

```

import matplotlib.pyplot as plt
import numpy as np
import nibabel as nib
from sklearn.model_selection import train_test_split
import torch
from torch.utils.data import Dataset, DataLoader
import torch.nn as nn
import torchvision.transforms as transforms
from glob import glob
import random
import SimpleITK as sitk
import pandas as pd
import nibabel as nb
import torch.nn.functional as F
import os

IMG_FILE_NAMES = glob('wCF_*')
if len(IMG_FILE_NAMES)>0:
    print(len(IMG_FILE_NAMES), ' matching files found:', IMG_FILE_NAMES[0])
else:
    print("No matching files found.")
```

761 matching files found: wCF_450_MRI_sMRI_CF_450_brain.nii.gz

```
#device configuration
device=torch.device('cuda' if torch.cuda.is_available() else 'cpu')
```

```
data_df=pd.read_csv('classification_clean1.csv')

data_df["Class"]的数据框["Diagnosis"]>0
#data_df["Class"]=data_df["FEP_binary"]>0

data_df.Class = data_df.Class.astype('int')
data_df.head(10)
```

	ID_CF	FirstEpisodes_FEP_HC	FEP_binary	Diagnosis	Gender	Age	Site 1	Site 2	Site 3	Site 4	Site 5
0	CF_001	FEP	1	3	0	23.857632	0	0	0	0	0
1	CF_002	FEP	1	3	0	28.952772	0	0	0	0	0
2	CF_003	FEP	1	1	0	20.199863	0	0	0	0	0
3	CF_004	FEP	1	1	0	28.517454	0	0	0	0	0
4	CF_005	FEP	1	2	1	39.101985	0	0	0	0	0
5	CF_007	FEP	1	4	1	24.043806	0	0	0	0	0
6	CF_008	FEP	1	4	1	23.808350	0	0	0	0	0
7	CF_009	FEP	1	1	0	28.908966	0	0	0	0	0
8	CF_010	FEP	1	3	0	29.404517	0	0	0	0	0
9	CF_011	FEP	1	5	1	24.763860	0	0	0	0	0



```
data_df.columns
```

```
Index(['ID_CF', 'FirstEpisodes_FEP_HC', 'FEP_binary',
       'Diagnosis', 'Gender', 'Age', 'Site 1', 'Site 2', 'Site 3', 'Site 4',
       'Site 5', 'Site 6', 'Site 7', 'Euler', 'Test', 'Class'],
      dtype='object')
```

Looking for the specifics parameters of images

```
#looking for the average min and max intensity of all the images

min_intensity = float('inf')
max_intensity = float('-inf')
```

```

for filename in IMG_FILE_NAMES:

    image = sitk.ReadImage(filename)
    min_image_intensity = sitk.GetArrayFromImage(image).min()
    max_image_intensity = sitk.GetArrayFromImage(image).max()
    #print(min_intensity, min_image_intensity )
    min_intensity = min(min_intensity, min_image_intensity)
    max_intensity = max(max_intensity, max_image_intensity)

print("Minimum intensity:", min_intensity)
print("Maximum intensity:", max_intensity)

```

```

Minimum intensity: -12879.776
Maximum intensity: 544463.3

```

```

#looking for the average parameters of images of all the images
#taken random images from IMG_FILE_NAMES to look the parameter's
# Load the image
img = nib.load(IMG_FILE_NAMES[1])

# Get the data from the image
data = img.get_fdata()

# Get the voxel resolution from the header
resolution = img.header.get_zooms()

print("Voxel resolution (mm):", resolution)

# Get the minimum and maximum intensity values
min_val = data.min()
max_val = data.max()

print("Minimum intensity value:", min_val)
print("Maximum intensity value:", max_val)

# Get the slice thickness and gap from the header
slice_thickness = img.header['pixdim'][3]
slice_gap = img.header['pixdim'][4]

print("Slice thickness (mm):", slice_thickness)
print("Slice gap (mm):", slice_gap)

# Get the affine matrix
affine = img.affine

# Get the range of the image in millimeters
x_range = affine[0,0]*img.shape[0]
y_range = affine[1,1]*img.shape[1]
z_range = affine[2,2]*img.shape[2]

print("Range in x (mm):", x_range)
print("Range in y (mm):", y_range)
print("Range in z (mm):", z_range)

```

```

Voxel resolution (mm): (2.0, 2.0, 2.0)
Minimum intensity value: -101.0
Maximum intensity value: 2153.0
Slice thickness (mm): 2.0
Slice gap (mm): 1.0
Range in x (mm): -158.0
Range in y (mm): 190.0
Range in z (mm): 158.0

```

dividing each images categories wise.Using the diagnosis value of each images the category are made.

```

imagenames_with_categories={
    'cat0':[], 
    'cat1':[], 
    'cat2':[], 
    'cat3':[], 
    'cat4':[]
}

```

```
'cat5':[],  
'cat6':[],  
'cat7':[]  
}  
  
# separating images as of using there diagnosis value  
for index, row in data_df.iterrows():  
    for name in IMG_FILE_NAMES:  
        if row['ID_CF'] in name:  
            if row['Diagnosis']==0:  
                imagnames_with_categories['cat0'].append(name)  
            elif row['Diagnosis']==1:  
                imagnames_with_categories['cat1'].append(name)  
            elif row['Diagnosis']==2:  
                imagnames_with_categories['cat2'].append(name)  
            elif row['Diagnosis']==3:  
                imagnames_with_categories['cat3'].append(name)  
            elif row['Diagnosis']==4:  
                imagnames_with_categories['cat4'].append(name)  
            elif row['Diagnosis']==5:  
                imagnames_with_categories['cat5'].append(name)  
            elif row['Diagnosis']==6:  
                imagnames_with_categories['cat6'].append(name)  
            elif row['Diagnosis']==7:  
                imagnames_with_categories['cat7'].append(name)  
  
imagnames_with_categories
```

```
'wCF_05_MR1_SMRI_CF_05_brain.nii.gz',
'wCF_711_MR1_SMRI_CF_711_brain.nii.gz',
'wCF_719_MR1_SMRI_CF_719_brain.nii.gz']}
```

Visualise the images of categories 0(the healthy images) and looking for the each images Intensity,Dimension,Slice Thickness,SliceGap,Voxel Resolution

```
categories = ['cat0']

for category in categories:
    for name in imagenames_with_categories[category]:
        # Load the image
        img = nib.load(name)

        # Get the data from the image
        data = img.get_fdata()

        # Display the image using matplotlib
        plt.imshow(data[:, :, 20], cmap='gray')
        plt.show()

        # Get the header information
        header = img.header

        # Get the intensity information
        intensity = header.get_data_dtype()

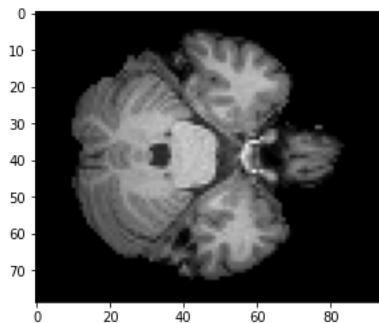
        # Get the dimension information
        dimension = header.get_data_shape()

        # Get the slice thickness information
        slice_thickness = header['pixdim'][3]

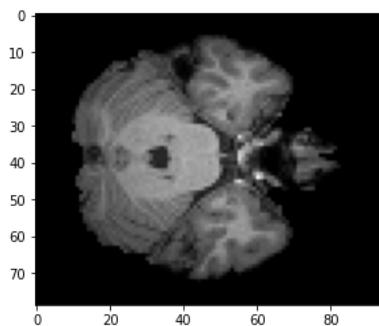
        # Get the slice gap information
        slice_gap = header['pixdim'][4]

        # Get the voxel resolution information
        voxel_resolution = header['pixdim'][1:4]

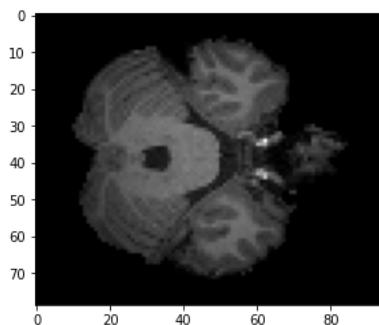
        # Print the information
        print("Intensity:", intensity)
        print("Dimension:", dimension)
        print("Slice Thickness:", slice_thickness)
        print("Slice Gap:", slice_gap)
        print("Voxel Resolution:", voxel_resolution)
```



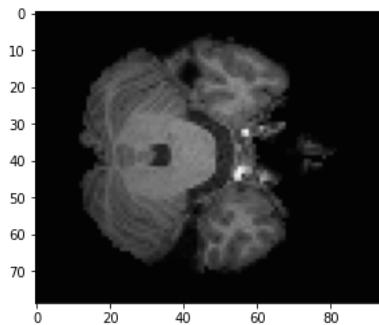
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



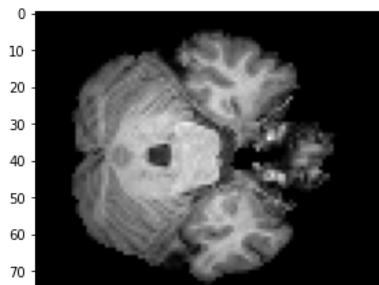
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

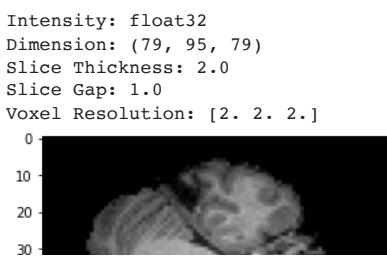
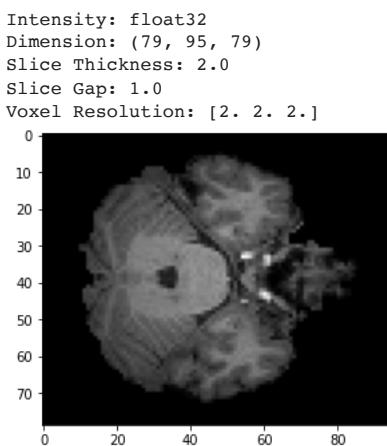
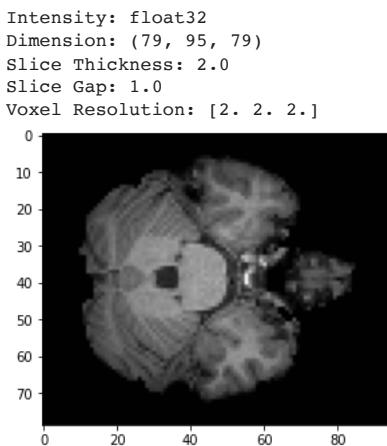
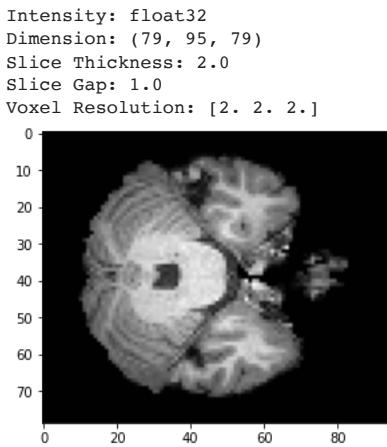
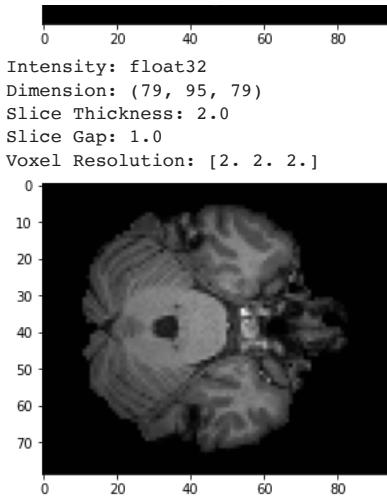


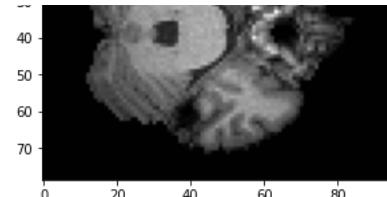
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



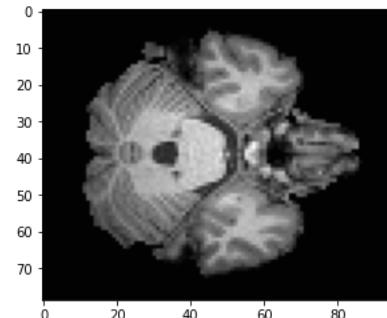
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



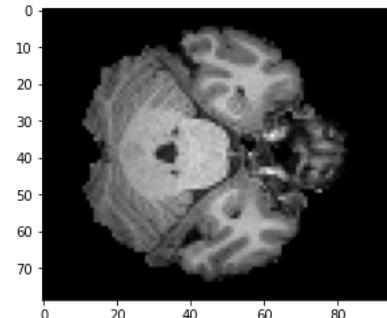




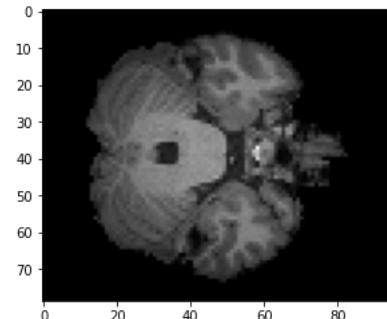
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



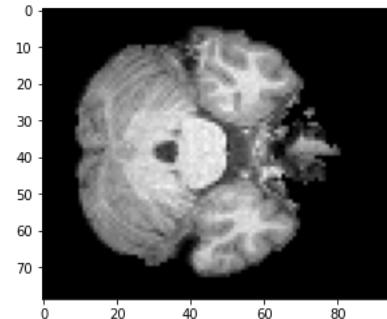
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

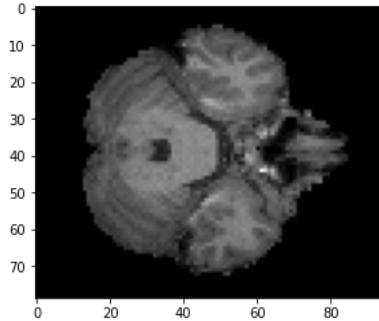


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



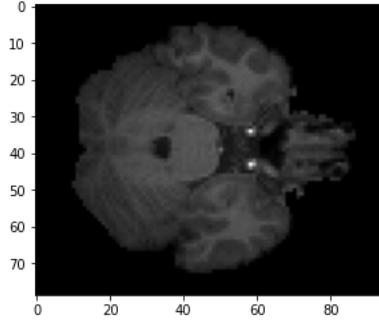
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



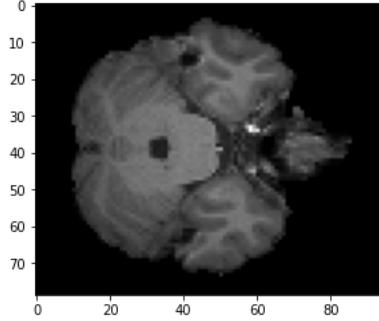
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



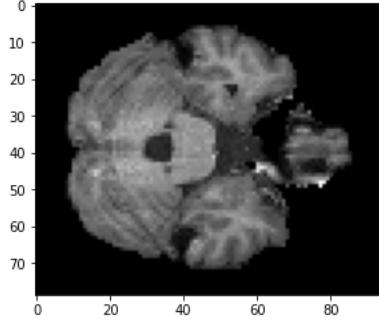
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



