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## Original research article

# Radiation therapy is not an independent risk factor for decreased sexual function in women with gynecologic cancers



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## ABSTRACT

**Aim:** To evaluate the associations of external beam radiation therapy (EBRT) and intracavitary brachytherapy (IB) with decreased sexual function.

**Background:** There's inconsistent evidence on whether radiation for gynecologic cancers has an impact on sexual health. IB, an underutilized treatment modality, is thought to have less adverse effects than EBRT.

**Materials and methods:** A cross-sectional study examining decreased sexual function following radiation for gynecologic cancers. A decrease in sexual function was measured as a change in the Female Sexual Function Index (FSFI) from before to after treatment, with a significant decrease determined by Reliable Change Index Statistic (RCIS). Chi-square and t-tests were employed.

**Results:** 171 women completed the survey; 35% ( $n=60$ ) received radiation, of whom 29 received EBRT and IB (48%), 15 EBRT alone (25%), 16 IB alone (27%). Women who received radiation had similar rates of decreased sexual function as women who did not (47% vs. 38%,  $P=0.262$ ). EBRT and IB had similar rates of decreased sexual function compared to women with no radiation (50% vs. 38%  $P=0.166$  and 47% vs. 38%  $P=0.309$ ). Women experiencing decreased sexual function were more likely to be under 50 years old (OR 5.4, 95%CI 1.6–18.1), have received chemotherapy (OR 5.7, 95%CI 1.4–22.9), and have cervical cancer (OR 7.8, 95%CI 2.1–28.8).

**Conclusions:** Treatment with EBRT or IB does not appear to impair sexual function in women with gynecologic cancer. Age less than 50, concurrent chemotherapy, and cervical cancer may place women with gynecologic cancer at higher risk for decreased sexual function following radiation.

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## 1. Background

There were an estimated 105,890 new cases of gynecologic cancers in 2016 with approximately 30,890 deaths. As treatments for gynecologic cancers are advancing, patient survivorship continues to increase, with 5-year survival rates for cervical and endometrial cancer surpassing 70% and 80%, respectively.<sup>1,2</sup> With this increasing survivorship, a greater focus on quality of life (QOL) is imperative for patients who have survived their gynecologic cancers and respective treatments. Sexual health is an important component of the quality of life, encompassing patients' intimate relationships, personal body image and pleasure sensations, as well as their reproductive and physical functions.<sup>3,4</sup> Multiple studies have shown that patients with gynecologic cancers are at increased risk for declining QOL and impaired physical and sexual function.<sup>3–6</sup>

Currently, there is inconsistent evidence as to whether radiation therapy, in particular, has an impact on sexual health.<sup>6</sup> Significant prospective evidence exists that radiation therapy can be used to optimize treatment for women with gynecologic cancers, and there is also significant evidence that radiation therapies have risks of both acute and long term side effects, including dermatitis, mucositis, bowel and bladder symptoms, infertility, and vaginal stenosis.<sup>6–8</sup> It is unclear whether radiation therapy and these side effects impact the patient's overall sexual function. Few studies have looked at the relationship between radiation therapy and quality of life or sexual function. These studies have produced contradictory results on whether radiation therapy, itself, is associated with impaired sexual function and whether factors like diagnosis, type of radiation treatment and age have an association with declining quality of life or impaired sexual function in women with gynecologic cancers.<sup>6,8</sup>

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## 2. Aim

This study aimed to examine radiation therapy, both external beam radiation therapy (EBRT) and intracavitary brachytherapy (IB), and its relationship with sexual health in order to better determine predictors of decreased sexual function following treatment. We had two main hypotheses: first, that radiation therapy, EBRT and IB would have similar rates of sexual dysfunction following treatment, and second, that concurrent chemotherapy and age less than 50 would predict higher rates of decreased sexual function following radiation therapy.

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## 3. Material and methods

Institutional Board Approval was obtained at all sites for this multi-institutional, cross-sectional study. The study population included female cancer survivors who were treated at the gynecological cancer clinics at the University of Colorado Hospital and Denver Health medical center from September 2013 through December 2015. Inclusion criteria included age 18–89 years, a diagnosis of gynecologic malignancy, and treatment at one of the respective institutions. The study was available in

English and Spanish, allowing for the inclusion of both English and Spanish speaking patients.

A cross-sectional study design was employed to assess sexual function in the female cancer survivors receiving treatment at the participating research institutions. The primary outcome analyzed was decreased sexual function following treatment. Participants were found through the gynecologic clinical practices of the participating research institutions, and administered a study survey either in person, by mail, or by an encrypted email. The study survey document included demographics, cancer diagnosis, sexual practice questions, and a sexual function questionnaire called the Female Sexual Function Index (FSFI). The FSFI includes 19 questions measuring sexual function, and has been validated for use in clinical trials. The survey was administered following completion of cancer treatment, and patients were asked to answer the sexual function questionnaire twice, once pertaining to their sexual function prior to treatment and once pertaining to their sexual function following treatment. A decrease in sexual function was measured as a change in the FSFI from before to after treatment. A Reliable Change Index Statistic (RCIS) was used to determine that a significant decrease in sexual function was a 5.8-point decrease in the FSFI.

Baseline characteristics between the radiation therapy and no radiation therapy cohorts were compared with chi square analysis. Rates of decreased sexual function were then compared between women who received radiation therapy and those who did not using chi-square and t-tests ( $n=171$ ). A bivariate analysis, again using chi-square and t-tests, was then performed on the sample of women who received radiation ( $n=60$ ). This analysis was performed with the primary outcome of decreased sexual function in order to determine which demographic and treatment variables had an association with decreased sexual function. Variables that were found to have a significant association in this bivariate analysis were then introduced into a multivariate logistic regression model to better determine independent associations with decreased sexual function. For all values, a  $P$  of  $<0.05$  was determined to be statistically significant.

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## 4. Results

A total of 409 women receiving treatment for gynecologic cancer at the University of Colorado Hospital and Denver Health medical center were approached for recruitment. Of these 409 women, 258 (63%) were enrolled in the study and 171 (42%) completed the pre- and post-treatment FSFI surveys. Of these 171 patients included in our analysis, 60 (35%) underwent treatment with radiation therapy, 29 of whom were treated with both EBRT and IB, 15 EBRT alone and 16 IB alone. In total, 44 women received EBRT and 45 women received IB. Women who received radiation therapy differed from those who did not in cancer diagnoses (endometrial cancer 53.3% vs. 33.3%, ovarian cancer 8.3% vs. 50.0%, cervical cancer 30.0% vs. 5.4%,  $P < 0.001$ ), rates of surgery (78.3% vs. 97.3%,  $P < 0.001$ ) and rates of chemotherapy (73.3% vs. 52.3%,  $P = 0.007$ ) (Table 1).

Women who received radiation therapy had similar rates of decreased sexual function as women who did not receive radiation therapy: 47% of women receiving any type of radiation

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