



Radiation Therapy Coding



Radiation Delivery Systems/Approaches and Coding

LINEAR ACCELERATOR - Linac

If the radiation treatment summary refers to beam energies, such as:

- 6X or 6MV, 10X or 10MV
- 12X or 12MV, 15X or 15MV

Then the treatment modality will always be **02, external beam, photons**
(a Linac was used to deliver the EBRT treatment)

If radiation treatment summary refers to treatment delivery as:

- E, eboost, MeV or “en face”

Code the treatment modality **04, external beam, electrons** (a Linac can also deliver electron therapy)

IORT Delivery Technology & Coding

IORT FOR BREAST CANCER, Volume: 41 - Partial Breast. Lymph Nodes are not Targeted!

Equipment	RT Delivery Method	Modality	Planning Technique	Comments
Zeiss Intrabeam	50 kVp Linac	02-Photons	02: Low energy x-ray/ photon therapy	Isotope-free. No radioactive source used
XOFT Axxent	50 kVp Linac	02-Photons	02: Low energy x-ray/ photon therapy	Isotope-free. No radioactive source used
LIAC 10/12 by Sordina IORT	Electron accelerator	04-Electrons	In most cases, 04-3D conformal	Max energy: 10 MeV, 12 MeV
NOVAC by Sordina IORT	Electron accelerator	04-Electrons	In most cases, 04-3D conformal	Check with Rad Onc for planning technique
Mobetron	Electron accelerator	04-Electrons	In most cases, 04-3D conformal	Energies: 6, 9, 12 MeV
Strut Assisted Volume Implant (SAVI)	Ir-192 Sources (HDR)	09-Brachy, Intracavitary HDR	88 - NA	Accelerated partial breast irradiation (PBI)
Mammosite	Ir-192 Sources (HDR)	09-Brachy, Intracavitary HDR	88 - NA	Accelerated partial breast irradiation (PBI)
Contura MLB	Ir-192 Sources (HDR)	09-Brachy, Intracavitary HDR	88 - NA	Accelerated partial breast irradiation (PBI)

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Zeiss INTRABEAM/XOFT Axxent eBx IORT Delivery Systems

Known as Electronic brachytherapy. Deliver low-energy photon therapy (50 kV range)

Modality code: 02, photons

Planning technique: 02, Low energy x-ray/photon therapy

Isotopes used in BRACHYTHERAPY

Element	Isotope	Half-Life	Clinical Application
Cesium	¹³⁷ Cs	30 years	LDR intracavitary and interstitial
Iridium	¹⁹² Ir	73.8 days	LDR & HDR, interstitial and intracavitary
Cobalt	⁶⁰ Co	5.26 years	HDR intracavitary
Iodine	¹²⁵ I	59.6 days	LDR permanent interstitial
Palladium	¹⁰³ Pd	17 days	LDR permanent interstitial
Cesium	¹³¹ Cs	9.69 days	LDR permanent
Ytterbium	¹⁶⁹ Yb	32 days	LDR temporary interstitial
Gold	¹⁹⁸ Au	2.7 days	LDR permanent
Strontium	⁹⁰ Sr	29 years	HDR (beta emitter)
Yttrium	⁹⁰ Y	64 hours	HDR (beta emitter)

Accubost: Non-invasive Breast Brachytherapy (NIBB)

- Allows for non-invasive approach to delivery a boost dose to lumpectomy cavity for breast cancer patients
- Dose is delivered via **Ir-192 HDR** sources
- Note that sources are not inserted into patient
- Utilizes mammography for treatment planning
- Advantage of technique is that it avoids irradiating lung, heart
- Cosmesis is comparable to that of conventional electron & photon boost
- How do you code this modality? **Best choice: 07, Brachytherapy, NOS**

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BRACHYTHERAPY for GYN cancers

