

External Beam/Teletherapy, Brachytherapy, IMRT, SBRT/SRS, IORT, and IGRT

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I. PURPOSE

The purpose of this policy is to provide general information applicable to the review and appropriateness of Radiation Therapy services. Although a service, supply or procedure may be medically necessary, it may be subject to limitations and/or exclusions under a member's benefit plan. If a service, supply, or procedure is not covered and the member proceeds to obtain the service, supply or procedure, the member may be responsible for the cost. Decisions regarding treatment and treatment plans are the responsibility of the physician. This policy is not intended to direct the course of clinical care a physician provides to a member, and it does not replace a physician's independent professional clinical judgment or duty to exercise special knowledge and skill in the treatment of members. NCH is not responsible for, does not provide, and does not hold itself out as a provider of medical care. The physician remains responsible for the quality and type of health care services provided to a member. Regarding Medicare cases, the applicable LCD or NCD will determine coverage of the treatment requested. If an LCD or NCD approves coverage of a treatment but does not specify the number of appropriate radiation fractions (treatments), the determination of the number of appropriate fractions will be made according to the guidance in the corresponding section of the NCH policy. In Medicare cases where there is no LCD or NCD, the determination of coverage and the appropriate number of radiation fractions will be made according to the guidance in the corresponding section of the NCH policy.

II. BACKGROUND

Radiation Oncology is the specialty of medicine that utilizes high-energy ionizing radiation in the treatment of malignant neoplasms and certain non-malignant conditions. Radiation Oncology uses several distinct therapeutic modalities: Teletherapy or, 2D external beam radiation therapy (EBRT), 3D external beam radiation therapy (EBRT), electron beam therapy, intensity modulated radiation therapy (IMRT), brachytherapy, hyperthermia, proton beam therapy, carbon ion therapy, neutron beam therapy and stereotactic radiation.

Radiation Therapy Treatment Process:

- A. Consultation
- B. Simulation
- C. Treatment Planning
- D. Treatment Delivery

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IV. DEFINITIONS

Bite Block: A restraining device generally used in the oral cavity often attached to an outside source for patient stability.

Block: A device fabricated of an energy-absorbing material such as lead or Cerrobend (Wood's metal) to shape or delineate the treatment portal to match the configuration of the desired area and to shield or protect normal structures.

Bolus: A tissue equivalent material used to change the surface deposition of a radiation beam.

Boost: The 2nd phase of a course of radiation treatment when the physician narrows down the treatment from a large area (i.e. the whole breast) to a smaller area of the body (i.e. the lumpectomy cavity).

Brachytherapy: A type of radiation therapy that utilizes radioactive isotopes (radioactive metals) for treatment of malignancies or benign conditions by placing the isotope directly on the target surface, into a body cavity (intracavitary), within the body tissues (interstitial) or near the tumor or target tissue.

Centigray (cGy): unit of ionizing radiation dose in the International System of Units (SI). A gray is the energy absorption of 1 joule per kg of irradiated material. 1 Gy is equivalent to 100 centigray/or rad. 1 centigray is equivalent to 1 rad (radiation absorbed dose).

Compensator: An irregularly shaped beam-modifying device utilized to reconfigure the beam intensity to match irregular tissue contours.

Collimator: A beam shaping device attached to the head of the treatment machine to define the initial configuration (the length and width) of the treatment portal.

Dosimetry: The calculation of the radiation dose distribution within a treatment beam.

Fiducial Markers: or fiducial is an object placed in the field of view of an imaging system which appears in the image produced, for use as a point of reference or a measure. It may be either

something placed into or on the imaging subject, or a mark or set of marks in the reticle of an optical instrument

Fraction: The number of treatment sessions administered. Administration of the total dose of radiation is spread out over time and delivered to the patient in a number of even parts (fractions) or treatment sessions.

Gray (Gy): unit of ionizing radiation dose in the International System of Units (SI). It is defined as the absorption of one joule of radiation energy per kilogram of matter.

Hydrogel: A water based material that is placed within the patient to provide separation and therefore protection of an organ which is adjacent to a target region or planned target volume (PTV).

Hyperfractionation: Radiation therapy delivered more than once per day.

Hypofractionation: Radiation therapy delivered over a shorter period of time (fewer days or weeks) compared to standard radiation therapy.

IMRT (Intensity Modulated Radiation Therapy): Is an advanced, noninvasive radiation treatment that uses a linear accelerator to safely deliver precise radiation to a tumor while minimizing the dose to surrounding normal tissue.

Intraoperative Radiation Therapy (IORT): An intensive radiation treatment that is administered during surgery.

Isodose: A plotting of lines or a series of lines following paths of the same dose distribution within a treatment beam.

Mold: A patient-restraining device usually constructed of plaster or thermosetting plastic that fits to the contour of the patient and restricts the motion of the patient during treatment.

Partial Mastectomy: A lumpectomy

PTV (planned target volume): A region to be targeted with radiation which may consist of gross tumor volume (GTV) or a clinical target volume (CTV) plus a margin of surrounding tissue to account for potential motion.

Port, Portal: These words are synonymous and refer to the site on the skin where the radiation beam enters the body. Field, often used as a synonym for port, will not be used in this policy.

Portal Verification: Any means of verifying the placement and configuration of the treatment portal.

RAD (radiation absorbed dose): unit used to measure the amount of radiation absorbed by an object or person, known as the “absorbed dose,” which reflects the amount of energy that radioactive sources deposit in materials through which they pass. The radiation-absorbed dose (rad) is the amount of energy (from any type of ionizing radiation) deposited in any medium (e.g., water, tissue, air). The related international system unit is the gray (Gy), where 1 Gy is equivalent to 100 rad.

Simulation: Part of the planning process that happens prior to treatment when a simulator, usually a CT, PET/CT, or MRI, is used to acquire images that will be used to plan the radiation treatments.

Stereotactic Radiosurgery (SRS) and Stereotactic Body Radiation Therapy (SBRT): are advanced, noninvasive radiation treatments that administer high-dose radiotherapy to discreet tumor foci in cranial or extracranial locations respectively in 1 to 5 treatments.

Teletherapy or External Beam Radiation Therapy (EBRT): The delivery of electromagnetic energy from a treatment machine at some distance from the treatment area. External beam radiation is

commonly delivered by a linear accelerator, which can deliver photons (x-rays) or electrons to the targeted area.

Volume of interest: This phrase refers to that volume within the body to which the radiation therapy is directed. In this policy, volume of interest is never synonymous with port and is preferred to other terms with (presumably) the same meaning because it is the phrase most commonly used by radiation oncologists. Treatment volume is accurate but less often used. Area of interest, used in the AMA's CPT manual, suggests a two-dimensional configuration and is, in this geometric sense, inaccurate. Target site seems to point to just the tumor itself and excludes the surrounding volume of tissue that might be of interest and other times to mean port. It should be discarded.

Wedge: A treatment beam modifying device acting to change the intensity of the treatment beam in a graduated fashion across the width or length of the treatment portal.

V. BREAST CANCER (INVASIVE CANCERS AND DCIS)

(Please print and use **The Dose Comparison Plan Worksheet** in the Attachment Section for post-mastectomy chest wall IMRT and whole breast IMRT)

A. Post-Mastectomy

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** treatment is considered medically necessary for:
 - a. The treatment of the chest wall and regional lymph nodes with up to 33 total fractions total (28 fractions and 5 boost fractions).
 - b. Palliative treatment of the chest wall with up to 15 fractions total for local control, to slow progression of the disease or to palliate symptoms.
2. **Intensity Modulated Radiation Therapy (IMRT)*** treatment is considered medically necessary for treatment of the LEFT chest wall and regional lymph nodes with up to 33 total fractions total (28 fractions and 5 boost fractions) when **ANY** of the following dose constraints are exceeded on the 3D plan:
 - a. Bilateral Lung V20_{Gy} > 30% on a 3D comparison plan **OR**
 - b. Heart mean dose > 5 Gy on a comparison 3D plan **OR**
 - c. Spinal cord maximum dose is > 50 Gy on a comparison 3D plan

*(IMRT is not indicated in the routine management of breast cancer. Its routine use has not been demonstrated to provide significant clinical advantage. If utilizing "field-in-field" techniques, complex treatment delivery (CPT code 77412) should be reported – not IMRT)^{1,2,4}

Exclusion Criteria

3. **Brachytherapy** is not considered medically necessary
4. **Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiation Therapy (SBRT)** are not considered medically necessary

B. Post-Lumpectomy and Lymph Node Negative Patients

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** treatment is considered medically necessary for:
 - a. Treatment of the whole breast following a lumpectomy with up to 21 fractions total (16 fractions and 5 boost fractions) independent of breast size (including central axis separation). Recent studies have demonstrated equivalent tumor control and cosmetic

outcome in specific patient populations (i.e., lymph node negative patients) with shorter courses of therapy.^{1,4}

- b. 3D Accelerated Partial Breast Irradiation (APBI) with up to 10 fractions total in patients who meet the following criteria:
 - i. **Invasive ductal carcinoma** – in patients that are greater or equal to 50 years of age **AND** have negative margins **AND** have tumors that are less than or equal to 2 cm in size.
 - ii. **DCIS** – in patients that have negative margins **AND** have tumors that are less than or equal to 2.5 cm in size **AND** are grade 1 or 2.
 - c. Palliative treatment of the breast with up to 15 fractions total for local control, to slow progression of the disease or to palliate symptoms.
2. **Intensity Modulated Radiation Therapy (IMRT)*** treatment is considered medically necessary for:
- a. Treatment of the entire LEFT breast following a lumpectomy with up to 30 fractions total (25 fractions and 5 boost fractions) for patients when **ANY** of the following dose constraints are exceeded on the 3D plan:
 - i. Bilateral Lung V20_{Gy} > 30% on a 3D comparison plan **OR**
 - ii. Heart mean dose > 5 Gy on a comparison 3D plan **OR**
 - iii. Spinal cord maximum dose is > 50 Gy on a comparison 3D plan

*(IMRT is not indicated in the routine management of breast cancer. Its routine use has not been demonstrated to provide significant clinical advantage. If utilizing “field-in-field” techniques, complex treatment delivery (CPT code 77412) should be reported – not IMRT)^{1,2,4}
 - b. IMRT Accelerated Partial Breast Irradiation (APBI) with 5 fractions **OR** 10 fractions total are indicated for patients who meet the following criteria:
 - i. **Invasive ductal carcinoma** – in patients that are greater or equal to 50 years of age **AND** have negative margins **AND** have tumors that are less than or equal to 2 cm in size.
 - ii. **DCIS** – in patients that have negative margins **AND** have tumors that are less than or equal to 2.5 cm in size **AND** are grade 1 or 2.
3. **Brachytherapy** treatment is considered medically necessary for:
- a. Accelerated Partial Breast Irradiation (APBI) with brachytherapy with 10 fractions total is indicated for patients who meet the following criteria:
 - i. **Invasive ductal carcinoma** – in patients that are greater or equal to 50 years of age **AND** have negative margins **AND** have tumors that are less than or equal to 2 cm in size.
 - ii. **DCIS** – in patients that have negative margins **AND** have tumors that are less than or equal to 2.5 cm in size **AND** are grade 1 or 2.

