

List of Figures

Figure No	Figure Legend	Page no
1	Figure 1.1: Sources of indole-3-carbinol	6
2	Figure 1.2: Main factors contributing to the biocompatibility of a drug deliver carrier.	11
3	Figure 1.3: Important elements for nanoparticles design.	12
4	Figure 2.1: Size distribution analysis of synthesized biogenic gold nanoparticles (AuNPI3Cs)	29
5	Figure 2.2: UV-vis spectra of synthesized biogenic gold nanoparticles (AuNPI3Cs) at 15min.	29
6	Figure 2.3: XRD pattern of biogenic AuNPI3Cs showing the facets of crystalline gold.	30
7	Figure 2.4: FTIR spectrum of indole-3-carbinol and synthesized gold particles (AuNPI3Cs)	30
8	Figure 2.5A HRTEM study of biogenic gold nanoparticles (AuNPI3Cs); (B): SEM image of AuNPI3Cs;	30
9	Figure 2.7: Atomic force microscopy (AFM) analysis of synthesized gold particles (AuNPI3Cs)	31
10	Figure 2.8: NMR analysis of indole-3-carbinol and synthesized gold particles (AuNPI3Cs)	31
11	Figure 3.1. Morphological changes of brine shrimp after treatment of AuNPI3Cs for 24 h.	50
12	Figure 3.2. Comet assay of Brine shrimp after AuNPI3Cs treatment	50
13	Figure 3.3. The effect of AuNPI3Cs on lymphocyte MDA level.	51
14	Figure 3.4. The effect of AuNPI3Cs on lymphocyte intracellular reduced glutathione level (GSH).	51
15	Figure 3.5. Intracellular reactive oxygen species (ROS) generation of AuNPI3Cs treated human lymphocytes by H ₂ DCFDA staining.	52
16	Figure 3.6. Determination of the genotoxic effects of AuNPI3Cs in human lymphocytes by alkaline comet assay.	52
17	Figure 3.7. Dot plots of cell cycle distribution of AuNPI3Cs treated human lymphocytes stained by propidium iodide.	53
18	Figure 3.8. The effect of I3C and AuNPI3Cs on serum urea level of Swiss albino mice.	55
19	Figure 3.9 shows the effect of I3C and AuNPI3Cs on serum creatinine level of Swiss albino mice.	55

20	Figure 3.10 shows the effect of I3C and AuNPI3Cs on serum ALP level of Swiss albino mice.	56
21	Figure 3.11 shows the effect of I3C and AuNPI3Cs on serum glutamic oxaloacetic transaminase (SGOT) of Swiss albino mice.	56
22	Figure 3.12. The effect of I3C and AuNPI3Cs on serum glutamic pyruvic transaminase (SGPT) of Swiss albino mice.	56
23	Figure 3.13 shows the effect of I3C and AuNPI3Cs on blood glucose level of Swiss albino mice.	58
25	Figure 3.14. The effect of AuNPI3Cs on serum cholesterol of Swiss albino mice.	58
26	Figure 3.15. Photomicrograph of the liver (A), kidney (B) section of mice administered with AuNPI3Cs at different doses for 28 days.	59
27	Figure 4.1 The intrinsic and extrinsic pathways of apoptosis	66
28	Figure 4.2 Mechanism of apoptosis	68
29	Figure 4.3 illustrates the effect of AuNPI3Cs on in vitro cytotoxicity against Jurkat cells (A) MCF-7 (B) and human lymphocyte cells (HLC).	78
30	Figure 4.4 Intracellular reduced glutathione (GSH) level of Jurkat (A) and MCF-7 (B) cells.	79
31	Figure 4.5 Intracellular oxidized glutathione (GSSG) level of Jurkat (A) and MCF-7 (B) cells.	79
32	Figure 4.6 Qualitative characterization of ROS formation by H2DCF2DA staining using fluorescence microscopy.	80
33	Effects of AuNPI3Cs and 5-FU on induction of reactive oxygen species (ROS) in Jurkat (C) and MCF-7(D) cell lines	80
34	Figure 4.7: Photomicrographs of morphology of I3C- and AuNPI3Cs-treated apoptotic Jurkat and MCF-7 cells under phase contrast microscope	81
35	Figure 4.8 Fluorescence microscopic observation of (A) Jurkat (B) and MCF-7 cells treated with IC50 dose of AuNPI3Cs for 24 h and stained with PI to detect chromatin condensation.	82
36	Figure 4.9 Chromatin condensation in Jurkat and MCF-7 cells treated with IC50 dose of AuNPI3Cs for 24 h after staining with DAPI.	83
37	Figure 4.10a: Mitochondrial membrane potential by Rhodamine 123 staining using fluorescence microscopy in AuNPI3Cs-treated Jurkat and MCF-7 cells.	84

