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The Cancer Control Challenge:
Better Understanding It to Better Face It

GREEN MICROALGAE AS POTENTIAL SOURCES OF ANTITUMORAL COMPOUNDS

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Introduction: Bioprospected microalgae collected from water bodies in Northern Ontario, Canada, have been shown to produce bioactive molecules, including carotenoids, polysaccharides, vitamins, and lipids, which exhibit significant pharmacological potential. Several studies have confirmed that extracts from these microalgae possess antioxidant, antimicrobial, and anticancer properties. Cancer, one of the leading causes of global mortality, is responsible for millions of deaths each year. This disease results from genetic and epigenetic alterations that disrupt critical cellular pathways, leading to uncontrolled cell growth, enhanced migratory and invasive capabilities, and resistance to immune system defenses. Conventional treatment strategies, such as surgery, radiotherapy, and chemotherapy, have notable limitations, including systemic toxicity and tumor resistance, which often result in therapeutic failure. Therefore, searching for novel molecules with antitumor potential is essential to provide alternative treatment options for patients unresponsive to current therapies. **Objective:** This study aims to evaluate the *in vitro* antitumor potential of various microalgae extracts against tumor cell lines. **Materials and Methods:** Bioprospected microalgae strains S5, P981 (Coccomyxa sp.), LL1 (Scenedesmus sp.), LL2A, and CC (Chlamydomonas sp.) were cultured for 14 days in Bold's Basal Medium (BBM) at pH 7 under 16-hour light/8-hour dark cycles at 25°C, with continuous agitation at 150 rpm. After harvesting, methanol, ethanol, and aqueous extraction were performed on each strain. The extracts were concentrated under vacuum, and the crude extracts were weighed. DMSO was then added to obtain a stock solution of microalgae extracts (ME) at 10 mg/mL. Tumor cell lines K562, MCF7, HCT-116, SKMEL-19, and AGP-01 were plated in 96-well plates, and microalgae extracts were added in a single dose (100 μg/mL) or in a concentration-response curve (200 μg/mL – 3.125 μg/mL) for 72 hours to evaluate cell viability and the Half-Maximal Inhibitory Concentration (IC50) of the most cytotoxic extracts using the MTT method. **Results:** Fifteen extracts were produced, with the methanolic extracts from S5 and LL2A showing activity against the MCF7 breast cancer cell line and the SKMEL-19 melanoma cell line, respectively. The ethanolic extracts from CC, LL2A, and P981 exhibited antileukemic activity against the K562 cell line, with IC50 values ranging from 78 to 96 μg/mL. Additionally, the aqueous extract

from S5 demonstrated cytotoxic potential against the AGP-01 gastric cancer cell line. **Conclusion:** Initial results indicate that extracts derived from green microalgae exhibit high antitumoral potential against various tumor types, positioning them as a promising source of new pharmacologically active compounds. Further research is needed to identify the specific compounds responsible for the antitumor activity in each extract, as well as to better understand their mechanisms of action both in vitro and in vivo across different tumor types.

Keywords: Bioactive molecules; Bioprospection; Cancer cell lines; Chemotherapy; *In vitro* studies.