

**DE NOVO CLASSIFICATION REQUEST FOR
PROSTATE IMMOBILIZER RECTAL BALLOON
DECISION SUMMARY**

1. Regulatory Information:

a. **Identification:**

FDA identifies this type of device as:

Rectal Balloon for Prostate Immobilization

The Rectal Balloon for Prostate Immobilization is a single use, inflatable, non-powered positioning device placed in the rectum to immobilize the prostate in patients undergoing radiation therapy. The device is intended to be used during all the phases of radiation therapy, including treatment planning, image verification, and radiotherapy delivery.

b. **New Regulation Number: 21 CFR 892.5720**

c. **Classification: II**

d. **Product Code: PCT**

2. Background:

a. **Device Name: Prostate Immobilizer Rectal Balloon**

b. **Submission number: K132194**

c. **Date of De Novo Request: July 15, 2013**

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e. **Requester's Recommended Classification: Class II**

3. **Indications for Use:**

The RadiaDyne Prostate Immobilizer Rectal Balloon is a single-use disposable, inflatable, non-powered positioning device intended for use in the temporary positioning of the rectal wall and adjacent structure in the male human anatomies. The purpose of the device is to stabilize the prostate during Computed Tomography (CT) exam and X-ray, when these imaging techniques are used for Radiation Therapy (RT) planning. The placement of the balloon requires a Physician or a Physician directed healthcare professional, and is performed as a separate procedure apart from the standard CT exam and RT treatment.

4. **Device Description:**

- a. **Device Description:** The RadiaDyne Prostate Immobilizer Rectal Balloon, as shown in figures 1 and 2 is designed as an immobilizer to assist in positioning the prostate in a more predictable and reproducible location during Computed Tomography (CT) exam and X-ray, when these imaging techniques are used for Radiation Therapy (RT) planning. The Prostate Immobilizer Rectal Balloon is inserted into the rectum and inflated prior to the start of a CT scan or RT therapy procedure. The device stabilizes the prostate once the device is inflated. The Prostate Immobilizer Rectal Balloon is deflated and removed after each individual scan or therapy procedure is complete, and a new balloon is used in the next therapy session. RadiaDyne's device is designed for single use, is provided non-sterile to the end user, is not intended to be sterilized by the end user, and is packaged in a kit configuration. Each kit contains the following items: Rectal Balloon (polyurethane); Syringe (accessory to the device); Lubricant (accessory to the device); Locking Stopper (accessory to the device); and Instructions Manual. The balloon consists of ^{(b)(4) Trade Secret} Formula & Process

The main section of the device consists of a balloon and tubing which are made of polyurethane. The remainder of the device is made from other medical grade materials consisting of the following components shown in Table 1.

<p>Table 1</p> <p>Bill of Material</p> <p>(Key Materials/Components Only)</p> <p>RadiaDyne Prostate Immobilizer Rectal Balloon</p>
<p>Main Device</p>

Component	Material
Balloon	Polyurethane
Catheter tubing	(b)(4) Trade Secret Formula & Process
Connector	
HUB	
Inner lumen	
1-way Stopcock, 90° turn Handle	
Venting Tip	
1.0 mm Fiducial Marker (only for “F” model designated devices)	
Accessory Kit	
Syringe (100 ml)	Polypropylene/Rubber
Lubricant	Fougera Surgilube®
Locking Stopper	(b)(4) Trade Secret Formula & Process

The device can be inflated with either air or water, and this process is carried out with the single use disposable syringe that is supplied with the device in the accessory kit. The locking stopper supplied with the Prostate Immobilizer Rectal Balloon controls the depth at which the balloon is inserted into the rectum. The device can therefore be locked into place once inserted into place. RadiaDyne’s Prostate Immobilizer Rectal Balloon is offered with a gas release valve (Models GRB) and without a gas release valve (Models: RB). Prior to insertion of the balloon, rectal gas can be removed from the rectum by methods not involving the balloon, such as inserting a pediatric catheter. The gas release model incorporates an open conduit through the balloon stem so that the rectal gas can be released once the balloon is inserted.

