

## Cytotoxic activity of fucoxanthin: a review of *in vitro* studies

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**Background:** Fucoxanthin, a marine carotenoid found in brown algae, has attracted attention for its unique structure, metabolism, safety and bioactivities [1]. Cancer is one of the leading causes of death worldwide and often treated with conventional drugs that have low survival rates and significant side effects [2–4]. Fucoxanthin has emerged as a promising natural anticancer agent, showing dose-dependent inhibitory effects on neuroblastoma, colon adenocarcinoma and lung carcinoma cell lines [3,5]; however, further research is required to fully explore its therapeutic potential. **Objective:** This review aims to discuss the cytotoxic activity, *in vitro*, of fucoxanthin against cancer cell lines. **Methods:** This narrative review was conducted using the PubMed database in order to find articles published between 2004 and 2024, related to the cytotoxic activity *in vitro* of fucoxanthin (natural or synthetic). **Results/Discussion:** Fucoxanthin showed significant cytotoxic effects on several cancer cell lines, including colon (HCT 116), melanoma (Malme-3M), cervical (SiHa), glioblastoma (GBM), leukaemia (HL-60) and endometrial adenocarcinoma (HEC-1-A) cells, with the effects being dose and time dependent [5–9]. Algae extracts outperformed pure fucoxanthin, suggesting synergistic effects with other compounds [5]. Additionally, fucoxanthin showed selective toxicity, targeting cancer cells while sparing normal cells, human umbilical vein endothelial cells (HUVEC) and human embryonic kidney cells (HEK-293) [5]. It also enhances the efficacy of chemotherapeutic drugs such as doxorubicin and cisplatin, particularly in triple-negative breast cancer, suggesting potential as an adjuvant therapy [10]. **Conclusion:** Fucoxanthin and its extracts exhibit selective cytotoxicity against cancer cells, often enhancing effectiveness when combined with other compounds or chemotherapy agents. The impact of these compound varies depending on concentration, exposure time, cell type, and whether it's used in pure or extract form. These findings suggest fucoxanthin's potential as an adjuvant for cancer treatment. However, further research is needed to clarify its mechanisms of action and assess its potential *in vivo* applications.

**Keywords:** cancer; cytotoxicity; fucoxanthin; *in vitro*.

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