

## Retrospective Evaluation of Chemotherapy and Radiotherapy Sequencing and Their Impact on Breast Cancer Treatment Outcomes

Dr. Omar Al-Khatib<sup>1\*</sup>, Dr. Lina Haddad<sup>1</sup>

<sup>1</sup>University of Jordan Faculty of Medicine, Department of Medical Oncology and Radiation Sciences, Amman, Jordan

### *Abstract*

In breast cancer patients, the ideal time sequences for chemotherapy and radiation therapy remain unknown. Most published trials were conducted including patients with early breast cancer. This retrospective analysis directed at evaluating the optimal sequence in the population for chemotherapy and radiotherapy. Chemotherapy and radiation therapy are typically not administered simultaneously in breast cancer patients due to the extensive use of Anthracyclinebased chemotherapy regimens and concerns about excessive radiation toxicity with simultaneous treatment. Therefore, the best way to sequence systemic and radiation therapies is to yet to decide. This question occurs for both lumpectomy-treated patients and mastectomy-treated patients, but the ideal sequencing of adjuvant chemotherapy and radiotherapy in breast cancer patients remains contentious. To date, there is no clear benefit in breast cancer treatment for any radio- and chemotherapy sequence. In our study, Chemotherapy is suggested before radiotherapy regarding disease-free survival and toxicity of therapy, but decisive information on the appropriate sequence is uncommon. Radiotherapy (RT) increases local control and breast cancer-specific survival after surgery for localized breast cancer. Adjuvant chemotherapy (CT) increases a 15-year survival in patients at danger of harboring micro-metastatic illness. This can be verified after mastectomy in our retrospective assessment in high-risk patients. The sequential method is suggested to consider reduced toxicity and survival rates according to present rules.

### **Keywords:**

*Mastectomy, Toxicity, Lumpectomy, systemic, optimum Sequence.*

### **Introduction**

Cancer produces cells that divide uncontrollably. This may result in tumors, damage to the immune system, and other lethal deficiencies (1). Breast cancer is one of the world's most prevalent female cancers and can be transferred commonly to remote organs like the bone, liver, lung, and brain that are mainly accountable for its incurability. Early diagnosis of the disease can lead to a healthy prognosis and a high survival rate(2).

Epidemiology says that breast cancer is affecting 2.1 million females each year, and causing the biggest amount of fatalities among females associated with cancer. It is estimated that 627,000 females died of breast cancer in 2018—roughly 15% of all women's cancer fatalities. Over 1.5 million women (25% of all women with cancer) are diagnosed with breast cancer every year throughout the world(3).

Radiation treatment can be used to treat breast cancer at almost every stage. Radiation therapy is an effective way to reduce the risk after surgery of recurrent breast cancer(4)(1). Chemotherapy drugs prevent cancer cells from growing and spreading by destroying or stopping cell division.

Our retrospective reviews primary goal was to evaluate the clinical outcome of patients with advanced locoregional breast cancer and adjuvant radiotherapy, with a focus on the role of sequencing chemotherapy and radiotherapy. Radiotherapy and chemotherapy with a variety of safety and efficacy with varying curing rates. These outcomes affect patient quality of life.

## Materials and methods

In this article, we are presenting results obtained from different peer-reviewed articles. This paper focusses on the evaluation of the clinical outcome of breast cancer patients after chemotherapy and adjuvant radiotherapy, with a specific interest in the role of sequencing and their success rates of chemo and radiotherapy.

## Results and discussion

From the review, we identified several pros and cons of chemo and radiation therapy. These pros and cons may affect the different levels in patient quality of life. Because in most cases, when compared to chemotherapy, radiotherapy is not given (5). So, we need to go for chemotherapy for that, and if this is not efficient and does not show consecutive levels, we should prefer radiotherapy or combine chemotherapy.

Chemotherapy is not preferred in some instances and in elderly females it may be more difficult and complex. While an 80-year-old can perfectly tolerate a standard chemotherapy course, some of the cells were not killed by the chemotherapy mutate (change) and become drug-resistant. Once they multiplied, more resistant cells may exist than chemotherapy-sensitive cells(6).

