1. A solid, oral pharmaceutical composition comprising a plurality of particles, each comprising:

a core comprising a therapeutic amount of a central nervous system stimulant and at least one pharmaceutically acceptable excipient;

a sustained release layer enclosing the core; and

a delayed release layer enclosing the sustained release layer,

wherein the composition provides a 4 to 12 hour period during which no more than about 10% of the central nervous system stimulant is released when the composition is placed in a simulated gastric environment.

2. The solid, oral pharmaceutical composition of claim 1, wherein the in vitro dissolution rate of the dosage form is between 0 and 10% drug released after 8 hours, between 2 and 30% released after 10 hours, between 15 and 60% released after 12 hours and between 45% and 95% released after 15 hours, and wherein the amount of drug released each hour increases from the period between 20% released and 65% released when measured by the USP Paddle Method at 75 rpm in 750 ml aqueous solution of 0.1N HCl for two hours followed by phosphate buffered solution at pH 6.8 and 37°C ± 0.5°C.

3. The solid, oral pharmaceutical composition of claim 1, wherein the in vitro dissolution rate of the dosage form is between 0 and 10% drug released after 6 hours, between 15 and 28% released after 10 hours, between 40 and 60% released after 12 hours and between 80% and 95% released after 15 hours, and wherein the amount of active ingredient released per each hour increases from the period between 20% released and 65% released, when measured by the USP Apparatus I in which the composition is placed in 700 ml aqueous solution of 0.1N HCl pH 1.1, for up to 2 hours followed by 2-6hr in sodium phosphate buffer at pH 6.0; followed by 6-20 hr in sodium phosphate buffer, pH 7.2 at 37°C ± 0.5°C.

4. The solid, oral pharmaceutical composition of any of claims 1-3, wherein no more than 10% of the agent is released within 6 hours and no more than 50% of the agent is released within

12 hours when placed in aqueous solution of 0.1N HCl for two hours followed by phosphate buffered solution at pH 6.8 and 37°C ± 0.5°C, and wherein, when the composition is administered to a human, a plot of plasma concentration versus time after administration exhibits a maximum between 12 and 20 hours after administration.

5. The solid, oral pharmaceutical composition of any of claims 1-4, wherein the core comprises amphetamine, dextroamphetamine, methylphenidate, or an isomer, racemic mixture, prodrug or pharmaceutical salt of any thereof.

6. The solid, oral pharmaceutical composition of any of claims 1-5, wherein the core comprises one or more excipients selected from polyvinyl pyrollidone, hydroxypropylmethyl cellulose, lactose, sucrose, microcrystalline cellulose and combinations of any thereof.

7. The solid, oral pharmaceutical composition of claim 1-6, wherein the delayed release layer comprises cellulose acetate phthalate, cellulose acetate trimaletate, hydroxyl propyl methylcellulose phthalate, polyvinyl acetate phthalate, acrylic polymers, polyvinyl acetaldiethylamino acetate, hydroxypropyl methylcellulose acetate succinate, cellulose acetate trimellitate, shellac, methacrylic acid copolymers, Eudragit L30D, Eudragit L100, Eudragit FS30D, Eudragit S100 or a combination of any thereof.

8. The solid, oral pharmaceutical composition of any of claims 1-7, wherein the plasticizer is dibutyl sebacate (DBS), tributyl citrate, acetyl tributyl citrate, acetyl triethyl citrate, mineral oil, castor oil or a fixed oil.

9. The solid, oral pharmaceutical composition of any of claims 1-8, wherein the delayed release layer comprises methacrylic acid copolymer Type B, mono- and diglycerides, dibutyl sebacate and polysorbate 80.

10. The solid, oral pharmaceutical composition of any of claims 1-9, wherein the sustained release layer comprises a water-insoluble and water-permeable polymer and a water soluble polymer.

11. The solid, oral pharmaceutical composition of any of claims 1-10, wherein the sustained release layer comprises a cellulose ether derivative, an acrylic resin, a copolymer of acrylic acid

and methacrylic acid esters with quaternary ammonium groups, a copolymer of acrylic acid and methacrylic acid esters or a combination of any thereof.

12. The solid, oral pharmaceutical composition of any of claims 1-11, wherein the sustained release layer comprises ethyl cellulose, hydroxypropyl cellulose and magnesium stearate.