Figure 1: RadiaDyne Prostate Immobilizer Rectal Balloon GRB Series
 [with a gas release valve]

CUSTOMIZABLE FABRICATION

GR SERIES

PROSTATE IMMOBILIZATION TREATMENT DEVICE

FEATURES

- 1.SOFT/FLEXIBLE TIP**
 - ATRAUMATIC DESIGN FOR COMFORTABLE INSERTION
- 2.FIDUCIAL MARKER (RB-100F)**
 - DAILY DEVICE VERIFICATION
- 3.GAS RELEASE TIP (GR Series Device)**
 - RELEASE TRANSIENT RECTAL GAS (After Inflation)
 - DECOMPRESS INITIAL RECTAL GAS
- 4.TAPERED DESIGN**
 - TAPERED PROXIMALLY/DISTALLY (Deflated Position)
 - FOLD UPON INSERTION
- 5.DISTAL BULBOUS BALLOON SECTION**
 - ASSISTS WITH STABILIZING SEMINAL VESICLES
- 6.MID-LINE GROOVE**
 - PROVIDES STABLE PLATFORM
 - MAINTAINS FLAT LONGITUDINAL SECTION FOR ANTERIOR SHAPE
- 7.THIN WALL BALLOON**
 - SOFT/THIN POLYURETHANE LAYERS FOR MINIMALLY INVASIVE INSERTIONS
- 8.CUSTOMIZABLE FILL CONTENT**
 - AIR/WATER CAPABILITY
 - CAPACITY FOR VARIABLE FILL VOLUMES (Physician Orders)
- 9.LOCKING DEPTH STOPPER**
 - REPRODUCIBLE DEVICE PLACEMENT (Inter-fractionally)
 - CUSTOMIZABLE TO PATIENT ANATOMY
 - ALLOWS FOR LOWER ANATOMICAL PLACEMENT
 - REDUCES DEVICE MIGRATION
- 10.DEPTH MARKERS**
 - REPRODUCIBLE CALIBRATION
- 11.SEMI-FLEXIBLE SHAFT**
 - NARROW PROFILE (Comparable size to Rectal Suppository ~ ¼")
 - CONTOURS TO PATIENT ANATOMY
- 12.GAS RELEASE VENT**
- 13.FLEXIBLE SYRINGE CONNECTOR TUBING**
- 14.RAPID RELEASE VALVE**

Figure 2: RadiaDyne Prostate Immobilizer Rectal Balloon RB Classic Series
 [without a gas release valve]



**CUSTOMIZABLE
 FABRICATION**

CLASSIC SERIES PROSTATE IMMOBILIZATION TREATMENT DEVICE

FEATURES

1. SOFT/FLEXIBLE TIP

- ATRAUMATIC DESIGN FOR COMFORTABLE INSERTION

2. FIDUCIAL MARKER (RB-100F)

- DAILY DEVICE VERIFICATION

3. TAPERED DESIGN

- TAPERED PROXIMALLY/DISTALLY (Deflated Position)

4. DISTAL BULBOUS BALLOON SECTION

- ASSISTS WITH STABILIZING SEMINAL VESICLES

5. MID-LINE GROOVE

- PROVIDES STABLE PLATFORM
- MAINTAINS FLAT LONGITUDINAL SECTION FOR ANTERIOR SHAPE

6. THIN WALL BALLOON

- SOFT/THIN POLYURETHANE LAYERS FOR MINIMALLY INVASIVE INSERTIONS

7. CUSTOMIZABLE FILL CONTENT

- AIR/WATER CAPABILITY
- CAPACITY FOR VARIABLE FILL VOLUMES (Physician Orders)

8. LOCKING DEPTH STOPPER

- REPRODUCIBLE DEVICE PLACEMENT (Inter-fractionally)
- CUSTOMIZABLE TO PATIENT ANATOMY
- ALLOWS FOR LOWER ANATOMICAL PLACEMENT
- REDUCES DEVICE MIGRATION

9. DEPTH MARKERS

- REPRODUCIBLE CALIBRATION

10. SEMI-FLEXIBLE SHAFT

- NARROW PROFILE (Comparable size to Rectal Suppository - 1/4")
- CONTOURS TO PATIENT ANATOMY

11. FLEXIBLE SYRINGE CONNECTOR TUBING

12. RAPID RELEASE VALVE

After inflation, the gas release conduit continues to provide an escape path for any additional gas arriving at the superior end of the balloon, thus preventing gas accumulation during the procedure. The gas release valve is always open and does not require any action to function. If the model without the gas release valve is used, some transient gas may accumulate during the procedure, as is customary when no balloon is inserted. Aside from this feature, the GRB and RB models are identical in materials, construction and function. Some of the key design features of the RadiaDyne Prostate Immobilizer Rectal Balloon are shown in the product specific marketing literature in figures 1 and 2.

