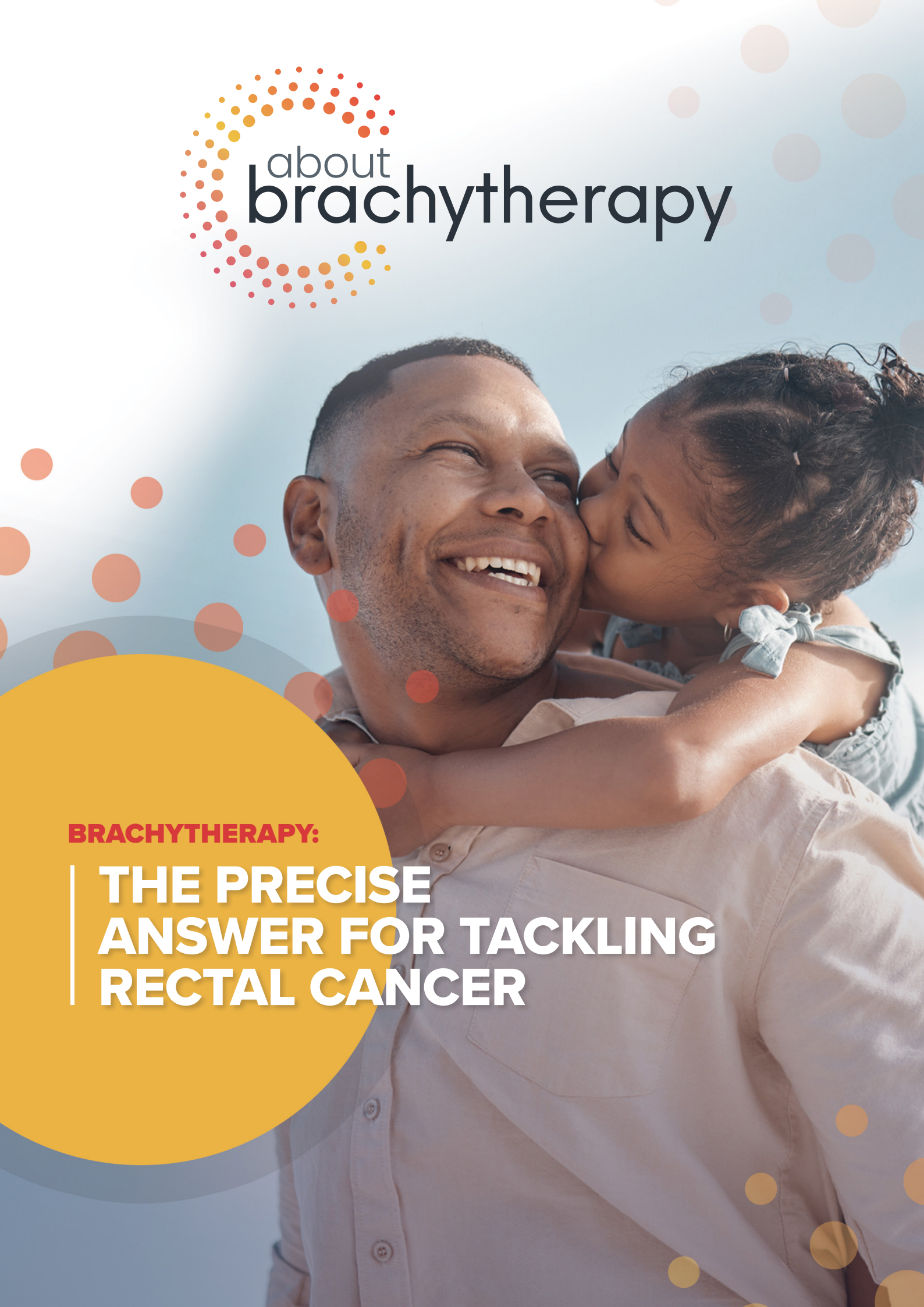
about brachytherapy



**BRACHYTHERAPY:**

# THE PRECISE ANSWER FOR TACKLING RECTAL CANCER

