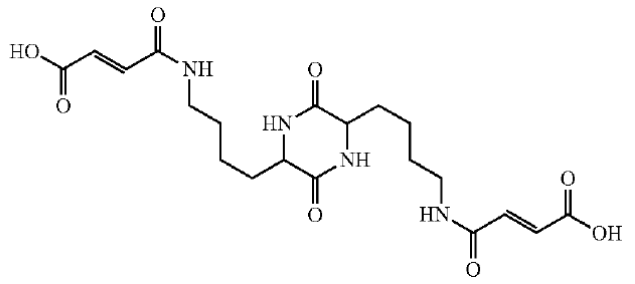
4. The cartridge of claim 3, wherein the dry powder is a formulation for oral inhalation.

5. The cartridge of claim 3, wherein the dry powder comprises an amount from 1 mg to 50 mg.

6. The cartridge of claim 3, wherein the dry powder comprises a diketopiperazine or a pharmaceutically acceptable salt thereof.

7. The cartridge of claim 6, wherein the diketopiperazine is of the formula 3,6-bis(N-X-4-aminobutyl)-2,5-diketo-piperazine, wherein X is selected from the group consisting of fumaryl, succinyl, maleyl, malonyl, oxalyl and glutaryl.

8. The cartridge of claim 6, wherein the diketopiperazine is



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9. The cartridge of claim 3, wherein the dry powder comprises a drug or an active agent.

10. The cartridge of claim 9, wherein the active agent comprises an endocrine hormone, vaccines or small molecules, including anti-asmatics, vasodilators, vasoconstrictors, muscle relaxants, neurotransmitter agonist or antagonists.

11. The cartridge of claim 3, wherein the dry powder comprises a peptide, a polypeptide, or fragments thereof, a small organic molecule or a nucleic acid molecule.

12. The cartridge of claim 11, wherein said peptide comprises insulin, glucagon, glucagon-like peptide-1, parathyroid hormone, deoxyribonuclease, oxytocin, oxyntomodulin, peptide YY, an exendin, or analogs thereof.

13. The cartridge of claim 3, wherein if the dry powder comprises a small organic molecule, the small organic molecule is a vasodialator, a vasoconstrictor, a neurotransmitter agonist or a neurotransmitter antagonist.

14. The cartridge of claim 13, wherein the small organic molecule comprises a triptan or an opiate.

15. The cartridge of claim 14, wherein the triptan comprises sumatriptan or rizatriptan.

16. The cartridge of claim 3, wherein the dry powder comprises an amorphous powder.

17. The cartridge of claim 1, wherein the cartridge is configured to fit within an inhaler.

18. The cartridge of claim 17, wherein the cartridge when fitted in the inhaler is configured to have a rigid air conduit through the cartridge.