CLAIMS

1. A pharmaceutical composition comprising coated and non-coated bone filler particles at a ratio of between about 1:3 – 10:1, in which the coated bone filler particles comprise between about 80-90% (w/w) of bone filler coated with between about 10-20% (w/w) of a matrix composition which comprises: (a) 15-25% (w/w) poly (lactic-co-glycolic acid) (PLGA) (b) 5-15% (w/w) of cholesterol; (c) 50-70% (w/w) of a mixture of 1,2-dipalmitoyl-sn-glycero-3-phosphocholine (DPPC) and 1,2-distearoyl-sn-glycero-3-phosphocholine (DSPC), in which the ratio of DPPC to DSPC is between 5:1 and 2:1 and (d) 7-12% (w/w) of doxycycline or doxycycline hyclate.

2. A pharmaceutical composition according to Claim 1, in which the bone filler is selected from the group consisting of allogeneic bone filler, xenogeneic bone filler, synthetic bone filler and a combination thereof.

3. A pharmaceutical composition according to Claim 1 or 2, in which the bone filler is synthetic bone filler.

4. A pharmaceutical composition according to Claim 3, in which the synthetic bone filler is Tri-Calcium Phosphate (β-TCP).

5. A pharmaceutical composition according to Claim 4, in which the β-TCP has an average particles size of up to 1mm.

6. A pharmaceutical composition according to any of Claims 1 to 3, in which the weight ratio between the coated bone particles and non-coated bone particles is about 1:1.

7. A pharmaceutical composition according to any of Claims 1 to 4, in which the doxycycline or doxycycline hyclate is present at 0.4-2% (w/w) of the total weight of the pharmaceutical composition.

8. A pharmaceutical composition according to Claim 5, in which the doxycycline or doxycycline hyclate is present at 0.5-1% (w/w) of the total weight of the pharmaceutical composition.

9. A pharmaceutical composition comprising (a) 90-95% (w/w) of β-TCP; (b) 1.0-2.0% (w/w) PLGA; (c) 0.4-0.8% (w/w) cholesterol; (d) 2.0-4.0% (w/w) of DPPC; (e) 0.7-1.3% (w/w) of DSPC; (f) 0.4-2% (w/w) of doxycycline or doxycycline hyclate.

10. Use of a pharmaceutical composition according to any preceding claim for the preparation of a medicament for the treatment of an open bone fracture in a patient.

11. Use according to Claim 10, in which the treatment provides local prolonged release of doxycycline or doxycycline hyclate at the fracture site.

12. Use according to Claim 10, in which the open bone fracture is an open long bone fracture.

13. Use according to any of Claims 10 to 12, in which the open bone fracture is selected from the group consisting of bone fractures classified Gustillo grade II, IIIa, IIIb and IIIc,.

14. Use according to Claim 13 in which the open bone fracture is selected from bone fractures classified Gustillo grade IIIa and IIIb.

15. Use according to any of Claims 10 to 14, in which the pharmaceutical composition is to be applied at a dose of 50 grams or lower per bone fracture site.

16. Use according to any of Claims 10 to 15, in which the treatment comprises implanting the pharmaceutical composition during a first surgical intervention at the bone fracture.

17. Use according to Claim 16, in which implanting is performed during the first surgical intervention at the bone fracture site after an irrigation and debridement (I&D) procedure.

CLAIMS

1. Use of a composition comprising a mixture of coated and non-coated bone filler particles at a ratio of between about 1:3 – 10:1, in which the coated bone filler particles comprise between about 80-90% (w/w) of bone filler coated with between about 10-20% (w/w) of a matrix composition, in which the matrix composition comprises: (a) 15-25% (w/w) poly (lactic-co-glycolic acid) (PLGA) (b) 5-15% (w/w) of cholesterol; (c) 50-70% (w/w) of a mixture of 1,2-dipalmitoyl-sn-glycero-3-phosphocholine (DPPC) and 1,2-distearoyl-sn-glycero-3-phosphocholine (DSPC), in which the ratio of DPPC to DSPC is between 5:1 and 2:1 and (d) 7-12% (w/w) of doxycycline or doxycycline hyclate, in the preparation of a medicament for the treatment of a bone void in a patient.

2. Use according to Claim 1, in which the bone filler is selected from the group consisting of allogeneic bone filler, xenogeneic bone filler, synthetic bone filler and a combination thereof.

3. Use according to Claim 1 or 2, in which the bone filler is synthetic bone filler.

4. Use according to Claim 3, in which the synthetic bone filler is Tri-Calcium Phosphate (β-TCP).

5. Use according to Claim 4, in which the β-TCP has an average particles size of up to 1mm.

6. Use according to any of Claims 1 to 3, in which the weight ratio between the coated bone particles and non-coated bone particles is about 1:1.

7. Use according to any of Claims 2 to 6, in which the composition further comprises an autograft bone material.

8. Use according to any of Claims 1 to 7, in which the doxycycline or doxycycline hyclate is present at 0.4-2% (w/w) of the total weight of the composition.

9. Use according to Claim 8, in which the doxycycline or doxycycline hyclate is present at 0.5-1% (w/w) of the total weight of the composition.

10. Use of a composition comprising (a) 90-95% (w/w) of β-TCP; (b) 1.0-2.0% (w/w) PLGA; (c) 0.4-0.8% (w/w) cholesterol; (d) 2.0-4.0% (w/w) of DPPC; (e) 0.7-1.3% (w/w) of

DSPC; (f) 0.4-2% (w/w) of doxycycline or doxycycline hyclate, in the preparation of a medicament for the treatment of a bone void in a patient.

11. Use according to any preceding claim, in which the bone void is an open bone fracture.

12. Use according to any preceding claim, in which the treatment provides local prolonged release of doxycycline or doxycycline hyclate at the treatment site.

13. Use according to Claim 11, in which the open bone fracture is an open long bone fracture.

14. Use according to any of Claims 11 to 13, in which the open bone fracture is selected from the group consisting of bone fractures classified Gustilo grade II, IIIa, IIIb and IIIc,.

15. Use according to Claim 14 in which the open bone fracture is selected from bone fractures classified Gustilo grade IIIa and IIIb.

16. Use according to any of Claims 11 to 15, in which the medicament is to be applied at a dose of 50 grams or lower per treatment site.

17. Use according to any of Claims 11 to 16, in which the medicament is to be implanted during a first surgical intervention at the bone fracture.

18. Use according to Claim 17, in which the medicament is to be implanted during the first surgical intervention at the bone fracture site after an irrigation and debridement (I&D) procedure.