38	Figure 4.10b: Measurement of Rhodamine 123 fluorescence intensity of Jurkat (C) and MCF-7 (D) cells using fluorescence spectrophotometer.	84
39	Figure 4.11 DNA fragmentation study in Jurkat and MCF-7 cells by agarose gel electrophoresis.	85
40	Figure 4.12 Analysis of cell cycle arrest by flow cytometry.	86
41	Figure 4.13: Photomicrographs of cytoskeletal destruction in apoptotic MCF-7 cells treated with I3C and AuNPI3Cs under polarizing microscope.	86
42	Figure 4.14. Western blot analysis of proapoptotic and antiapoptotic proteins in Jurkat (A) and MCF-7 (B) cells treated with I3C and AuNPI3Cs.	87
43	Figure 5.1. Effect of AuNPI3Cs on in vitro cytotoxicity against EAC cells and MLCs. Cells were treated with AuNPI3Cs for 24 h at 37°C.	108
44	Figure 5.2.A Fluorescence image of intracellular uptake of AuNPI3Cs in EAC cell. B Estimation of intracellular uptake of Au ⁺ ion in EAC cell by atomic absorption spectroscopy.	109
45	Figure 5.3a: Intracellular reduced glutathione (GSH) levels of EAC cells. 5.3b: Intracellular oxidized glutathione (GSSG) levels of EAC cells.	110
46	Figure 5.4a: Effects of AuNPI3Cs and 5-FU on reactive oxygen species (ROS) induction in the EAC cell line; Qualitative characterization of ROS formation by H ₂ DCFDA staining using fluorescence microscopy.	111
47	Figure 5.4b: DCF fluorescence intensity of EAC cells were expressed in graphical form in term of ROS production.	111
48	Figure 5.5. (A)Morphological analysis by scanning electron microscopy of EAC cells; (B) Polarizing microscopic analysis of EAC cells.	112
49	Figure 5.6. Effects of AuNPI3Cs and 5-FU on LDH release assay in EAC cell.	112
50	Figure 5.7.Fluorescence- based chromatin condensation study.	113
51	Figure 5.8.EtBr-AO double staining study in EAC cells. Cells were stained with EtBr-AO and visualized under fluorescence microscope.	114

52	Figure 5.9. AuNPI3Cs-induced apoptosis as measured by TUNEL assay. DNA strand breaks were analyzed by flow cytometry.	115
53	Figure 5.10. Determination of the genotoxic effects of AuNPI3Cs and 5-FU on EAC cells by the Comet assay.	116
54	Figure 5.11. A. Measurement of mitochondrial membrane potential (MMP) of AuNPI3Cs and 5-FU treated EAC cells.	117
55	Figure 5.11. B. Qualitative characterization of mitochondrial membrane potential by Rhodamine 123 staining using fluorescence microscopy.	117
56	Figure 5.12. FACS analysis of Annexin V-FITC and PI staining of EAC Cells. Cells were treated with AuNPI3Cs and 5-FU for 24 h, stained with Annexin V-FITC and PI and measured by flow cytometry.	118
57	Figure 5.13. Cell cycle arrest analysis by flow cytometry.	119
58	Figure 5.14. Western blot analysis of Bax, Bcl-2 and Caspase- 3 proteins in EAC cells treated with AuNPI3Cs and 5-FU for 24 h.	120
59	Figure 5.15. The effect of AuNPI3Cs on change of body weight of EAC bearing mice.	121
60	Figure 5.16. The effect of AuNPI3Cs on Mean survival time by Kaplan Meier method in EAC bearing mice.	121
61	Figure 5.17. The effect of AuNPI3Cs on tumour volume in EAC bearing mice.	122
62	Figure 5.18. The effect of AuNPI3Cs on tumour cell count in EAC bearing mice.	122
63	Figure 5.19 shows the effect of AuNPI3Cs on liver and kidney MDA after 15 days treatment in EAC bearing mice.	124
64	Figure 5.20 shows the effect of AuNPI3Cs on liver and kidney GSH after 15 days treatment in EAC bearing mice.	125
65	Figure 5.21 shows the effect of AuNPI3Cs on liver and kidney SOD after 15 days treatment in EAC bearing mice.	125
66	Figure 5.22 shows the effect of AuNPI3Cs on liver and kidney Catalase after 15 days treatment in EAC bearing mice.	126
67	Figure 5.23 shows the effect of AuNPI3Cs on liver and kidney GPx after 15 days treatment in EAC bearing mice.	126
68	Figure 5.24 shows the effect of AuNPI3Cs on liver and kidney GST after 15 days treatment in EAC bearing mice.	127
69	Figure 5.25 A: Solid tumour regression study in EAC induced mice after subcutaneous injection of I3C (50 mg/kg/day) and AuNPI3Cs (1.5	128