(The use of Electronic Brachytherapy³ and AccuBoost[®] are considered investigational and not medically necessary)
4. **Intra-Operative Radiation Therapy (IORT)**³ - Requires Clinical Review by an NCH Physician

Exclusion Criteria

1. **Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiation Therapy (SBRT)** are not considered medically necessary

C. Post-Lumpectomy and Lymph Node Positive Patients

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** treatment is considered medically necessary for:
 - a. Treatment of the whole breast and the supraclavicular/axillary lymph nodes following a lumpectomy with up to 30 total fractions total (25 fractions and 5 boost fractions) when an additional field is needed to cover the supraclavicular/axillary lymph nodes.⁴
 - b. Palliative treatment of the breast with up to 15 fractions total for local control, to slow progression of the disease or to palliate symptoms.
2. **Intensity Modulated Radiation Therapy (IMRT)*** treatment is considered medically necessary for:
 - a. Treatment of the entire LEFT breast following a lumpectomy with up to 30 fractions total (25 fractions and 5 boost fractions) for patients when **ANY** of the following dose constraints are exceeded on the 3D plan:
 - i. Bilateral Lung V20_{Gy} > 30% on a 3D comparison plan **OR**
 - ii. Heart mean dose > 5 Gy on a comparison 3D plan **OR**
 - iii. Spinal cord maximum dose is > 50 Gy on a comparison 3D plan

*(IMRT is not indicated in the routine management of breast cancer. Its routine use has not been demonstrated to provide significant clinical advantage. If utilizing “field-in-field” techniques, complex treatment delivery (CPT code 77412) should be reported – not IMRT)^{1,2,4}

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary
2. **Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiation Therapy (SBRT)** are not considered medically necessary

D. Male Breast Cancer

1. Indications for radiation treatment after breast surgery in men with breast cancer are the same as for women with breast cancer

VI. CENTRAL NERVOUS SYSTEM TUMORS (CNS)

A. Primary Brain and Spinal Cord Cancers^{5,6}

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary in the treatment of CNS tumors including:
 - a. **Low grade glioma** (grades 1 and 2) with up to 30 fractions of 3D or IMRT, includes pilocytic astrocytoma, astrocytoma, oligodendroglioma, and oligoastrocytoma.
 - b. **High grade glioma** (grades 3 and 4) with up to 30 fractions of 3D or IMRT, includes high grade anaplastic astrocytoma, anaplastic oligodendroglioma, anaplastic oligoastrocytoma, and glioblastoma multiforme (GBM).
 - c. **Primary CNS lymphoma** with up to 25 fractions of 3D or IMRT
 - d. **Adult Medulloblastoma** with up to 31 fractions of 3D or IMRT
 - e. **Meningioma** with up to 30 fractions of 3D or IMRT
 - f. **Pituitary tumors** with up to 27 fractions of 3D or IMRT
 - g. **Ependymoma** with up to 33 fractions of 3D or IMRT for intracranial sites

- h. **Other primary spinal cord tumors** with up to 33 fractions of 3D or IMRT
 - 2. **Stereotactic Radiosurgery (SRS)** with *1 fraction is considered medically necessary:
 - a. For the treatment of meningiomas **OR**
 - b. For the treatment of pituitary tumors
- *More than 1 fraction of SRS/SBRT requires Clinical Review by an NCH Physician

Exclusion Criteria

- 1. **Brachytherapy** is not considered medically necessary

B. Benign Brain Lesions^{7,8,9}

Including Arteriovenous Malformations (AVM), Acoustic Neuromas or Schwannoma, and Trigeminal Neuralgia

Indications for Use/Inclusion Criteria

- 1. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** - Requires Clinical Review by an NCH Physician
- 2. **Stereotactic Radiosurgery (SRS)** with *1 fraction is considered medically necessary for an AVM, Acoustic Neuroma or Schwannoma, and Trigeminal Neuralgia

*More than 1 fraction of SRS/SBRT requires Clinical Review by an NCH Physician

Exclusion Criteria

- 1. **Brachytherapy** is not considered medically necessary

C. Prophylactic Cranial Irradiation (PCI) of the Brain¹⁰

Indications for Use/Inclusion Criteria

- 1. **3D External Beam Radiation Therapy** - treatment is considered medically necessary to attempt to prevent brain metastases from small cell lung cancer with up to 10 fractions of whole brain radiation.
- 2. **Intensity Modulated Radiation Therapy (IMRT)** treatment is considered medically necessary to attempt to prevent brain metastases from small cell lung cancer with up to 10 fractions, only when using a hippocampal sparing whole brain planning technique.

Exclusion Criteria

- 1. **Brachytherapy** is not considered medically necessary
- 2. **Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiation Therapy (SBRT)** treatment is not considered medically necessary

VII. GASTROINTESTINAL CANCERS

(Please print and use **The Dose Comparison Plan Worksheet** in the Attachment Section for Gastrointestinal IMRT)

Indications for Use/Inclusion Criteria

- A. **3D External Beam Radiation Therapy** treatment is considered medically necessary in the treatment of gastrointestinal cancers including:
 - 1. **Rectal cancer**, for pre-operative or post-operative with up to 28 fractions and for definitive treatment with up to 30 fractions.^{11,12}
 - 2. **Anal cancer**, for definitive treatment with up to 30 fractions.^{13,14}
 - 3. **Cholangiocarcinoma**, for definitive or post-operative treatment with up to 30 fractions.¹⁵

4. **Esophageal cancer**, for pre-operative, post-operative and definitive treatment with up to 28 fractions.^{16,17}
 5. **Cervical Esophageal cancer**, for pre-operative, post-operative, and definitive treatment with up to 33 fractions.
 6. **Gastric cancer**, for pre-operative and post-operative with up to 28 fractions.¹⁸
 7. **Pancreatic cancer**, for pre-operative or post-operative with up to 28 fractions and for definitive treatment up to 30 fractions.¹⁹
 8. **For local control/palliative treatment** of a gastrointestinal organ with up to 15 fractions.
 9. **Colon cancer** - requires Clinical Review by an NCH Physician
- B. **Intensity Modulated Radiation Therapy (IMRT)** – is indicated for the treatment of Rectal, Cholangiocarcinoma, Esophageal, Gastric, and Pancreatic Cancers when **ANY** of the following dose constraints are exceeded on the 3D plan:
1. Liver mean dose is > 28 Gy on a 3D comparison plan **OR**
 2. Kidney mean dose is > 18 Gy on a 3D comparison plan **OR**
 3. Small Bowel V45Gy is >195 cc on a 3D comparison plan **OR**
 4. Spinal Cord maximum dose is > 50 Gy on a comparison 3D plan **OR**
 5. Heart mean dose > 30 Gy on a comparison 3D plan **OR**
 6. Bilateral Lung V20_{Gy} > 30% on a 3D comparison plan
- C. **Intensity Modulated Radiation Therapy (IMRT)** is indicated in the treatment for pre-operative rectal cancer with 5 fractions.²⁰
- D. **Intensity Modulated Radiation Therapy (IMRT)** is indicated in the treatment of anal cancers with 28 to 33 fractions.²¹
- E. **Intra-Operative Radiation Therapy (IORT)** requires Clinical Review by an NCH Physician for Rectal and Pancreatic cancer.
- F. **Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiation Therapy (SBRT)** treatment with 1-5 fractions is considered medically necessary for the treatment of Pancreatic Cancer **ONLY** when the pancreatic cancer is surgically inoperable.²²
- G. **Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiation Therapy (SBRT)** with 1-5 fractions is considered medically necessary for the treatment of liver metastases if a patient has oligometastatic disease (see section on Metastatic Cancer - Oligometastatic Spread)

Exclusion Criteria

- A. **Brachytherapy** is not considered medically necessary.
- B. **Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary for the treatment of Rectal, Anal, Cholangiocarcinoma, Esophageal cancer, Gastric cancers.

VIII. GENITOURINARY CANCERS

A. **Low-Risk Prostate Cancer**^{23,24,25}

(Stage T1c-T2a AND Gleason Score ≤ 6 AND PSA < 10)

Indications for Use/Inclusion Criteria

1. **Brachytherapy** is considered medically necessary:

- a. For treatment in low-risk prostate cancer with 1 LDR radiation seed implantation
- b. For treatment in low-risk prostate cancer with 2 HDR brachytherapy treatments
- 2. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary:
 - a. For treatment in low-risk prostate cancer with 28 fractions of IMRT (moderate hypofractionation)
 - b. For treatment in low-risk prostate cancer with 40 fractions of IMRT in patients excluded from hypofractionation due to a prostate of 90 grams or larger **OR** a history of inflammatory bowel disease **OR** a history of superficial bladder cancer
- 3. **Stereotactic Body Radiation Therapy (SBRT)** is considered medically necessary with 1-5 fractions for treatment of low-risk prostate cancer.