- b. **Principle of Operation:** The placement of the balloon requires a Physician or a Physician-directed healthcare professional, and is performed as a separate procedure apart from the standard CT exam and RT treatment. The balloon is inserted in the patient's rectum and inflated with air or water using the syringe. Standard imaging and treatment protocols are to be used to verify the device placement and adjust the stopper depth until the desired device position is obtained. The balloon is intended to stabilize the prostate and displace normal tissue away from the radiation treatment area. Stabilization of the prostate is intended to allow more consistent treatment targeting and delivery of radiation to tumor only. The displacement of normal tissue is intended to reduce unnecessary radiation exposure and reduce side effects from radiation treatment.
- c. **Modes of Operation:** The device can be used to stabilize the prostate during Computed Tomography (CT) exam and X-ray, when these imaging techniques are used for Radiation Therapy (RT) planning.
- d. **Accessories:** The device is packaged in a kit configuration with the following items: rectal balloon, syringe (optional), lubricant, stopper, and instruction manual.

5. **Summary of Nonclinical/Bench Studies**

Nonclinical performance data were provided to address the following areas:

a. **Biocompatibility/Materials:**

Biocompatibility testing was submitted for the subject device which is intended for direct skin and/or mucosal membrane contact with the patient for less than 24 hours. There is also the possibility for contact with breached or compromised skin/mucosal surface; as such the

(b)(4) Trade Secret
Formula & Process



- Cytotoxicity was evaluated (b)(4) Trade Secret Formula & Process
The test articles had a toxicity grade of 0 which indicates no reactivity.
- Skin Irritation was evaluated using (b)(4) Trade Secret Formula & Process
The results showed no significantly greater biological reaction than sites treated with the control article. The primary irritation index was 0.0. The response was categorized as negligible.
- Sensitization: (b)(4) Trade Secret Formula & Process
All sites were observed for evidence of dermal reactions (b)(4) Trade Secret Formula & Process after patch removal. Based on the (b)(4) Trade Secret Formula score the test article has a Grade I reaction and is classified as having weak allergenic potential.
- Acute Systemic Toxicity was evaluated by (b)(4) Trade Secret Formula & Process
The result showed no significant difference between test and control animals.

These tests adequately address the biocompatibility concerns for the subject device.

b. **Shelf Life/Sterility:**

The sponsor has provided shelf-life testing data, which ensures that the subject device is within acceptable bioburden limits and device will function properly after 2 years of storage. Therefore, the shelf-life of RadiaDyne's Prostate Immobilizer Rectal Balloon is declared on the product label and is set at two years. The sponsor has specified that the bioburden limit for the subject device is (b)(4) Trade Secret Formula & Process and the tested devices were all well below (b)(4) Trade Secret Formula & Process which is acceptable. This specification derives from the medical and scientific literature and the fact that the product is neither intended nor offered for sale as sterile, and is for use in the rectum, an anatomical cavity laden with bacteria and enormously high CFU counts. Please refer to Bench testing section for bioburden testing results.

c. **Electromagnetic Compatibility and Electrical Safety:**

Not applicable

d. **Software:**

Not applicable

e. **Performance Testing – Bench**

The following performance tests were performed:

- **Bioburden testing:** It was conducted based on (b)(4) Trade Secret Formula & Process
This process was repeated (b)(4) TS Process times per article. Colony Forming Units (CFU) were enumerated for each volume. (b)(4) Trade Secret Formula & Process
- **Leakage Testing:** All devices are subject to leak testing as the final quality control check. Each device is filled and held under pressure (b)(4) TS Process before they are released to inspection. Devices that pass the leak test are accepted for final processing to finished goods.
- **Tensile-strength and Burst-strength Testing (in air):** A sampling of each lot is subject to burst-strength testing. The purpose of the testing is to verify the elastic deformation and seal integrity. The balloon is capable of withstanding a test-fill volume of (b)(4) Trade Secret Formula & Process of H₂O before rupturing. The tensile strength is (b)(4) Trade Secret Formula & Process using a standard (b)(4) TS Process coupon at (b)(4) Trade Secret Formula & Process of travel.
- **Burst-strength testing (in vivo):** Each product code is designed to a (b)(4) Trade Secret Formula & Process inflation volume. This is a controlled test to ensure that the balloon is capable of inflating to its designed volume plus a reasonable safety factor. This test simulates in vivo use of rectal balloon inside the rectum by (b)(4) Trade Secret Formula & Process and inflating in a (b)(4) Trade Secret Formula & Process
- **Stopper resistance testing:** (b)(4) Trade Secret Formula & Process placement of the balloon ensures the best product performance. (b)(4) Trade Secret Formula & Process

