Claims

1. A pharmaceutical or veterinary formulation, in the form of a sterile injectable dosage form, comprising:

(a) a plurality of particles having a weight-, number-, or volume-based mean diameter that is between 1 μm and 50 μm, which particles comprise solid cores comprising a biologically-active agent and coated with a coating comprising zinc oxide; and

(b) an oleaginous carrier system comprising a pharmaceutically-acceptable or veterinarily-acceptable oil and in which said particles are suspended.

2. A formulation as claimed in Claim 1, wherein the zinc oxide-coated particles comprise one or more discrete layers surrounding said cores, said one or more layers each comprising at least one separate zinc oxide coating.

3. A formulation as claimed in Claims 1 or 2, wherein the cores consist essentially of a biologically-active agent.

4. A formulation as claimed in Claim 3, wherein the biologically-active agent is selected from an analgesic, an anaesthetic, an anti-ADHD agent, an anorectic agent, an antiaddictive agent, an antibacterial agent, an antimicrobial agent, an antifungal agent, an antiviral agent, an antiparasitic agent, an antiprotozoal agent, an anthelmintic, an ectoparasiticide, a vaccine, an anticancer agent, an antimetabolite, an alkylating agent, an antineoplastic agent, a topoisomerase, an immunomodulator, an immunostimulant, an immunosuppressant, an anabolic steroid, an anticoagulant agent, an antiplatelet agent, an anticonvulsant agent, an antidementia agent, an antidepressant agent, an antidote, an antihyperlipidemic agent, an antigout agent, an antimalarial, an antimigraine agent, an anti-inflammatory agent, an antiparkinson agent, an antipruritic agent, an antipsoriatic agent, an antiemetic, an anti-obesity agent, an antiasthma agent, an antibiotic, an antidiabetic agent, an antiepileptic, an antifibrinolytic agent, an antihemorrhagic agent, an antihistamine, an antitussive, an antihypertensive agent, an antimuscarinic agent, an antimycobacterial agent, an antioxidant agent, an antipsychotic agent, an antipyretic, an antirheumatic agent, an antiarrhythmic agent, an anxiolytic agent, an aphrodisiac, a cardiac glycoside, a cardiac stimulant, an entheogen, an entactogen, an euphoriant, an orexigenic, an antithyroid agent, an anxiolytic sedative, a hypnotic, a neuroleptic, an astringent, a bacteriostatic agent, a beta blocker, a calcium channel blocker, an ACE inhibitor, an angiotensin II receptor antagonist, a renin inhibitor, a beta-adrenoceptor blocking agent, a blood product, a

blood substitute, a bronchodilator, a cardiac inotropic agent, a chemotherapeutic, a coagulant, a corticosteroid, a cough suppressant, a diuretic, a deliriant, an expectorant, a fertility agent, a sex hormone, a mood stabilizer, a mucolytic, a neuroprotective, a nootropic, a neurotoxin, a dopaminergic, an antiparkinsonian agent, a free radical scavenging agent, a growth factor, a fibrate, a bile acid sequestrants, a cicatrizant, a glucocorticoid, a mineralcorticoid, a haemostatic, a hallucinogen, a hypothalamic-pituitary hormone, an immunological agent, a laxative agent, a antidiarrhoeals agent, a lipid regulating agent, a muscle relaxant, a parasympathomimetic, a parathyroid calcitonin, a serenic, a statin, a stimulant, a wakefulness-promoting agent, a decongestant, a dietary mineral, a biphosphonate, a cough medicine, an ophthamological, an ontological, a H1 antagonist, a H2 antagonist, a proton pump inhibitor, a prostaglandin, a radio-pharmaceutical, a hormone, a sedative, an anti-allergic agent, an appetite stimulant, a steroid, a sympathomimetic, a thrombolytic, a thyroid agent, a vasodilator, a xanthine, an erectile dysfunction improvement agent, a gastrointestinal agent, a histamine receptor antagonist, a keratolytic, an antianginal agent, a non-steroidal antiinflammatory agent, a COX-2 inhibitor, a leukotriene inhibitor, a macrolide, a NSAID, a nutritional agent, an opioid analgesic, an opioid antagonist, a potassium channel activator, a protease inhibitor, an antiosteoporosis agent, a cognition enhancer, an antiurinary incontinence agent, a nutritional oil, an antibenign prostate hypertrophy agent, an essential fatty acid, a non-essential fatty acid, a cytokine, a peptidomimetic, a peptide, a protein, a radiopharmaceutical, a senotherapeutic, a toxoid, a serum, an antibody, a nucleoside, a nucleotide, a vitamin, a portion of genetic material, a nucleic acid, or a mixture of any of these.

5. A formulation as claimed in Claim 4, wherein the biologically-active agent is azacitidine.

6. A formulation as claimed in any one of the preceding claims, wherein the coating is applied by atomic layer deposition.

7. A formulation as claimed in any one of the preceding claims, wherein more than one discrete layer of zinc oxide is applied to the core sequentially.

8. A formulation as claimed in Claim 7, wherein between 3 and 10 discrete layers of zinc oxide are applied.

9. A formulation as claimed in any one of the preceding claims, wherein the total thickness of the zinc oxide coating is between 0.5 nm and 2 μm.

10. A formulation as claimed in any one of Claims 7 to 9, wherein the maximum thickness of an individual discrete layer of zinc oxide coating is about 1 hundredth of the weight-, number-, or volume-based mean diameter of the core, including any other discrete layers that have previously been applied to the core.

11. A formulation as claimed in any of the preceding claims, wherein the carrier system comprises one or more medium chain triglycerides.

12. A formulation as claimed in Claim 11, wherein the medium chain triglycerides comprise C_6 to C_{12} alkyl chain triglycerides.

13. A formulation as claimed in any one of the preceding claims in the form of an infusible dosage form.

14. A formulation as claimed in Claim 13 in the form of a liquid, a sol or a gel, administrable *via* a surgical administration apparatus that forms a depot formulation.

15. A process for the preparation of a formulation as defined in any one of the preceding claims, wherein the coated particles are made by applying the layer(s) of zinc oxide coating material to the cores, and/or previously-coated cores, by atomic layer deposition.

16. A process as claimed in Claim 15, wherein:
(i) solid cores are coated with a first discrete layer of coating material;
(ii) the coated cores from step (i) are then subjected to a deagglomeration process step;
(iii) the deagglomerated coated cores from step (ii) are then coated with a second discrete layer of coating material;
(iv) repeating steps (ii) and (iii) to obtain the required number of discrete layers.

17. A process as claimed in Claim 16, wherein the deagglomeration step that takes place between applications of coatings comprises sieving.

18. A process as claimed in Claim 17, wherein the sieving comprises sonic sifting.

19. A process for the preparation of a formulation as defined in any one of Claims 1 to 14 wherein the coated particles are mixed with the carrier system after coating.

20. An injectable and/or infusible dosage form comprising a formulation as defined in any one of Claims 1 to 14 contained within a reservoir and an injection or infusion means.

21. A dosage form as claimed in Claim 20 which is a surgical administration apparatus that forms a depot formulation.

22. A dosage form as claimed in Claim 20 or Claim 21, wherein coated particles as defined in any one of Claims 1 to 14 and the carrier system are housed separately, and in which admixing occurs prior to and/or during injection or infusion.