B. Favorable Intermediate-Risk Prostate Cancer^{23,24,25}

(Stage T2b-c OR Gleason Score = 7 OR PSA level between 10 – 20)

*Favorable and Unfavorable Intermediate risk are defined by the treating physician.

Indications for Use/Inclusion Criteria

- 1. **Brachytherapy** is considered medically necessary:
 - a. For treatment in favorable intermediate-risk with 1 LDR radiation seed implantation
 - b. For treatment in favorable intermediate risk with 2 HDR brachytherapy treatments
- 2. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary:
 - a. For treatment in favorable intermediate risk prostate cancer with 28 fractions of IMRT (moderate hypofractionation)
 - b. For treatment in favorable intermediate risk prostate cancer with 40 fractions of IMRT in patients excluded from hypofractionation due to a prostate of 90 grams or larger **OR** a history of inflammatory bowel disease **OR** a history of superficial bladder cancer
- 3. **Stereotactic Body Radiation Therapy (SBRT)** with 1-5 fractions is considered medically necessary for the treatment of favorable intermediate-risk prostate cancer.

C. Unfavorable Intermediate-Risk Prostate Cancer^{23,24,25}

(Stage T2b-c OR Gleason Score = 7 OR PSA level between 10 – 20)

*Favorable and Unfavorable Intermediate risk are defined by the treating physician.

Indications for Use/Inclusion Criteria

- 1. **Brachytherapy** is considered medically necessary:
 - a. For treatment in unfavorable intermediate-risk with 1 LDR radiation seed implantation when combined with 28 IMRT treatments
 - b. For treatment in unfavorable intermediate-risk with 2 HDR brachytherapy treatments when combined with 28 IMRT treatments
- 2. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary:
 - a. For treatment in unfavorable intermediate risk prostate cancer with 28 fractions of IMRT (moderate hypofractionation)
 - b. For treatment in unfavorable intermediate risk prostate cancer with 40 fractions of IMRT in patients excluded from hypofractionation due to a prostate of 90 grams or larger **OR** a history of inflammatory bowel disease **OR** a history of superficial bladder cancer
- 3. **Stereotactic Body Radiation Therapy (SBRT)** with 1-5 fractions is considered medically necessary for the treatment of unfavorable intermediate-risk prostate cancer.

D. High-Risk Prostate Cancer^{23,24,25}

(Stage T3 OR Gleason Score = 8–10 OR PSA level greater than 20)

Indications for Use/Inclusion Criteria

1. **Brachytherapy** is considered medically necessary:
 - a. For treatment in high-risk prostate cancer with 1 LDR radiation seed implantation when combined with 28 IMRT treatments
 - b. For treatment with high-risk prostate cancer with 2 HDR brachytherapy treatments when combined with 28 IMRT treatments
2. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary:
 - a. For treatment in high-risk prostate cancer with 28 fractions of IMRT (moderate hypofractionation)
 - b. For treatment in high-risk prostate cancer with 40 fractions of IMRT in patients excluded from hypofractionation due to a prostate of 90 grams or larger **OR** a history of inflammatory bowel disease **OR** a history of superficial bladder cancer **OR** when the treatment field includes treating the bilateral pelvic lymph nodes.
3. **Stereotactic Body Radiation Therapy (SBRT)** with 1-5 fractions is considered medically necessary for the treatment of high-risk prostate cancer.

E. Prostate Cancer with Positive Regional Lymph Nodes (N1)^{23,24,25}

Indications for Use/Inclusion Criteria

1. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary in the treatment of prostate cancer with positive lymph nodes (N1):
 - a. For treatment of lymph node positive prostate cancer with 40 fractions of IMRT

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary.
2. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary.

F. Prostate Cancer with Low Volume Metastatic Disease²⁶

Indications for Use/Inclusion Criteria

1. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary in the treatment of prostate cancer with low volume metastatic disease with 20 fractions (moderate hypofractionation) if **ALL** of the following conditions are met:
 - a. There are a total of 3 or fewer metastatic bone lesions **AND**
 - b. No visceral metastases (i.e. no metastases in the lungs, brain, or liver) **AND**
 - c. Documentation of the extent of the metastatic disease has been provided through a recent full body PET/CT scan report **OR** through reports of recent CT scans of the Chest, Abdomen, and Pelvis.

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary.
2. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary.

G. Post-Prostatectomy Radiation for Prostate Cancer²³

Indications for Use/Inclusion Criteria

1. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary in the treatment of post-prostatectomy prostate cancer with 36 fractions when **ANY** of the following apply:
 - a. Pathological T3 disease
 - b. Seminal vesical invasion
 - c. Positive surgical margin
 - d. PSA that remains detectable after prostatectomy
 - e. PSA that begins rising in 2 post-postprostatectomy measurements

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary.
2. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary.

H. Prostate Cancer/Prophylactic Breast Radiation

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** for prophylactic breast radiation in men receiving Androgen Deprivation Therapy (to prevent gynecomastia) is considered medically necessary with up to 3 fractions.

I. Bladder Cancer²⁷

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary in the treatment of bladder cancer:
 - a. For definitive treatment (bladder conservation) with up to 33 fractions.
 - b. For post-operative treatment with negative margins with up to 25 fractions.
 - c. For post-operative treatment with positive margins with up to 30 fractions.
2. **3D External Beam Radiation Therapy** is considered medically necessary to improve local control in the palliative treatment of metastatic bladder cancer with up to 15 fractions.

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary
2. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary

J. Urethral Cancer

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary in the treatment of urethral cancer:
 - a. For definitive treatment (organ conservation) with up to 35 fractions.
 - b. For post-operative treatment with negative margins with up to 25 fractions.
 - c. For post-operative treatment with positive margins with up to 30 fractions.
 - d. For post-operative treatment with positive margins **AND** gross residual disease with up to 35 fractions.
 - e. For recurrent **AND** gross disease with up to 37 fractions.
2. **3D External Beam Radiation Therapy** is considered medically necessary to improve local control in the palliative treatment of metastatic urethral cancer with up to 15 fractions.

Exclusion Criteria

1. Brachytherapy is not considered medically necessary.
2. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary.

K. Penile Cancer

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT) are considered medically necessary in the treatment of penile cancer:
 - a. For definitive treatment with up to 35 fractions
 - b. For post-operative treatment following a penectomy with positive margins with up to 30 fractions.
2. 3D External Beam Radiation Therapy is considered medically necessary to improve local control in the palliative treatment of metastatic penile cancer with up to 15 fractions.
3. Brachytherapy may be considered medically necessary for definitive treatment OR with post-operative treatment following a penectomy (Requires Clinical Review by an NCH Physician)

Exclusion Criteria

1. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary.

IX. GYNECOLOGICAL CANCERS

A. Cervical Cancer²⁸

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT) are considered medically necessary for non-surgical definitive treatment:
 - a. In combined modality therapy of cervical cancer with 25 fractions AND a brachytherapy boost of 2 LDR insertions
 - b. In combined modality therapy of cervical cancer with 25 fractions AND a brachytherapy boost of 5 HDR insertions
2. 3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)²⁸ are considered medically necessary for post-hysterectomy treatment:
 - a. In combined modality therapy of cervical cancer with 25 fractions AND a brachytherapy boost of up to 3 HDR vaginal cylinder insertions
3. 3D External Beam Radiation Therapy is considered medically necessary for the local control/palliative treatment of cervical cancer in up to 15 fractions.
4. Brachytherapy is considered medically necessary in combined modality therapy (see above)

Exclusion Criteria

1. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary

B. Endometrial Cancer^{29,30}

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT) are considered medically necessary for post-hysterectomy treatment of endometrial cancer with:
 - a. 25 fractions of 3D or IMRT
 - b. Combined modality therapy with 25 fractions AND a brachytherapy boost with up to 5 HDR vaginal cylinder insertions

2. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary for non-surgical definitive treatment of endometrial cancer with:
 - a. Combined modality therapy with 25 fractions **AND** a brachytherapy boost with up to 3 HDR insertions
3. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary for pre-operative treatment of endometrial cancer with:
 - a. Combined modality therapy with 25 fractions **AND** a brachytherapy boost with up to 2 HDR insertions
4. **3D External Beam Radiation Therapy** is considered medically necessary for the local control/palliative treatment of cervical cancer with up to 15 fractions.
5. **Brachytherapy** is considered medically necessary:
 - a. When brachytherapy is combined with 3D or IMRT treatments (see above)
 - b. For post-hysterectomy treatment of endometrial cancer with up to 5 HDR insertions as stand-alone radiation treatment
 - c. For non-surgical definitive treatment of endometrial cancer with up to 5 HDR insertions as stand-alone radiation treatment

Exclusion Criteria

1. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary

C. Vulvar Cancer³¹

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary for post-operative treatment of vulvar cancer with:
 - a. 28 fractions with 3D or IMRT
 - b. Combined modality therapy with 28 fractions **AND** a brachytherapy boost with up to 5 HDR treatments
2. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary for non-surgical definitive treatment of vulvar cancer with:
 - a. 36 fractions with 3D or IMRT
3. **3D External Beam Radiation Therapy** is considered medically necessary for the local control/palliative treatment of vulvar cancer in up to 15 fractions.
4. **Brachytherapy** is considered medically necessary:
 - a. When brachytherapy is combined with 3D or IMRT treatments (see above)

Exclusion Criteria

1. **Stereotactic Body Radiation Therapy (SBRT)** is not considered to be medically necessary