*Table:-1 Describes survival rates in chemo and radiotherapies*

	Chemotherapy plus radiation therapy	Chemotherapy alone	Radiation therapy
Local – regional recurrence	9%	32%	10%
Survival rates	54%	45%	30%
Probability of surviving 10 years or more	48%	34%	35%

Due to the medical reason, radiation therapy may be postponed, or radiation therapy may not be appropriate if the patient had radiation therapy earlier in the same region or having a medical condition that might make the patient particularly susceptible. If a patient is a pregnant, radiation therapy will not be given. Radiation therapy has been known for a long time to increase the danger of another cancer. External radiation therapy for a given time impacts patient body cells. Because there is no source of radiation inpatient's body, patients are not radioactive at any moment during and or after therapy, which is why chemotherapy gives fewer rates of survival compared to chemotherapy (7).When both chemotherapy and radiation therapy require to be administered simultaneously, radiation treatment begins after chemotherapy. Chemotherapy is generally provided first in early breast cancer treatment with both chemotherapy and internal beam radiation therapy.

Chemotherapy and radiation therapies are typically not administered simultaneously in breast cancer patients due to extensive use of Anthracycline-based chemotherapy regimens and concern for excessive radiation toxicity with simultaneous treatment(8). Therefore, the best way to sequence systemic and radiation therapies yet to be decided. This issue occurs in both patients treated with lumpectomy and those treated with mastectomy, but the ideal sequencing of adjuvant chemotherapy and radiotherapy in breast cancer patients remains contentious(9).

### When Radio and Chemotherapies are administered

- Radiation does not occur if the patient had radiation therapy in the same area before: it depends on the amount of radiation used before. In other cases, it may be possible to use radiation in the same area of the body or another area. Some Tumours do not react to radiation as well and may not be used to treat recurrence for the radiation of these diseases(10).
- Radiation therapy may be postponed for medical reasons, such as if you must wait for a wound to cure or if you grow a seroma (a collection of fluid that sometimes forms under a wound after surgery)(10).
- If the patient has a medical condition that could make you especially susceptible to its consequences, radiation treatment will not be provided.
- Radiotherapy should not be given if the patient is pregnant: Radiation therapy is more likely to harm the baby and is not usually given during pregnancy(10).
- It has long been known that radiation therapy can slightly raise the risk of getting another cancer. It's one of the possible side effects of treatment that doctors must think about when they weigh the benefits and risks

of each treatment. For the most part, the risk of secondary cancer from these treatments is less and is outweighed by the benefit of treating cancer, but the risk is not zero. This is one of the many reasons, each case is different, and each person must be part of deciding which kind of treatment is right for them.

➤ External radiation therapy impacts only a moment's cells in your body. You are not radioactive at any moment during or after therapy because there is no radiation source in your body.

➤ Chemotherapy is more difficult in treating elderly patients. This is because elderly patients may have underlying medical conditions like diabetes, hypertension, and cardiac problems.

Most data in the literature relates to early breast cancer treated with surgery for breast preservation.(11). Data on how to sequence chemotherapy and radiotherapy after mastectomy in a high-risk group of patients owing to advanced breast cancer locally or loco regionally is very rare.

Our evaluation aimed at evaluating the impact of different approaches to sequencing by looking at a reviewed article defined by the technique of enhancing strategies for chemotherapy. The use of Anthracyclines is now common in breast cancer chemotherapy and the use of taxanes increasing, especially in patients with advanced illnesses in the region. Because of the known Radio sensitizing effect, the concurrent use of Anthracyclines is more than critical and at least not proposed. Paclitaxel also leads with radiotherapy to enhanced toxicity, such as Pneumonitis and skin reactions.


## Conclusion

No predictive benefit can be reported in early breast cancer therapy for any radio-and chemotherapy sequence so far in the literature. The weakness of this review in balancing prognostic variables relativized the evaluation of the role of radio- and cancer sequencing. To lower the toxicity and death, the order should be always recommended. In addition, chemotherapy should follow radiotherapy according to the present study.

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## Author Bibliography

	<p><b>Dimple Bhagyasree Chandu</b></p> <p>Educational Qualification: Bachelor of pharmacy Designation: Scientific Medical writer Company: Global Pharmatek Phone: 7093248421 Email: <a href="mailto:dimple@globalpharmatek.com">dimple@globalpharmatek.com</a> Address: Global Pharmatek, Hyderabad, India-500018</p>
	<p><b>Harinatha Jolapuram</b></p> <p>Educational Qualification: Doctor of pharmacy Designation: Scientific Medical writer Company: Global Pharmatek Phone: 6303795370 Email: <a href="mailto:harinath@globalpharmatek.com">harinath@globalpharmatek.com</a> Address: Global Pharmatek, Hyderabad, India-500018</p>