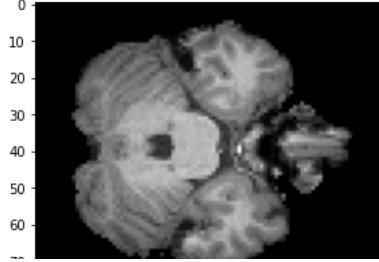
Intensity: float32

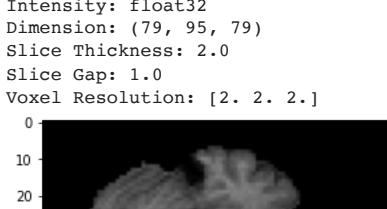
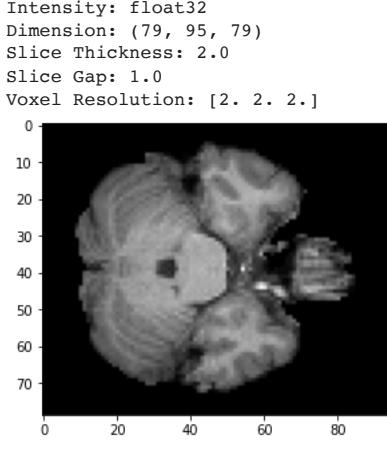
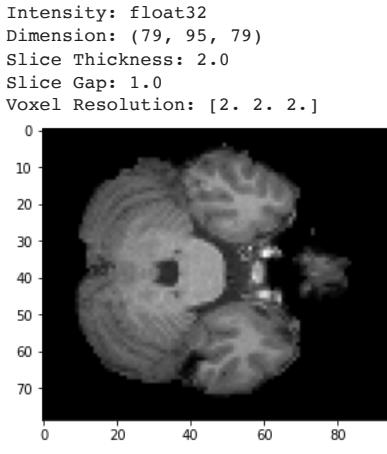
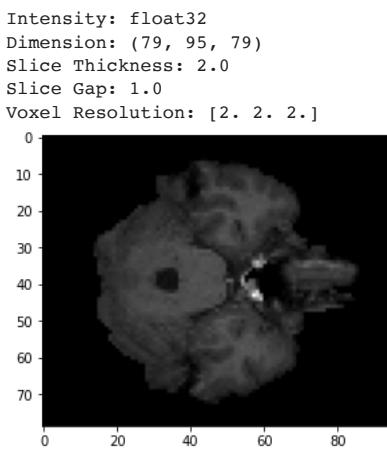
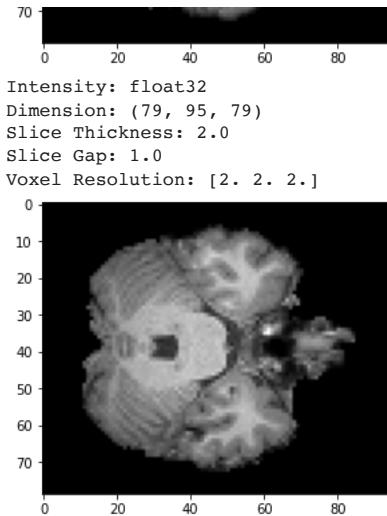
Dimension: (79, 95, 79)

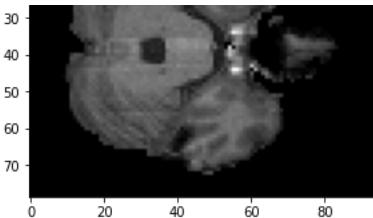
Slice Thickness: 2.0

Slice Gap: 1.0

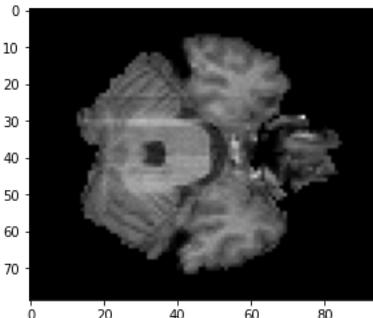
Voxel Resolution: [2. 2. 2.]



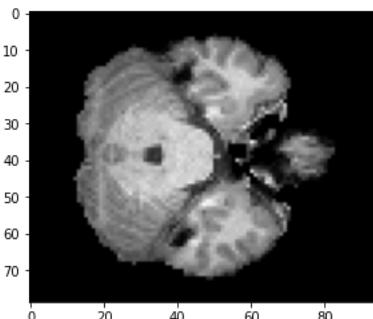




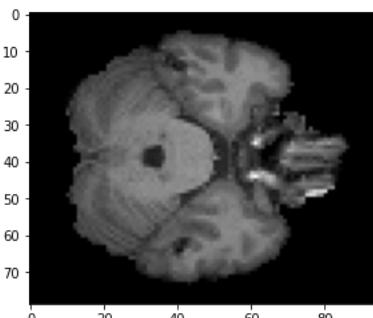
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



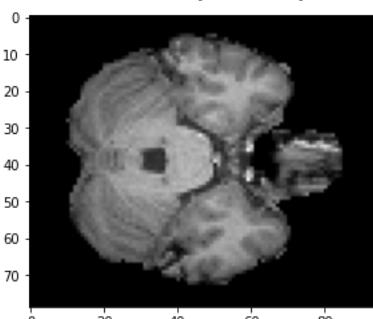
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

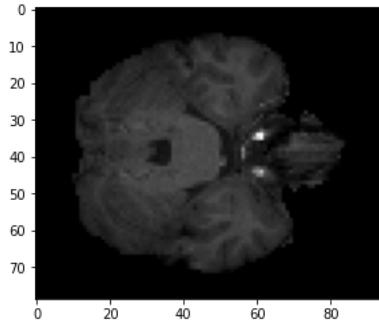


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

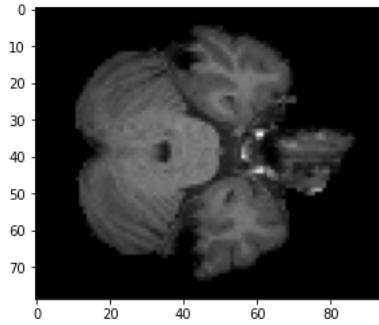


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0

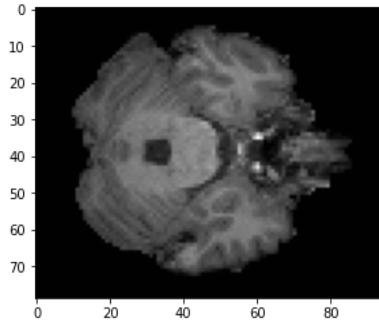
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



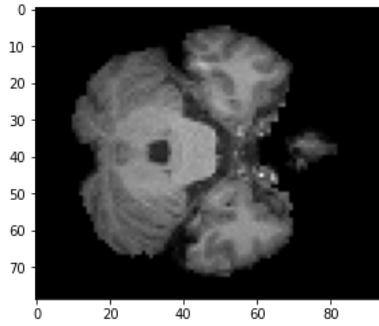
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



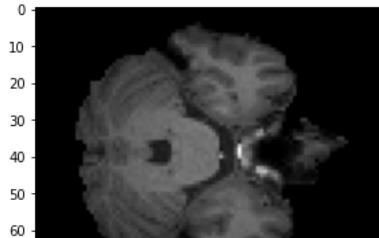
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

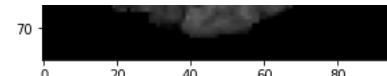


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

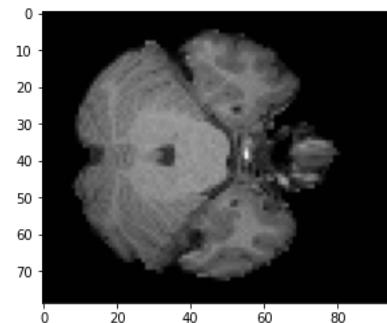


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

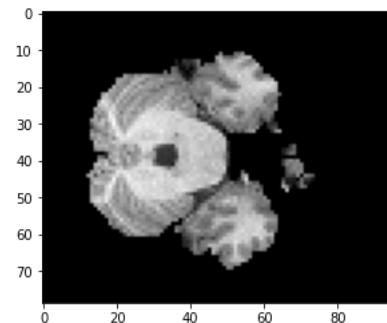




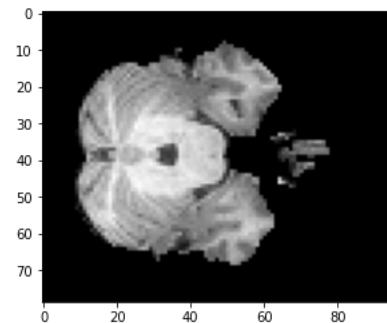
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



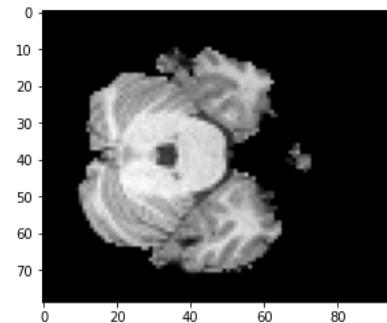
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

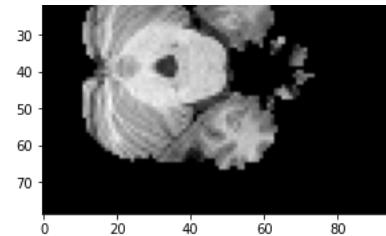


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

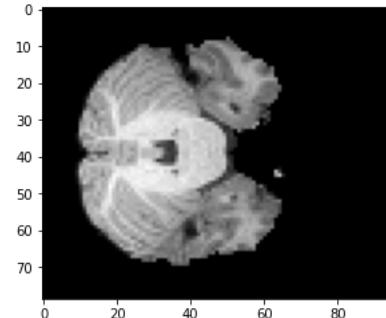


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

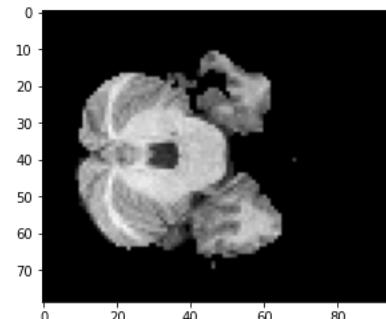




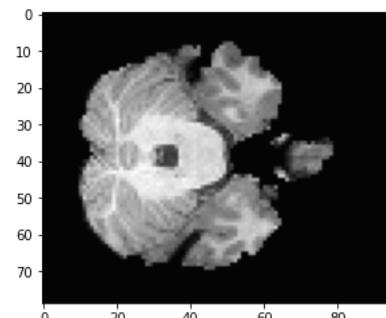
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



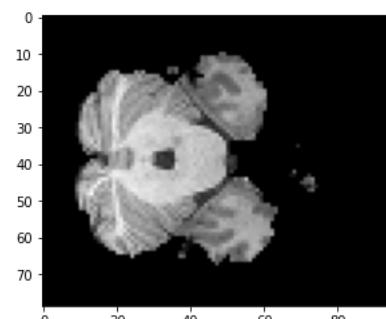
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

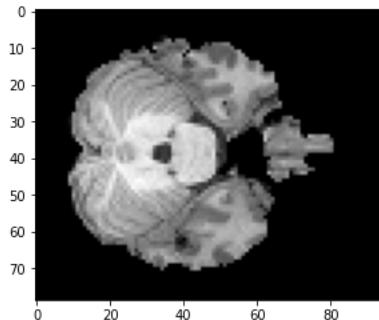


Intensity: float32
Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



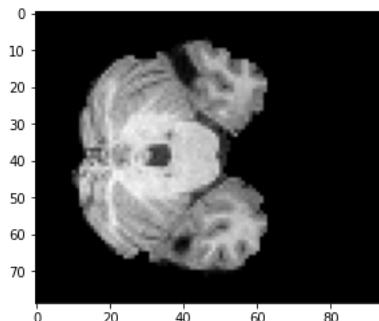
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



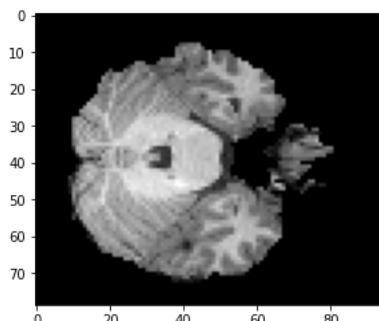
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



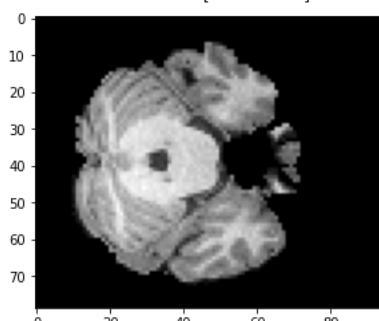
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



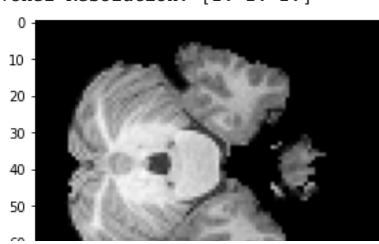
Intensity: float32

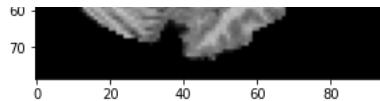
Dimension: (79, 95, 79)

Slice Thickness: 2.0

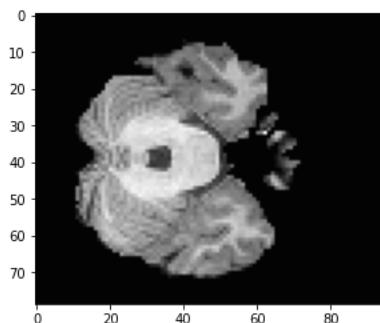
Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]

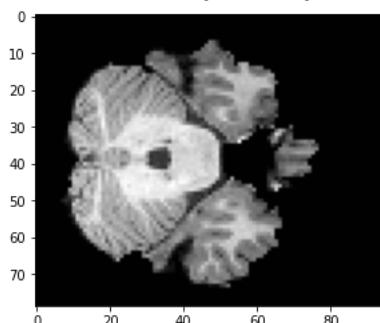




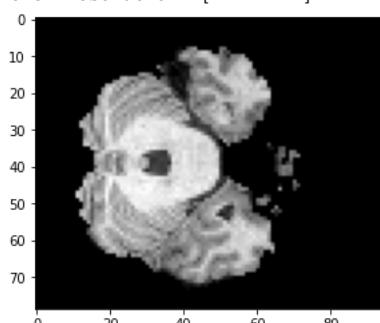
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



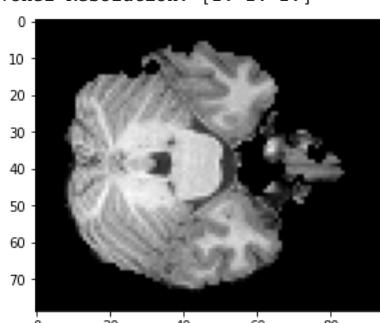
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

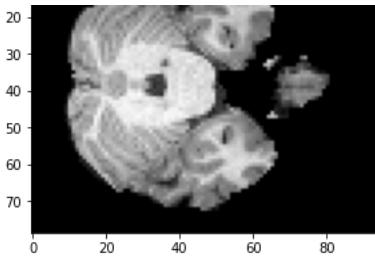


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

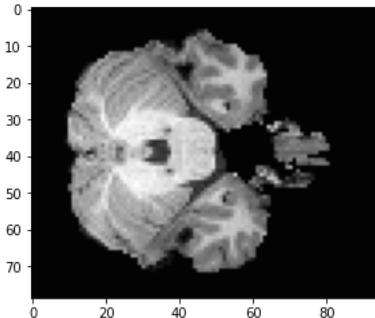


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

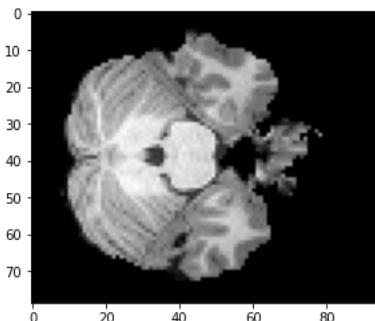




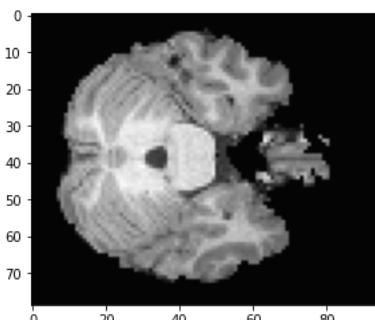
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



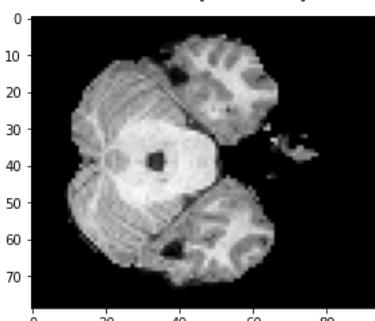
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



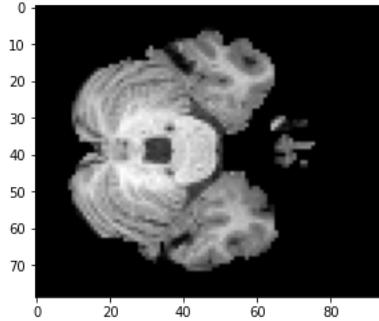
Intensity: float32
Dimension: (79, 95, 79)

