Patent: Metallic nanoparticles functionalised with the VIP neuropeptide and preparation procedure

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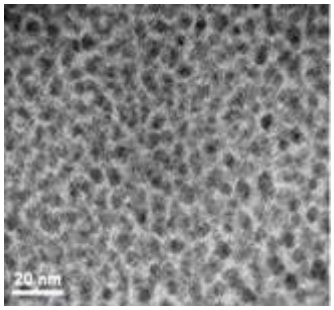
Description



The present invention refers to the **functionalisation of the vasoactive intestinal neuropeptide (VIP) to metallic nanoparticles** leaving **its capacity for interaction with its specific receptors undamaged**, thus **allowing the formulation of detection strategies and a selective drug release on tumour cells or the treatment of diseases with an autoimmune and/or inflammatory component**.

Need or problem solved

- The present invention can be applied in the **chemical, biochemical, immunological and other sectors** because, as the acid end of the VIP neuropeptide remains available, a wide spectrum of biological functions is obtained, including immunomodulation, the VIP neuropeptide acting predominantly as a **potent anti-inflammatory and as an inhibiting agent of the Th1 response in the immune system**
- Therefore, the nanoparticle-VIP conjugates emerge as **therapeutic factors for the treatment of diseases with inflammatory and autoimmune components.**
- In addition to its action upon the target cells as an important therapeutic agent, the VIP neuropeptide can also be used as a means of **releasing other drugs on human tumours** over expressing VIP-specific receptors in their plasma membranes.

Innovative issues/Competitive advantages

- One of the limitations in the clinical use of neuropeptides and, particularly, that of VIP, has always been its short mean life in circulation, which required its chronic administration, increasing its cost and inhibiting the doses prescribed to patients. Now, the functionalisation of the VIP neuropeptide to metallic particles, not only facilitates its action as a therapeutic agent on target cells or as a mode for releasing other drugs on tumours overexpressing VIP receptors, but, in certain cases, it also **increases the mean life of the molecule attached to it, as it hinders proteolytic attack**.
- Furthermore, the functionalisation of VIP nanoparticles faces with difficulties in designing an effective method allowing for functionalisation in a way that its carboxyl-terminal end remains free, as it is from this end that it interacts with its specific membrane receptors. The studies described this far maintain a nanoparticle/peptide orientation that leaves the amino group free to participate in the recognition functions. In general, **nowadays, the functionalisation of a peptide in order to leave its amino-terminal end free does not imply any difficulties, unlike what occurs if the carboxyl end is left exposed.**
- In the nanoparticles referred to in this invention, one of the configurations leaves the amino group free, while another one allows leaving the VIP's acid end available, as the functional group actually in charge of maintaining such specific reception and of participating in the cellular functions. **The functionalised nanoparticles are then stable, non-toxic, soluble in water and compatible with**

biological systems. They also make it possible to explore and ascribe the dependent (free carboxyl) and independent effects of the receptor (free amino).

Types of interested companies

- Cancer research units
- Hospitals
- Pharmaceutical companies performing R&D into antitumour drugs