13. The solid, oral pharmaceutical composition of any of claims 1-12 contained in a water soluble capsule providing a single dose of the solid, oral pharmaceutical composition.

14. A solid, oral pharmaceutical composition comprising a therapeutic amount of a central nervous system stimulant wherein the composition, when orally administered to a human, provides a delayed release of the central nervous system stimulant from 4 to 12 hours and a maximum serum concentration (Cmax) from 10 to 16 hours after administration.

15. The solid, oral pharmaceutical composition of claim 14, wherein the serum area under the curve at 6 hours (AUC_{0-6}) after administration is less than about 2% of total $AUC_{0-\infty}$

16. The solid, oral pharmaceutical composition of claim 14 or 15, wherein the serum area under the curve at 10 hours (AUC_{0-10}) after administration is less than about 7% of total $AUC_{0-\infty}$

17. Use of a composition of any preceding claim for manufacture of a medicament for treatment of a condition in a subject with a disorder or condition responsive to the administration of a central nervous system stimulant.

18. Use of claim 17, wherein the disorder or condition is attention deficit disorder, attention deficit hyperactivity disorder, excessive daytime sleepiness, major depressive disorder, bipolar depression, negative symptoms in schizophrenia, chronic fatigue, fatigue associated with chemotherapy or binge eating disorder.

Claims :

1. A solid, oral pharmaceutical composition comprising a plurality of particles, each comprising:

a core comprising a therapeutic amount of a central nervous system stimulant and at least one pharmaceutically acceptable excipient;

a sustained release layer enclosing the core; and

a delayed release layer enclosing the sustained release layer,

wherein the composition provides a 4 to 12 hour period during which no more than about 10% of the central nervous system stimulant is released when the composition is placed in a simulated gastric environment.

2. The solid, oral pharmaceutical composition of claims 1, wherein the core comprises amphetamine, dextroamphetamine, methylphenidate, or an isomer, racemic mixture, prodrug or pharmaceutical salt of any thereof.

3. The solid, oral pharmaceutical composition of claims 1 or 2, wherein the core comprises one or more excipients selected from polyvinyl pyrollidone, hydroxypropylmethyl cellulose, lactose, sucrose, microcrystalline cellulose and combinations of any thereof.

4. The solid, oral pharmaceutical composition of any of claims 1-3, wherein the delayed release layer comprises cellulose acetate phthalate, cellulose acetate trimaletate, hydroxyl propyl methylcellulose phthalate, polyvinyl acetate phthalate, acrylic polymers, polyvinyl acetaldiethylamino acetate, hydroxypropyl methylcellulose acetate succinate, cellulose acetate trimellitate, shellac, methacrylic acid copolymers, Eudragit L30D, Eudragit L100, Eudragit FS30D, Eudragit S100 or a combination of any thereof.

5. The solid, oral pharmaceutical composition of any of claims 1-4, wherein the plasticizer is dibutyl sebacate (DBS), tributyl citrate, acetyl tributyl citrate, acetyl triethyl citrate, mineral oil, castor oil or a fixed oil.

6. The solid, oral pharmaceutical composition of any of claims 1-5, wherein the delayed release layer comprises methacrylic acid copolymer Type B, mono- and diglycerides, dibutyl sebacate and polysorbate 80.

7. The solid, oral pharmaceutical composition of any of claims 1-6, wherein the sustained release layer comprises a water-insoluble and water-permeable polymer and a water soluble polymer.

8. The solid, oral pharmaceutical composition of any of claims 1-7, wherein the sustained release layer comprises a cellulose ether derivative, an acrylic resin, a copolymer of acrylic acid and methacrylic acid esters with quaternary ammonium groups, a copolymer of acrylic acid and methacrylic acid esters or a combination of any thereof.

9. The solid, oral pharmaceutical composition of any of claims 1-8, wherein the sustained release layer comprises ethyl cellulose, hydroxypropyl cellulose and magnesium stearate.

10. A water soluble capsule containing a single dose of the solid, oral pharmaceutical composition of any of claims 1-9.

11. Use of the composition of any of claims 1-9, for manufacture of a medicament for treatment of attention deficit disorder, attention deficit hyperactivity disorder, excessive daytime sleepiness, major depressive disorder, bipolar depression, negative symptoms in schizophrenia, chronic fatigue, fatigue associated with chemotherapy or binge eating disorder.