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Molecular Chimeras: Iron Oxide Nanoparticles and Selenoglycoconjugates for Advanced Nanomedicine

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In the last ten years, magnetic Iron Oxide Nanoparticles (IONPs) have been increasingly studied, not only for their scientific relevance but also for their wide range of technological and biomedical applications. These include targeted drug delivery, magnetic resonance imaging (MRI) and magnetic hyperthermia.¹ Among various nanomaterials, IONPs stand out due to their unique combination of properties: they are cost-effective to produce, physically and chemically stable, biocompatible, and environmentally friendly.² Their excellent magnetic behavior further enhances their potential in medical technologies. In addition to these advantages, recent studies have shown that IONPs can effectively reduce oxidative stress, a major contributor to cellular aging and chronic disease. This antioxidant effect, however, is strongly influenced by factors such as the nanoparticles' chemical composition, surface charge, size, and coating, all of which play a crucial role in determining their biological activity.³ Based on this background and the promising properties of IONPs, this work involved a new approach to the preparation of nanostructured materials, consisting of IONPs coated with polyphenols and Se-sugars (Scheme 1). Namely, we focused on novel selenoglycoconjugates belongs to a seleno-based family exhibiting notable antioxidant activity.⁴



Scheme 1. Synthesis of nanosystems consisting of IONPs coated with polyphenols and Se-sugars.

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