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



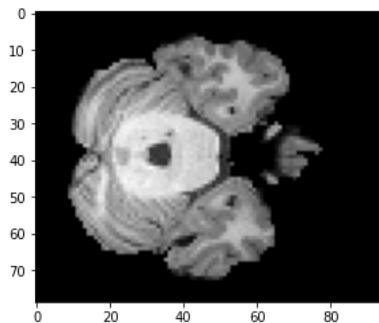
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



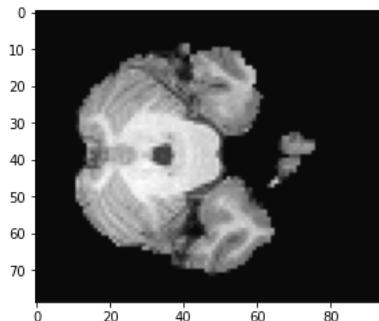
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



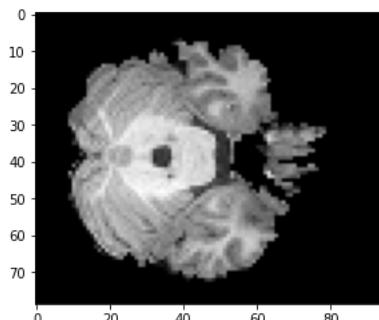
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



Intensity: float32

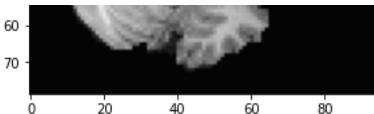
Dimension: (79, 95, 79)

Slice Thickness: 2.0

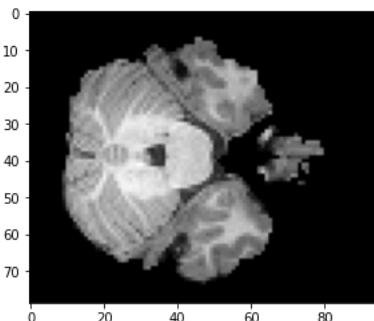
Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]

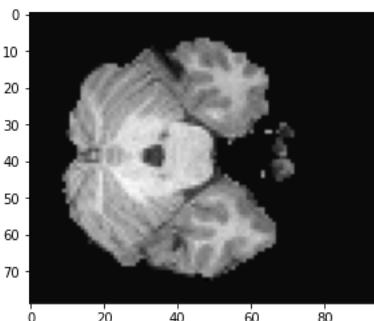




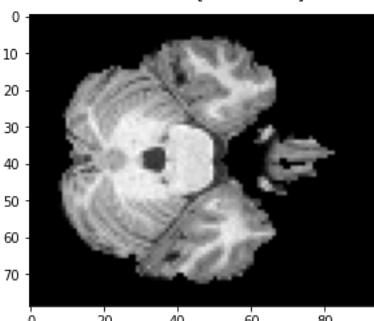
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



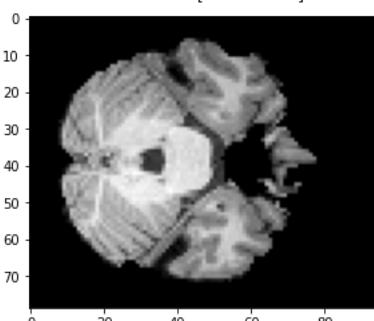
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



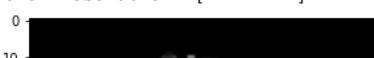
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

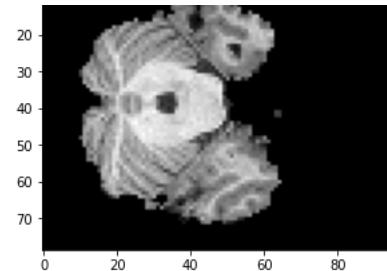


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

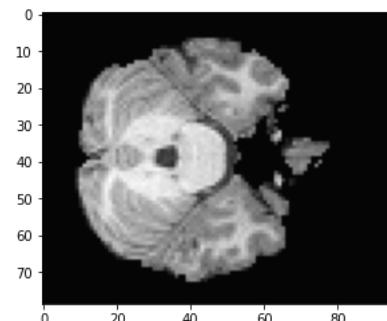


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

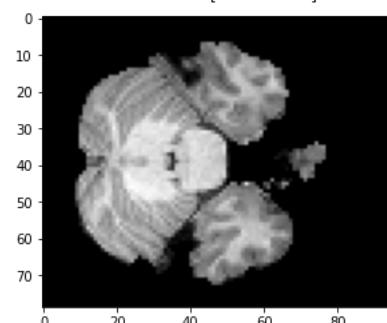




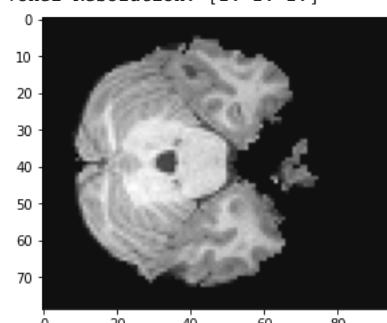
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



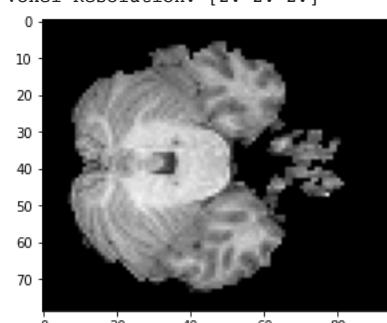
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

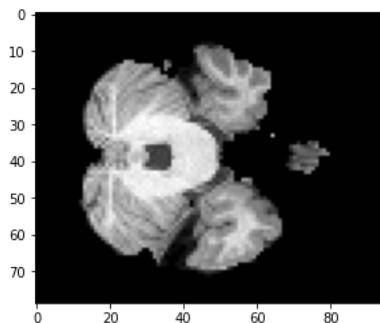


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

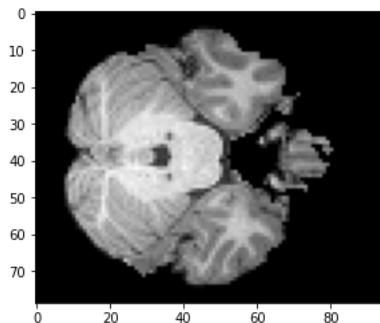


Intensity: float32

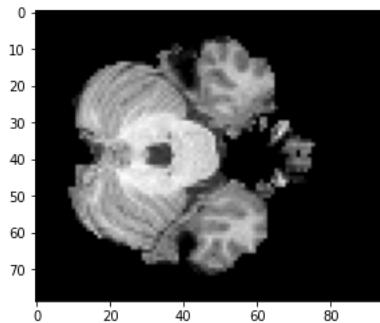
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



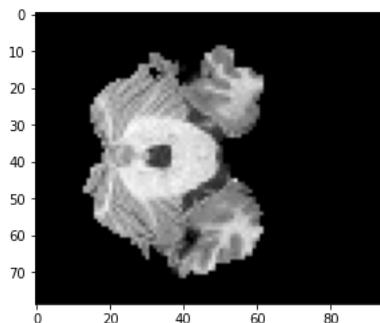
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



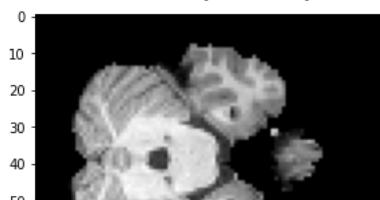
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

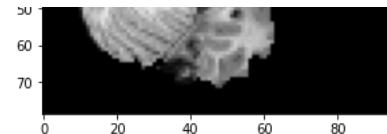


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

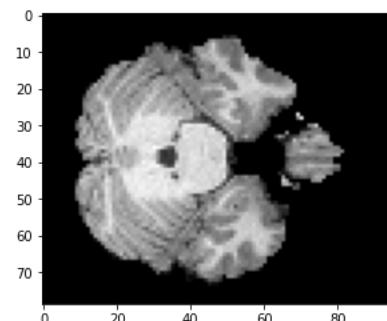


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

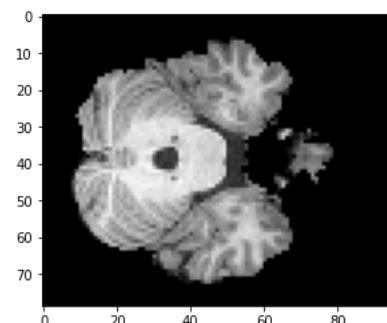




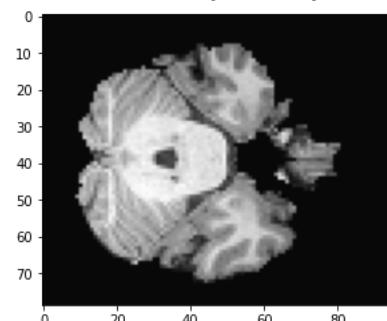
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



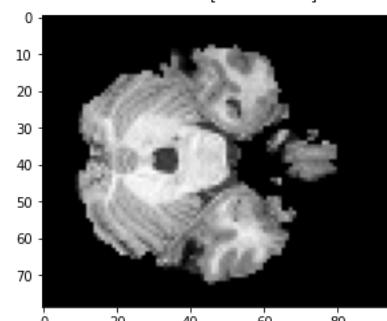
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



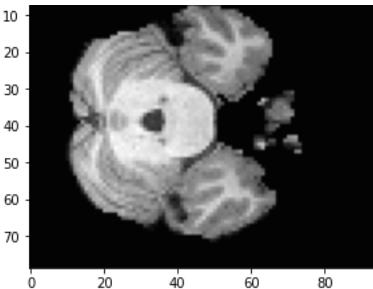
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



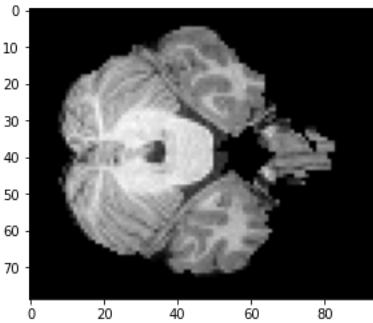
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



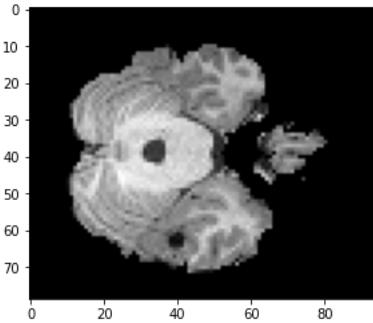
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



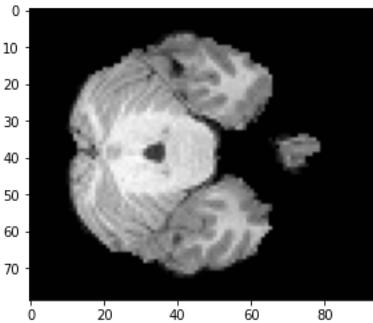
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



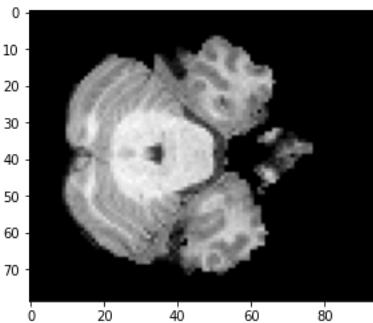
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



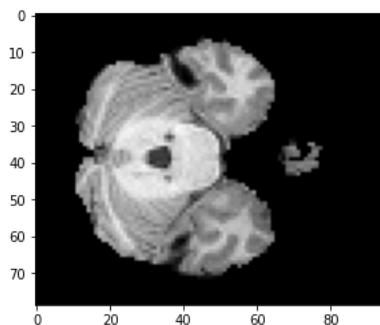
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



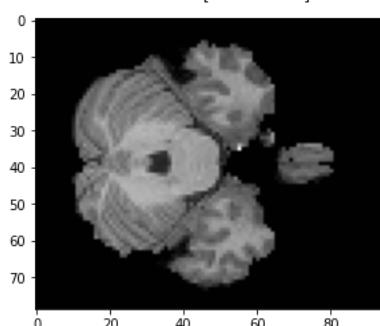
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



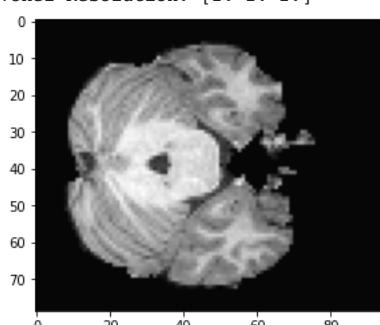
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



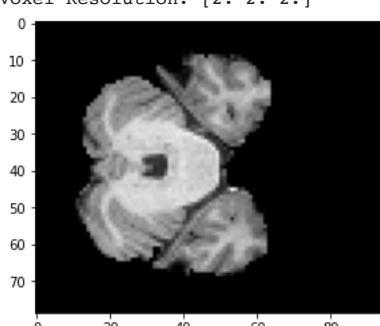
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

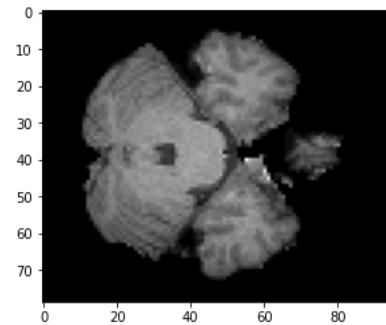


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

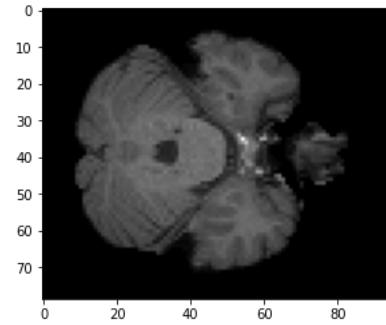




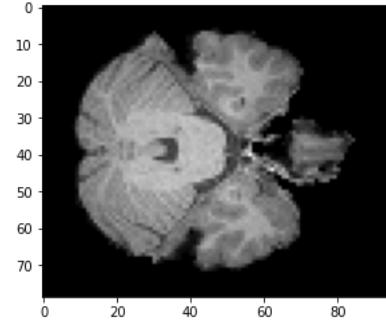
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



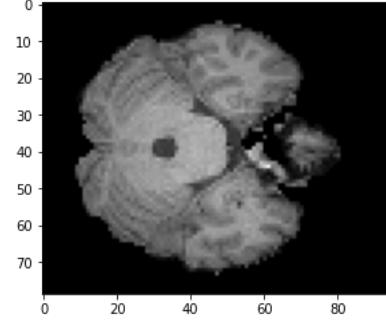
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



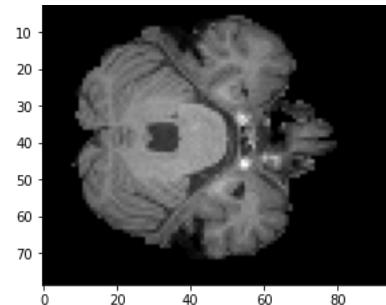
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



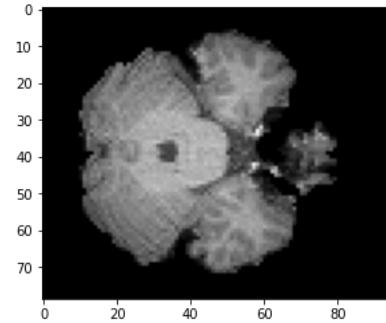
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



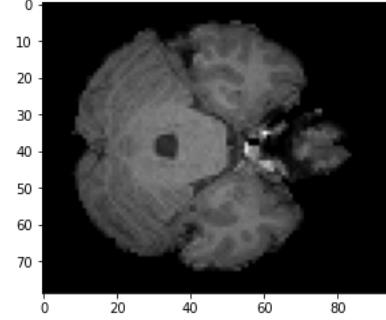
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



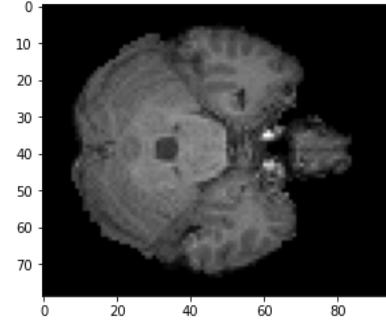
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



