XXXV

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Natural Polyphenols for One Pot Green Synthesis and Stabilization of Gold Nanoparticles with Antioxidant Activity

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Gold nanoparticles (GNPs) are likely to provide an attractive platform for combining a variety of biophysico-chemical properties into a unified nanodevice with a great therapeutical potential (1,2).
In this study, we investigated the capabilities of three different bioactive natural polyphenols, epigallocatechin-3-gallate (EGCG), resveratrol (RSV), and fisetin (FS)(3,4), to allow synergistic chemical reduction of gold salts to GNPs, as well as stabilization in a one-pot green process. The GNPs were characterized by physico-chemical techniques, polyphenols content, and in vitro stability. The antioxidant activity of the nanoparticles (NPs) was also determined by DPPH and ABTS radical-scavenging assays (5).
With a size in the range diameter of 10 to 25 nm, the obtained NPs were found to contain 2.71%, 3.23%, and 5.47% of EGCG, RSV, and FS, respectively. Nanoprototypes exhibited remarkable in vitro stability in various media suggesting that NP surface coating with phytochemicals prevents the aggregation in different simulated physiological conditions. The scavenging activities for DPPH and ABTS were highly correlated with the EGCG, RSV, and FS content. Moreover, high correlation coefficients between the ABTS and DPPH values highlighted a similar predictive capacity for antioxidant activities of prepared nanosystems. These results prompted us to propose the green synthesized EGCG-, RSV-, and FS-based nanogold conjugates as promising candidates for the treatment of disorders associated with oxidative stress including neurodegenerative disorders, cardiovascular disease, inflammatory disorders, and cancer.

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