	mg/kg/day) for 28 days.	
70	Figure 5.25 B: Bar graph represents tumour masses in gram in EAC induced mice.	128
71	Figure 5.25 C: Tumour volume in EAC induced mice after subcutaneous injections of I3C and AuNPI3Cs.	128
72	Figure 5.26 Immuno-histochemical CD-31, Ki-67 expression in EAC-induced solid tumour from mice treated with subcutaneous injection of I3C (50 mg/kg/day) and AuNPI3Cs (1.5 mg/kg/day) for 28 days.	129
73	Figure 5.27 Histological alterations of liver after treatment of AuNPI3Cs in EAC bearing Swiss albino mice. (scale bar = 50 μ m)	130
74	Figure 5.28 Histological alterations of kidney after treatment of AuNPI3Cs in EAC bearing Swiss albino mice. (scale bar = 50 μ m)	131
75	Figure 6.1. Effect of AuNPI3Cs on in vitro cytotoxicity against DLA cells and MLCs. Cells were treated with AuNPI3Cs for 24 h at 37°C.	148
76	Figure 6.2a: Intracellular reduced glutathione (GSH) levels of DLA cells.	149
77	Figure 6.2b: Intracellular oxidized glutathione (GSSG) levels of DLA cells.	149
78	Figure 6.3a: Effects of AuNPI3Cs and 5-FU on reactive oxygen species (ROS) induction in DLA cell line; Qualitative characterization of ROS formation by H2DCFDA staining using fluorescence microscopy.	150
79	Figure 6.3b: DCF fluorescence intensity of DLA cells were expressed in graphical form in term of ROS production.	150
80	Figure 6.4. Fluorescence- based chromatin condensation study. A. Cells were stained with propidium iodide (PI) B. Cells were stained with DAPI and visualized under a fluorescence microscope to detect chromatin condensation.	151
81	Figure 6.5. AO-EtBr double staining study in DLA cells. Cells were stained with EtBr-AO and visualized under fluorescence microscope.	151
82	Figure 6.6. Shows the effect of AuNPI3Cs, I3C and 5-FU on DNA fragmentation.	152
83	Figure 6.7. A. Measurement of mitochondrial membrane potential (MMP) of AuNPI3Cs and 5-FU treated DLA cells.	153
84	Figure 6.7. B. Qualitative characterization of mitochondrial membrane potential by Rhodamine 123 staining using fluorescence microscopy.	153
85	Figure 6.8. Cell cycle arrest analysis by flow cytometry.	154
86	Figure 6.9. The effect of AuNPI3Cs on change of body weight of DLA bearing mice.	155
87	Figure 6.10 The effect of AuNPI3Cs on Mean survival time in DLA bearing mice	156
88	Figure 6.11. The effect of AuNPI3Cs on tumour volume in DLA bearing	156

	mice.	
89	Figure 6.12 The effect of AuNPI3Cs on tumour cell count in DLA bearing mice.	157
90	Figure 6.13 shows the effect of AuNPI3Cs on liver and kidney MDA after 15 days treatment in DLA bearing mice.	159
91	Figure 6.14 shows the effect of AuNPI3s on liver and kidney GSH after 15 days treatment in DLA bearing mice.	160
92	Figure 6.15 shows the effect of AuNPI3Cs on liver and kidney SOD after 15 days treatment in DLA bearing mice.	160
93	Figure 6.16 shows the effect of AuNPI3Cs on liver and kidney Catalase after 15 days treatment in DLA bearing mice.	161
94	Figure 7.1. Diphenyl-2-Picrylhydrazine (DPPH) scavenging activity at different concentrations of AuNPI3s and ascorbic acid.	177
95	Figure 7.2 showed nitric oxide scavenging activity at different concentrations of AuNPI3Cs and ascorbic acid.	177
96	Figure 7.3 Superoxide anion scavenging activity of AuNPI3Cs and ascorbic acid at different concentrations.	178
97	Figure 7.4 illustrates hydroxyl radical scavenging activity at different concentrations of AuNPI3Cs and ascorbic acid.	178
98	Figure 7.5. Peroxynitrite scavenging activity at different concentrations of AuNPI3Cs and ascorbic acid.	178
99	Figure 7.6 showed hypochlorous acid scavenging activity at different concentrations of AuNPI3Cs and ascorbic acid.	179
100	Figure 7.7. Lipid peroxidation scavenging activity at different concentrations of AuNPI3Cs and ascorbic acid.	179