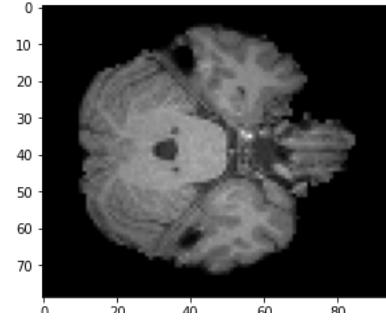
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



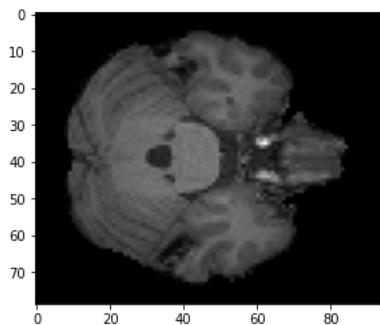
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



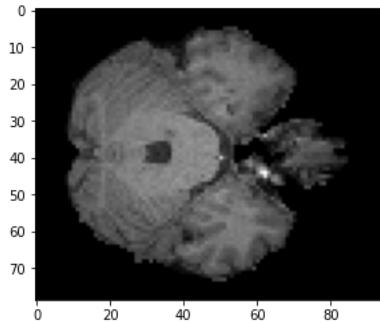
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



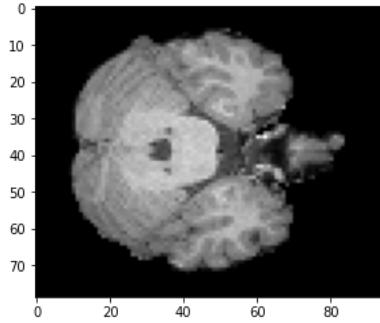
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



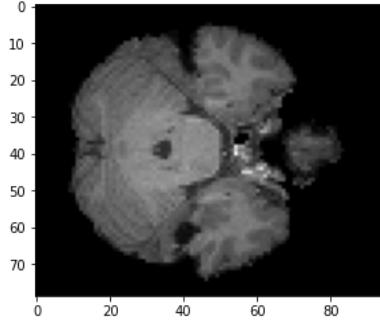
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

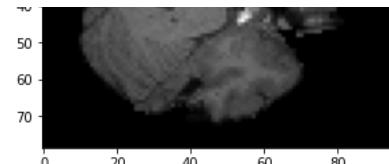


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

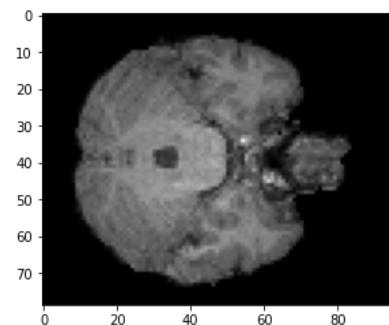


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

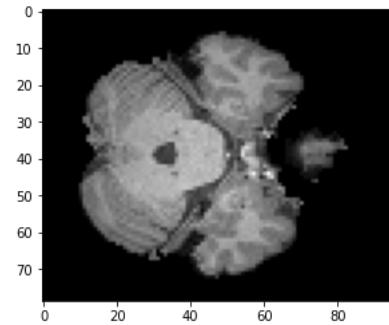




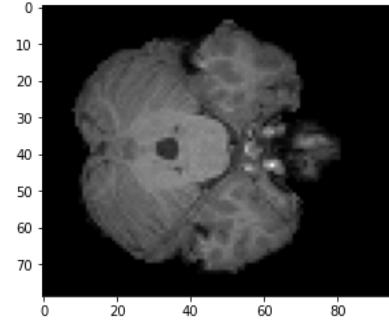
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



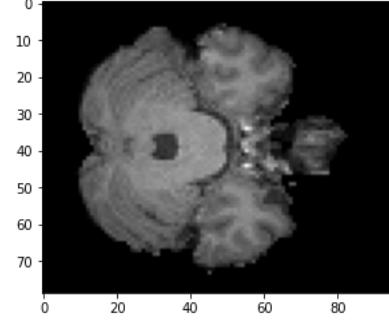
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



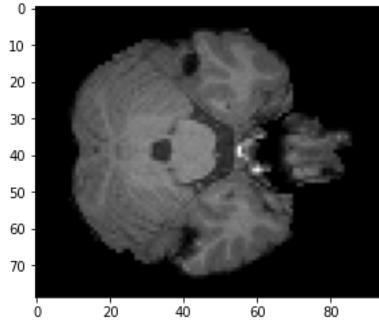
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



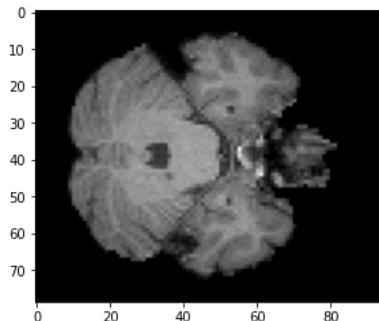
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



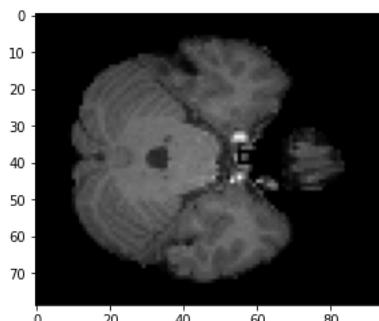
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



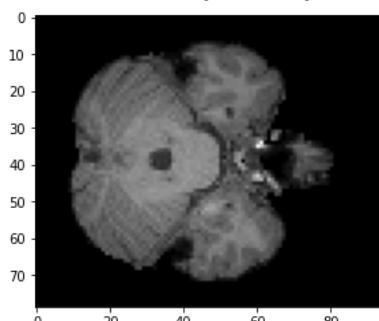
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



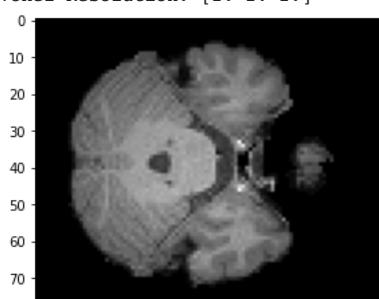
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

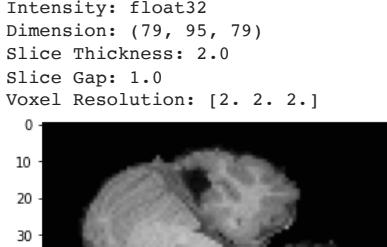
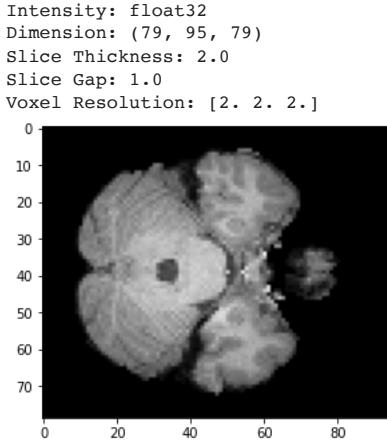
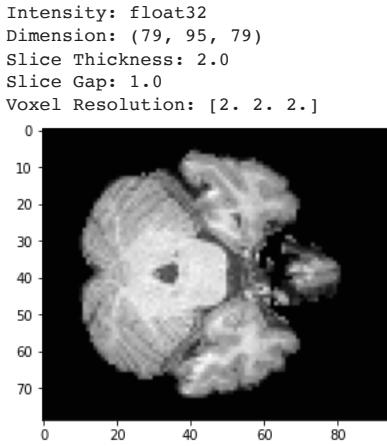
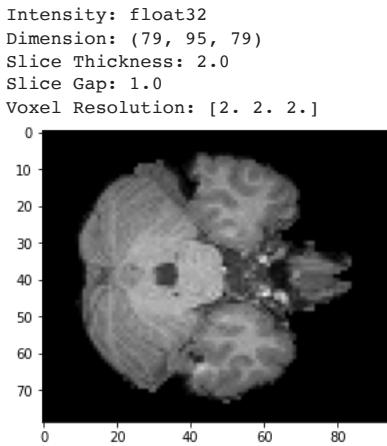
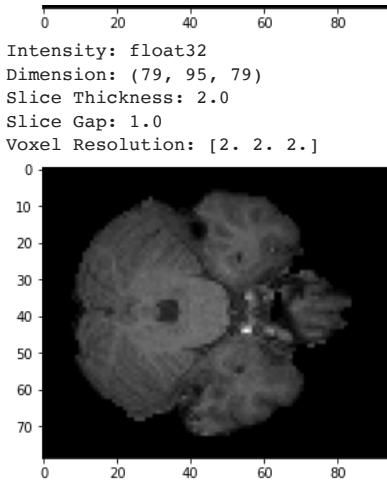


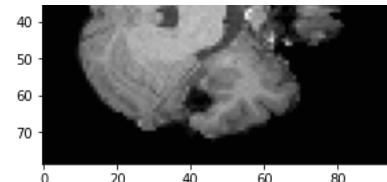
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



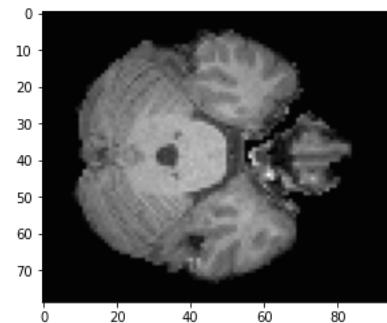
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



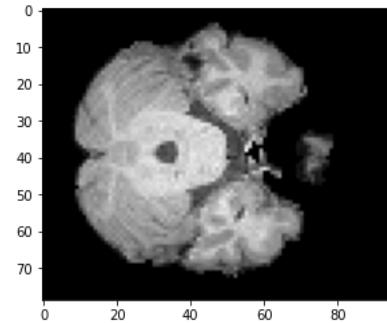




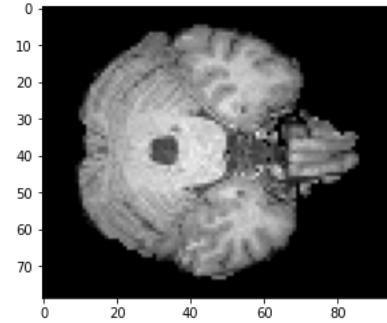
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



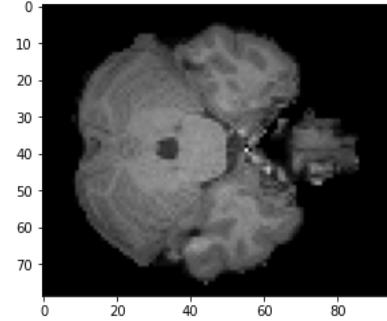
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



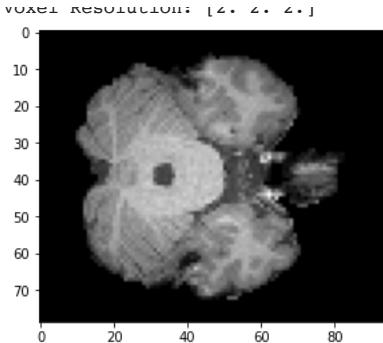
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



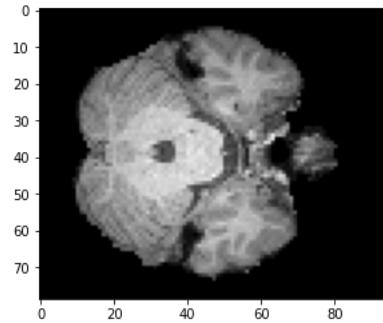
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



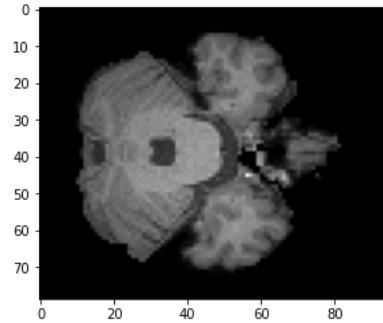
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



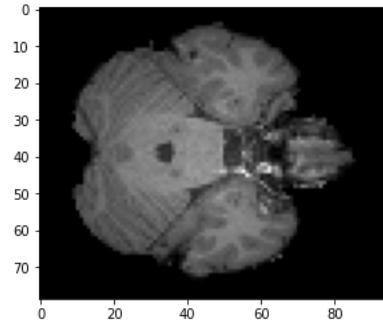
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



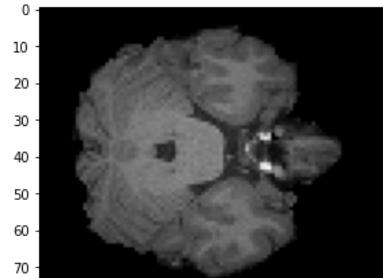
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

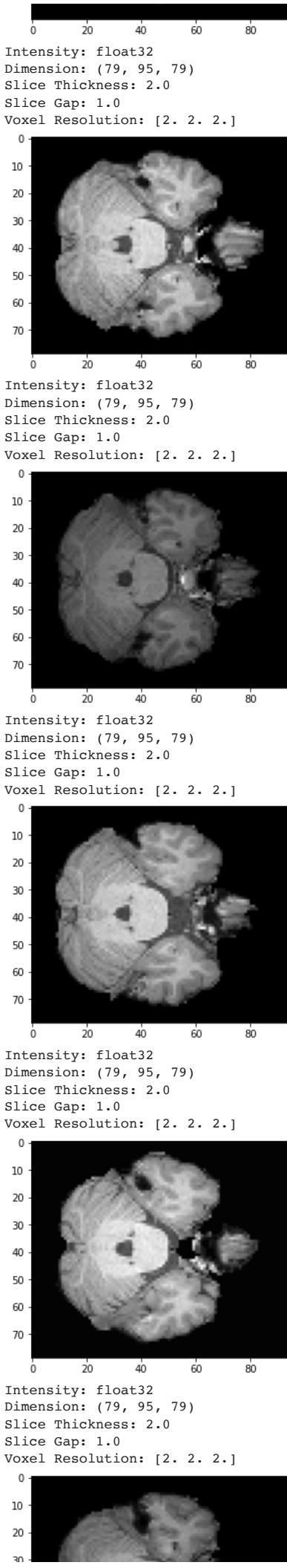


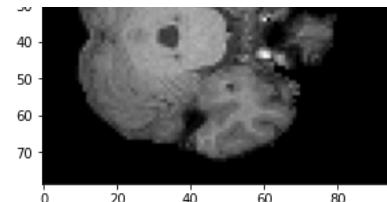
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



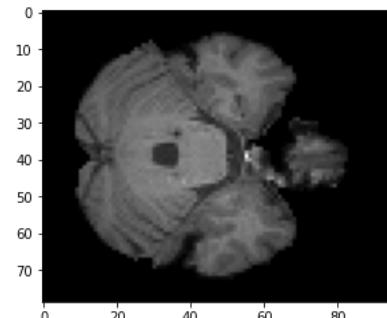
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



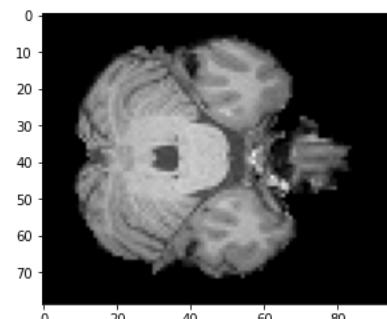




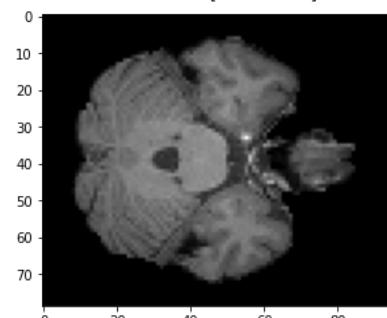
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



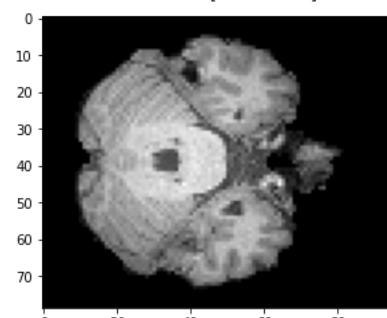
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

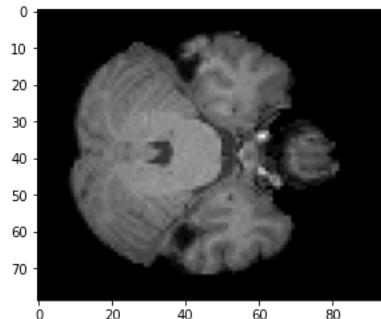


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

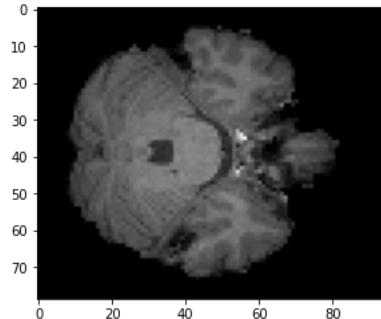


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0

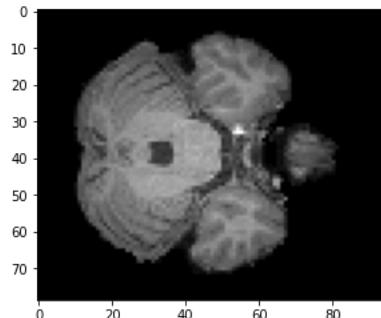
Voxel Resolution: [2. 2. 2.]



