HIGHLIGHTS OF THE STUDY: AT A GLANCE

The present piece of work provides following important information:

 **Synthesis and Characterization Gold nanoparticle embedded 3,6-dihydroxyflavone**

Gold nanoparticle embedded 3,6-dihydroxyflavone has been synthesized using chemical reduction method and characterized by UV, XRD, SEM, TEM, EDAX and AFM analysis, providing following points:

- **UV spectra depict the presence of broad peak in the range of 425-520 nm indicates the particles are mono dispersed.**
- **XRD analysis gives an average particle size 12 nm.**
- **SEM analysis depicts uniform needle type morphology in contrast of large size of aggregated rhombic crystal of native 3,6-dihydroxyflavone.**
- **TEM micrograph shows nucleated cell type of morphology with 6-12 nm particle size.**
- **EDAX micrograph supports strong gold atom signals around 2.30, 9, 10.30, 11.30, and 12.30 keV.**
- **AFM image shows continuous and uniformly distributed particles with small size in contrast of rough surface with larger particle size of native 3,6-dihydroxyflavone.**

 **Antioxidant activity: In vitro study**

*In vitro* antioxidative activity of gold nanoparticle embedded 3,6-dihydroxyflavone (GNDHF) with dietary compound lutein (LUT) and selenium methyl selenocysteine (MSC) in ratio (1:1:1) at concentration 100 µg/mL: **DPPH** (87.13±1.43) %, **Fenton** (85.11±1.31) %, **Hydrogen peroxide** (83.10±1.51) % and **Nitric oxide** (84.02±1.13) %.

 **Antioxidant activity: In vivo study**

*In vivo* antioxidative activity of gold nanoparticle embedded 3,6-dihydroxyflavone (GNDHF) with dietary compound lutein (LUT) and selenium methyl selenocysteine (MSC) in concentration (8/1.5/10 µM) at dose of 5 mg/Kg body weight of mice in terms of down regulation level of reduced glutathione and lipid peroxidation in liver of female Balb/c mice induced with sarcoma 180 cancer cells to develop oxidative stress: **reduced glutathione** (0.15 µM) and **lipid peroxidation** (0.18 nM).

 **Antibreast cancer activity: In vitro study**

*In vitro* antibreast cancer activity of the combination (GNDHF: LUT: MSC) exhibited enhancement in percent inhibition (90.27 %, 90.51 % and 91.57 %) in MCF-7 and (80.17 %, 80.27 % and 80.67 %) in MDA-MB-468 cell lines by all the three MTT, TBE and SRB bioassays.

 **Antitumor activity: In vivo study**

*In vivo* antitumor study of gold nanoparticle embedded 3,6-dihydroxyflavone (GNDHF) with dietary compound lutein (LUT) and selenium methyl selenocysteine (MSC) in concentration (8/1.5/10 µM) at dose of 5 mg/Kg body weight of female Balb/c mice induced with sarcoma 180 cancer cells: **mean body weight** (29.17 mg), **tumor volume** (091.0 mm³) and **tumor growth delay** (5 days).
Antimutagenic activity: In vivo study

Antimutagenic efficacy of the combination (GNDHF: LUT: MSC) against sarcoma 180 cancer cells induced cytogenetic damage in mice bone marrow: Chromosomal aberrations: (17 %); Micronucleus formation: (5.1-5.9 %).

Histopathological study

The gold nanoparticle embedded 3,6-dihydroxyflavone (GNDHF) with dietary compound lutein (LUT) and selenium methyl selenocysteine (MSC) in concentration (8/1.5/10 µM) at dose of 5 mg/Kg body weight plays a major role in triggering of apoptosis, and decreased angiogenesis in sarcoma 180 cancer tumor inhibition in mice without any major toxicity.