CLAIMS

1. A vaccine composition comprising a nanoparticle and/or aggregate of nanoparticles for use for treating cancer in a subject suffering from a metastatic cancer or from a liquid cancer, wherein the treatment comprises exposing the subject to a fractionated radiotherapy comprising at least one irradiation step wherein the ionizing radiations dose ranges from 1.8 to 20 Gray (Gy), and wherein each nanoparticle consists in a material having a density of at least 7 g/cm3 and an atomic number (Z) of at least 25 and each nanoparticle or aggregate of nanoparticles is covered with a biocompatible coating allowing the nanoparticle stability between pH 6.5 and 7.5 in a physiological fluid.

2. A vaccine composition comprising a nanoparticle and/or aggregate of nanoparticles for use for treating cancer in a subject suffering from metastatic cancer and undergoing a palliative radiotherapy, in a subject suffering from metastatic cancer for whom radiotherapy has been abandoned, in a subject suffering from a cancer which is not treated by radiotherapy, or in a subject suffering from a liquid cancer, wherein the treatment comprises exposing the subject to a fractionated radiotherapy comprising at least one irradiation step wherein the ionizing radiations dose ranges from 1.8 to 30 Gray (Gy), and wherein each nanoparticle consists in a material having a density of at least 7 g/cm^3 and an atomic number (Z) of at least 25 and each nanoparticle or aggregate of nanoparticles is covered with a biocompatible coating allowing the nanoparticle stability between pH 6.5 and 7.5 in a physiological fluid.

3. The vaccine composition for use according to claim 2 wherein the ionizing radiations dose ranges from 1.8 to 20 Gray (Gy).

4. The vaccine composition for use according to anyone of claims 1 to 3 wherein, when the cancer is a metastatic cancer, the at least one irradiation step is applied *in vivo* on one, at most two, tumor sites of the metastatic cancer comprising the nanoparticles or aggregates of nanoparticles.

5. The vaccine composition for use according to anyone of claims 1 to 3 wherein, when the cancer is a metastatic cancer, the at least one irradiation step is applied *ex vivo* on a cancer sample of the subject comprising the nanoparticles or aggregates of nanoparticles, and the *ex vivo* lethally irradiated cancer cells and at least part of the associated cell supernatant from the cancer sample are at least partly readministered to the subject before any optional subsequent *in vivo* treatment of cancer in said subject.

6. The vaccine composition for use according to anyone of claims 1 to 3 wherein, when the cancer is a liquid cancer, the at least one irradiation step is applied *ex vivo* on a liquid cancer sample of the subject comprising the nanoparticles or aggregates of nanoparticles, and the irradiated liquid cancer sample is at least partly readministered to the subject before any optional subsequent *in vivo* treatment of cancer in said subject.

7. The vaccine composition for use according to claim 6 wherein the liquid cancer sample is a blood sample or the whole blood volume of the subject.

8. The vaccine composition for use according to anyone of claims 5 to 7, wherein the *ex vivo* lethally irradiated cancer cells or the irradiated liquid cancer sample is at least partly readministered to the subject together with at least one additional immunotherapeutic agent, the *ex vivo* lethally irradiated cancer cells or the irradiated liquid cancer sample and the least one additional immunotherapeutic agent being administered to the subject either simultaneously or separately.

9. The vaccine composition for use according to anyone of claims 1 to 8, wherein the ionizing radiations dose is selected from 1.8, 2, 2.4, 2.5, 3, 3.2, 3.6, 4, 4.5, 5, 5.5, 6, 7, 8, 10, 15 and 20 Gy per fraction treatment.

10. The vaccine composition for use according to anyone of claims 1 to 9, wherein the metastatic cancer affects (i) a connective tissue and is selected from a fibrosarcoma, myxosarcoma, liposarcoma, chondrosarcoma, osteosarcoma, chordoma, malignant fibrous histiocytoma, (ii) an endothelium or mesothelium tissue and is selected from hemangiosarcoma, angiosarcoma, lymphangiosarcoma and mesothelioma, (iii) a muscle tissue and is selected from leiomyosarcoma and rhabdomyosarcoma, (iv) an epithelial tissue and is selected from adenocarcinoma, squamous cell carcinoma and epidermoid carcinoma, (v) a neural tissue and is selected from multiform glioblastoma, glioma, neuroblastoma, medulloblastoma, meningioma, neurofibrosarcoma and schwannoma, and (vi) the APUD system and is selected from thyroid carcinoma, pancreas carcinoma, stomach carcinoma and intestine carcinoma; or wherein the metastatic cancer is a melanoma.

11. The vaccine composition for use according to claim 10 wherein the metastatic cancer is or derives from a cancer selected from skin cancer, central nervous system cancer, head and neck cancer, lung cancer, kidney cancer, breast cancer, gastrointestinal cancer (GIST), prostate cancer, liver cancer, colon cancer, rectum cancer, anal cancer, oesophagus cancer, male genitourinary cancer, gynecologic cancer, adrenal and retroperitoneal cancer, sarcomas of bone and soft tissue, pediatric cancer, neuroblastoma, central nervous system cancer and Ewing's sarcoma.

12. The vaccine composition for use according to anyone of claims 1 to 9, wherein the liquid cancer affects blood or lymphoid cell tissue and is selected from leukemia, myeloma and lymphoma.

13. The vaccine composition for use according to anyone of claims 1 to 12, wherein the nanoparticle or aggregate of nanoparticles are to be administered to the subject to be treated together with at least one immunotherapeutic agent, the nanoparticle or aggregate of nanoparticles and the least one immunotherapeutic agent being administered to the subject either simultaneously or separately.

14. The vaccine composition for use according to anyone of claims 1 to 13, wherein the composition further comprises a pharmaceutically acceptable carrier or vehicle.

15. The vaccine composition for use according to claim 14, wherein the composition further comprises at least one immunotherapeutic agent.

16. A kit comprising (i) a nanoparticle or aggregate of nanoparticles consisting in a material having a density of at least 7 g/cm^3 and an atomic number (Z) of at least 25, each nanoparticle or aggregate of nanoparticles being covered with a biocompatible coating allowing the nanoparticle stability between pH 6.5 and 7.5 in a physiological fluid, or a composition according to anyone of claims 1-14, together with (ii) at least one immunotherapeutic agent.

17. The vaccine composition for use according to claim 15 or the kit according to claim 16, wherein the at least one immunotherapeutic agent is selected from a monoclonal antibody, a cytokine, and a combination thereof.