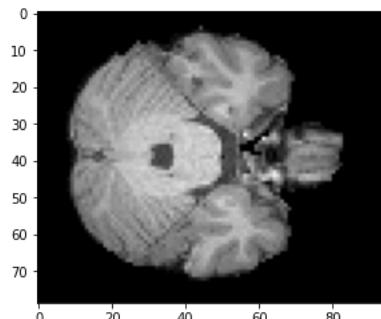
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

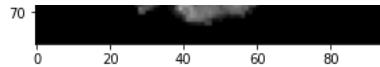


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

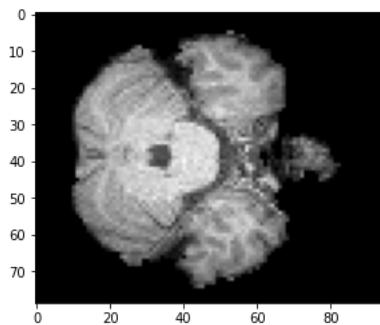


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

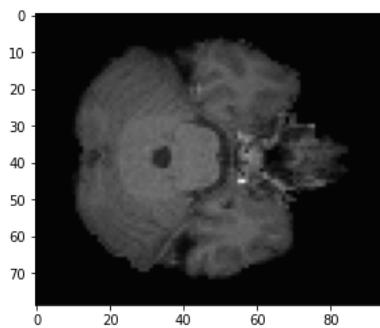




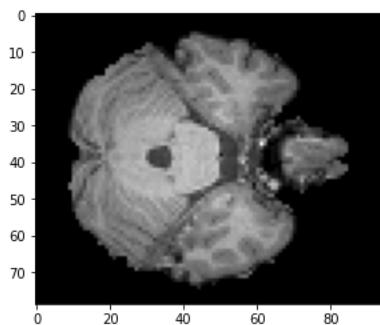
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



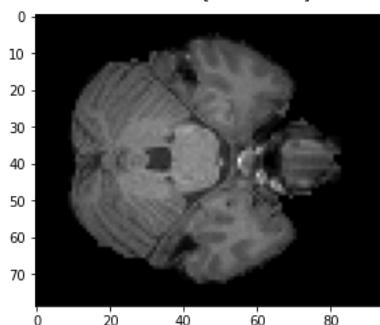
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



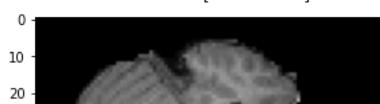
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

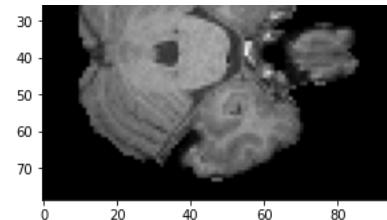


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

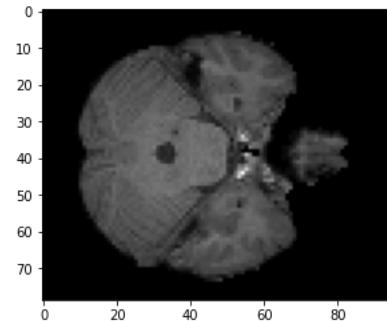


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

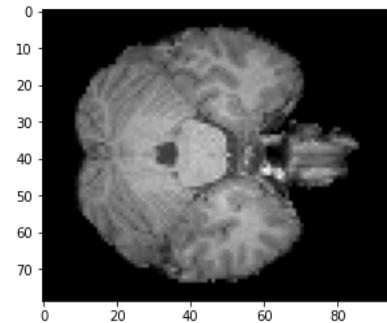




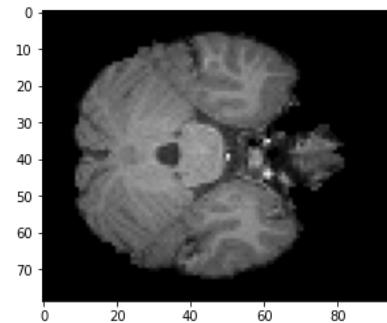
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



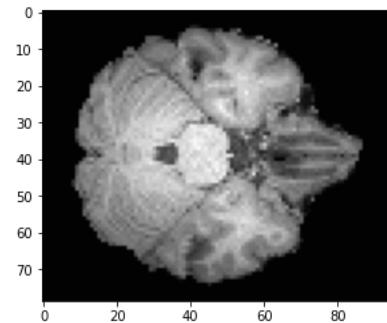
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

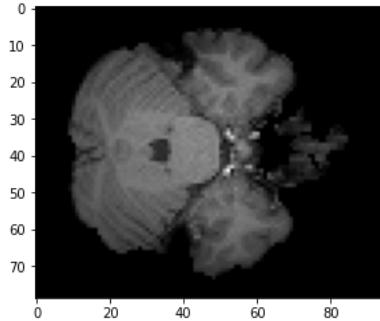


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

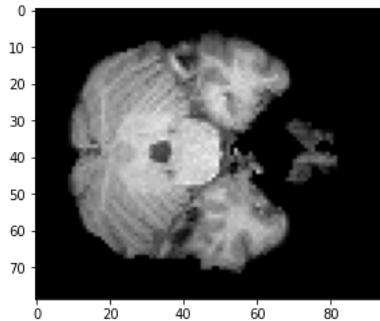


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0

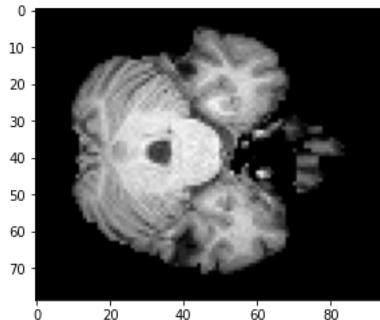
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



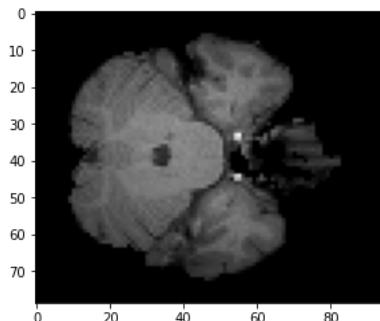
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

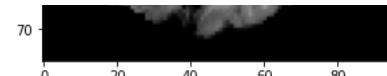


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

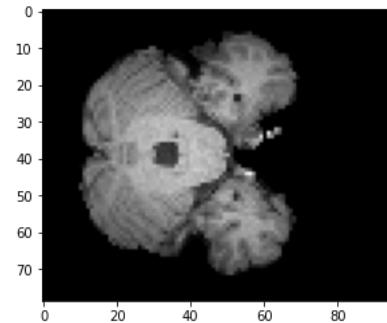


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

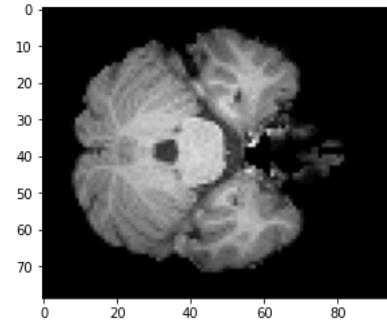




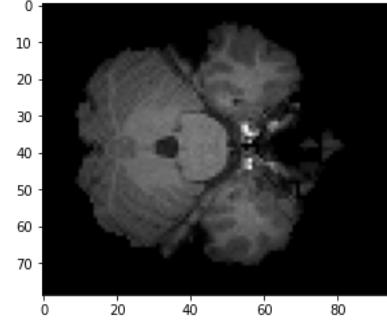
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



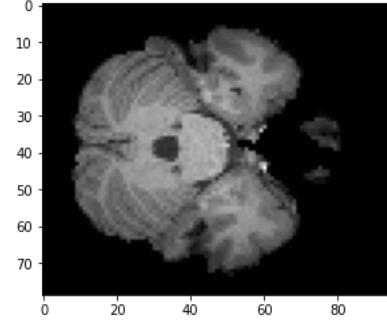
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

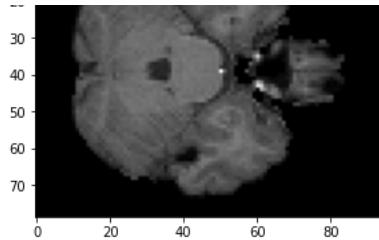


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

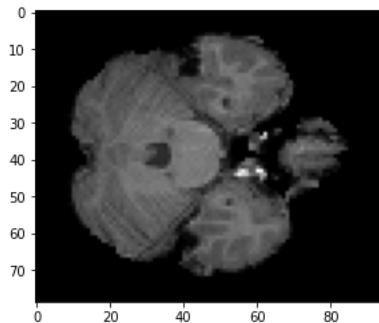


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

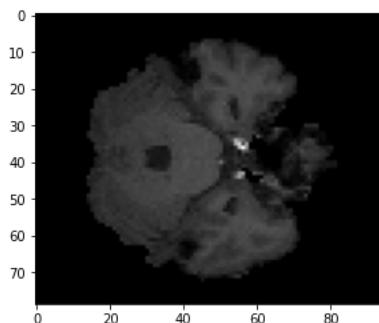




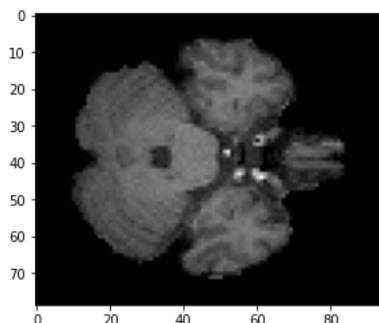
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



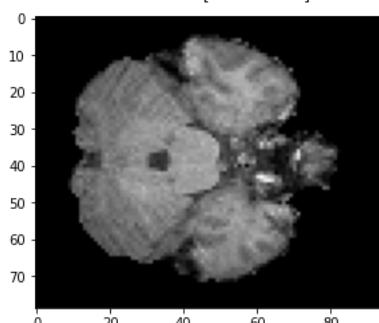
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

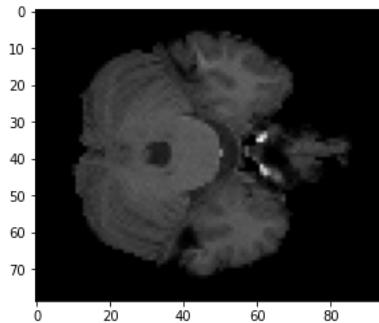


Intensity: float32
Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



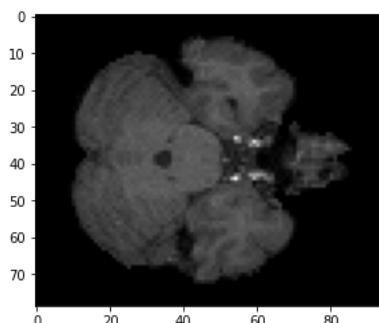
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



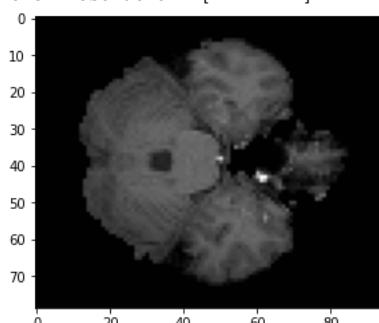
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



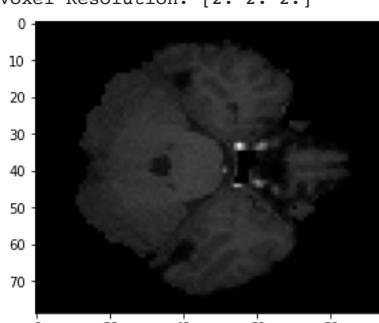
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



Intensity: float32

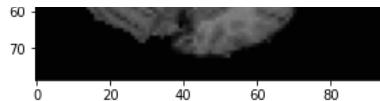
Dimension: (79, 95, 79)

Slice Thickness: 2.0

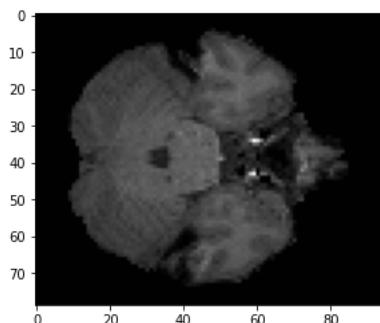
Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]

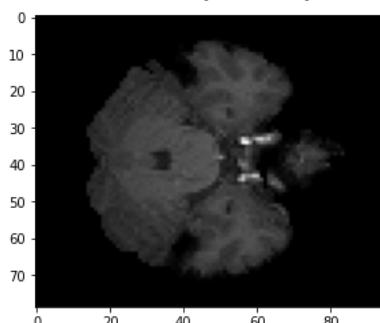




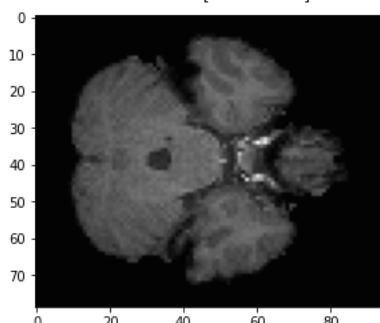
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



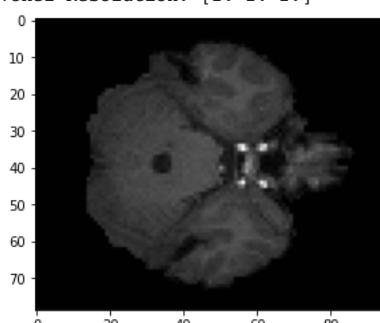
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

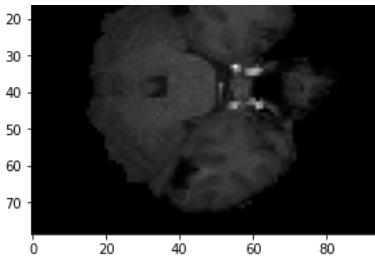


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

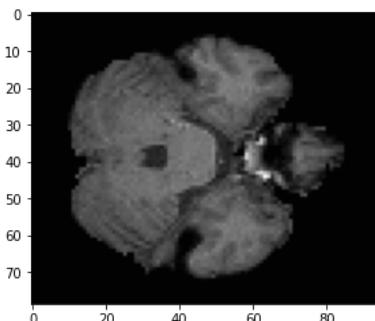


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

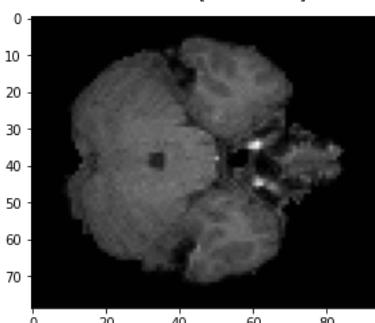




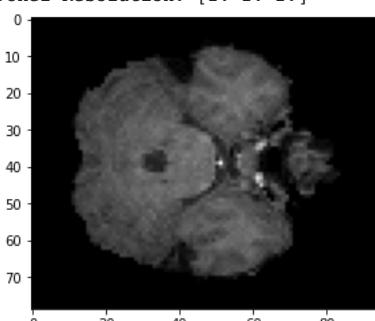
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



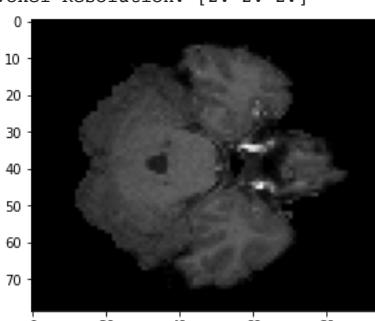
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

