CLAIMS

1. Use of a combination of (i) at least one biocompatible organic nanoparticle and of (ii) at least one carrier comprising at least one pharmaceutical compound of interest, wherein the biocompatible organic nanoparticle is a liposome, the longest dimension of the biocompatible nanoparticle is between about 4 nm and about 500 nm as measured by Dynamic Light Scattering (DLS), and the surface charge value of the biocompatible nanoparticle is a negative surface charge equal to or below -10 mV, and wherein the surface of the carrier is devoid of, or does not expose, a polymer selected from Dextran, polysialic acid (PSA), hyaluronic acid, chitosan, heparin, polyvinyl pyrrolidone (PVP), polyvinyl alcohol (PVA), polyacrylamide, poly (ethylene glycol) (PEG), and a PEG-based copolymer, in the manufacture of a medicament for enhancing therapeutic efficiency of the pharmaceutical compound of interest in a subject in need of said at least one pharmaceutical compound of interest, wherein the subject is to be intravenously administered with the at least one carrier comprising at least one pharmaceutical compound and the at least one biocompatible nanoparticle, and wherein said at least one biocompatible nanoparticle is to be intravenously administered to the subject between more than 5 minutes and about 72 hours before the at least one carrier comprising at least one pharmaceutical compound, and wherein the biocompatible nanoparticle is not used as such as a pharmaceutical compound.

2. The use according to claim 1, wherein the nanoparticle is further covered with a biocompatible coating.

3. The use according to claim 1, wherein the carrier is a plain carrier.

4. The use according to claim 1, wherein the carrier is a hollow carrier.

5. The use according to any one of claims 1 to 4, wherein the at least one biocompatible nanoparticle and the at least one carrier comprising the pharmaceutical compound(s) are to be administered in combination, to thereby maintain the therapeutic benefit of said pharmaceutical compound(s) for a reduced toxicity, or increase the therapeutic benefit of said pharmaceutical compound(s) for an equivalent or reduced toxicity, for the subject, when compared to therapeutic benefit and toxicity induced by the standard therapeutic

dose(s) of said compound(s) in the absence of any biocompatible nanoparticle and/or carrier.

6. The use according to any one of claims 1 to 5, wherein the at least one biocompatible nanoparticle and the at least one carrier comprising the pharmaceutical compound(s) are to be administered in combination, to thereby allow a reduction of at least 10% of the administered pharmaceutical compound(s) therapeutic dose(s) when compared to the standard therapeutic dose(s) of said compound(s) while maintaining the same therapeutic benefit for an equivalent toxicity or a reduced toxicity for the subject or while increasing the therapeutic benefit for an equivalent or reduced toxicity for the subject in the absence of any biocompatible nanoparticle and/or carrier.

7. The use according to any one of claims 1 to 6, wherein the at least one nanoparticle is cleared from the subject to whom it has been administered within one hour and six weeks after its administration to a subject in need of the at least one pharmaceutical compound referred to in claim 1.

8. The use according to any one of claims 1 to 7, wherein the pharmaceutical compound is selected from a small molecule, in particular a targeted small molecule, a cytotoxic compound and a transition metal coordination complex.

9. The use according to any one of claims 1 to 8, wherein the pharmaceutical compound is encapsulated in the carrier, impregnated in the carrier or bound to the carrier.

10. The use according to any one of claims 1 to 9, wherein the carrier is a liposome.

11. The use according to claim 10, wherein the liposome comprises 62% mol of DiPalmitoylPhosphatidylCholine (DPPC), 22% mol of Hydrogenated Soybean PhophatidylCholine (HSPC) and 16% mol of Cholesterol (Chol); 90% mol of DiPalmitoylPhosphatidylCholine (DPPC) and 10% mol of MonoPalmitoylPhosphatidylcholine (MPPC); or 1-palmitoyl-2oleoyl-sn-glycero-3-phosphocholine (POPC) and 1,2-dioleoyl-sn-glycero-3-phosphoethanolamine (DOPE) in a molar ratio 3:1 and an equal amount of α-(3'-O-cholesteryloxycarbonyl)-δ-(N-ethylmorpholine)-succinamide (MoChol) and cholesterylhemisuccinate (CHEMS).

12. The use according to anyone of claims 1 to 11, wherein the pharmaceutical compound is released from the carrier by temporal-controlled diffusion, carrier erosion and/or carrier degradation.

13. The use according to anyone of claims 1 to 12, wherein the pharmaceutical compound is released from the carrier in response to an intracellular or an extracellular stimulus.

14. The use according to anyone of claims 1 to 13, wherein the pharmaceutical compound is released from the carrier when said carrier is exposed to electromagnetic radiations, ultrasounds and a magnetic field.