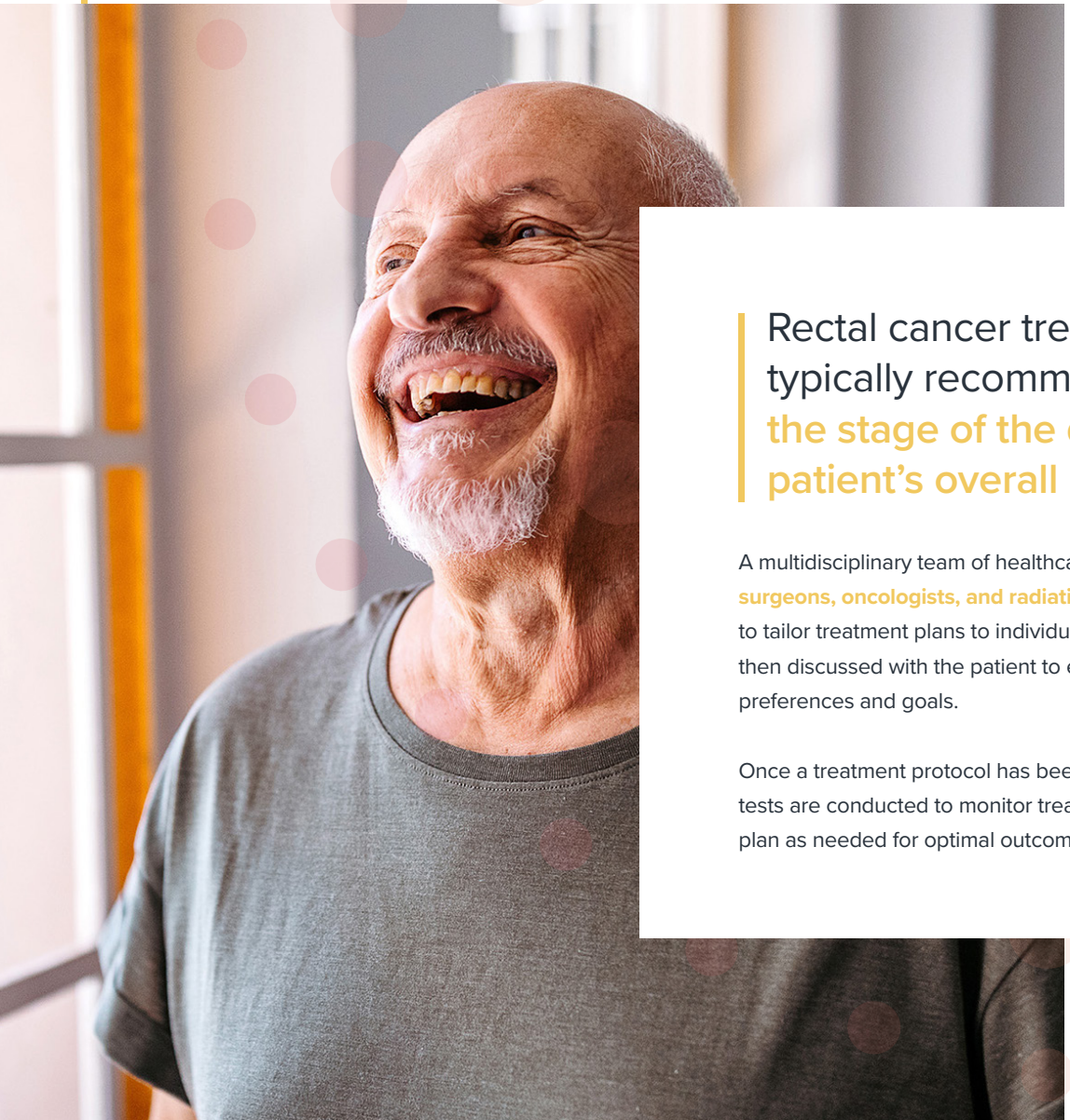
# Treatment options

There are several ways rectal cancer can be treated. These include standard treatments such as:

