CHEMICAL SYNTHESIS AND FUNCTIONAL CHARACTERIZATION OF VASOACTIVE INTESTINAL PEPTIDE (VIP) METAL-PROTECTED NANOPARTICLES

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Capped nanoparticles that can be coupled to a variety of molecules and biomolecules are of great interest due to their potential applications in biomedicine, such as molecular markers, drug delivery or ultrasensitive detection. Here we present results on the synthesis and characterisation of silver nanoparticles that have a narrow size distribution (≈5 nm), are stable and water soluble and are protected by biocompatible polymers. These particles are then coupled to a biologically active peptide by either COOH or NH_2 termini. The particles at the different stages of functionalization are studied by means of a variety of methods including TEM, FTIR, Raman, X-Ray fluorescence, ^{1}H-NMR and TOCSY. VIP metal-protected nanoparticles did no show any toxicity effects as assayed by MTT and LDH measurements in Raw 264.7 cells. Importantly, VIP-nanoparticles showed important immunomodulatory capabilities *in vitro* and *in vivo*. In this sense, we performed experiments in microglia primary cell cultures from the central nervous system from C57 mice as well in an experimental model of lethal septic shock after cecal ligation and puncture. This work provides the first evidence of VIP-nanoparticles as an efficient immunomodulatory factor with the capacity to deactivate the inflammatory response and opens new possibilities to target specific cell types by ligand-directed VIP-nanoparticles in immune-based disorders with inflammatory/autoimmune components.