PEG-PACA nanoparticles functionalized by “click chemistry” for β-amyloid peptide targeting

Le Droumaguet, B.;† Nicolas, J.;† Couvreur, P.;† Andrieux, K.†
† Laboratoire de Physico-Chimie, Pharmacotechnie et Biopharmacie, Univ. Paris Sud XI, UMR CNRS 8612, Faculté de Pharmacie, 5 rue Jean- Baptiste Clément, 92296 Châtenay-Malabry, France

Purpose: Nowadays, enhancing drug delivery using nanoparticles is one of the challenging tasks of pharmaceutical research. PEG-PACA (polyethyleneglycol-polyalkylcyanoacrylate) nanoparticles (NPs) have been shown to increase biodistribution of drugs in vivo but in the same time are non-specifically distributed and can therefore be delivered in healthy tissues. This clearly points out the need to functionalize nanoparticles to obtain targeting systems. We report in this work on the synthesis of PEG-PACA NPs and their further functionalization with different appropriate ligands able to selectively target and interact with β-amyloid peptide (Aβ) implicated in Alzheimer disease (AD).

Methods: Azide-functionalized PEG-PACA NPs have been synthesized and functionalized with different alkyne-containing ligands known to exhibit significant affinity for Aβ by “click chemistry” reaction. After characterization of these ligand functionalized NPs, their affinity and selectivity for Aβ has been tested.

Results: The new synthesized copolymer has been characterized. Azide-functionalized PEG-co-PACA NPs have been prepared by nanoprecipitation and characterized (diameter, zeta potential and stability). Finally, their bioaffinity for Aβ has been investigated and compared to non-functionalized NPs.

Conclusion: These new NPs will be further evaluated with an in vivo AD model.

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