- **Surgery (partial or entire removal of the rectum)**
- **Radiation therapy—including External beam radiation therapy (EBRT), Stereotactic Body radiation therapy (SBRT) and Brachytherapy (interventional radiation therapy)**
- **Chemotherapy**

Emerging therapies can be considered particularly in clinical trial settings:

- **Radiation therapy—including External beam radiation therapy (EBRT), Stereotactic**
- **Body radiation therapy (SBRT) and Brachytherapy (interventional radiation therapy)**
- **Targeted therapy**
- **Immunotherapy**



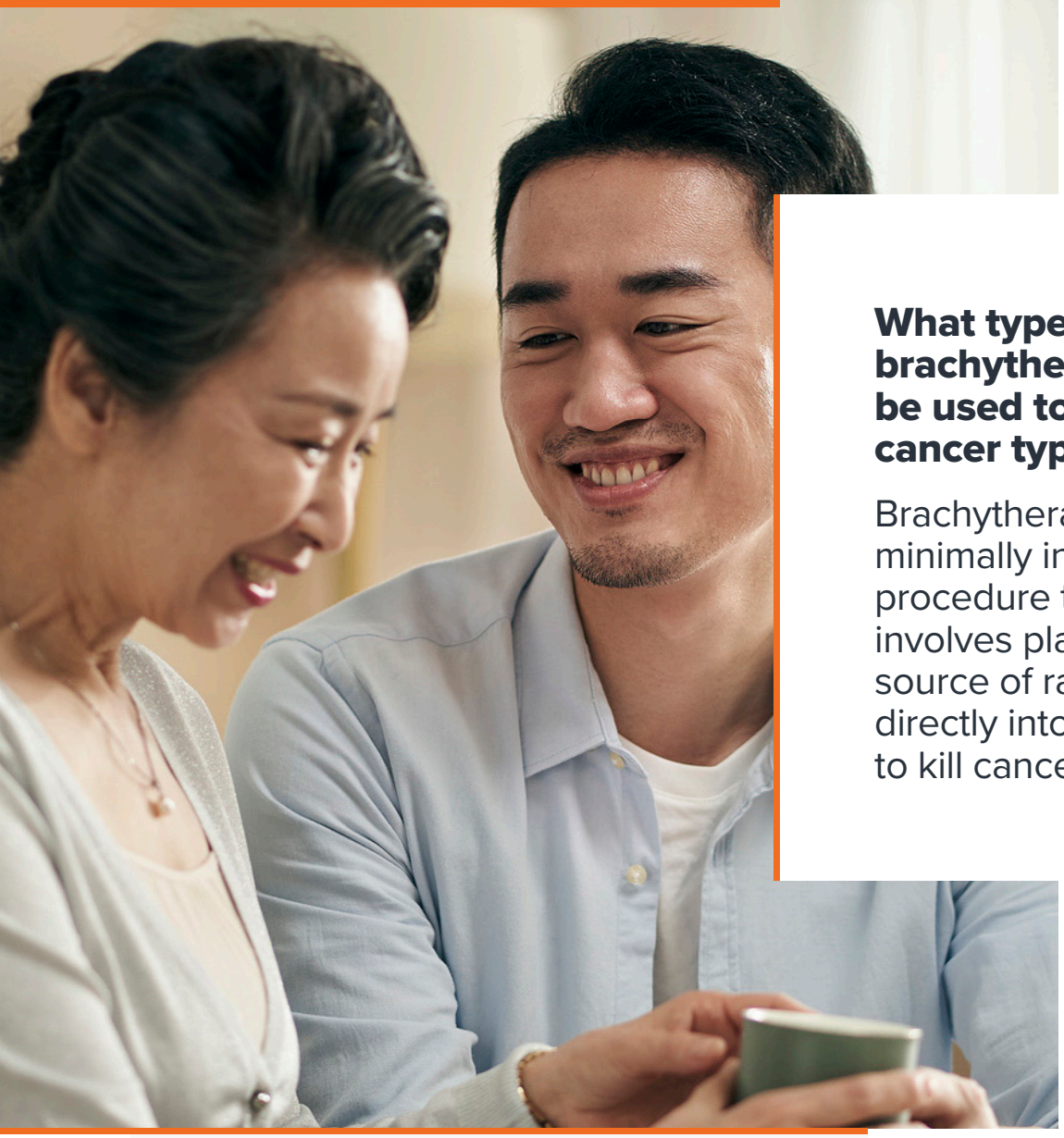
## Rectal cancer treatments are typically recommended based on the stage of the disease and the patient's overall health.