D. Vaginal Cancer

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary for post-operative treatment of vaginal cancer with:
 - a. 28 fractions with 3D or IMRT
2. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary for non-surgical definitive treatment of vaginal cancer with:
 - a. 35 fractions with 3D or IMRT

- b. Combined modality therapy with 35 fractions **AND** a brachytherapy boost with up to 5 HDR treatments
- 3. **3D External Beam Radiation Therapy** is considered medically necessary for the local control/palliative treatment of vaginal cancer with up to 15 fractions.
- 4. **Brachytherapy** is considered medically necessary:
 - a. When brachytherapy is combined with 3D or IMRT treatments (see above)

Exclusion Criteria

- 1. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary

X. HEAD AND NECK CANCERS

A. Oral Cavity Cancer^{32,33,34}

Indications for Use/Inclusion Criteria

- 1. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary in the treatment of cancers of the oral cavity:
 - a. For non-surgical definitive treatment with up to 35 fractions
 - b. For post-operative treatment with up to 33 fractions
 - c. In combination with brachytherapy (see below) with up to 25 fractions of 3D or IMRT
- 2. **Brachytherapy** is considered medically necessary in selected patients:
 - a. As a boost of 7 HDR brachytherapy treatments in combination with 25 fractions of 3D or IMRT
 - b. As a boost of 1 LDR brachytherapy treatment in combination with up to 25 fractions 3D or IMRT
 - c. As sole treatment with up of 10 HDR brachytherapy treatments
 - d. As sole treatment with 1 LDR brachytherapy treatment

Exclusion Criteria

- 1. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary

B. Oropharynx Cancer^{32,33,34}

Indications for Use/Inclusion Criteria

- 1. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary in the treatment of cancers of the oropharynx:
 - a. For non-surgical definitive treatment with up to 35 fractions
 - b. For post-operative treatment with up to 33 fractions

Exclusion Criteria

- 1. **Brachytherapy** is not considered medically necessary
- 2. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary

C. Hypopharynx Cancer^{32,33,34}

Indications for Use/Inclusion Criteria

- 1. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary in the treatment of cancers of the hypopharynx:
 - a. For non-surgical definitive treatment with up to 35 fractions
 - b. For post-operative treatment with up to 33 fractions

Exclusion Criteria

1. Brachytherapy is not considered medically necessary
2. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary

D. Nasopharynx Cancer^{32,33,34}

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT) are considered medically necessary in the treatment of cancers of the nasopharynx:
 - a. For non-surgical definitive treatment with up to 39 fractions

Exclusion Criteria

1. Brachytherapy is not considered medically necessary.
2. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary.

E. Supraglottic Larynx Cancer^{32,33,34}

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT) are considered medically necessary in the treatment of cancers of the supraglottic larynx:
 - a. For non-surgical definitive treatment with up to 35 fractions
 - b. For post-operative treatment with up to 33 fractions

Exclusion Criteria

1. Brachytherapy is not considered medically necessary.
2. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary.

F. Glottic Larynx Cancer^{32,33,34}

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy is considered medically necessary in the treatment of cancers of the glottic larynx:
 - a. For non-surgical definitive treatment of early stage T1N0 with up to 28 fractions with hypofractionation
 - b. For non-surgical definitive treatment of early stage T2N0 with up to 29 fractions with hypofractionation
 - c. For non-surgical definitive treatment of any stage (except metastatic Stage IV patients) with up to 35 treatments
 - d. For post-laryngectomy treatment of any stage (except metastatic Stage IV patients) with up to 33 treatments
2. Intensity Modulated Radiation Therapy (IMRT) is considered medically necessary in the treatment of cancers of the glottic larynx:
 - a. For non-surgical definitive treatment of only stage III and non-metastatic Stage IV patients with up to 35 treatments (IMRT is not considered medically necessary for stage I and II glottic larynx patients)
 - b. For post-laryngectomy treatment of any stage, non-metastatic patient with up to 33 treatments.

Exclusion Criteria

1. Brachytherapy is not considered medically necessary.
2. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary.

G. Salivary Gland Cancer^{32,33,34}

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT) are considered medically necessary in the treatment of cancers of the salivary glands:
 - a. For non-surgical definitive treatment with up to 35 fractions
 - b. For post-operative treatment with up to 33 fractions

Exclusion Criteria

1. Brachytherapy is not considered medically necessary.
2. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary.

H. Maxillary Sinus Cancer^{32,33,34}

Indications for Use/Inclusion Criteria

1. Intensity Modulated Radiation Therapy (IMRT) is considered medically necessary in the treatment of cancers of the maxillary sinus:
 - a. For non-surgical definitive treatment with up to 35 fractions
 - b. For post-operative treatment with up to 33 fractions

Exclusion Criteria

1. Brachytherapy is not considered medically necessary.
2. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary.

I. Cancers of the Lip^{32,33,34}

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT) are considered medically necessary in the treatment of cancers of the lip:
 - a. For non-surgical definitive treatment with up to 35 fractions
 - b. For post-operative treatment with up to 33 fractions
 - c. In combination with brachytherapy (see below) with up to 25 fractions of 3D or IMRT
2. Brachytherapy is considered medically necessary in selected patients:
 - a. As a boost of 7 HDR brachytherapy treatments in combination with 25 fractions of 3D or IMRT
 - b. As a boost of 1 LDR brachytherapy treatment in combination with up to 25 fractions 3D or IMRT
 - c. As sole treatment with up of 10 HDR brachytherapy treatments
 - d. As sole treatment with 1 LDR brachytherapy treatment

Exclusion Criteria

1. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary

J. Occult/Unknown Primary Cancer^{32,33,34}

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT) are considered medically necessary in the treatment of occult/unknown primary cancers:
 - a. For non-surgical definitive treatment with up to 35 fractions
 - b. For post-operative treatment with up to 33 fractions

Exclusion Criteria

1. Brachytherapy is not considered medically necessary
2. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary

K. Re-irradiation of a Head and Neck Cancer^{32,33,34}

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT) are considered medically necessary in the re-irradiation treatment of recurrent head and neck cancers:
 - a. For non-surgical definitive treatment with up to 35 fractions
 - b. For post-operative treatment with up to 33 fractions

Exclusion Criteria

1. Brachytherapy is not considered medically necessary.
2. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary.

L. Local Control and Palliative Treatment of the Head and Neck

1. 3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT) are considered medically necessary for the local control/palliative treatment of a head and neck cancer with up to 15 fractions.

XI. LUNG CANCERS

(Please print and use [The Dose Comparison Plan Worksheet](#) in the Attachment Section for Lung cancer IMRT)

A. Early Stage I-II Non-Small Cell Lung Cancer (NSCLC - definitive treatment)

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy is considered medically necessary with up to 35 fractions
2. Intensity Modulated Radiation Therapy (IMRT) is considered medically necessary with up to 10 fractions
3. Intensity Modulated Radiation Therapy (IMRT) is considered medically necessary with up to 35 fractions when ANY of the following dose constraints are exceeded on the 3D plan:
 - a. Esophageal mean dose is > 34 Gy on a comparison 3D plan OR
 - b. Spinal Cord maximum dose is > 50 Gy on a comparison 3D plan OR
 - c. Heart mean dose > 30 Gy on a comparison 3D plan OR
 - d. Bilateral Lung V_{20Gy} > 30% on a 3D comparison plan
4. Stereotactic Body Radiation Therapy (SBRT) is considered medically necessary with up to 5 fractions in patients that have stage I OR stage IIA (for tumors greater than 5 cm OR tumors with positive lymph nodes, SBRT is not considered medically necessary).

Exclusion Criteria

1. Brachytherapy is not considered medically necessary.

B. Stage III NSCLC (definitive treatment)

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy is considered medically necessary with up to 35 fractions OR

2. Intensity Modulated Radiation Therapy (IMRT) is considered medically necessary with up to 35 fractions.

Exclusion Criteria

1. Brachytherapy is not considered medically necessary.
2. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary.

C. Stage IIIA NSCLC (preoperative treatment)

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy is considered medically necessary with up to 27 fractions.
2. Intensity Modulated Radiation Therapy (IMRT) is considered medically necessary with up to 27 fractions when ANY of the following dose constraints are exceeded on the 3D plan:
 - a. Esophageal mean dose is > 34 Gy on a comparison 3D plan OR
 - b. Spinal Cord maximum dose is > 50 Gy on a comparison 3D plan OR
 - c. Heart mean dose > 30 Gy on a comparison 3D plan OR
 - d. Bilateral Lung V20_{Gy} > 30% on a 3D comparison plan

Exclusion Criteria

1. Brachytherapy is not considered medically necessary.
2. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary.

D. Stage I-III NSCLC (postoperative OR local recurrence)

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy is considered medically necessary with up to 35 fractions
2. Intensity Modulated Radiation Therapy (IMRT) is considered medically necessary with up to 35 fractions

Exclusion Criteria

1. Brachytherapy is not considered medically necessary.
2. Stereotactic Body Radiation Therapy (SBRT) is not considered medically necessary.

E. Stage IV NSCLC (local control and palliative treatment)

1. 3D External Beam Radiation Therapy is considered medically necessary with up to 15 fractions

F. Limited Stage Small Cell Lung Cancer (SCLC)

Indications for Use/Inclusion Criteria

1. 3D External Beam Radiation Therapy is considered medically necessary with up to 35 fractions given one fraction per day.
2. Intensity Modulated Radiation Therapy (IMRT) is considered medically necessary with up to 35 fractions given once per day when ANY of the following dose constraints are exceeded on the 3D plan:
 - a. Esophageal mean dose is > 34 Gy on a comparison 3D plan OR
 - b. Spinal Cord maximum dose is > 50 Gy on a comparison 3D plan OR
 - c. Heart mean dose > 30 Gy on a comparison 3D plan OR
 - d. Bilateral Lung V20_{Gy} > 30% on a 3D comparison plan

3. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary for 30 fractions given twice per day (BID).
4. **Stereotactic Body Radiation Therapy (SBRT)** is considered medically necessary with up to 5 fractions in patients that have limited stage SCLC with tumors 5 cm or smaller (for tumors greater than 5 cm **OR** tumors with positive lymph nodes, SBRT is **not** considered medically necessary).