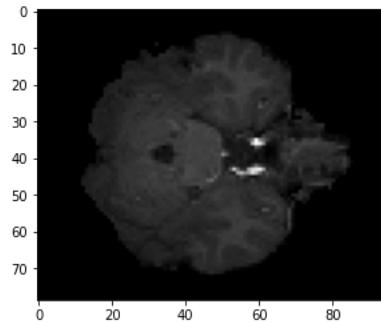


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

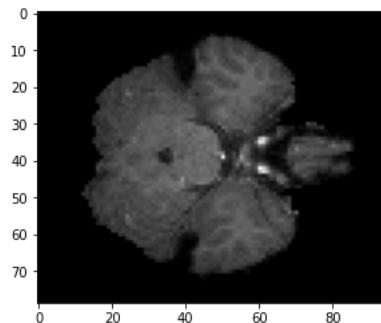


Intensity: float32
Dimension: (79, 95, 79)

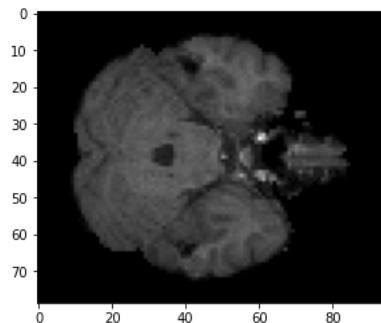
```
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]
```



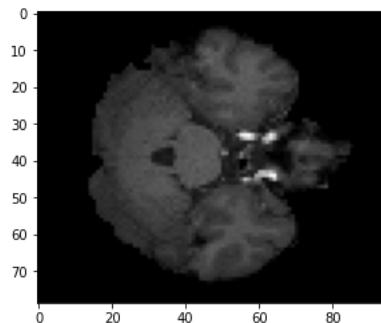
```
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]
```



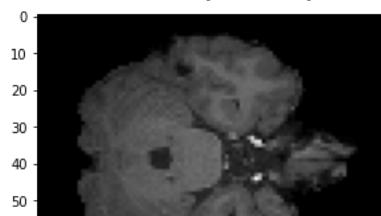
```
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]
```

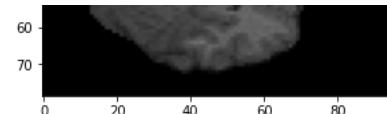


```
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]
```

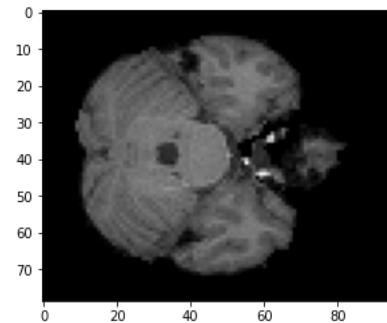


```
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]
```

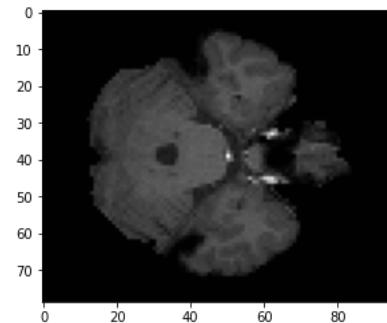




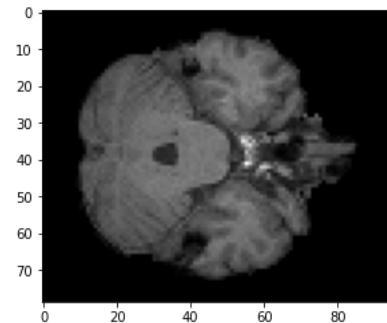
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



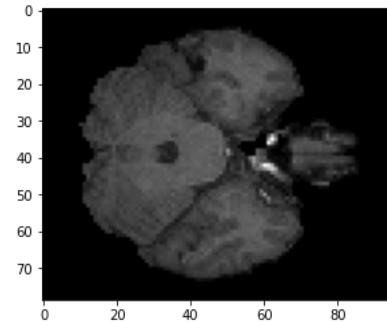
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

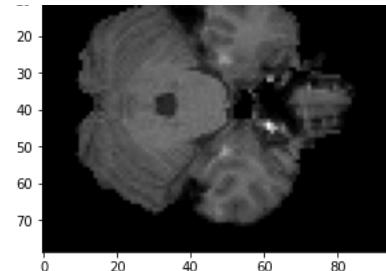


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

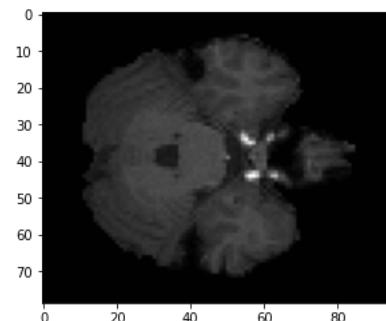


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

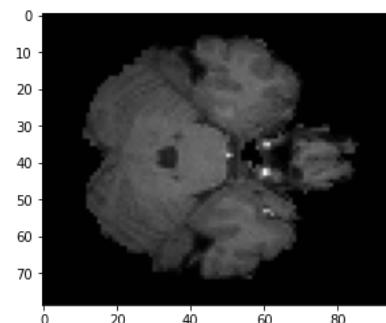




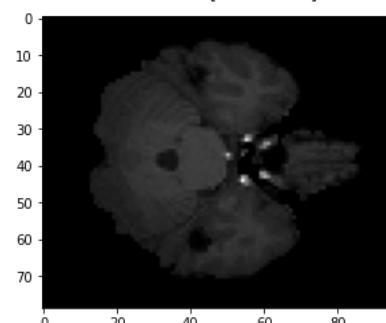
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



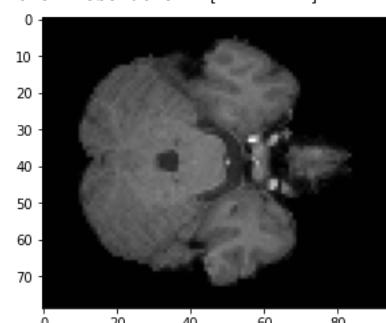
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

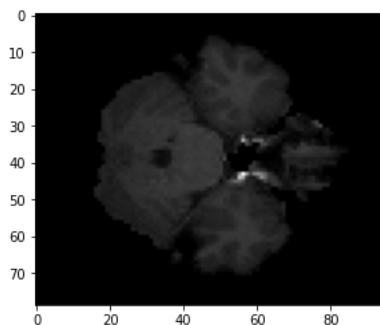


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

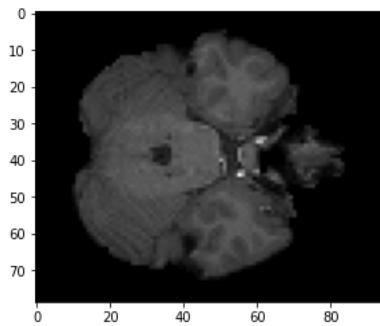


Intensity: float32

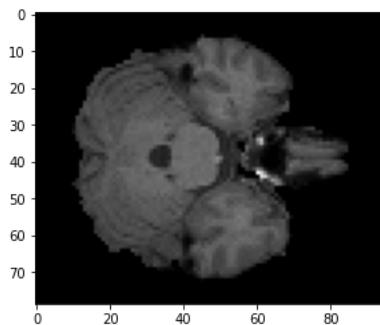
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



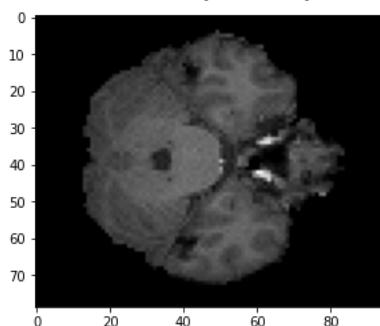
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

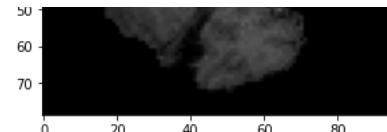


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

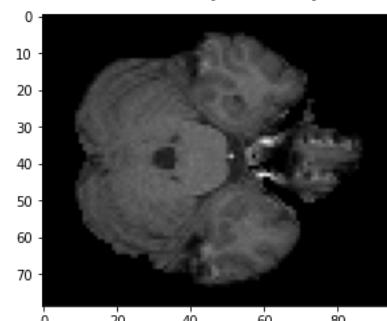


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

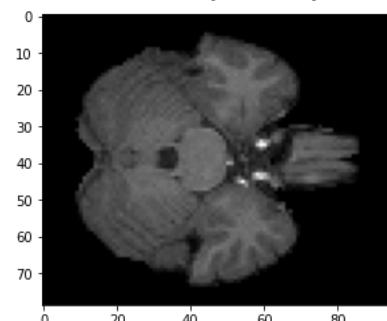




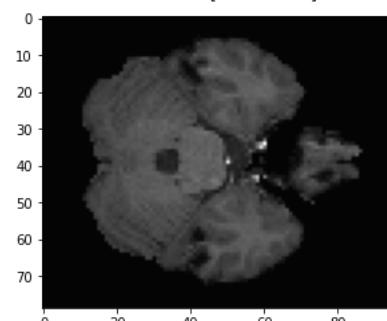
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



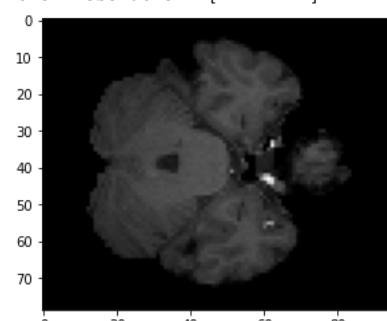
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



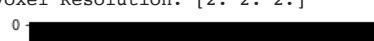
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

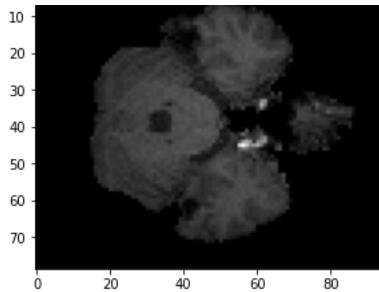


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

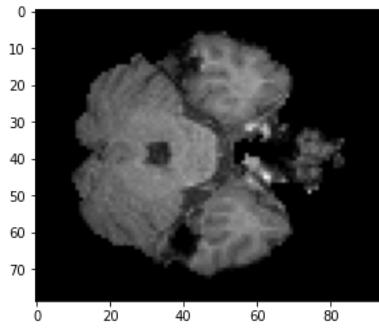


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

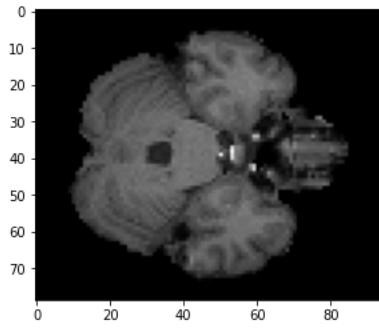




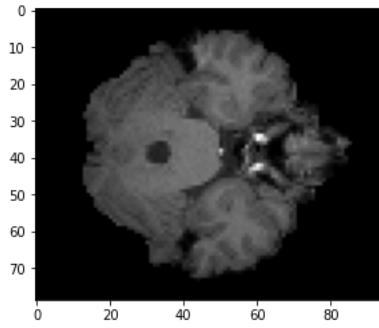
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



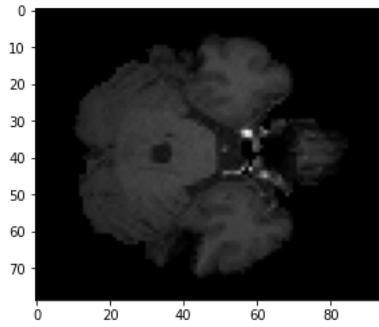
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



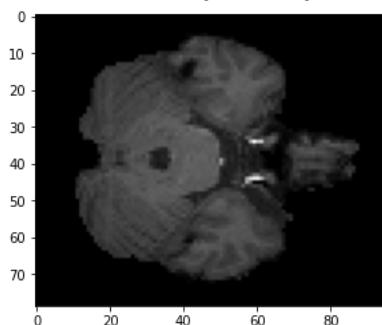
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



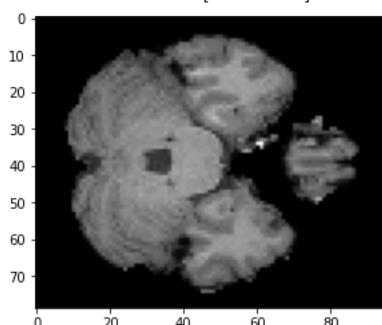
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



```
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]
```



```
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]
```



```
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
```

▼ Visualization of unhealthy images from category 1 to 7

```
categories = ['cat1', 'cat2', 'cat3', 'cat4', 'cat5', 'cat6', 'cat7']

for category in categories:
    for name in imagenames_with_categories[category]:
        # Load the image
        img = nib.load(name)

        # Get the data from the image
        data = img.get_fdata()

        # Display the image using matplotlib
        plt.imshow(data[:, :, 20], cmap='gray')
        plt.show()

        # Get the header information
        header = img.header

        # Get the intensity information
        intensity = header.get_data_dtype()

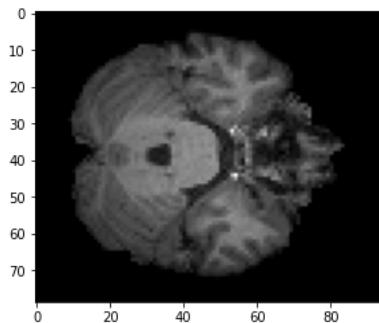
        # Get the dimension information
        dimension = header.get_data_shape()

        # Get the slice thickness information
        slice_thickness = header['pixdim'][3]

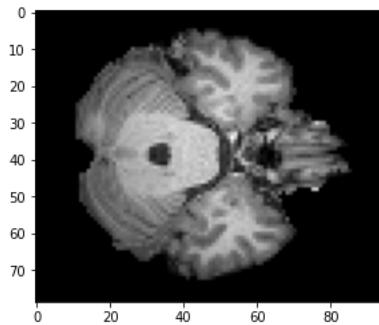
        # Get the slice gap information
        slice_gap = header['pixdim'][4]

        # Get the voxel resolution information
        voxel_resolution = header['pixdim'][1:4]

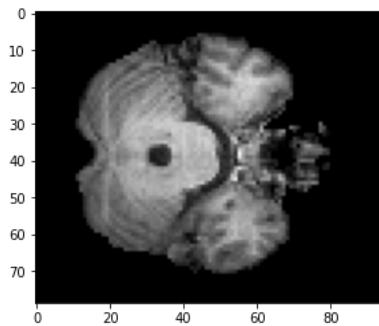
        # Print the information
        print("Intensity:", intensity)
        print("Dimension:", dimension)
        print("Slice Thickness:", slice_thickness)
        print("Slice Gap:", slice_gap)
        print("Voxel Resolution:", voxel_resolution)
```



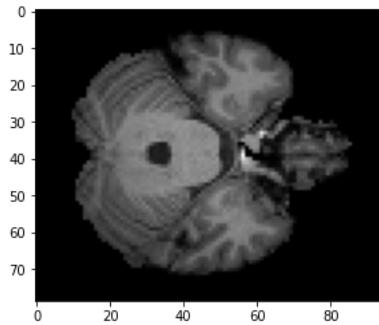
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



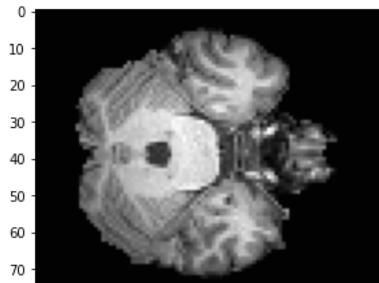
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

