Complexation of anticancer Pt-drugs on Polymers containing poly(L-Histidine)

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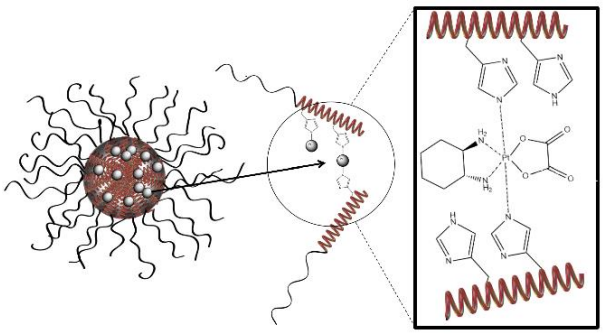

Figure 1: The suggested mechanism of conplexation

This research focuses on the complexation of the anticancer drug oxaliplatin and its verification through NMR spectroscopy. Oxaliplatin is primarily utilized in the treatment of colorectal cancer.[1,2] To encapsulate the drug, polypeptides and hybrid copolymers based on poly(L-Histidine) were synthesized. Poly(L-Histidine) contains an imidazole group, granting it pH sensitivity and the ability to act as a ligand for metal ions like Zn and Pt. [2,3] These properties qualify the nanoparticles as a drug delivery system for metal based anticancer drugs.

A novel aspect of this study is the use of the protonated solvent 1,1,1,3,3,3-Hexafluoro-2-propanol (HFIP) to investigate the complexation of poly(L-Histidine) and oxaliplatin via Nuclear Magnetic Resonance (NMR) spectroscopy. HFIP serves as an effective solvent for poly(L-Histidine), and the use of d6-DMSO capillaries was essential for the measurements. The study concluded with an analysis of drug encapsulation in hybrid copolymers using NMR spectroscopy in D_2O and D_2O Buffer (pH=5). Results showed the complexation of the platinum-based drug with the imidazole group of poly(L-Histidine), highlighted by the disappearance of the hydrogens at the -NH position of the imidazole ring and changes in the shifts of poly(L-Histidine). Additionally, the pH responsiveness of the nanoparticles was confirmed through NMR spectroscopy, indicating their suitability for in vitro testing. Furthermore, Thermogravimetric Analysis (TGA), Circular Dichroism (CD), and Transmission Electron Microscopy (TEM) were employed for a comprehensive characterization of the nanoparticles.

References

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