(b)(4) Trade Secret Formula & Process are essential to ensuring (b)(4) Trade Secret Formula & Process placement. The stopper test involves (b)(4) Trade Secret Formula & Process in a controlled manner (b)(4) Trade Secret Formula & Process. The results take into account the combination of both (b)(4) Trade Secret Formula & Process

- Vent testing: To test the gas release portion (vent) of the device, (b)(4) Trade Secret Formula & Process. The air flow must be greater than (b)(4) Trade Secret Formula & Process (b)(4) Trade Secret Formula & Process

All the above performance tests are adequate.

6. Summary of Clinical Information

The following is the summary of the literature provided by the sponsor that supports a reasonable assurance of safety and effectiveness for the subject device:

Wachter *et al* [1] observed maximum prostate anterior-posterior (AP) displacements >5 mm in 2/10 patients treated with endorectal balloons, compared to 8/10 patients treated without endorectal balloons. Using repeated CT-examinations, lead to the conclusion that an endorectal balloon reduces prostate movements during treatment. A total of 252 patients were treated for localized prostate cancer using fractionated radiation therapy to a total dose of 66 Gy (ICRU reference point) with the rectal balloon catheter used in daily radiation treatment. It was reported there were no complications related to the balloon application. These balloons were longer compared to the subject balloon and did not cause any perforations or other tissue damage. D'Amico *et al* [2] with a balloon similar shape and fill volume to the subject balloon concluded that an endorectal balloon reduced intrafraction motion, as repeated CT-imaging with 1 min time intervals showed a decrease in maximum prostate AP displacement from 4 mm to ≤ 1 mm. They also concluded that the placement and inflation of the endorectal balloons were well tolerated by all patients. Woel *et al* [3] described acute toxicity in patients treated with four-field three-dimensional (3D) conformal radiation therapy (CRT) using an intrarectal (endorectal) balloon during the first 15 fractions of radiation therapy. The finding of this study show that the expected increase in acute genitourinary, gastrointestinal, and dermatologic toxicity is resolved either by end of treatment or by 3 months after treatment. In this follow-up study, Woel *et al* [3] found that the intrarectal (endorectal) balloon was well tolerated by all of the patients; none of the patients had to discontinue use of the balloon device. The balloon used in this study is similar to the subject balloon in fill volume, shape and it fills parallel to the rectal wall. Patel *et al* [4] demonstrated that the use of a rectal balloon significantly reduces the rectal wall volume in the high dose region for radiation therapy and should produce corresponding reductions in rectal complication rates. They also

found that the balloon catheter has been well-tolerated without any complications, but some patients required the use of topical lidocaine ointment due to rectal irritation. None of the patients in this study had to discontinue use of the endorectal balloon. The balloon used in this study was similar in fill volume to the subject device balloon

It has been reported that the Baylor College of Medicine/Methodist Hospital group [5] has been using endorectal balloons in prostate IMRT since 1998. In their study, they report that three hundred ninety-three of the 396 patients (393/396=99.2%) tolerated the 100 ml barium-enema type endorectal balloon for the entire 35-day course of the Intensity modulated radiation therapy (IMRT) treatment. Only 0.8% (3/396) required volume reduction to 50 ml, 4.3% (17/396) required lubricant jelly, 11.6% (46/396) requested anal medication and 6.8% (27/396) requested antidiarrhea medication. The rate of acute anorectal toxicity was clinically acceptable. No patient had grade 3 or 4 toxicities. Duration of the toxicities typically was 1 to 2 weeks. Patients with pre-existing anorectal disease are at higher risk of developing acute anorectal toxicity with the use of an endorectal balloon. This finding is considered as a warning/contraindication. The endorectal balloon (barium enema) used in this study differs from the subject balloon in key parameters like balloon shape and shaft design. The subject balloon shape is more favorable from safety point of view because of more favorable fill volume and balloon shape. Ronson *et al* [6] also observed equally good results in a group of 3561 patients. Of all the patients evaluated, 3,474 patients (3474/3561=97.6%) tolerated the rectal balloon throughout the entire course of prostate irradiation treatment. Only 87 patients (87/3561=2.4%) declined the balloon for one or more treatments. Importantly, these patients still utilized the balloon for 85.5% of the total treatment days (mean percent). Rectal balloons with fill volumes=120cc were well tolerated by the study patients. The subject balloon fill volume of 60-100ml is less than the fill volume used by Ronson *et al* [6] and thus favorable from safety and tolerance point of view.