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary.

G. Extensive Stage SCLC (stage IV)

1. **3D External Beam Radiation Therapy** is considered medically necessary with up to 15 fractions

H. Prophylactic Cranial Irradiation (PCI)^{39,40}

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** - treatment is considered medically necessary to attempt to prevent brain metastases from small cell lung cancer with up to 10 fractions of whole brain radiation.
2. **Intensity Modulated Radiation Therapy (IMRT)** treatment is considered medically necessary to attempt to prevent brain metastases from small cell lung cancer with up to 10 fractions, only when using a hippocampal sparing whole brain planning technique.

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary.
2. **Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiation Therapy (SBRT)** treatment is not considered medically necessary.

XII. LYMPHOMAS

A. Hodgkin's Lymphoma^{41,42}

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** is considered medically necessary with 10 to 18 fractions in Hodgkin's Lymphoma.
2. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary with 10 to 18 fractions for Hodgkin's lymphoma in the:
 - a. Head & Neck region
 - b. Mediastinal region

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary.
2. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary.

B. Non-Hodgkin's Lymphoma^{41,43,44}

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** is considered medically necessary with 10 to 18 fractions in Non-Hodgkin's lymphoma.
2. **3D External Beam Radiation Therapy** is considered medically necessary for palliative treatment with 2 fractions.

3. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary with 10 to 18 fractions for Non-Hodgkin's lymphoma in the:
 - a. Head & Neck region
 - b. Mediastinal region

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary.
2. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary.

XIII. METASTATIC CANCER

A. Oligometastatic Spread^{45,46,47}

Indications for Use/Inclusion Criteria

*All requests for treatment of Oligometastatic Spread require Clinical Review by an NCH Physician.

1. **Oligometastatic Spread** is defined as "limited metastatic disease" if **ALL** of the following criteria are met:
 - a. There are a total of 1-3 current and separate metastatic lesions anywhere in the body **AND**
 - b. Sufficient documentation of the extent of disease has been provided (either via a recent PET/CT scan report **OR** via recent CT scan reports of the Chest, Abdomen, & Pelvis).
2. **Stereotactic Body Radiation Therapy (SBRT)** is considered medically necessary for the treatment of oligometastatic spread with up to 5 fractions.

Exclusion Criteria

1. **3D External Beam Radiation Therapy** is not considered medically necessary.
2. **Brachytherapy** is not considered medically necessary.
3. **Intensity Modulated Radiation Therapy (IMRT)** is not considered medically necessary.

B. Non-Oligometastatic Spread

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** is considered medically necessary for the treatment of non-oligometastatic spread in up to 15 fractions (for **Bone Metastases** however, appropriate regimens include 8 Gy in 1 fraction, 20 Gy in 5 fractions or 30 Gy in 10 fractions.^{48,49})
2. **Non-Oligometastatic Spread** is defined as the spread of a cancer to 4 or more current and separate metastatic lesions within the body (i.e. metastases in the bones, lungs, liver, etc.).

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary.
2. **Intensity Modulated Radiation Therapy (IMRT)** is not considered medically necessary.
3. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary.

C. Brain Metastases^{50,51,52,53}

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** - treatment is considered medically necessary with up to 10 fractions.
2. **Intensity Modulated Radiation Therapy (IMRT)** treatment with up to 10 fractions is considered medically necessary **ONLY**:
 - a. When using a hippocampal sparing whole brain planning technique

3. **Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiation Therapy (SBRT)** treatment in 1-5 fractions is considered medically necessary when **ALL** of the following apply:
 - a. When the patient has stable systemic disease (low overall tumor volume) defined as only 1-3 current and separate metastatic lesions elsewhere in the body
 - b. When the patient has a performance status of 0, 1, or 2
 - c. When all lesions can be treated in a single treatment plan in a single fraction (for SRS) **OR** with 2 to 5 fractions (of SBRT)

Exclusion Criteria

1. **Brachytherapy** is not considered to be medically necessary.

XIV. MYELOMA

A. Solitary Plasmacytoma⁵⁴

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** is considered medically necessary with up to 25 fractions for solitary plasmacytomas.

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary.
2. **Intensity Modulated Radiation Therapy (IMRT)** is not considered medically necessary.
3. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary.

B. Multiple Myeloma⁵⁴

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** is considered medically necessary with up to 10 fractions for multiple myeloma.

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary.
2. **Intensity Modulated Radiation Therapy (IMRT)** is not considered medically necessary.
3. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary.

XV. PEDIATRIC CANCERS

Pediatric cancer patients are defined as cancer patients 18 years old or younger. When possible, pediatric cancer patients should be treated by physicians that specialize in Pediatric Radiation Oncology. 3D conformal, IMRT, Brachytherapy and SBRT are considered medically necessary in appropriate doses and fractions per the recommendation of the treating physician.

- A. **3D External Beam Radiation Therapy** is considered medically necessary.
- B. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary^{55,56}
- C. **Brachytherapy** is considered medically necessary.
- D. **Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiation Therapy (SBRT)** are considered medically necessary.

XVI. RE-IRRADIATION*

Re-irradiation is defined as a request for radiation treatment to an area of the body that has already received prior radiation to that same area. It does not apply to a situation where a patient has

received radiation treatment to one area of the body (i.e. the lung) and now requires radiation to a completely separate area of the body (i.e. the femur). In general, treatments such as IMRT and SRS/SBRT in the context of re-irradiation are considered medically necessary since the organs at risk in the previously treated area are usually at or near their maximum tolerance levels. Greater treatment accuracy with IMRT or SRS/SBRT is therefore required.

*All requests for re-irradiation require Clinical Review by an NCH Physician. Documentation of the prior treatment area and prior total radiation dose is also required.

- A. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary.
- B. **Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiation Therapy (SBRT)** are considered medically necessary.

XVII. SARCOMA

(Please print and use [The Dose Comparison Plan Worksheet](#) in the Attachment Section for Sarcoma IMRT)

A. Soft Tissue Sarcoma of an Extremity/Body Wall/Head and Neck (Pre-operative)⁵⁷

Indications for Use/Inclusion Criteria

- 1. **3D External Beam Radiation Therapy** is considered medically necessary in the pre-operative treatment of a soft tissue sarcoma with up to 25 fractions.
- 2. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary in the pre-operative treatment of a soft tissue sarcoma with up to 25 fractions as sole treatment when **ANY** of the following dose constraints are exceeded on the 3D plan:
 - a. Liver mean dose is > 28 Gy on a 3D comparison plan **OR**
 - b. Kidney mean dose is > 18 Gy on a 3D comparison plan **OR**
 - c. Small Bowel V45_{Gy} is >195 cc on a 3D comparison plan **OR**
 - d. Spinal Cord maximum dose is > 50 Gy on a comparison 3D plan **OR**
 - e. Heart mean dose > 30 Gy on a comparison 3D plan **OR**
 - f. Bilateral Lung V20_{Gy} > 30% on a 3D comparison plan

Exclusion Criteria

- 1. **Brachytherapy** is not considered medically necessary.
- 2. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary.

B. Soft Tissue Sarcoma of an Extremity/Body Wall/Head and Neck (Post-operative)⁵⁷

Indications for Use/Inclusion Criteria

- 1. **3D External Beam Radiation Therapy** is considered medically necessary in the post-operative treatment of a soft tissue sarcoma:
 - a. With up to 25 treatments followed by a brachytherapy boost
 - b. With up to 35 fractions as sole treatment
- 2. **Brachytherapy** is considered medically necessary as a post-operative boost in combination with 3D or IMRT treatments (see above):
 - a. With 1 LDR brachytherapy boost treatment combined with up to 25 treatments of 3D or IMRT radiation
 - b. With 10 HDR brachytherapy boost treatments combined with up to 25 treatments of 3D or IMRT radiation

3. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary in the post-operative treatment of a soft tissue sarcoma with up to 35 fractions as sole treatment when **ANY** of the following dose constraints are exceeded on the 3D plan:
 - a. Liver mean dose is > 28 Gy on a 3D comparison plan **OR**
 - b. Kidney mean dose is > 18 Gy on a 3D comparison plan **OR**
 - c. Small Bowel V45_{Gy} is >195 cc on a 3D comparison plan **OR**
 - d. Spinal Cord maximum dose is > 50 Gy on a comparison 3D plan **OR**
 - e. Heart mean dose > 30 Gy on a comparison 3D plan **OR**
 - f. Bilateral Lung V20_{Gy} > 30% on a 3D comparison plan

Exclusion Criteria

1. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary

C. Retroperitoneal/Abdominal Sarcoma^{58,59}

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** is considered medically necessary in the pre-operative or post-operative treatment of a retroperitoneal/abdominal sarcoma with up to 25 fractions.
2. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically in the pre-operative or post-operative treatment of a retroperitoneal/abdominal sarcoma with up to 25 fractions as sole treatment when **ANY** of the following dose constraints are exceeded on the 3D plan:
 - a. Liver mean dose is > 28 Gy on a 3D comparison plan **OR**
 - b. Kidney mean dose is > 18 Gy on a 3D comparison plan **OR**
 - c. Small Bowel V45_{Gy} is >195 cc on a 3D comparison plan **OR**
 - d. Spinal Cord maximum dose is > 50 Gy on a comparison 3D plan **OR**
 - e. Heart mean dose > 30 Gy on a comparison 3D plan **OR**
 - f. Bilateral Lung V20_{Gy} > 30% on a 3D comparison plan

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary.
2. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary.

D. Desmoid Tumors (Aggressive Fibromatosis)

Indications for Use/Inclusion Criteria

1. **3D External Beam Radiation Therapy** is considered medically necessary in the treatment of desmoid tumors with up to 25 fractions.