A multidisciplinary team of healthcare experts, including **surgeons, oncologists, and radiation therapists**, collaborates to tailor treatment plans to individual patients. These plans are then discussed with the patient to ensure alignment with their preferences and goals.

Once a treatment protocol has been implemented, regular follow-up tests are conducted to monitor treatment response and adjust the plan as needed for optimal outcomes.

You can learn more about rectal cancer treatment options by visiting **The National Cancer Institute** which provides treatment recommendations categorized by the cancer stage.

# Types of brachytherapy



## What types of brachytherapy can be used to treat this cancer type?

Brachytherapy is a minimally invasive procedure that involves placing a source of radiation directly into the rectum to kill cancer cells.

## Endorectal brachytherapy

Brachytherapy for rectal cancer is typically performed using endorectal brachytherapy.

"Endorectal" refers to inside the rectum. This treatment involves placing a small balloon-like device (a rectal applicator) into the rectum to deliver high-intensity radiation for a few minutes. This is typically done in 4 treatments (or less), with about 2 weeks between each treatment. This can let some patients, particularly elderly patients, avoid major surgery and a colostomy. This type of treatment is used for some small rectal cancers or in cases where radiation was already given in the pelvic area, and the rectal cancer has come back. Sometimes, external-beam radiation therapy is also given.

## High-dose-rate endorectal brachytherapy (HDREBT)

For rectal cancer, the most common type of brachytherapy is typically **high-dose-rate (HDR) brachytherapy.** During the procedure, a high dose of radiation is delivered to the tumor over a short period, often in multiple sessions. HDR brachytherapy allows for precise targeting of the cancerous cells while minimizing radiation exposure to healthy surrounding tissue and organs at risk. It is often part of a comprehensive treatment plan, including surgery, chemotherapy, and/or external beam radiation therapy. However, the specific treatment approach may vary depending on the individual patient's condition and the recommendations of their healthcare team.

## Image-Guided Brachytherapy for Rectal Cancer

Image-guided high-dose-rate (HDR) endorectal brachytherapy has advanced significantly in recent years. This technique utilizes advanced imaging technologies such as MRI or CT scans to visualize the tumor and surrounding structures precisely. By integrating these images into the treatment planning process, oncologists can accurately position the radiation source in respect to the tumor, ensuring optimal radiation delivery while minimizing damage to nearby healthy tissues. This level of precision allows higher radiation doses to be delivered directly to the tumor, improving treatment outcomes and reducing side effects for patients. Brachytherapy therapy irradiates from the inside of the body compared to EBRT, where radiation comes from outside the patient and goes through healthy tissue during treatment delivery.

# Effectiveness

## How effective is brachytherapy?

Clinical findings have consistently demonstrated the effectiveness of brachytherapy in treating rectal cancer, especially HDR brachytherapy.

Studies have shown high tumor control rates and favorable outcomes, particularly when combined with other treatment modalities such as surgery and chemotherapy. Brachytherapy delivers targeted radiation directly to the tumor, sparing surrounding healthy tissues and leading to better disease management.

## Effectiveness and Advances:

HDR Brachytherapy's Role: Proven to be a potent option for local tumor control, HDR brachytherapy minimizes radiation exposure to healthy tissues, offering a strategic advantage in rectal cancer treatment.

Technological Progress: The integration of advanced imaging techniques has refined brachytherapy. Image-guided procedures allow for precise targeting of the cancerous cells, enhancing the treatment's efficacy and reducing side effects.

## Significant Research Outcomes:

### High-Dose-Rate Endorectal Brachytherapy (HDREBT) [1]

A method showing promise for improved tumor control and possibly eliminating the need for surgery in certain cases. Current research is evaluating its effectiveness in both preoperative and postoperative settings, with phase III trials exploring its standalone potential.