The studies by Both *et al* [7], Wang *et al* [8], and Wootton *et al* [9] using the subject balloon system demonstrate that the application of endorectal balloons is safe and well-tolerated. Some patients with pre-existing anorectal disease require additional clinical care

Both *et al* [7] using the subject balloon system reported on intrafraction prostate displacements measured with electromagnetic tracking system. It was reported that the use of daily endorectal balloon placement consistently stabilized the prostate, preventing clinically significant displacement (>5 mm) during imaging and therapy. A 3-mm internal margin may sufficiently account for 95% of intrafraction prostate movement for up to 6 minutes of treatment time. Directional analysis suggests that the lateral internal margin could be further reduced to 2 mm. Wang *et al* [8] using the subject balloon system quantified interfraction prostate motion between patient groups treated with and without daily endorectal balloons employed during prostate radiotherapy and established the effectiveness of the subject endorectal balloon.

The percentage of time that the prostate was displaced in any direction was less in the subject endorectal balloon group for almost all magnitudes of motion considered. The directional analysis shows that the endorectal balloon reduced internal margins in almost all directions, especially the anterior-posterior direction.

Wootton *et al* [9] using the subject balloon system retrospectively examined the effectiveness of an endorectal balloon that has a passive gas release conduit for the removal of rectal gas during prostate proton radiotherapy. Bowel gas buildup can cause balloon displacement. They found that the subject balloons with gas-release mechanism can effectively release bowel gas, decrease the probability of balloon displacement and may be able to improve clinical workflow by reducing the need for separate medical procedures to reduce bowel gas.

The review of the available literature related to the use of endorectal balloons and the subject balloons shows that the subject balloon is safe and well tolerated by patients. However, as the literature suggests, there are a few risks involved which can be mitigated by applying general and special controls. The literature also reveals that the benefit of the Prostate Immobilizer Rectal Balloon is to improve target localization and reduce prostate motion, which may improve treatment outcomes in external beam radiotherapy. The review of the different clinical studies also raises a question about reproducibility of daily endorectal balloon insertion. This can be improved by applying position verification strategies to confirm the position of rectal balloon relative to prostate gland. In view of all the reviewed clinical studies, it can be concluded that the subject balloon is a reasonably safe and effective device.

References:

- [1] S. Wachter et al., *The Influence of a Rectal Balloon as Internal Mobilization Device on Variations of Volumes and Dose-Volume Histograms During Treatment Course of Conformal Radiotherapy for Prostate Cancer*. 52 INT. J. RADIAT. ONCOL. BIOL. PHYS. 91-100 (2002).
- [2] A.V. D'Amico, et al., *A Practical Method to Achieve Prostate Gland Immobilization and Target Verification for Daily Treatment*, 51 INT. J. RADIAT. ONCOL. BIOL. PHYS. 1431-36 (2001).
- [3] Woel et al., *Acute Gastrointestinal, Genitourinary, and Dermatological Toxicity During Dose-escalated 3Dconformal radiation Therapy (3DCRT) Using an Intrarectal Balloon for Prostate Gland Localization and Immobilization*, 62 INT. J. RADIAT. ONCOL. BIOL. PHYS. 392-396 (2005).
- [4] R.R. Patel et al., *Rectal Dose Sparing with a Balloon Catheter and Ultrasound Localization in Conformal Radiation Therapy for Prostate Cancer*, 67 RADIOTHER. & ONCOL. 285-94 (2003).
- [5] M.D. Bastasch, M.D., et al., *Tolerance of Endorectal Balloon in 396 Patients Treated With Intensity-Modulated Radiation Therapy (IMRT) for Prostate Cancer*, 29 AM. J. CLIN. ONCOL. 8-11 (2006).

