The Radiosensitizer Potential of Sulforaphane on Breast Cancer Cells

7th Kaunas / Lithuania International
Hematology / Oncology Colloquium
26 May 2022

Danguolė Laukaitienė[1], Rasa Ugenskienė[1], Arturas Inčiūra[2], Elona Juozaitytė[2]

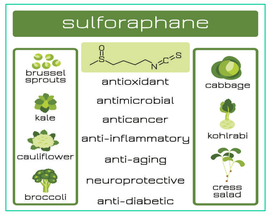
[1]Oncology Research Laboratory, Oncology Institute, Lithuanian University of Health Sciences, Kaunas, Lithuania

[2]Oncology Institute, Lithuanian University of Health Sciences, Kaunas, Lithuania

Objective

Radiation therapy is commonly applied in the treatment of breast cancer. However, radioresistance and side effects are limiting factors of this practice. Therefore, studying substances that can enhance the radiation effect and, at the same time, protect normal cells is very relevant. One of these is **sulforaphane** (SFN). Sulforaphane is an herbal isothiocyanate that typically occurs in cruciferous vegetables like broccoli and cauliflower. In recent years, it gained scientific popularity for its cancer preventive attributes as well as its antitumor effects.

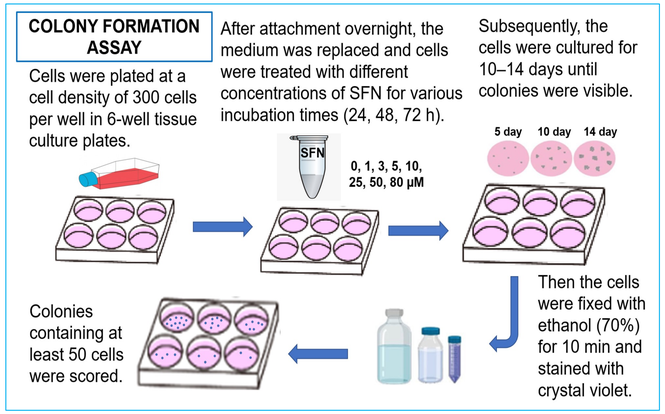
Thus, the **aim** of this work is to evaluate the response of the breast cancer cell line to the impact of sulforaphane and the effects of this substance in combination with radiotherapy.

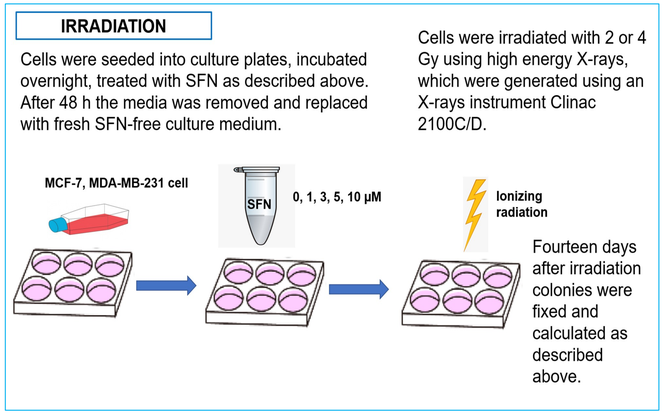


Methods

Cell viability and colony formation assay were used to test the anticancer efficiency of sulforaphane and to confirm the ability of SFN to sensitize MCF-7 and MDA-MB-231 breast cancer cells to radiotherapy.

Statistical analyses. All data are represented as the means ± SD. Statistical significance was determined using Student's t-tests. $P<0.05$ was considered to indicate a statistically significant result.





Results

We examined the effect of SFN on viability of two breast cancer cell lines: MDA-MB-231 and MCF-7. Our study suggests that the inhibition of cell viability was significantly increased in MCF-7 cell line in response to SFN in a dose- and time-dependent manner compared with the control group (0 μM SFN) ($P<0.05$) (Fig.1). The results also indicated that MDA-MB-231 cells have higher SFN tolerance than MCF-7 cells (Fig.2).

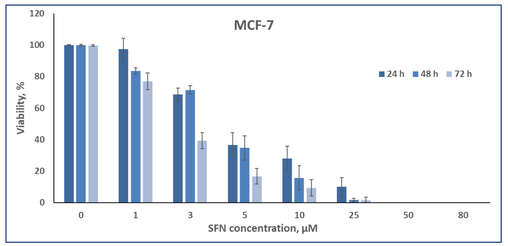


Figure 1. The effect of sulforaphane on viability of MCF-7 breast cancer cell lines

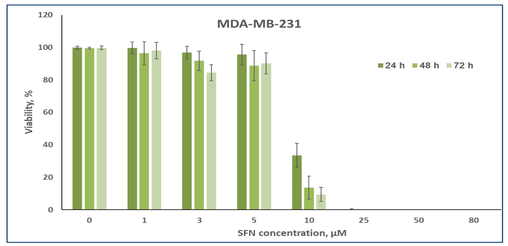


Figure 2. The effect of sulforaphane on viability of MDA-MB-231 breast cancer cell lines

Further the radiosensitizing effect of SFN at different concentrations (1, 3, 5, 10 μM) in 48 h cell culture irradiated at 0, 2, and 4 Gy were evaluated. The combination of SFN and radiation treatment produced significantly greater antitumor effects on the breast cancer cells than either treatment alone (Fig. 3, 4).

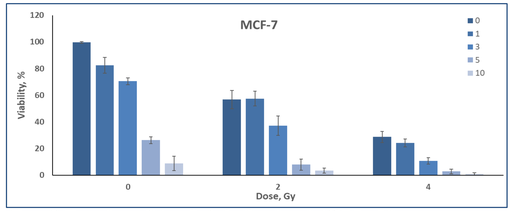


Figure 3. The radiosensitizing effect of sulforaphane in MCF-7 cell line.

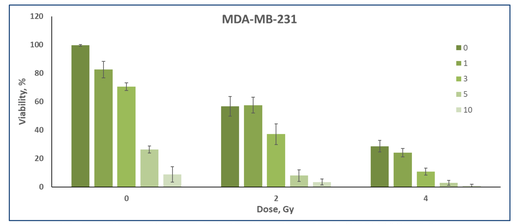


Figure 4. The radiosensitizing effect of sulforaphane in MDA-MB-231 cell line.

Conclusions

Our study results revealed that SFN is a potential radiosensitizer of MCF-7 and MDA-MB-231 breast cancer cells.

Key words

Sulforaphane, breast cancer, radiotherapy, radiosensitivity