### Image-Guided Brachytherapy [2]

Over the past two decades, this approach has seen significant advancements, marking a new era in rectal cancer treatment. High precision in targeting tumors leads to better outcomes and fewer side effects.

### The OPERA Study [3]

This research emphasizes the effectiveness of contact x-ray brachytherapy as a boost treatment, particularly for early-stage rectal cancer patients. It highlights the potential for increased organ preservation, offering hope for maintaining quality of life post-treatment.

## The landscape of rectal cancer treatment is evolving, with brachytherapy playing a crucial role

By leveraging precise targeting and advanced imaging, this treatment method offers a promising pathway for effective disease management, potentially sparing patients from the rigors of surgery and preserving organ function. As research continues, the future of brachytherapy in rectal cancer care looks increasingly promising, underlining its value in multimodal treatment strategies.

# Advantages of brachytherapy

For certain rectal cancers, brachytherapy can be as effective as surgery or external beam radiation. Its distinct advantages enhance treatment efficacy and significantly improve the patient's overall quality of life. Here are some key advantages:

**Highly Effective with Fewer Side Effects:**
Brachytherapy demonstrates a strong track record of curing certain types of rectal cancer, allowing precise radiation targeting directly at the tumor site, resulting in minimized side effects and sparing surrounding healthy tissues.

**Minimally Invasive with Quick Recovery:**
This treatment is less invasive compared to traditional surgery, often performed as an outpatient procedure, leading to shorter treatment times and rapid recovery, enabling patients to resume normal activities swiftly.

**Preserves Organ Function and Offers Flexibility:**
By concentrating radiation on the cancerous area, brachytherapy helps maintain organ function, with the potential for repeat treatments if necessary, providing a tailored approach to patient care.

**Viable Option for Various Patient Needs:**
Particularly beneficial for elderly or frail patients deemed inoperable or those opting against surgery, brachytherapy offers a non-operative, effective treatment for locally advanced rectal cancer cases, with a focus on preserving quality of life.

It's important to note that the suitability of brachytherapy as a treatment option depends on various factors, including the stage and characteristics of cancer. Brachytherapy is typically pursued in consultation with a multidisciplinary healthcare team.

# Side effects of brachytherapy

## All treatments for rectal cancer carry a risk of side effects. Radiation therapy in general is often associated with side effects.

However, brachytherapy is associated with sparing surrounding healthy tissue from unnecessary radiation, with the potential for fewer side effects than alternatives such as external beam radiation therapy. People respond to treatments in different ways.

The type of side effects that may be experienced depends on a number of factors such as the stage of the rectal cancer and whether there are any compounding health problems. The majority of brachytherapy patients receive a multimodality treatment with other treatments such as surgery, and EBRT. This makes it very difficult to distinguish between side effects from brachytherapy, side effects caused by other treatments, and disease related symptoms and complications.

### Acute (Short-Term) Side Effects:

| | |
|---|---|
| Rectal Discomfort: | Short-term discomfort or fullness in the rectum during or after the procedure. |
| Bowel Changes: | Temporary changes in bowel habits, such as diarrhea or constipation. |
| Urinary Symptoms: | Mild, short-term urinary symptoms like increased frequency or urgency. |
| Bowel Changes: | General fatigue during treatment, which typically resolves after the treatment is complete. |

### Potential Long-Term Side Effects:

Most side effects gradually disappear in weeks or months after treatment. But some side effects can continue. Or you might notice some that begin months or years later.

| | |
|---|---|
| Sexual Dysfunction: | There is a possibility of both short-term and long-term sexual dysfunction, although this is more commonly associated with other pelvic radiation methods. |
| Bowel Changes: | Some individuals may experience persistent changes in bowel habits over the long term. |
| Rectal Inflammation or Ulceration | In rare cases, inflammation or ulceration of the rectal lining may have longer-term effects. |

It's essential for individuals undergoing rectal brachytherapy to maintain open communication with their healthcare team. Regular follow-up appointments allow healthcare providers to monitor and address any side effects, providing supportive care and guidance as needed. Remember that advancements in medical techniques and personalized treatment plans aim to minimize potential long-term side effects.