- [6] B.B. Ronson, et al., *Patient Tolerance of Rectal Balloons in Conformal Radiation Treatment of Prostate Cancer*, 64 INT. J. RADIAT. ONCOL. BIOL. PHYS. 1367-70 (2006).
- [7] S. Both, et al., *Real-Time Study of Prostate Intrafraction Motion During External Beam Radiotherapy with Daily Endorectal Balloon*, 81 INT. J. RADIAT. ONCOL. BIOL. PHYS. 1302-09 (2011).
- [8] K.K. Wang et al., *A Study to Quantify the Effectiveness of Daily Endorectal Balloon for Prostate Intrafraction Motion Management*, 83 INT. J. RADIAT. ONCOL. BIOL. PHYS. 1055-63 (2011).
- [9] L.S. Wootton et al., *Effectiveness of a Novel Gas-Release Endorectal Balloon in the Removal of Rectal Gas for Prostate Proton Radiation Therapy*, 13 J. APP. CLIN. MED. PHYS., 190-97 (2012).

7. Labeling

The labeling for the RadiaDyne Prostate Immobilizer Rectal Balloon is consistent with the clinical data and covers all the hazards and other clinically relevant information that may impact safe and effective use of the device. The labeling is sufficient and satisfies the requirements of 21 CFR Part 801.109 Prescription devices. The following summarizes how the RadiaDyne Prostate Immobilizer Rectal Balloon labeling addresses the special controls:

- a. **Labeling must include adequate instructions for use on the proper insertion procedure, positioning, and inflation of the rectal balloon.**

The instructions for the Prostate Immobilizer Rectal Balloon include the following: insert the device, position and lock the device; use gas release catheter or transient gas-release vent; fill the balloon component of the device; and remove the device. Statements in the Instructions for Use relate to the use of lubricant, using clinical imaging verification technique and treatment protocols, monitoring the patient's tolerance of the device, and the necessary procedures when a patient does not tolerate the device. The Instructions for Use also include photographs of the Prostate Immobilizer Rectal Balloon, diagrams related to inserting and removing the device, the complete Intended Use and Indications for Use statements, and information about transportation and storage of the device. The labeling also provides the information about used lubricant, Fougera Surgilube® and MR conditional for 3 T or less for tantalum fiducial marker.

- b. **The device labeling must include appropriate contraindications, warnings, and an expiration date that is supported by performance data as well as supporting the sterility if presented as sterile.**

The labeling includes following warning statements: "Do not transport the patient with the rectal balloon inserted. The balloon should be removed prior to transport."; "Failure to perform the standard imaging position verification

protocol may cause the device to not perform as intended.”; “Reduce the rectal balloon fill volume if the patient experiences discomfort due to the rectal balloon inflation.” and “Do not apply excessive pressure/force on the shaft or tubing of the rectal balloon.” The labeling includes following contraindications: Hemorrhoids; Peri-rectal/Peri-anal abscess; Anal fissure; Prior low anterior resection; Rectal fistula; Rectal fissure; Rectal ulcer; Anal canal stricture; Diverticulitis; Surgery of the prostate, rectum or surrounding area within the last eight weeks; Radiation of the rectum or surrounding area within the last eight weeks; and Any standard exclusionary criteria recognized for endo-rectal / intra-rectal devices.

The labeling also includes an expiration date which has been specified as 2 years and states that the device is not sterile since this is not required for this application. The device labeling also states that it is for single use.

8. Risks to Health and Required Mitigation Measures

FDA has indentified following risks generally associated with the use of Prostate Immobilization Rectal Balloons:

- i. **Anorectal Toxicity:** Insertion of rectal balloon can cause adverse rectal tissue reaction on patients as a result of direct contact to the rectal mucosa. This reaction may also result due to toxic, irritating, or sensitizing agents present in the rectal balloon formulation (allergic reaction).
- ii. **Tissue Damage:** Healthy tissue damage can result due to lack of physical integrity of the rectal balloon. A lack of physical integrity of rectal balloon is a failure to perform the prostate immobilization due to low quality of the material and substandard structural feature of the device. It can lead to adverse consequences to the patients such as leakage which can cause tissue toxicity from contamination and balloon burst which can cause local injury. Lack of physical integrity of the rectal balloon can also cause other mechanical and functional disorders.
- iii. **Perforation of the Rectum:** Perforation of the rectum may occur due to traumatic insertion of the rectal balloon. The improper direction of the rectal balloon tip and excessive force are likely the main causes of traumatic insertion of the rectal balloon. Over distending the rectal balloon can also lead to perforation. The bowel gas buildup can also contribute to perforation.
- iv. **Irradiation of Healthy Tissue:** Irradiation to healthy tissue can occur due to incorrect balloon placement. Incorrect balloon placement may be due to bowel gas build up, incorrect balloon insertion, or incorrect inflation of the balloon and may cause irradiation of healthy tissue and/or an inadequate (higher or lower) radiation dose delivered to the treatment target.

