Talk

Synthesis of Tannic acid and Gallic acid nanostructures with biomedical applications

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ABSTRACT

Motivation: Tannic acid (TA) and Gallic acid (GA) are natural polyphenolic compounds belonging to the family of tannins, a subset of secondary metabolites that stands out due to their biological activity, including anticancer, antioxidant, antimicrobial and antiviral activities [1,2]. Our group has developed TA nanoparticles with antitumor activity that can be selectively targeted to tumors, thereby reducing the undesirable side effects associated with chemotherapy [3].

In this work we have broadened the scope of these promising nanoparticles by introducing GA in their formulation. Additionally, we have tackled the synthesis of metal-organic frameworks (MOFs) based on TA and GA.

Methods and Results: The obtained nanostructures have been characterized by physicochemical techniques: Scanning Electron Microscopy (SEM), Raman Spectroscopy, Tyndall Effect, Dynamic Light Scattering (DLS), UV-Visible and Infrared Spectroscopy.

Our TA/GA nanoparticles have a hydrodynamic diameter of just 202 nm and a zeta potential of -34 mV. This is an improvement over the previously described TA nanoparticles. Their entrapment efficiency is very high (92.4 %). Moreover, we have simplified the synthesis by reducing the amount of coating polymer.

In a different approach we have also synthesized MOFs using TA and GA as ligand and different metal cations (Fe^{2+}, Fe^{3+} or Ni^{2+}). They have different hydrodynamic diameters and shapes, and their crystallinity is being studied by X-Ray Diffraction.

Conclusions: TA/GA nanoparticles have been obtained by using polymers Generally Recognized As Safe (or GRAS) by the Food and Drug Administration. Their size has been optimized, so they are suitable for intravenous administration. With respect to the MOFs structures synthesized, their potential applications are more diverse (including, for example, catalytic processes) depending on their size, porosity and crystallinity.

REFERENCES

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