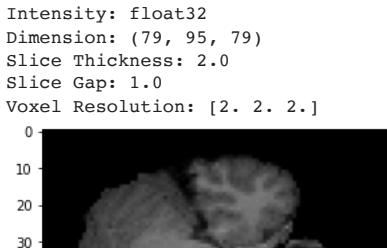
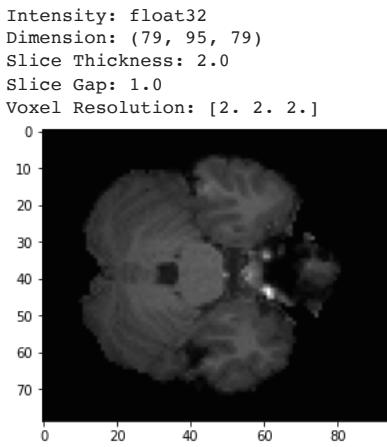
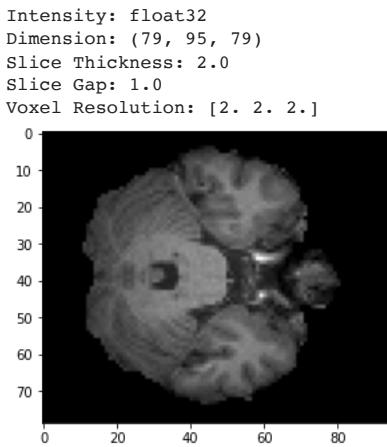
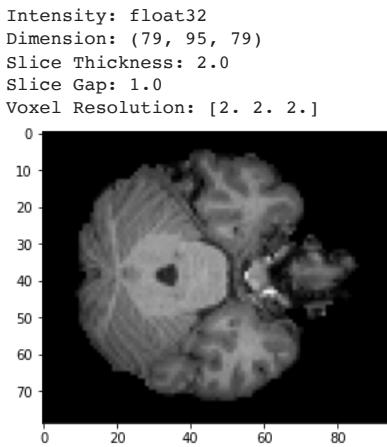
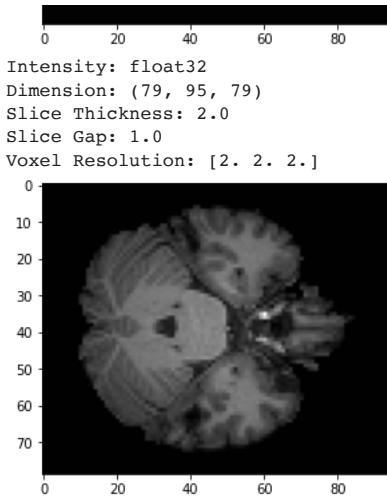


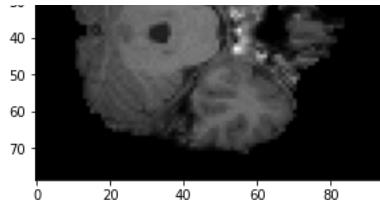
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



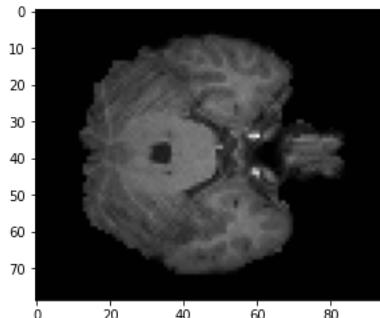
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



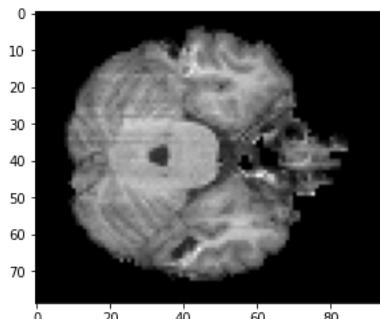




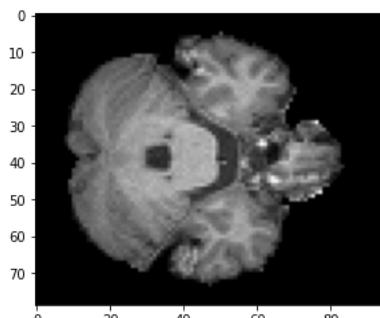
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



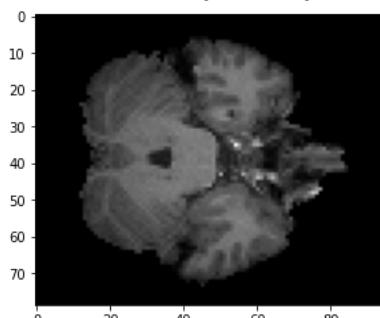
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

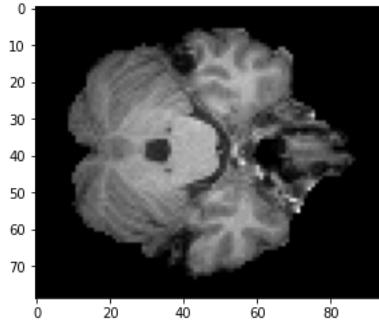


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



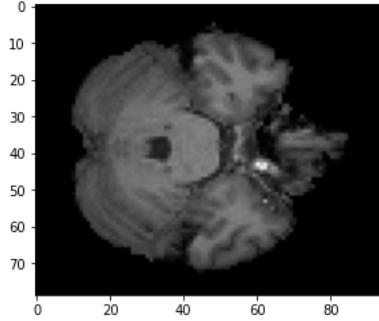
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



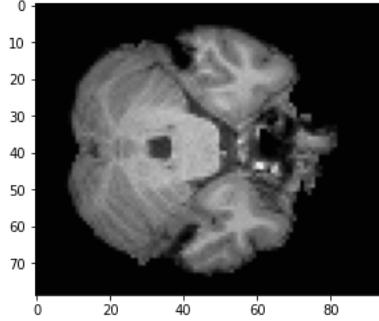
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



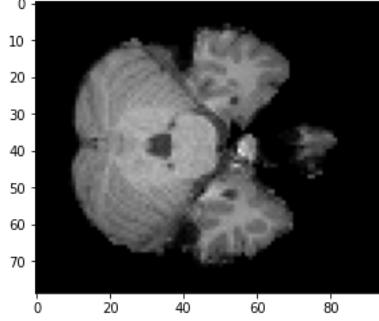
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



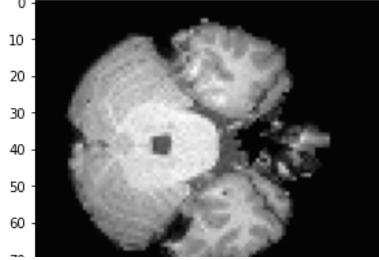
Intensity: float32

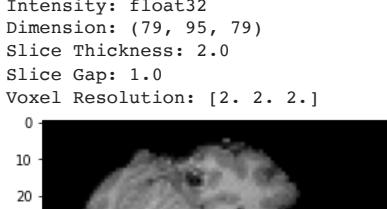
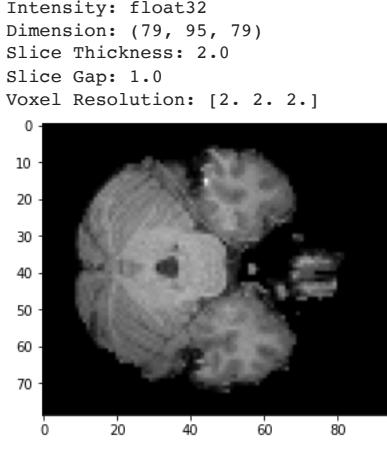
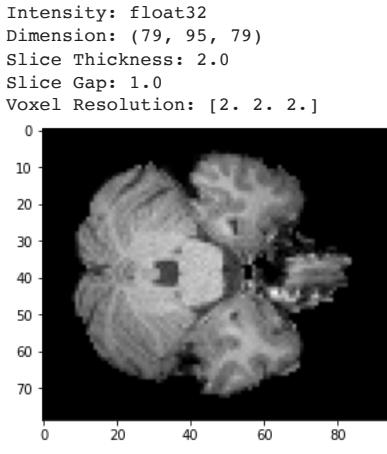
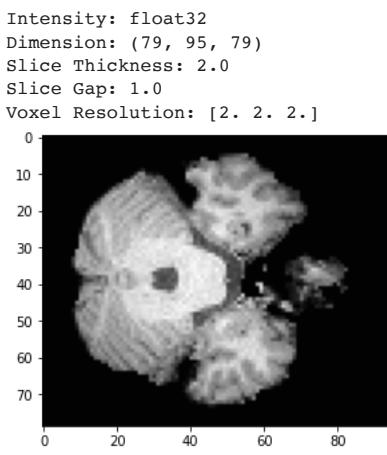
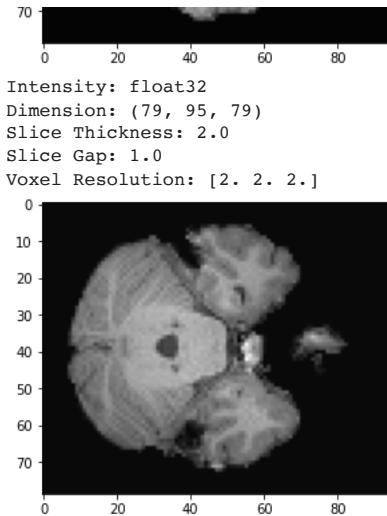
Dimension: (79, 95, 79)

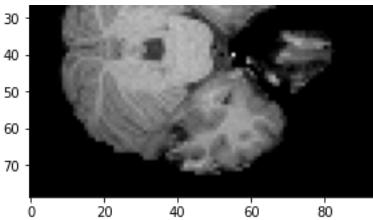
Slice Thickness: 2.0

Slice Gap: 1.0

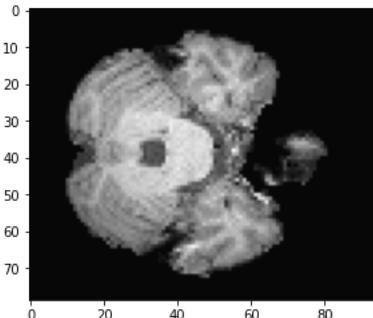
Voxel Resolution: [2. 2. 2.]



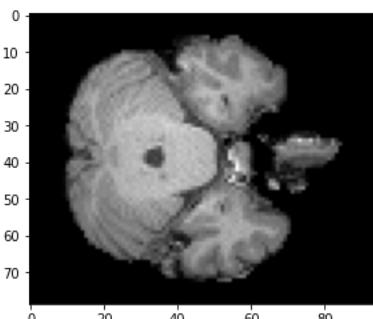




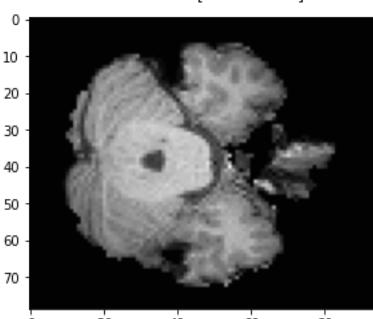
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



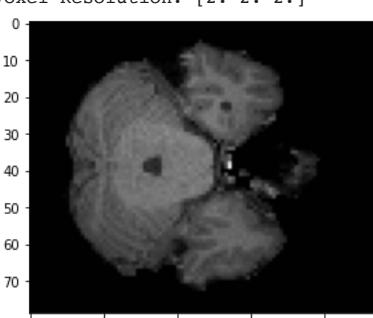
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

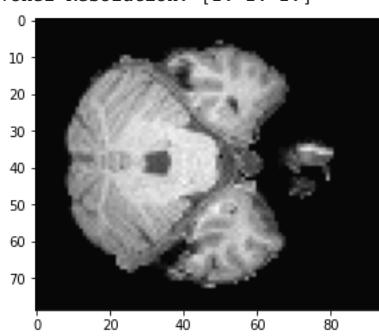


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

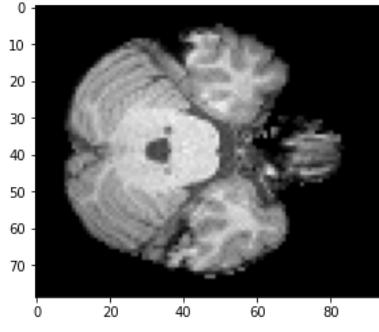


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0

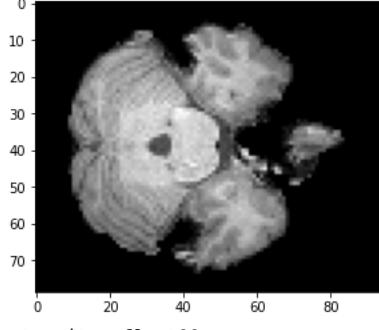
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



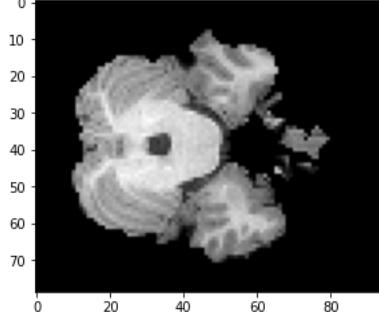
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

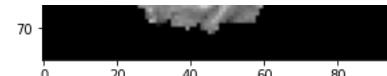


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

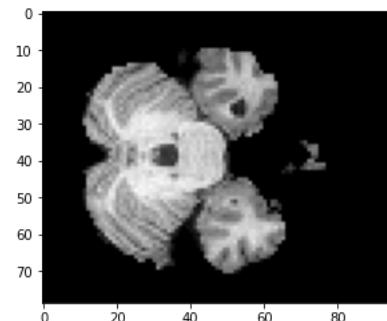


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

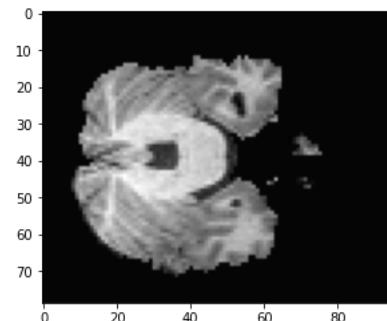




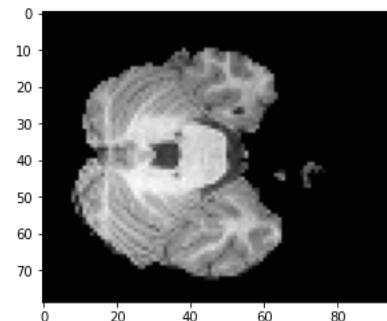
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



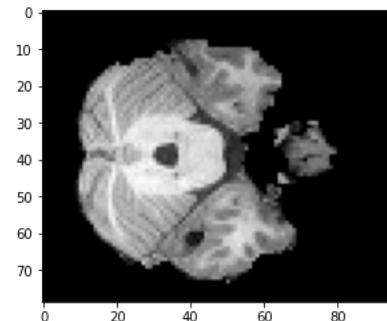
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

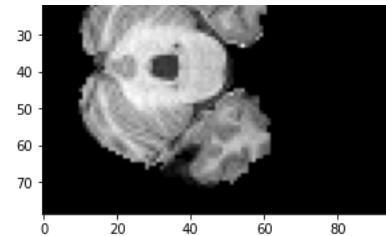


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

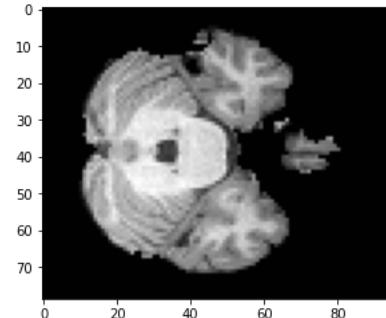


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

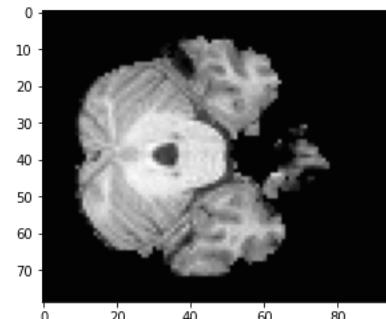




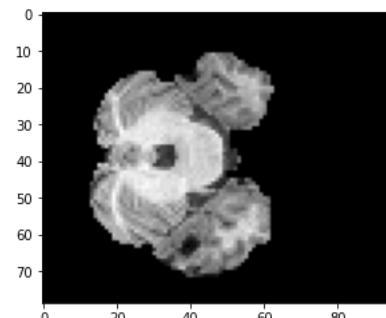
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



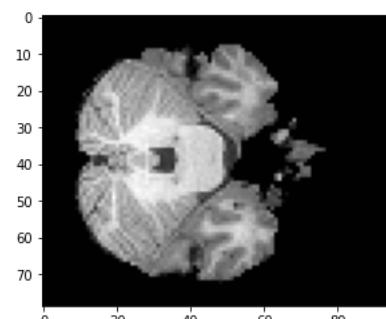
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

