

**PhD thesis title:** Mechanistic insights into the bioactivity and bioavailability of natural compounds against cancer  
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### **ABSTRACT**

Cancer can be defined as the uncontrolled cell proliferation and migration of such cells into the nearby tissues. Understanding the molecular mechanism and developing a therapeutic strategy is a cumbersome process due to the increased number of complex pathways and factors that drives the normal cells to become cancerous. Targeted therapy, including monoclonal antibodies and small-molecule drugs, fail in clinical trials multiple times due to the heterogeneous nature of the tumor cells and various other micro-environmental factors. Side- effects such as vomiting, diarrhoea, high blood pressure and fatigue are commonly observed in patients treated with chemotherapy or targeted therapy using synthetic drugs. Radiation therapy and surgery can remove the tumor cells; however, there are higher chances of regeneration of the cancer stem cells that can grow back the tumor during the post-treatment phase. In this premise, there is a need for alternative drugs to conventional synthetic cancer drugs that can reduce side effects in the patients undergoing treatment. Natural resources have emerged as a crucial source of pharmaceutically relevant novel secondary metabolites, several of which are already approved, and many are under development or in clinical trials. Traditional medicinal system like Ayurveda that uses whole plant extract for treating various diseases including cancer, Alzheimer's and other neurodegenerative diseases, are in practice for many years in India due to their lesser side effects. However, their individual compound's mechanism of action is not completely understood for use in treatment. With this background, this PhD thesis aimed to bring the mechanistic understanding of natural compounds and their mode of action by studying their bioactivity and bioavailability inside the cell.