Annotations for Chemotherapy and Radiation Therapy in Treating Young Patients With Newly Diagnosed, Previously Untreated, High-Risk Medulloblastoma/PNET (ACNS0332-Tumor-Annotations)

Summary

This dataset contains image annotations derived from the NCI Clinical Trial "Chemotherapy and Radiation Therapy in Treating Young Patients With Newly Diagnosed, Previously Untreated, High-Risk Medulloblastoma/PNET (ACNS0332)". This curated dataset provides a comprehensive picture of imaging in pediatric patients with newly diagnosed primitive neuroectodermal tumors throughout their treatment and until any potential relapse. This is the largest known dataset of patients with supratentorial primitive neuroectodermal tumors and pineoblastomas. This dataset was generated as part of an NCI project to augment TCIA datasets with annotations that will improve their value for cancer researchers and AI developers.

Annotation Protocol

For each patient, every DICOM Study and DICOM Series was reviewed to identify and annotate clinically relevant time points and sequences. In a typical patient the following time points were annotated:

1. Pre-surgical study
2. Post-surgical study [if applicable]
3. Follow-up study at the completion of radiotherapy.
4. Follow-up study at the end of chemotherapy.
5. Follow-up study relapse [if applicable]

At each time point, 3D segmentations (DICOM SEG), seed points (DICOM RTSTRUCT) and negative finding assessments (DICOM RTSTRUCT) were created:

1. Enhancing tumor on an axial 3D T1 post contrast sequence
    a. If not available, a 3D post contrast sequence in another plane was used.
    b. If no 3D post contrast sequence was available, the tumor was annotated in all 3 planes utilizing 2D post contrast sequences.
    c. On post-contrast sequences, the entire tumor, including the cystic and non enhancing components was annotated.
    d. Any resection cavity or post-op changes/products was excluded.
2. Edema on an axial T2 FLAIR sequence
    a. If not available, an axial T2 or other T2 weighted sequence was used.
    b. The segmentation mask contains both the edematous tissue and the tumor.
3. The portion of the tumor demonstrating restricted diffusion on an ADC sequence
4. Up to 5 metastatic lesions within the brain and and up to 5 metastatic lesions in the spine as demonstrated on whatever T1 post contrast sequence they are visualized on
    a. When present, the 5 largest lesions were annotated.
5. A manually placed seed point (kernel) were created for each segmented structure
    a. The seed points for each segmentation are provided in a separate DICOM RTSTRUCT file.
    b. Spinal metastases, which are too small to apply a volumetric mask to, only have a seed point annotation.
6. If no seed points or segmentations were generated a "Negative Assessment Report" RTSTRUCT file was created to record this fact.
7. To ensure a high standard of accuracy and data quality, each annotation was reviewed by a secondary reader.

Important supplementary information and sample code

1. A spreadsheet containing a variety of useful metadata about the annotations, including calculated tumor volumes, is available in the **Data Access** section below.
2. Important information about how to interpret the DICOM annotation data can be found on the **Detailed Description** section below. It includes information about specific tags which document where the tumor was found, whether it was enhancing/non-enhancing, which study time point the annotation relates to, details for lesion tracking across time points, etc.
3. A Jupyter notebook demonstrating how to use the NBIA Data Retriever Command-Line Interface application and our REST API (with authentication) to access these data can be found in the **Additional Resources** section below.
4. Instructions for visualizing these data in 3D Slicer can be found in the **Additional Resources** section below.

Data Access
Data Access

Data Type	Download all or Query/Filter	License
ACNS0332 Annotations -- Segmentations, Seed Points, and Negative Findings Assessments (DICOM, 0.2 GB)	*Download Search* (Download requires the NBIA Data Retriever)	CC BY 4.0

ACNS0332 Annotation Metadata (CSV)	*Download*	CC BY 4.0

Collections Used in this Third Party Analysis

Below is a list of the Collections used in these analyses:

Source Data Type	Download	License
Original ACNS0332 Images used to create Segmentations and Seed Points (DICOM, 12.1 GB)	*Download* (Download requires the NBIA Data Retriever)	NCTN/NCORP Data Archive License (Without Collaborative Agreement)
Original ACNS0332 Images used to create Negative Assessment reports (DICOM, 9.4 GB)	*Download* (Download requires the NBIA Data Retriever)	NCTN/NCORP Data Archive License (Without Collaborative Agreement)

Click the Versions tab for more info about data releases.

- Chemotherapy and Radiation Therapy in Treating Young Patients With Newly Diagnosed, Previously Untreated, High-Risk Medulloblastoma /PNET (ACNS0332)

Additional Resources for this Dataset

The following external resources have been made available by the data submitters. These are not hosted or supported by TCIA, but may be useful to researchers utilizing this collection.

- NCTN/NCORP Data Archive provides the Clinical Data files related to these subjects, and is also where you go to request access to the entire dataset
- Jupyter notebook demonstrating how to use the NBIA Data Retriever Command-Line Interface application and our REST API (with authentication) to access these data
- Instructions for Visualizing these data in 3D Slicer

Detailed Description
Detailed Description

Image Statistics	Radiology Imaging Statistics
Modalities	RTSTRUCT, SEG
Number of Patients	85
Number of Studies	555
Number of Series	3338
Number of Images	3338
Images Size (GB)	0.2

Important information contained in the DICOM headers:

1. **Anatomic Region Sequence** (0x0008, 0x2218) was inserted containing CNS Segmentation Types as defined in: https://dicom.nema.org/medical /dicom/current/output/chtml/part16/sect_CID_7153.html. In cases where tumor spans multiple regions, multiple location codes were inserted. For example, if the tumor is centered in the parietal lobe, but also involves the frontal and temporal lobes, anatomical codes for all three locations were attached to the structure.
2. **Segmented Property Category Code Sequence** (0x0062,0x0003) was inserted into DICOM SEG objects containing one of the following codes:
   - (NCIt, C113842, "Enhancing Lesion")
   - (NCIt, C81175, "Non-Enhancing Lesion")
   - (SNOMED-CT, 14799000, "Neoplasm, Secondary")
   - (SNOMED-CT, 79654002, "Edema")
3. **Tracking ID** (0x0062,0x0020) and **Tracking UID** (0x0062,0x0021) tags were inserted for each segmented structure to enable longitudinal lesion tracking.
4. A study time point description was inserted into the **Clinical Trial Time Point ID** (0x0012,0x0050) attribute to help identify each annotation in the context of the clinical trial assessment protocol. The time point description contains one of the following strings: *pre-operative, post-operative, post-radiation, post-chemotherapy, or recurrence*. Additionally, a **Concept Name Code Sequence** (0x0040, 0xA043) and **Concept Code Sequence** (0x0040,0xA168) were added to **Acquisition Context Sequence** (0x0040, 0x0555).The former defines a **Time Point Type** concept and latter is populated with one of the following concepts:
   - (SNOMED-CT, 262068006, "Pre-operative")
   - (SNOMED-CT, 262061000, "Post-operative")
   - (SNOMED-CT, 264908009, "Post-radiation")
   - (SNOMED-CT, 262502001, "Post-chemotherapy")
   - (SNOMED-CT, 25173007, "Recurrent tumor (finding)")

5. For reviewed studies with no radiologic findings, a "negative" DICOM SEG and/or RTSS file are provided. These files contain no segmentation or contour data, but still contain pertinent metadata in **Clinical Trial Time Point ID**, **Acquisition Context Sequence**, **Anatomic Region Sequence**, and **Segmented Property Category Code Sequence**. The primary motivation for providing these annotations is to capture the information that no radiologic findings (e.g. progression or new metastatic disease) were found during review.

<u>Citations & Data Usage Policy</u>
Citations & Data Usage Policy

Users must abide by the TCIA Data Usage Policy and Restrictions. Attribution should include references to the following citations:

ⓘ **Data Citation**

Rozenfeld, M., & Jordan, P. (2022). **Annotations for Chemotherapy and Radiation Therapy in Treating Young Patients With Newly Diagnosed, Previously Untreated, High-Risk Medulloblastoma/PNET (ACNS0332-Tumor-Annotations) (Version 2) [Data set]**. The Cancer Imaging Archive. https://doi.org/10.7937/D8A8-6252

ⓘ **TCIA Citation**

Clark K, Vendt B, Smith K, Freymann J, Kirby J, Koppel P, Moore S, Phillips S, Maffitt D, Pringle M, Tarbox L, Prior F. **The Cancer Imaging Archive (TCIA): Maintaining and Operating a Public Information Repository**, Journal of Digital Imaging, Volume 26, Number 6, December, 2013, pp 1045-1057. DOI: 10.1007/s10278-013-9622-7

Other Publications Using This Data

TCIA maintains a list of publications which leverage TCIA data. If you have a manuscript you'd like to add please contact TCIA's Helpdesk.
<u>Versions</u>
Version 3 (Current): Updated 2023/08/03

Data Type	Download all or Query/Filter	License
ACNS0332 Annotations -- Segmentations, Seed Points, and Negative Findings Assessments (DICOM, 0.2 GB)	*Download Search* (Download requires the NBIA Data Retriever)	CC BY 4.0
ACNS0332 Annotation Metadata (CSV)	*Download*	CC BY 4.0

Updated annotation metadata spreadsheet column for Annotation Type to be consistent with other NCTN annotation datasets.

Version 2: Updated 2023/03/21

Data Type	Download all or Query/Filter	License
ACNS0332 Annotations -- Segmentations, Seed Points, and Negative Findings Assessments (DICOM, 0.2 GB)	*Download Search* (Download requires the NBIA Data Retriever)	NCTN/NCORP Data Archive License (Without Collaborative Agreement)
ACNS0332 Annotation Metadata (CSV)	*Download*	NCTN/NCORP Data Archive License (Without Collaborative Agreement)
Original ACNS0332 Images used to create Segmentations and Seed Points (DICOM, 12.1 GB)	*Download* (Download requires the NBIA Data Retriever)	NCTN/NCORP Data Archive License (Without Collaborative Agreement)
Original ACNS0332 Images used to create Negative Assessment reports (DICOM, 9.4 GB)	*Download* (Download requires the NBIA Data Retriever)	NCTN/NCORP Data Archive License (Without Collaborative Agreement)

Removed 5 duplicated annotation files and updated metadata report.

Version 1: Updated 2022/10/05

Data Type	Download all or Query/Filter	License
ACNS0332 Annotations -- Segmentations, Seed Points, and Negative Findings Assessments (DICOM, 0.2 GB)	*Download Search* (Download requires the NBIA Data Retriever)	NCTN/NCORP Data Archive License (Without Collaborative Agreement)
ACNS0332 Annotation Metadata (CSV)	*Download*	NCTN/NCORP Data Archive License (Without Collaborative Agreement)
Original ACNS0332 Images used to create Segmentations and Seed Points (DICOM, 12.1 GB)	*Download* (Download requires the NBIA Data Retriever)	NCTN/NCORP Data Archive License (Without Collaborative Agreement)
Original ACNS0332 Images used to create Negative Assessment reports (DICOM, 9.4 GB)	*Download* (Download requires the NBIA Data Retriever)	NCTN/NCORP Data Archive License (Without Collaborative Agreement)