- Use of tandem an ovid (T&O) applicators, or tandem and ring (T&R) applicators, also used for intracavitary LDR (¹³⁷C)
- Applicators connected to remote afterloaders for delivery of HDR brachytherapy (¹⁹²Ir)
- Dwell time range from 15-25 minutes

Vaginal Cuff Brachytherapy Ir-192

Treatment Modality	09-Brachytherapy, intracavitary, HDR
Planning Technique	88-NA
Treatment Volume	72-Vagina
Radiation to draining lymph nodes	00-No Radiation to draining lymph nodes

Elekta Venezia Brachytherapy Ir-192 seeds: Interstitial and/or Intercavitary HDR

- Elekta Venezia is a hybrid system that can deliver interstitial and/or intracavitary HDR brachytherapy. *If the device is used to perform interstitial HDR with a simultaneous intracavitary treatment, then code as 07, brachytherapy, NOS*
- If treatment summary states “Vaginal Cuff Brachytherapy”, code it *intracavitary*

STORE 2021 - CTR Guide Highlights

Radiation Primary Treatment Volume

STORE 2021 page 260

- Note that for many of the treatment volumes, the same code should be used when the anatomic structure is targeted or when the surgical bed of the resected anatomical structure is targeted. For example, when prostate cancer is treated with radiation alone, code 64 will be the Primary Treatment Volume. Similarly, when prostate cancer is treated with radiation alone after radical prostatectomy, code 64 will be the Primary Treatment Volume. There is an exception to the rule for breast cancer. In patients with breast cancer, code 41 (Breast-partial) in patients who have had a lumpectomy and were treated with partial breast irradiation (sometimes called accelerated partial breast irradiation, APBI). Code 40 (Breast-whole) in patients who had a lumpectomy and whole breast radiation, and code 42 (chest wall) in patients who had a mastectomy and post-mastectomy radiation.

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Radiation Therapy Coding



STORE 2021 - CTR GUIDE HIGHLIGHTS

Phase 1 Radiation

STORE 2021, page 261

If the patient received just one phase of treatment,

code the **phase II Radiation Treatment Volume "00"** (no treatment)

All other phase II and phase III data fields should be left blank

12/3/19 to 12/20/19 at
Any Hospital, USA

Vaginal cuff HDR Ir-192
Intracavitary Brachytherapy.

700 cGy x 3 fxs = 2100 cGy

Seg	#	Field	Code/Definition
Summary	1	Rad/Surg Sequence	00 No RT and/or surgical...
	2	Reason No Rad	0 Radiation was admin...
	3	Location of Rad	1 All RT at this facility
	4	Date Started/Flag	12/03/19
	5	Date Finished/Flag	12/20/19
	6	Number of Phases	02
	7	Discontinued Early	01 Radiation completed
	8	Total Dose	002100
Phase 1	9	RT Treatment Volume	72 Vagina
	10	Rad to Nodes	00 No RT
	11	Modality	09 Brachy, intracavitary, HDR
	12	Planning Technique	88 NA
	13	Number of Fraction	003
	14	Dose of Fraction	00700
	15	Total Phase 1 Dose	002100
Phase 2	16	RT Treatment Volume	00
	17	Rad to Nodes	
	18	Modality	
	19	Planning Technique	
	20	Number of Fraction	
	21	Dose of Fraction	
	22	Total Phase 2 Dose	
Phase 3	23	RT Treatment Volume	
	24	Rad to Nodes	
	25	Modality	
	26	Planning Technique	
	27	Number of Fraction	
	28	Dose of Fraction	
	29	Total Phase 3 Dose	

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STORE 2021 - CTR GUIDE HIGHLIGHTS

