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## The communion of medicinal chemistry and nanotechnology in anticancer therapeutics

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Recent development in nanotechnology has an immense impact on the medicinal chemistry research. Nanomedicine is an interdisciplinary research field where medicinal chemistry, nanotechnology, and biology meet each other. We have combined medicinal chemistry and nanotechnology based approaches for cancer prevention, cancer therapy and development of new therapeutic agents. The flavonoid luteolin, 3', 4', 5, 7-tetrahydroxyflavone, is a natural antioxidant which is usually found in its glycosylated form in many green vegetables including broccoli, artichoke, celery, cabbage, cauliflower, green pepper, and spinach. Luteolin has a wide range of pharmacological properties ranging from anti-inflammation to anticancer effects. Luteolin has shown anticancer effects against lung cancer, head and neck cancer, breast, prostate, liver, colon, cervical, and skin cancer. We have synthesized water-soluble Nano-Luteolin from hydrophobic luteolin, and studied its anticancer activity against lung cancer and head and neck cancer. *In vitro* studies demonstrated that, both luteolin and nano-luteolin inhibited the growth of lung cancer cells (H292 cell line) and squamous cell carcinoma of head and neck (SCCHN) cells (Tu212 cell line). In Tu212 cells, the IC<sub>50</sub> value of luteolin was 6.96  $\mu\text{mol/L}$  and that of nano-luteolin was 4.13  $\mu\text{mol/L}$ . In H292 cells, the IC<sub>50</sub> of luteolin was 15.56  $\mu\text{mol/L}$ , and that of nano-luteolin was 14.96  $\mu\text{mol/L}$ . *In vivo* studies using a tumor xenograft mouse model demonstrated that nano-luteolin significantly inhibited the tumor growth of SCCHN compared to the luteolin treated group. Furthermore, detail protein analysis of Nano-Luteolin treated SCCHN tumor of mice have shown a significant decrease of proliferative markers such as PCNA, E2F1, CDK4; and pro-survival factors such as phospho-prohibitin (pPHB), total PHB and Bcl2. However, under this condition pro-apoptotic factors such as Bax, cleaved caspase-9, and p53 have increased in Nano-Luteolin treated SCCHN tumor. In conclusion, our studies suggest that the Nano-Luteolin may be a potential therapeutic agent in the treatment of lung or, head and neck cancer.

### Biography

Debatosh Majumdar has completed his PhD in Organic Chemistry from the Complex Carbohydrate Research Center and the Department of Chemistry of the University of Georgia. He worked on the design and synthesis of biologically important carbohydrates and glycopeptides. He was a research fellow in the department of medicinal chemistry at the University of Michigan, where he worked on the design and synthesis of cysteine protease inhibitors. Then he worked on cancer therapy and cancer nanomedicine at the Emory Winship Cancer Institute of Emory University. Now he is a scientist at Glycosyn LLC., a premier biopharmaceutical company, where he is synthesizing biologically important carbohydrates, glycoproteins, and glycoconjugates. He has published many papers and book chapters, and has been serving as an editorial board member of the World Journal of Organic Chemistry, JSM Nanotechnology and Nanomedicine, and reviewers of PLOS ONE, Frontiers in Bioscience, Drug Delivery Letters, and others.

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