Exclusion Criteria

1. **Brachytherapy** is not considered medically necessary.
2. **Intensity Modulated Radiation Therapy (IMRT)** is not considered medically necessary.
3. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary.

XVIII. SKIN CANCERS^{60,61,62,63,64}

Indications for Use/Inclusion Criteria

- A. **2D or 3D External Beam Radiation Therapy** is considered medically necessary in the treatment of:
 1. **Basal Cell and Squamous Cell Carcinoma** – For tumors less than 2 cm with up to 20 fractions

2. **Basal Cell and Squamous Cell Carcinoma** – For tumors greater than 2 cm with up to 30 fractions
 3. **Melanoma** – with up to 35 fractions
 4. **Merkel Cell Carcinoma** – with up to 30 fractions
 5. **Dematofibrosarcoma Protuberans (DFSP)** – with up to 30 fractions
- B. **Brachytherapy** is considered medically necessary for the treatment of Basal Cell and Squamous Cell Carcinomas with up to 10 fractions of HDR (radioisotope based). The use of Electronic Brachytherapy is considered investigational and not medically necessary.
- C. **Intensity Modulated Radiation Therapy (IMRT)** is considered medically necessary in the treatment of Squamous cell, Melanoma, or Merkel cell cancers only when:
1. Treatment includes treating a **lymph node chain** when lymph node spread is suspected with up to 35 fractions (*Requires Clinical Review by an NCH Physician)
- D. Superficial Radiation or Orthovoltage Radiation is considered medically necessary for the treatment of Basal Cell and Squamous Cell Carcinomas with up to 18 fractions.

Exclusion Criteria

- A. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary

XIX. THYMOMA/THYMIC CANCERS^{65,66}

Indications for Use/Inclusion Criteria

- A. **3D External Beam Radiation Therapy OR Intensity Modulated Radiation Therapy (IMRT)** are considered medically necessary in the treatment of thymoma and thymic tumors with up to 35 fractions.
- B. **3D External Beam Radiation Therapy** is considered medically necessary with up to 15 fractions

Exclusion Criteria

- A. **Brachytherapy** is not considered medically necessary
- B. **Stereotactic Body Radiation Therapy (SBRT)** is not considered medically necessary

XX. OPTIONAL SERVICES

A. **Image-Guided Radiation Therapy (77387, 77014, G6002, G6017)**

Indications - IGRT is indicated when **ANY** of the following apply:

1. When Intensity Modulated Radiation Therapy (IMRT) is being utilized
2. When Proton Beam Radiation Therapy (PBRT) is being utilized
3. When the patient has had prior radiation and the current treatment field abuts the previously irradiated treatment area
4. When a left-sided breast cancer is being treated AND a deep inspiration breath hold technique (DIBH) is being utilized
5. When 3D accelerated partial breast irradiation (APBI) is being utilized
6. When fiducial markers have been implanted for the purpose of IGRT tracking
7. When the patient is morbidly obese (BMI>35) and there is considerable variation in the daily patient set-up affecting treatment accuracy

B. **Respiratory Motion Management (77293)**

Indications – Respiratory Motion Management is used for the purpose of precisely tracking the movement of a targeted tumor as it moves during the respiratory cycle.

Respiratory Motion Management is indicated when **ALL** of the following apply:

1. **When treating lung, thoracic, liver, biliary, or pancreatic cancers** which move significantly as the patient is breathing.
2. **A 4D CT simulation must be performed.** The 4D CT captures CT images throughout the entire (inspiration, expiration, and neutral breath positions) respiratory cycle. (Note - This service is not used for treating breast cancer with a Deep Inspiration Breath Hold (DIBH) technique).
3. When the patient's respiratory motion is acquired using a respiratory sensors and/or external fiducials and then registered to the 4D CT images.
4. When a Radiation Oncologist contours the moving tumor volume and creates an ITV.

C. Special Treatment Procedure (77470)

Indications – The Special Treatment Procedure is indicated when **ANY** of the following apply:

1. When concurrent chemotherapy is being utilized
2. When brachytherapy is being utilized
3. When proton therapy is being utilized
4. When total body irradiation is being utilized
5. When treating a pediatric cancer patient under anesthesia
6. When hyperthermia is being utilized
7. When the patient has had prior radiation and the current treatment field abuts the previously irradiated treatment field
8. When Stereotactic Body Radiation Therapy (SBRT) or when Stereotactic Radiosurgery (SRS) is being utilized

D. Special Physics Consult (77370)

Indications – The Special Physics Consult is indicated when **ANY** of the following apply:

1. When brachytherapy is being utilized
2. When image fusion (with a PET, CT, or MRI) is performed during the planning process by a medical physicist
3. When the patient has had prior radiation and the current treatment field abuts the previously irradiated treatment field
4. When analysis of dose to a fetus is required
5. When analysis of dose to a pacemaker/defibrillator is required
6. When Stereotactic Body Radiation Therapy (SBRT) or when Stereotactic Radiosurgery (SRS) is being utilized

XXI. APPROVAL AUTHORITY

- A. Review – Utilization Management Department
- B. Final Approval – Utilization Management Committee

XXII. ATTACHMENTS

- A. Attachment A: Breast Cancer IMRT – Physician and Dosimetrist Worksheet

- B. Attachment B: Gastrointestinal IMRT – Physician and Dosimetrist Worksheet
- C. Attachment C: Lung Cancer IMRT – Physician and Dosimetrist Worksheet
- D. Attachment D: Sarcoma IMRT – Physician and Dosimetrist Worksheet

XXIII. REFERENCES

1. 2013 ASTRO (Choosing Wisely Campaign), <https://www.astro.org/Patient-Care-and-Research/Patient-Education/2013-Choosing-Wisely-List>
2. 2021 ASTRO Radiation Oncology Coding Resource, pgs. 84-85.
3. Shah C, Vicini F, Shaitelman, et al. The American Brachytherapy Society consensus statement for accelerated partial-breast irradiation. *Brachytherapy*. 2018 Jan-Feb;17(1):154-170 – “Intraoperative radiation therapy and electronic brachytherapy should not be offered regardless of technique outside of clinical trial.”
4. Smith BD, Bellon JR, Blitzblau R, et al. Radiation therapy for the whole breast: Executive summary of an American Society for Radiation Oncology (ASTRO) evidence-based guideline. *Pract Radiat Oncol*. 2018 May - Jun;8(3):145-152.
5. Cabrera, AR, Kirkpatrick, JP, Fiveash, JB, et al. Radiation therapy for glioblastoma: Executive summary of an American Society for Radiation Oncology evidence-based clinical practice guideline. *Pract Radiat Oncol*. 2016;6(4):217-25.
6. Minniti, G, Amichetti, M, Enrici, RM. Radiotherapy and radiosurgery for benign skull base meningiomas. *Radiat Oncol*. 2009;4:42.
7. Germano, IM, Sheehan, J, Parish, J, et al. Congress of Neurological Surgeons systematic review and evidence-based guidelines on the role of radiosurgery and radiation therapy in the management of patients with vestibular schwannomas. *Neurosurgery*. 2018;82(2):E49-E51.
8. Kondziolka, D, Perez, B, Flickinger, JC, et al. Gamma knife radiosurgery for trigeminal neuralgia: results and expectations. *Arch Neurol*. 1998;55(12):1524-9.
9. Lunsford, LD, Kondziolka, D, Flickinger, JC, et al. Stereotactic radiosurgery for arteriovenous malformations of the brain. *J Neurosurg*. 1991;75(4):512-24.
10. Gondi, V, Pugh, SL, Mehta, MP, et al. NRG Oncology CC003: a randomized phase II/III trial of prophylactic cranial irradiation with or without hippocampal avoidance for small cell lung cancer. *J Clin Oncol*. 2019;37(15 Suppl):abstract TPS8578.
11. Sun, Z, Adam, MA, Kim, J, et al. Intensity-modulated radiation therapy is not associated with perioperative or survival benefit over 3D-conformal radiotherapy for rectal cancer. *J Gastrointest Surg*. 2017;21(1):106-11.
12. Wee, CW, Kang, HC, Wu, HG, et al. Intensity-modulated radiotherapy versus three-dimensional conformal radiotherapy in rectal cancer treated with neoadjuvant concurrent chemoradiation: a meta-analysis and pooled-analysis of acute toxicity. *Jpn J Clin Oncol*. 2018;48(5):458-66.
13. Two-year outcomes of RTOG 0529: A phase II evaluation of dose-painted IMRT in combination with 5-fluorouracil and mitomycin-C for the reduction of acute morbidity in carcinoma of the anal canal. https://ascopubs.org/doi/abs/10.1200/jco.2011.29.4_suppl.368
14. NRG Oncology/RTOG 0529: Long-Term Outcomes of Dose-Painted Intensity Modulated Radiation Therapy, 5-Fluorouracil, and Mitomycin-C in Anal Canal Cancer. [https://www.redjournal.org/article/S0360-3016\(17\)31209-9/fulltext](https://www.redjournal.org/article/S0360-3016(17)31209-9/fulltext)
15. Tao, R, Krishnan S, Bhosale PR, et al. Ablative radiotherapy doses lead to a substantial prolongation of survival in patients with inoperable intrahepatic cholangiocarcinoma: A retrospective dose response analysis. *J Clin Oncol*. 2016 Jan 20; 34(3):219-226.

