Claims:

1. A blister package comprising a blistered base sheet comprising:

one or more cavities having a void, a dome structure, a shelf, an interior surface, and an exterior surface, wherein each of the one or more cavities is configured to hold a cartridge containing a pharmaceutical formulation; and

a lid bonded to said blister package.

2. The blister package of claim 1, wherein the shelf forms a cartridge top retaining feature in the interior surface of the cavities.

3. The blister package of claim 1 or 2, wherein the shelf extends from the dome structure and forms a substantially flat end of the one or more cavities and has an indentation or recess which forms a cartridge retaining feature in the interior surface of the one or more cavities.

4. The blister package of any one of the preceding claims, wherein the void is configured to house a pharmaceutical cartridge having a container and a lid or top that extends over the container.

5. The blister package of any one of the preceding claims, wherein the pharmaceutical formulation comprises an active ingredient.

6. The blister package of claim 5, wherein the pharmaceutical formulation comprises a diketopiperazine.

7. The blister package of claim 5, wherein the diketopiperazine is bis—3,6-(N-fumaryl-4-aminobutyl)-2,5-diketo-diketopiperazine.

8. The blister package of claim 5, wherein the active ingredient is a peptide, protein, a small molecule or a nucleic acid.

9. The blister package of claim 8, wherein the active ingredient is selected from the group consisting of insulin, glucagon like peptide 1, glucagon, oxytocin, oxyntomodulin, peptide YY, sumatriptan, a peptidyl peptidase IV inhibitor, parathyroid hormone, deoxyribonuclease I, and active fragments or analogs thereof.

10. The blister package of any of the preceding claims, wherein the blistered base sheet comprises at least three layers selected from polyvinyl chloride and ACLAR.

11. The blister package of claim 10, wherein the ACLAR layer forms a middle layer of the blistered base sheet having a thickness of about 230 µm to about 720 µm in thickness.

12. The blister package of any one of the preceding claims, wherein the lid comprises a foil comprising one or more layers selected from aluminum, plastic polymer or co-polymer.

13. The blister package of any one of the preceding claims, wherein the lid has a thickness of about 10 µm to 75 µm.

14. The blister package of any one of the preceding claims, wherein the blistered base sheet has a thickness greater than about 100 µm.

15. A method of manufacturing a blister package configured to house one or more cartridges containing a pharmaceutical formulation, comprising:

bonding a film to a blistered base sheet,

wherein one or more cavities are molded on the blistered base sheet comprising at least three layers selected from polyvinyl chloride and ACLAR; wherein the cartridge comprises a container and a top is in the one or more cavities when the film is bonded to the blistered base sheet; and wherein the blistered base sheet is optionally perforated to segment the cavities from one another.

16. The method of claim 15, wherein the pharmaceutical formulation comprises an active ingredient.

17. The method of claim 16, wherein the pharmaceutical formulation comprises a diketopiperazine.

18. The method of claim 17, wherein the diketopiperazine is bis—3,6-(N-fumaryl-4-aminobutyl)-2,5-diketo-diketopiperazine.

19. The method of any one of claims 16-18, wherein the active ingredient is a peptide, protein, a small molecule or a nucleic acid.

20. The method of any of claims 16-18, wherein the active ingredient is selected from insulin, glucagon like peptide 1, glucagon, oxytocin, oxyntomodulin, peptide YY, sumatriptan, a peptidyl peptidase IV inhibitor, parathyroid hormone, deoxyribonuclease I, and active fragments or analogs thereof.

CLAIMS:

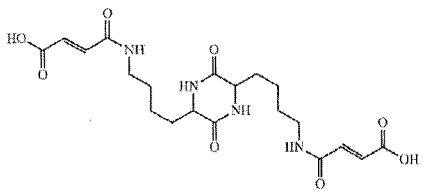
1. A blister package comprising a blistered base sheet comprising one or more cavities having a void, a dome structure, a shelf and a cartridge containing a pharmaceutical formulation comprising a diketopiperazine and an active ingredient; a lid bonded to said blister package; wherein the one or more cavities have an exterior surface and interior surface, and wherein the shelf includes an indentation in the exterior surface.

2. The blister package of claim 1, wherein the indentation is a cartridge top retaining feature in the interior surface of the cavities.

3. The blister package of claim 1, wherein the shelf extends from the dome structure and forms a substantially flat end of the one or more cavities and said indentation which forms a cartridge retaining feature in the interior surface of the one or more cavities.

4. The blister package of claim 1, wherein the cartridge comprising a container and a lid or top that extends over the container.

5. The blister package of claim 1, wherein the diketopiperazine has a formula



6. The blister package of claim 1, wherein the active ingredient is a peptide, protein, a small molecule or a nucleic acid.

7. The blister package of claim 1, wherein the active ingredient is selected from the group consisting of insulin, glucagon like peptide 1, glucagon, oxytocin, oxyntomodulin, peptide YY, sumatriptan, a peptidyl peptidase IV inhibitor, parathyroid hormone, deoxyribonuclease I and active fragments or analogs thereof.

8. The blister package of claim 7 wherein the active ingredient is at least one of insulin, glucagon like peptide 1, glucagon, and a peptidyl peptidase IV inhibitor.

9. The blister package of claim 8 wherein the active ingredient is insulin.

10. The blister package of claim 8 wherein the active ingredient is glucagon like peptide 1.

11. The blister package of claim 8 wherein the active ingredient is glucagon.

12. The blister package of claim 7 wherein the active ingredient is at least one of oxytocin, oxyntomodulin, and peptide YY.

13. The blister package of claim 12 wherein the active ingredient is oxytocin.

14. The blister package of claim 12 wherein the active ingredient is oxyntomodulin.

15. The blister package of claim 12 wherein the active ingredient is peptide YY.

16. The blister package of claim 1, wherein the blistered base sheet comprises at least three layers selected from polyvinyl chloride and ACLAR.

17. The blister package of claim 16, wherein the ACLAR layer forms the middle layer of the blistered base sheet having a thickness of about 230 μm to about 720 μm in thickness.

18. The blister package of claim 1, wherein the lid comprises a foil comprising one or more layers of selected from aluminum, plastic polymer or co-polymer.

19. The blister package of claim 18, wherein the lid has a thickness of about 10 μm to 75 μm.

20. The blister package of claim 1, wherein the blistered base sheet has a thickness greater than 100 μm.