Phase 2 Radiation

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If the patient received just two phases of treatment,

code the **phase III Radiation Treatment Volume "00" (no treatment)**

and leave all other phase III data fields blank

6/1/20 to 7/13/20 at Any Hospital, USA

Right breast, 5X/6X/3D, 2 cGy x 25 fxs = 5000 cGy

Right breast boost, 6X/3D, 2 cGy x 5 fxs = 1000 cGy

Total Dose = 6000 cGy

Descriptive Name	Field Value
Location of Radiation Treatment	(1) All radiation treatment at this facility
Date RT Started	06/01/2020
Date RT Ended	07/13/2020
Phase I Radiation Primary Treatment	(40) Breast - Whole
Phase I Radiation to Draining Nodes	(00) No radiation treatment
Phase I Radiation Treatment Modality	(02) External beam, photons
Phase I Radiation External Beam	(04) Conformal or 3-D conformal therapy
Phase I Dose per Fraction	(00200)
Phase I Number of Fractions	(025)
Phase I Total Dose	(005000)
Phase II Radiation Primary Treatment	(41) Breast - partial
Phase II Radiation to Draining Nodes	(00) No radiation treatment to draining nodes
Phase II Radiation Treatment Modality	(02) External beam, photons
Phase II Radiation External Beam	(04) Conformal or 3-D conformal therapy
Phase II Dose per Fraction	(00200)
Phase II Number of Fractions	(005)
Phase II Total Dose	(001000)
Phase III Radiation Primary Treatment	(00) No radiation treatment
Phase III Radiation to Draining Nodes	
Phase III Radiation Treatment Modality	
Phase III Radiation External Beam	
Phase III Dose per Fraction	
Phase III Number of Fractions	
Phase III Total Dose	

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Radiation Treatment Modality STORE 2021, page 268, 3rd bullet

- Use code 13- Radioisotopes, NOS for radioembolization procedures, e.g. intravascular Yttrium-90 for cases diagnosed January 1, 2019 and later..."
- Apply this rule to targeted radionuclide therapy, molecular radiotherapy, radio-pharmaceuticals (RPs), alpha radioimmunotherapy, SIRT (Selective Internal Radiation Therapy).
- Numerous radionuclide available and site specific.
- Do not confuse with diagnostic radiopharmaceuticals:
 - Thallium-201, chloride, or Tc-99 is used for myocardial perfusion imaging.
 - FDG, incorporating F18, used for PET/CT imaging.

Code 13 - Radioisotopes, NOS

Diagram identifies most commonly used radionuclides for therapeutic purpose.

Among these:

- Yttrium 90
- I-131
- Radium 223
- Strontium-89
- Lutetium-177

<https://s3.amazonaws.com/rdcmssnmml/files/production/public/images/2020%20TRT%20Infographic%20%281%29.pdf>

Targeted Cancer Treatment with Nuclear Medicine Therapy

What is Radioisotope Therapy?
Precision treatment in which a radioactive drug compound seeks and destroys cancer cells.

Thyroid Cancer
• Approximately 52,070 new cases estimated in the US in 2019
• **Treatment:** iodine-131
• Cure rates in excess of 90%

Non-Hodgkin's Lymphoma
• Approximately 74,200 new cases estimated in the US in 2019
• **Treatment:** yttrium-90 ibritumomab tiuxetan
• Effective in 75% of patients
• Equivalent efficacy to chemotherapy, but requires only one cycle, and with fewer side-effects

Neuroblastoma
• Most common cancer in infants; Approximately 800 new cases diagnosed each year in the US
• **Treatment:** iodine-131 MIBG
• Reported response rates of up to 57% when used alone and up to 75% when used in combination with chemotherapy

Benefits of Radioisotope Therapy
• Highly selective—kills cancer cells and spares healthy cells
• Can be tailored to the unique biologic characteristics of the patient and the molecular properties of the tumor
• Virtually all performed as outpatient procedures
• Side effect rates less than other treatments

Neuroendocrine Tumors
• Approximately 17,000 new cases estimated in the US in 2019
• **Treatment:** lutetium-177 DOTATATE
• Median progression-free survival rate is 29 months

Paraganglioma and Pheochromocytoma
• Approximately 1,000 new cases estimated each year
• **Treatment:** iodine-131 MIBG
• Median overall survival of 36.7 months, with sustained blood pressure control