16. Bradley JD, Paulus R, Komaki R, et al. Standard-dose versus high-dose conformal radiotherapy with concurrent and consolidation carboplatin plus paclitaxel with or without cetuximab for patients with stage IIIA or IIIB non-small cell lung cancer (RTOG 0617): a randomized, two-by-two factorial phase 3 study. *Lancet Oncol.* 2015 Feb; 16(2):187-199.
17. Opendijk V, van der Gaast A, van Lanschot JJB, et al. Patterns of recurrence after surgery alone versus preoperative chemoradiotherapy and surgery in the CROSS trials. *J Clin Oncol.* 2014 Feb 10; 32(5):385-391.
18. Alani S, Soyfer V, Strauss N, et al. Limited advantages of intensity-modulated radiotherapy over 3D conformal radiation therapy in the adjuvant management of gastric cancer. *Int J Radiat Oncol Biol Phys.* 2009 Jun 1; 74(2):562-566.
19. Van Tienhoven G, Versteijne E, Suker, M, et al. Preoperative chemoradiotherapy versus immediate surgery for resectable and borderline resectable pancreatic cancer (PREOPANC-1): A randomized, controlled, multicenter phase III trial. *American Society of Clinical Oncology (ASCO) 2018.* Presented June 4, 2018. Abstract LBA4002.
20. Van Gijn W, Marijnen CAM, Nagtegaal ID, Kranenborg EMK, Putter H, Wiggers T, et al. Preoperative radiotherapy combined with total mesorectal excision for resectable rectal cancer: 12-year follow-up of the multicentre, randomised controlled TME trial. *Lancet Oncol.* 2011;12:575–82.
21. Chuong, MD, Freilich, JM, Hoffe, SE, et al. Intensity-Modulated Radiation Therapy vs. 3D Conformal Radiation Therapy for Squamous Cell Carcinoma of the Anal Canal. *Gastrointest Cancer Res.* 2013;6(2):39-45.
22. Herman JM, Chang DT, Goodman KA, et al. Phase 2 multi-institutional trial evaluating Gemcitabine and stereotactic body radiotherapy for patients with locally advanced unresectable pancreatic adenocarcinoma. *Cancer.* 2015 Apr 1; 121(7):1128-1137.
23. 2021 NCCN Guidelines – Prostate Cancer
24. Hypofractionated Radiation Therapy for Localized Prostate Cancer: Executive Summary of an ASTRO, ASCO, and AUA Evidence-Based Guideline - *Practical Radiation Oncology* (2018) 8, 354-360
25. Ten-Year Update of a Randomized, Prospective Trial of Conventional Fractionated Versus Moderate Hypofractionated Radiation Therapy for Localized Prostate Cancer - *J Clin Oncol.* 2020 May 20;38(15):1676-1684.
26. *Lancet.* 2018 Dec 1;392(10162):2353-2366 - Radiotherapy to the primary tumour for newly diagnosed, metastatic prostate cancer (STAMPEDE): a randomised controlled phase 3 trial
27. Mak RH, Hunt D, Shipley WU, et al. Long-term outcomes in patients with muscle-invasive bladder cancer after selective bladder-preserving combined-modality therapy: A pooled analysis of Radiation Therapy Oncology Group protocols 8802, 8903, 9506, 9706, 9906, and 0233. *J Clin Oncol.* 2014 Dec 1; 32(34):3801-3809.
28. Macdonald DM, Lin LL, Biehl K, et al. Combined intensity-modulated radiation therapy and brachytherapy in the treatment of cervical cancer. *Int J Radiat Oncol Biol Phys.* 2008 Jun 1; 71(2):618-624.
29. Onsrud M, Cvancaraova M, Hellebust, et al. Long-term outcomes after pelvic radiation for early stage endometrial early-stage endometrial cancer. *J Clin Oncol.* 2013 Nov 1;31(31):3951-3956.
30. Scholten AN, van Putten WLJ, Beerman H, et al. Postoperative radiotherapy for stage 1 endometrial carcinoma: long-term outcome of the randomized PORTEC trial with central pathology review. *Int J Radiat Oncol Biol Phys.* 2005 Nov 1; 63(3) 834-838.
31. Gaffney DK, King B, Viswanathan AN, Barkati M, Beriwal S, Eifel P, Erickson B, Fyles A, Goulart J, Harkenrider M, Jhingran A, Klopp A, Koh WJ, Lim K, Petersen I, Portelance L, Small W Jr, Stewart A, Wiebe E, Wolfson A, Yashar C, Bosch W. Consensus Recommendations for Radiation

Therapy Contouring and Treatment of Vulvar Carcinoma. *Int J Radiat Oncol Biol Phys*. 2016 Jul 15;95(4):1191-200. doi: 10.1016/j.ijrobp.2016.02.043. Epub 2016 Feb 21.

32. Bernier J, Dommenege C, Ozsahin M, et al. Postoperative irradiation with or without concomitant chemotherapy for locally advanced head and neck cancer. *N Engl J Med*. 2004 May 6; 350(19):1945-1952.
33. Nguyen-Tan P, Zhang Q, Ang K, et al. Randomized phase III trial to test accelerated versus standard fractionation in combination with cisplatin for head and neck carcinomas in the Radiation Therapy 6 J.T. Parsons and B.D. Greene Practical Radiation Oncology: Month 2015 Oncology Group 0129 Trial: Long-term report of efficacy and toxicity. *J Clin Oncol*. 2014;32:3858-3867
34. Quon, H, Vapiwala, N, Forastiere, A, et al. Radiation therapy for oropharyngeal squamous cell carcinoma: American Society of Clinical Oncology endorsement of the American Society for Radiation Oncology evidence-based clinical practice guideline. *J Clin Oncol*. 2017;35(36):4078-90.
35. Bradley J, Schild, Bogart, J, et al. RTOG 0617/NCCTG N0628/CALGB 30609/ECOG R0617. A randomized phase III comparison of standard-dose (60 Gy) versus high-dose (74 Gy) conformal radiotherapy with concurrent and consolidation carboplatin/paclitaxel +/- cetuximab (IND #103444) in patients with Stage IIIA/IIIB non-small cell lung cancer. *NRG Oncology. Study Team 1/19/16*.
36. Timmerman R, McGarry R, Yiannoutsos C, et al. Excessive toxicity when treating central tumors in a phase II study of stereotactic body radiation therapy for medically inoperable early-stage lung cancer. *J Clin Oncol*. 2006 Oct 20, 24(30): 4833-4839.
37. Turrisi AT, Kim K, Blum R, et al. Twice daily compared to once-daily thoracic radiotherapy in limited small-cell lung cancer treated concurrently with cisplatin and etoposide. *N Engl J Med*. 1999 Jan 28; 340(4): 265-271.
38. Pignon JP, Arriagada R, Ihde DC, et al. A meta-analysis of thoracic radiotherapy for small-cell lung cancer. *N Engl J Med*. 1992 Dec 3; 327(23):1618-1624.
39. Aupérin A, Arriagada R, Pignon JP, et al. for the Prophylactic Cranial Irradiation Overview Collaborative Group. Prophylactic cranial irradiation for patients with small-cell lung cancer in complete remission. *N Engl J Med*. 1999 Aug 12; 341(7):476-484. Belderbos J, Phd M, Ruyscher DD, Jaeger KD, et al. OC-0503 Phase III trial of Prophylactic Cranial Irradiation with or without Hippocampus Avoidance in SCLC. *Radiotherapy and Oncology*. 2019; 133(Supplement 1):S259. doi:10.1016/s0167-8140(19)30923-5.
40. Belderbos J, Phd M, Ruyscher DD, Jaeger KD, et al. OC-0503 Phase III trial of Prophylactic Cranial Irradiation with or without Hippocampus Avoidance in SCLC. *Radiotherapy and Oncology*. 2019; 133(Supplement 1):S259. doi:10.1016/s0167-8140(19)30923-5.
41. Specht L, Yahalom J, Illidge T, et al. Modern radiation therapy for Hodgkin lymphoma: Field and dose guidelines from the International Lymphoma Radiation Oncology Group (ILROG). *Int J Radiat Oncol Biol Phys*. 2014 Jul 15; 89(4):854-862.
42. Straus DJ, Portlock CS, Qin J, et al. Results of a prospective randomized clinical trial of doxorubicin, bleomycin, vinblastine, and dacarbazine (ABVD) followed by radiation therapy (RT) versus ABVD alone for stages I, II, and IIIA nonbulky Hodgkin disease. *Blood*. 2004 Dec 1; 104(12):3483-3489.
43. Phan J, Mazloom A, Medeiros LJ, et al. Benefit of consolidative radiation therapy in patients with diffuse large B-cell lymphoma treated with R-CHOP chemotherapy. *J Clin Oncol*. 2010 Sep 20; 28(27):4170-4176.
44. Goda JS, Gospodarowicz M, Pintilie M, et al. Long-term outcome in localized extranodal mucosa-associated lymphoid tissue lymphomas treated with radiotherapy. *Cancer*. 2010; 116(16):3815-3824.