# Safety of radiation

## A common question about brachytherapy is whether the procedure causes any radiation risks to family and friends

If high dose rate (HDR) brachytherapy is used, the radiation sources are only temporarily placed in the body and are removed after each treatment. Hence, there is no radiation risk to family or friends.

If low dose rate (LDR) brachytherapy (seed therapy) is used, only the seeds give out radiation and these will not make you radioactive. The radiation levels given out by the seeds are low; however, your healthcare professional may advise you to avoid close contact with small children and pregnant women after the brachytherapy procedure.

# FAQs

## How effective is brachytherapy in treating rectal cancer? [1,2,3]

Clinical findings have consistently demonstrated the effectiveness of rectal brachytherapy in treating rectal cancer, especially HDR brachytherapy. Studies have shown high tumor control rates and favorable outcomes, particularly when combined with other treatment modalities such as surgery and chemotherapy. A 50% increase in survival rates has been reported when brachytherapy is combined with other treatments for rectal cancer. This combination therapy has shown significant effectiveness in improving patient outcomes and increasing the chances of survival compared to treatments without brachytherapy.

## Can I choose whether I have a low dose rate or a high dose rate of brachytherapy to treat my rectal cancer?

This will depend on several factors, including how advanced your tumor is and what treatments are available at your hospital. Discuss which options might be best for you with your doctor or other healthcare professional.

## Will the brachytherapy procedure hurt?

For most patients with rectal cancer, HDR brachytherapy is a well-tolerated procedure with some discomfort but without pain.

## How will I know if brachytherapy has worked?

After your procedure, you will be scheduled regular appointments to check that the tumor is responding to the treatment.

## What are the side effects of brachytherapy in the treatment of rectal cancer?

All treatments for rectal cancer carry a risk of side effects. Side effects of brachytherapy can include problems passing urine and bowel problems. Some men may find that their sexual function is affected. Read more on possible side effects of brachytherapy.

## How soon can I return to work after receiving brachytherapy?

After high-dose-rate brachytherapy, you may be able to return to work the following day if you feel good and are cleared by your doctor.

## Can I just have brachytherapy alone to treat my rectal cancer?

Usually, brachytherapy is a part of the treatment protocol, which includes external beam radiation therapy and chemotherapy. Rectal brachytherapy can be used as a monotherapy in certain cases, particularly for early-stage rectal cancer or in patients who are not candidates for surgery or external beam radiation therapy. Your doctor will discuss your treatment with you.

## If the cancer comes back, can I choose to have brachytherapy again?

Yes, this is possible. Brachytherapy can be used in case of cancer recurrence. Your doctor will recommend the most appropriate treatment or a treatment combination.

# References

## Treatment options


1. The National Cancer Institute available at https://www.cancer.gov/types/colorectal/patient/rectal-treatment-pdq#_345


## Brachytherapy


1. Elsevier Cancer/Radiothérapie Volume 26, Issues 6–7, October 2022, Pages 879-883. Clinical applications of high dose rate endorectal brachytherapy for patients with rectal cancer by T. Vuong et al. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S1278321822001536?via%3Dihub
2. Cancers 2022, 14(19), 4846. Image-Guided Brachytherapy for Rectal Cancer: Reviewing the Past Two Decades of Clinical Investigation, by Te Vuong et al. Retrieved from https://www.mdpi.com/2072-6694/14/19/4846
3. Elsevier The Lancet Gastroenterology & Hepatology, Volume 8, Issue 4, April 2023, Pages 356-367.


## FAQs


1. Clinical application of high dose rate endorectal brachytherapy for patients with rectal cancer, T. Vuong et al.
2. MORPHEUS Phase II-III study; a pre-planned interim safety analysis and preliminary results. Aurelie Garant et al.
3. Neoadjuvant chemoradiotherapy with radiation dose escalation with contact x-ray brachytherapy boost or external beam radiotherapy boost for organ preservation in early cT2-cT3 rectal adenocarcinoma (OPERA): a phase 3, randomised controlled trial. J-P Gerard et al.