- v. Patient intolerance: Insertion of the rectal balloon can be intolerable to the patient. This intolerance can be due to any one or combination of the following factors: pain, irritation, anxiety, and any type of discomfort. This intolerance is further exacerbated by every repeated physical insertion of the rectal balloon and daily irradiation assault as the rectum and anus will become more sensitive after a series of radiation treatments and repeated insertion of rectal balloon. If the patient is unable to tolerate the balloon during any of the treatment sessions throughout the entire radiation treatment course, this may result in a need to re-plan the radiation treatment and /or delay the delivery of the radiotherapy.

Table: Identified Risks to Health and Required Mitigation Measures

Identified Risks	Required Mitigation Measures
<p>Anorectal Toxicity</p> <p>Insertion of rectal balloon can cause adverse rectal tissue reaction on patients as a result of direct contact to the rectal mucosa. This reaction may also result due to toxic, irritating, or sensitizing agents present in the rectal balloon formulation (allergic reaction).</p>	<p>Special controls (1)(i), (1)(ii), (1)(iii), (1)(iv), (2)(i)(D), (2)(ii), (2)(iii), and (2)(iv)</p>
<p>Tissue Damage</p> <p>Healthy tissue damage can result due to lack of physical integrity of the rectal balloon. A lack of physical integrity of rectal balloon is a failure to perform the prostate immobilization due to low quality of the material and substandard structural feature of the device. It can lead to adverse consequences to the patients such as leakage which can cause tissue toxicity from contamination and balloon burst which can cause local injury. Lack of physical integrity of the rectal balloon can also cause other mechanical and functional</p>	<p>Special controls (1)(iv), (1)(v), (2)(i)(A), (2)(i)(D), (2)(ii), (2)(iii), and (2)(iv)</p>

disorders.	
<p>Perforation of the Rectum</p> <p>Perforation of the rectum may occur due to traumatic insertion of the rectal balloon. The improper direction of the rectal balloon tip and excessive force are likely the main causes of traumatic insertion of the rectal balloon. Over distending the rectal balloon can also lead to perforation. The bowel gas buildup can also contribute to perforation.</p>	<p>Special controls (1)(v)(A), (1)(v)(B), (2)(i)(A), (2)(i)(D), (2)(ii), (2)(iii), and (2)(iv)</p>
<p>Irradiation of Healthy Tissue</p> <p>Irradiation to healthy tissue can occur due to incorrect balloon placement. Incorrect balloon placement may be due to bowel gas build up, incorrect balloon insertion, or incorrect inflation of the balloon and may cause irradiation of healthy tissue and/or an inadequate (higher or lower) radiation dose delivered to the treatment target.</p>	<p>Special controls (1)(v)(A), (1)(v)(B), (2)(i)(B), (2)(ii), (2)(iii), and (2)(iv)</p>
<p>Patient Intolerance</p> <p>Insertion of the rectal balloon can be intolerable to the patient. This intolerance can be due to any one or combination of the following factors: pain, irritation, anxiety, and any type of discomfort. This intolerance is further exacerbated by every repeated physical insertion of the rectal balloon and daily irradiation as the rectum and anus will become more sensitive after a series of radiation treatments and repeated insertion of rectal balloon. If the patient is unable to tolerate the balloon during any of the treatment sessions throughout the entire radiation treatment course, this may result</p>	<p>Special controls (1)(v)(A), (2)(i)(A), (2)(i)(C), (2)(ii), (2)(iii), and (2)(iv)</p>

in a need to re-plan the radiation treatment and /or delay the delivery of the radiotherapy.	
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9. Special Controls

In addition to the general controls of the FD&C Act, the Prostate Immobilization Rectal Balloon is subject to the following special controls:

- 1) The premarket notification submission must include methodology and results of the following non-clinical and clinical performance testing:
 - i) Biocompatibility testing of the final finished device;
 - ii) If provided sterile, sterilization validation;
 - iii) If not provided sterile, bioburden testing of the final finished device;
 - iv) Shelf life and expiration date validation; and
 - v) Performance testing, including, but not limited to:
 - A) Venting mechanism (if device has a vent mechanism);
 - B) Safety mechanism(s) to prevent advancement beyond its intended safe placement; and
 - C) Structural integrity testing (e.g., tensile strength, balloon leakage and burst strength).
- 2) Labeling that includes:
 - i) Appropriate warnings and contraindications, including, but not limited to the following statements:
 - A) “Do not transport the patient with the rectal balloon inserted. The balloon should be removed prior to transport.”;
 - B) “Failure to perform the standard imaging position verification protocol may cause the device to not perform as intended.”;
 - C) “Reduce the rectal balloon fill volume if the patient experiences discomfort due to the rectal balloon inflation.”; and
 - D) “Do not apply excessive pressure/force on the shaft or tubing of the rectal balloon.”;
 - ii) Adequate instructions for use on the proper insertion procedure, positioning, and inflation of the rectal balloon;
 - iii) Whether the device is sterile or non-sterile; and,
 - iv) An expiration date.

10. Benefit/Risk Determination

Summary of the Benefits	The benefit of Prostate Immobilizer Rectal Balloon is to improve target localization by reducing prostate motion, which may improve treatment outcomes in external beam radiotherapy. These benefits include improved treatment delivery with smaller margins and improved positional reproducibility.
Summary of the Risks	The potential risks associated are anorectal toxicity, tissue damage, perforation of the rectum, irradiation of healthy tissue, and patient intolerance. However, these risks can be significantly reduced by applying identified special controls.
Summary of Other Factors	For the successful use of this device, during each imaging and subsequent radiation treatment, the position of rectal balloon relative to prostate gland should be reproduced. This solely depends upon the experience and expertise of the physician. However, this risk can be effectively minimized, if image verification techniques are used.
Conclusion	The benefit of Prostate Immobilizer Rectal Balloon is to improve target localization by reducing prostate motion, which may improve treatment outcomes in external beam radiotherapy. These benefits include improved treatment delivery with smaller margins and improved positional reproducibility. The motion of the prostate has been a significant issue effecting the treatment of the prostate cancer patients receiving external beam radiation therapy. There are risks involved, including the misplacement of the prostate immobilizer rectal balloon. These risks however can be mitigated by applying general and the identified special controls. Therefore, in conclusion due to the benefit of improved stability of the prostate during treatment, this device certainly has potential to benefit

	patients undergoing external beam radiotherapy.
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11. **Other comments**

None

12. **Conclusion:**

The request for de novo review of the Prostate Immobilizer Rectal Balloon is granted. FDA believes that special controls, along with the applicable general controls, provide reasonable assurance of the safety and effectiveness of the device type. This device is classified under the following:

Product Code: PCT

Device Type: Rectal Balloon for Prostate Immobilization

Class: Class II (special controls)

Regulation: 21 CFR 892.5720

(a) *Identification.* A rectal balloon for prostate immobilization is a single use, inflatable, non-powered positioning device placed in the rectum to immobilize the prostate in patients undergoing radiation therapy. The device is intended to be used during all the phases of radiation therapy, including treatment planning, image verification, and radiotherapy delivery.

(b) *Classification.* Class II (special controls). A rectal balloon for prostate immobilization must comply with the following special controls:

- 1) The premarket notification submission must include methodology and results of the following non-clinical and clinical performance testing:
 - i) Biocompatibility testing of the final finished device;
 - ii) If provided sterile, sterilization validation;
 - iii) If not provided sterile, bioburden testing of the final finished device;
 - iv) Shelf life and expiration date validation; and
 - v) Performance testing, including, but not limited to:

- A) Venting mechanism (if device has a vent mechanism);
- B) Safety mechanism(s) to prevent advancement beyond its intended safe placement; and
- C) Structural integrity testing (e.g., tensile strength, balloon leakage and burst strength).

2) Labeling that includes:

- i) Appropriate warnings and contraindications, including, but not limited to the following statements:

- A) “Do not transport the patient with the rectal balloon inserted. The balloon should be removed prior to transport.”;

- B) “Failure to perform the standard imaging position verification protocol may cause the device to not perform as intended.”;

- C) “Reduce the rectal balloon fill volume if the patient experiences discomfort due to the rectal balloon inflation.”; and

- D) “Do not apply excessive pressure/force on the shaft or tubing of the rectal balloon.”

- ii) Adequate instructions for use on the proper insertion procedure, positioning, and inflation of the rectal balloon;

- iii) Whether the device is sterile or non-sterile; and

- iv) An expiration date.