45. Palma DA, Olson R, Harrow S, Gaede S, Louie AV, Haasbeek C, Mulroy L, Lock M, Rodrigues GB, Yaremko BP, Schellenberg D, Ahmad B, Griffioen G, Senthil S, Swaminath A, Kopeck N, Liu M, Moore K, Currie S, Bauman GS, Warner A, Senan S. Stereotactic ablative radiotherapy versus standard of care palliative treatment in patients with oligometastatic cancers (SABR-COMET): A randomised, phase 2, open-label trial. *Lancet*. 2019 May 18;393(10185):2051-2058.
46. Suter P, Clump DA, Kalash R, et al. Initial results of a multicenter phase 2 trial of stereotactic ablative radiation therapy for oligometastatic cancer. *Int J Radiat Oncol Biol Phys*. 2019;103(1):116-22.
47. Tsao MN, Ven LI, Cheung P, et al. Stereotactic body radiation therapy for extracranial oligometastatic non-small-cell lung cancer: a systematic review. *Clin Lung Cancer*. 2020;21(2):95-105
48. 2013 ASTRO (Choosing Wisely Campaign), <https://www.astro.org/Patient-Care-and-Research/Patient-Education/2013-Choosing-Wisely-List>
49. Lutz S, Balboni T, Jones J, et al. Palliative radiation therapy for bone metastases: Update of an ASTRO Evidence-Based Guideline. *Pract Radiat Oncol*. 2017;7(1):4-12.
50. Andrews DW, Scott CB, Sperduto PW, et al. Whole brain radiation therapy with or without stereotactic radiosurgery boost for patients with one to three brain metastases: phase III results of RTOG 9508 randomized trial. *Lancet*. 2004 May 22; 363(9422):1665-1672.
51. Sperduto PW, Shanley R, Luo X, et al. Secondary analysis of RTOG 9508, a phase 3 randomized trial of whole brain radiation therapy versus WBRT plus stereotactic radiosurgery in patients with 1-3 brain metastases; poststratified by the graded prognostic assessment (GPA). *Int J Radiat Oncol Biol Phys*. 2014 Nov 1;90(3):526- 31.
52. Gondi V, Pugh SL, Tome WA, et al. Preservation of memory with conformal avoidance of the hippocampal neural stem-cell compartment during whole-brain radiotherapy for brain metastases (RTOG 0933): a phase II multiinstitutional trial. *J Clin Oncol*. 2014 Dec 1;32(34):3810-3816.
53. Kocher M, Soffiotti R, Abacioglu U, et al. Adjuvant whole-brain radiotherapy versus observation after radiosurgery or surgical resection of one to three cerebral metastases: results of the EORTC 22952-26001 study. *J Clin Oncol*. 2011 Jan 10; 29(2):134-141.
54. Tsang RW, Campbell BA, Goda JS, et al. Radiation therapy for solitary plasmacytoma and multiple myeloma: Guidelines from the International Lymphoma Radiation Oncology Group. *Int J Radiat Oncol Biol Phys*. 2018 Jul 15;101(4):794-808.
55. Bhatnagar, A, Deutsch, M. The role for intensity modulated radiation therapy (IMRT) in pediatric population. *Technol Cancer Res Treat*. 2006;5(6):591-5.
56. Sterzing, F, Stoiber, EM, Nill, S, et al. Intensity modulated radiotherapy (IMRT) in the treatment of children and adolescents--a single institution's experience and a review of the literature. *Radiat Oncol*. 2009;4(37)
57. Kraybill WG, Harris J, Spiro IJ, et al. Phase II study of neoadjuvant chemotherapy and radiation therapy in the management of high-risk, high-grade, soft tissue sarcomas of the extremities and body wall: Radiation Therapy Oncology Group Trial 9514. *J Clin Oncol*. 2006 Feb 1; 24(4):619-625.
58. Long-term outcomes in treatment of retroperitoneal sarcomas: A 15 year single-institution evaluation of prognostic features, *J Surg Oncol* 2016 Jul;114(1):56-64.doi: 10.1002/jso.24256. Epub 2016 Apr 13.
59. Treatment of retroperitoneal sarcoma: current standards and new developments, *Curr Opin Oncol*. 2017 Jul;29(4):260-267. doi: 10.1097/CCO.0000000000000377.
60. Likhacheva M, Awan M, Barker C, et al. Definitive and Postoperative Radiation Therapy for Basal and Squamous Cell Cancers of the Skin: Executive Summary of an American Society for

Radiation Oncology Clinical Practice Guideline. Practical Radiation Oncology. 2020 January - February; 10(1), pp.8-20.

61. Tom MC, Hepel JT et al. The American Brachytherapy Society consensus statement for electronic brachytherapy. *Brachytherapy*. 18 (2019) 292-298. "In light of a randomized trial in breast showing higher rates of recurrence and the lack of prospective data with mature follow up with other sites, as well as concerns regarding dosimetry, it is not recommended that EB be utilized for accelerated partial breast irradiation, nonmelanomatous skin cancers, or vaginal cuff brachytherapy outside prospective clinical trials at this time."
62. Agrawal S, Kane III JM, Guadagnolo BA, et al. The benefits of adjuvant radiation therapy after therapeutic lymphadenectomy for clinically advanced, high-risk, lymph node-metastatic melanoma. *Cancer*. 2009 Dec 15; 115(24):5836-5844.
63. Burmeister BH, Henderson MA, Ainslie J, et al. Adjuvant radiotherapy versus observation alone for patients at risk of lymph-node field relapse after therapeutic lymphadenectomy for melanoma: a randomised trial. *Lancet Oncol*. 2012 Jun; 13(6):589-597.
64. Chang DT, Amdur RJ, Morris CG, et al. Adjuvant radiotherapy for cutaneous melanoma: comparing hypofractionation to conventional fractionation. *Int J Radiat Oncol Biol Phys*. 2006 Nov 15; 66(4):1051-1055.
65. Korst RJ, Bezjak A, Blackmon S, et al. Neoadjuvant chemoradiotherapy for locally advanced thymic tumors: A phase II, multi-institutional clinical trial. *J Thorac Cardiovasc Surg*. 2014 Jan;147(1):36-46.e1.
66. Treatment modalities and outcomes in patients with advanced invasive thymoma or thymic carcinoma. *Am J Clin Oncol*. 2016 Apr;39(2):120-125.

Attachment A: Breast Cancer IMRT – Physician and Dosimetrist Worksheet

(For Post-Mastectomy Chest Wall and Whole Breast Cancers)

DOSE LIMITS

Heart Mean dose > 5 Gy on a comparison 3D plan

*Bilateral Lung V20_{Gy} > 30% on a comparison 3D plan - *not ipsilateral lung

Spinal Cord maximum dose > 50 Gy on a comparison 3D plan

Please perform a dose comparison of a 3D plan vs. an IMRT plan and write any relevant numbers in the spaces below. Then use this information to answer the questions in the NCH portal and fax this sheet to NCH.

| | | |
|-----------------------------------|----------------|------------------------------------|
| Heart mean dose | 3D plan ____Gy | IMRT plan ____Gy |
| *Bilateral Lung V20 _{Gy} | 3D plan ____% | IMRT plan ____% (*not ipsilateral) |
| Spinal Cord max dose | 3D plan ____Gy | IMRT plan ____Gy |

Attachment B: Gastrointestinal IMRT – Physician and Dosimetrist Worksheet

(For Rectal, Cholangiocarcinoma, Esophageal cancer, Gastric cancer, and Pancreatic Cancers)

DOSE LIMITS

Liver mean dose is > 28 Gy on a 3D comparison plan

Kidney mean dose is > 18 Gy on a 3D comparison plan

Small Bowel V45_{Gy} is >195 cc on a 3D comparison plan

Spinal Cord maximum dose is > 50 Gy on a comparison 3D plan

Heart mean dose > 30 Gy on a comparison 3D plan

*Bilateral Lung V20_{Gy} > 30% on a 3D comparison plan *not ipsilateral lung

Please perform a dose comparison of a 3D plan vs. an IMRT plan and write any relevant numbers in the spaces below. Then use this information to answer the questions in the NCH portal and fax this sheet to NCH.

| | | |
|----------------------------------|----------------|------------------------------------|
| Liver mean dose | 3D plan ____Gy | IMRT plan ____Gy |
| Kidney mean dose | 3D plan ____Gy | IMRT plan ____Gy |
| Small Bowel V45 _{Gy} | 3D plan ____% | IMRT plan ____% |
| Spinal Cord max dose | 3D plan ____Gy | IMRT plan ____Gy |
| Heart mean dose | 3D plan ____Gy | IMRT plan ____Gy |
| Bilateral Lung V20 _{Gy} | 3D plan ____% | IMRT plan ____% (*not ipsilateral) |

Attachment C: Lung Cancer IMRT – Physician and Dosimetrist Worksheet
(For Non-small cell and Small cell lung cancers)

DOSE LIMITS

Esophageal mean dose is > 34 Gy on a comparison 3D plan

Spinal Cord maximum dose is > 50 Gy on a comparison 3D plan

Heart mean dose > 30 Gy on a comparison 3D plan

*Bilateral Lung V20_{Gy} > 30% on a 3D comparison plan - *not ipsilateral

Please perform a dose comparison of a 3D plan vs. an IMRT plan and write any relevant numbers in the spaces below. [Then use this information to answer the questions in the NCH portal](#) and fax this sheet to NCH.

| | | |
|----------------------------------|----------------|------------------------------------|
| Esophageal mean dose | 3D plan ____Gy | IMRT plan ____Gy |
| Spinal Cord max dose | 3D plan ____Gy | IMRT plan ____Gy |
| Heart mean dose | 3D plan ____Gy | IMRT plan ____Gy |
| Bilateral Lung V20 _{Gy} | 3D plan ____% | IMRT plan ____% (*not ipsilateral) |

Attachment D: Sarcoma IMRT – Physician and Dosimetrist Worksheet
DOSE LIMITS

Liver mean dose is > 28 Gy on a 3D comparison plan

Kidney mean dose is > 18 Gy on a 3D comparison plan

Small Bowel V45_{Gy} is >195 cc on a 3D comparison plan

Spinal Cord maximum dose is > 50 Gy on a comparison 3D plan

Heart mean dose > 30 Gy on a comparison 3D plan

*Bilateral Lung V20_{Gy} > 30% on a 3D comparison plan *not ipsilateral lung

Please perform a dose comparison of a 3D plan vs. an IMRT plan and write any relevant numbers in the spaces below. Then use this information to answer the questions in the NCH portal and fax this sheet to NCH.

| | | |
|----------------------------------|----------------|------------------------------------|
| Liver mean dose | 3D plan ____Gy | IMRT plan ____Gy |
| Kidney mean dose | 3D plan ____Gy | IMRT plan ____Gy |
| Small Bowel V45 _{Gy} | 3D plan ____% | IMRT plan ____% |
| Spinal Cord max dose | 3D plan ____Gy | IMRT plan ____Gy |
| Heart mean dose | 3D plan ____Gy | IMRT plan ____Gy |
| Bilateral Lung V20 _{Gy} | 3D plan ____% | IMRT plan ____% (*not ipsilateral) |