Liver Cancer (Hepatocellular Carcinoma) and Liver-Dominant Metastatic Disease
• Approximately 42,030 new cases of liver cancer and intrahepatic bile duct cancer estimated in the US in 2019
• **Treatment:** selective internal radiation therapy (SIRT) with yttrium-90 microspheres
• Median survival rate for liver cancer patients of 20.5 months vs. 17.4 months with SIRT as compared to chemoembolism, with less toxicity. In liver-dominant metastatic disease from colon cancer, partial response, stable disease, and progressive disease seen in 10.2, 60, and 30 percent of patients, respectively

Bone Metastases from Castration-Resistant Prostate Cancer
• Approximately 174,650 new cases of prostate cancer estimated in the US in 2019
• **Treatments:** radium-223 dichloride, samarium-153 lexitronam, and strontium-89 chloride
• Nearly comparable adverse events and 3.6-month overall survival benefit and 5.6-month benefit in time to first skeletal-related event with radium-223 dichloride compared to placebo

SNMMI Value Initiative
SOCIETY OF NUCLEAR MEDICINE & MOLECULAR IMAGING

www.snmml.org/therapyinfographic

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Radiation Therapy Coding



Radiation Treatment Modality

RADIOISOTOPES

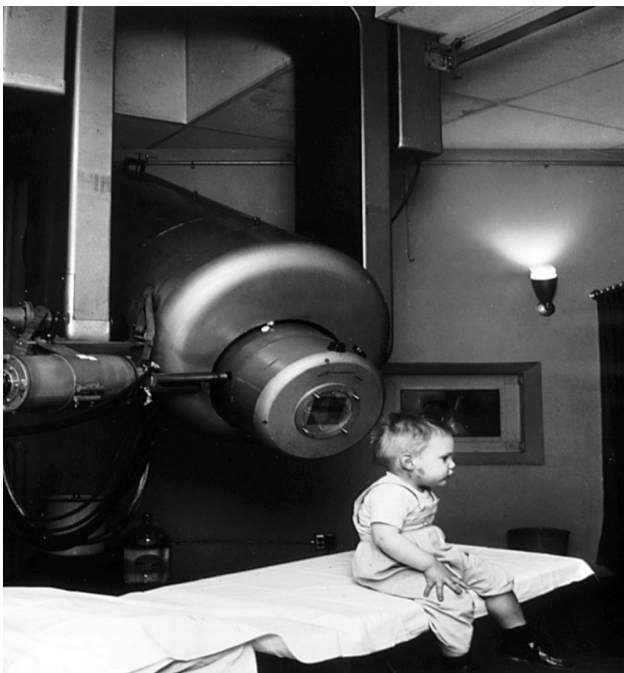
- Do not overlook following codes:

Code	Label
14	Radioisotopes, Radium - 223
15	Radioisotopes, Strontium - 89
16	Radioisotopes, Strontium - 90

STORE page 281 (on dose/fx):

Code 99998 when radioisotopes were administered to the patient (codes 14-16) for Phase I - III...

- Plaque radiotherapy** or episcleral plaque radiotherapy (also referred to as episcleral plaque brachytherapy, EPBRT):
 - Use of radioactive seeds (I-125) in a plaque sewn to the eyeball, temporarily, for management of retinoblastoma, uveal melanoma.
 - Code to **07 - Brachytherapy, NOS**



Historical image showing Gordon Isaacs, the first patient treated with linear accelerator radiation therapy (in this case an electron beam) for retinoblastoma in 1957. Gordon's right eye was removed January 11, 1957, because his cancer had spread. His left eye, however, had only a localized tumor that prompted Henry Kaplan to try to treat it with the electron beam. Gordon is now living in the east bay, and his vision in the left eye is normal.

https://en.wikipedia.org/wiki/External_beam_radiotherapy#/media/File:External_beam_radiotherapy_retinoblastoma_nci-vol-1924-300.jpg

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