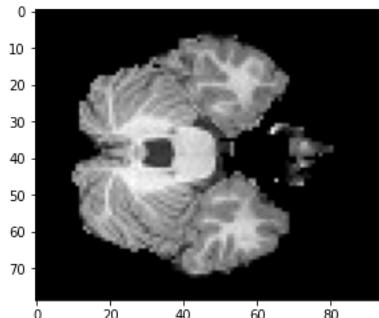


Intensity: float32
Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



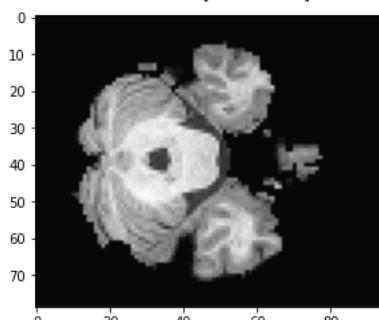
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



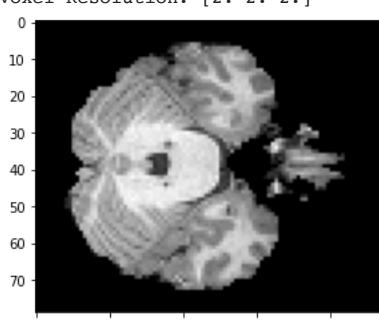
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



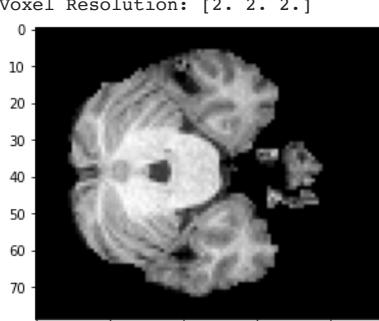
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



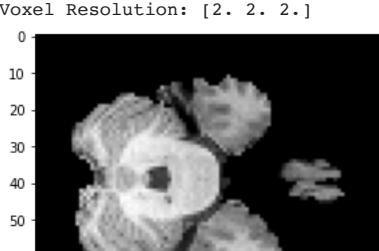
Intensity: float32

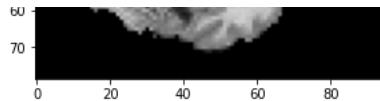
Dimension: (79, 95, 79)

Slice Thickness: 2.0

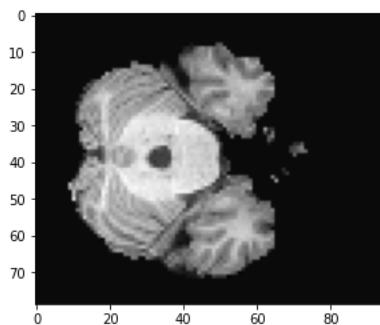
Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]

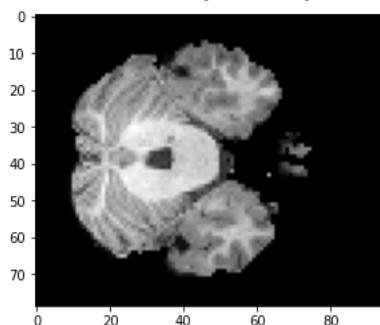




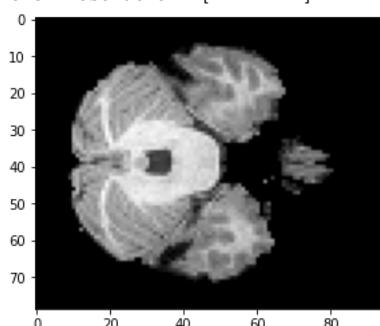
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



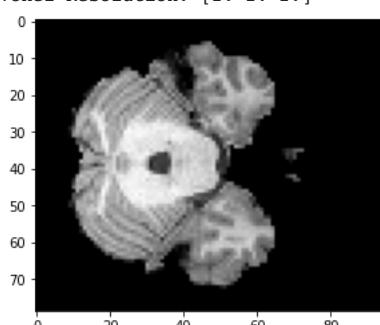
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

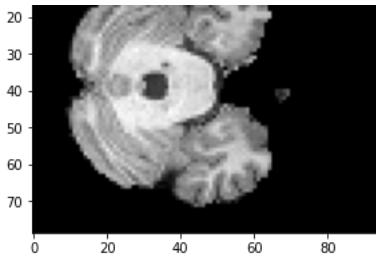


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

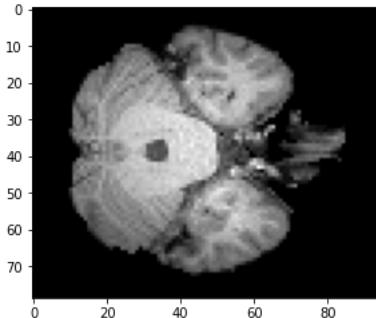


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

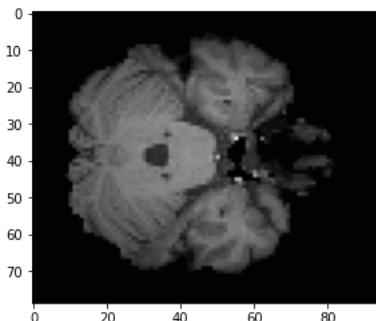




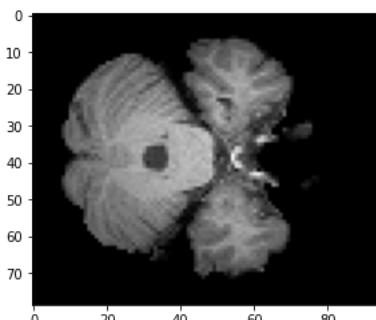
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



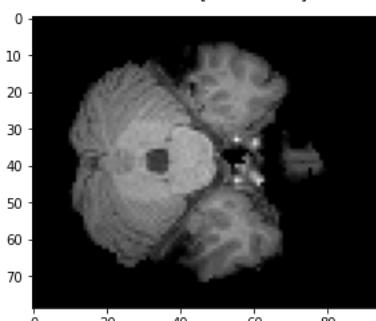
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



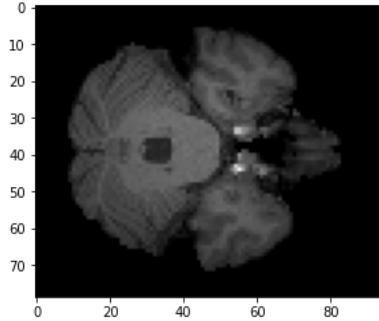
Intensity: float32
Dimension: (79, 95, 79)

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



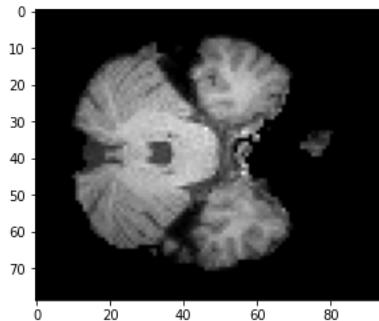
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



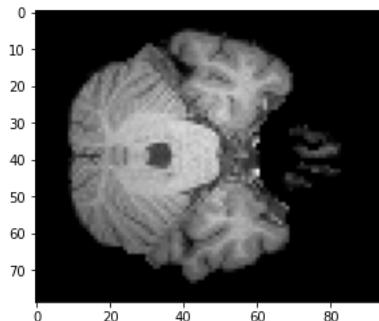
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



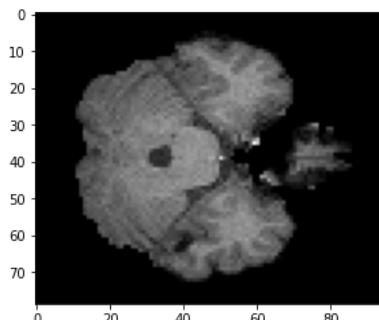
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



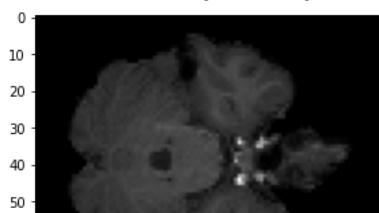
Intensity: float32

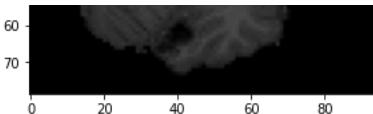
Dimension: (79, 95, 79)

Slice Thickness: 2.0

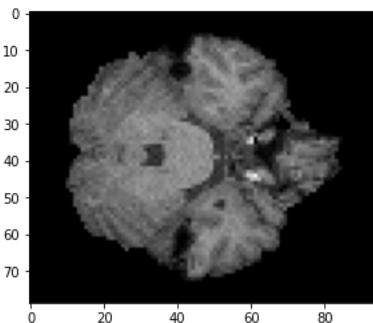
Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]

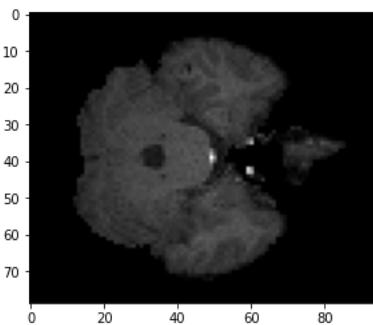




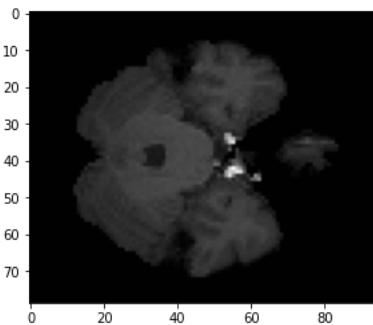
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



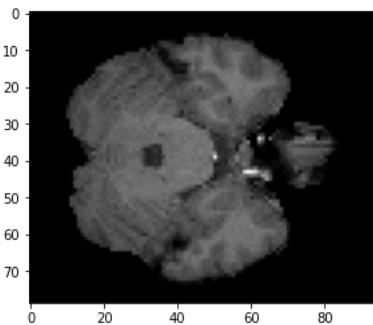
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

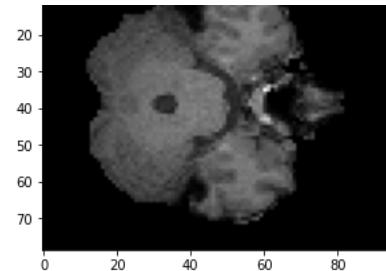


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

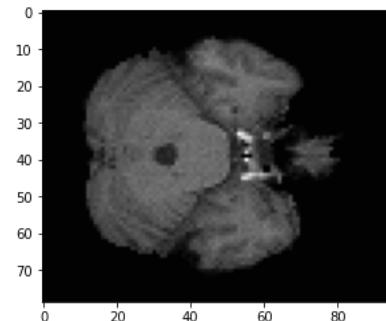


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

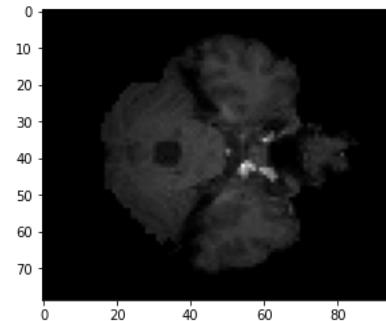




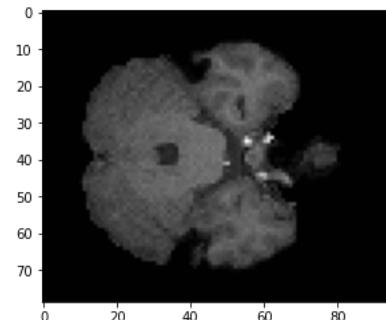
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



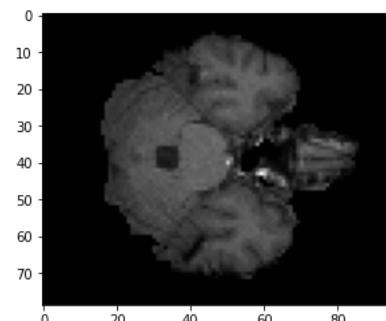
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

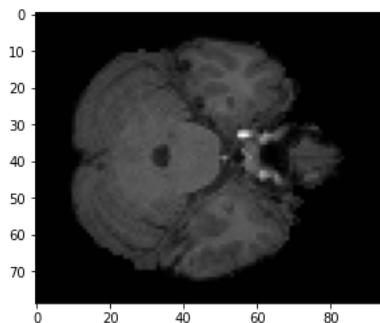


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

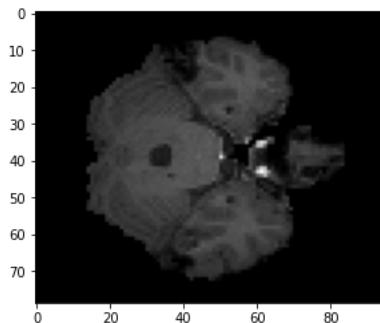


Intensity: float32

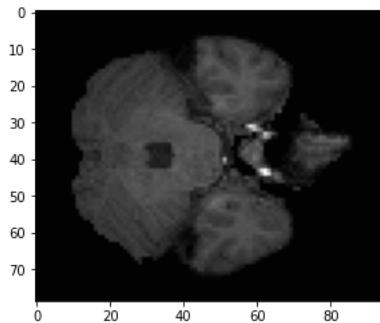
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



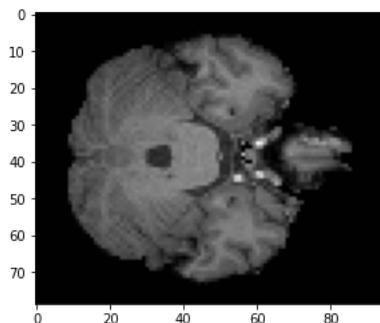
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



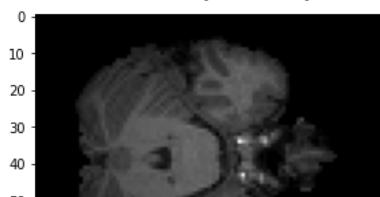
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

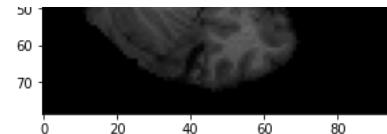


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

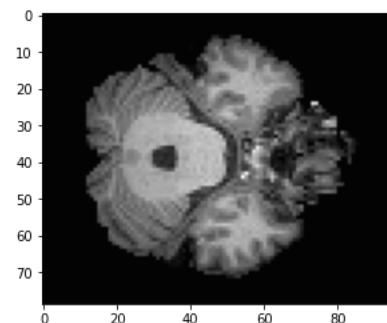


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

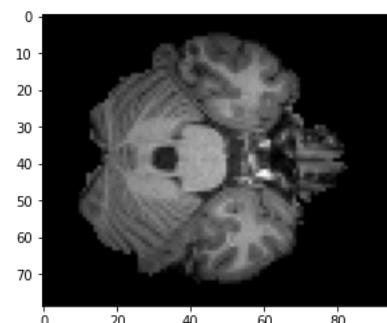




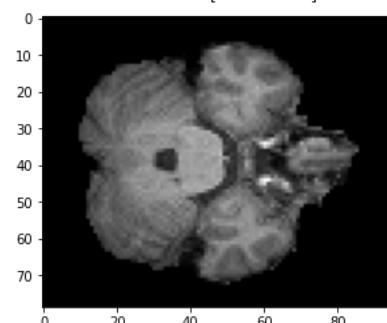
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



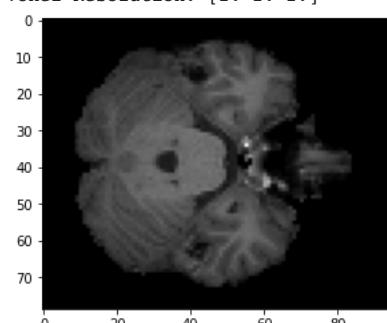
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



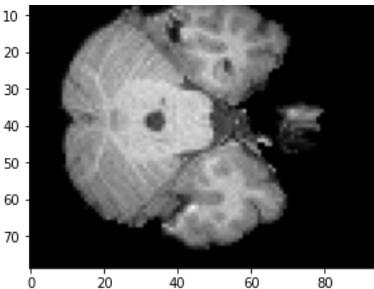
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



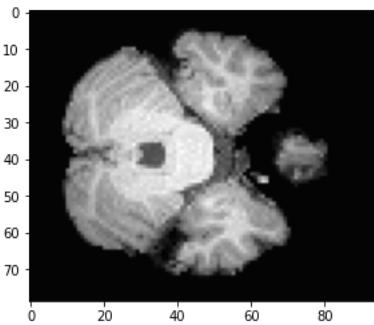
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



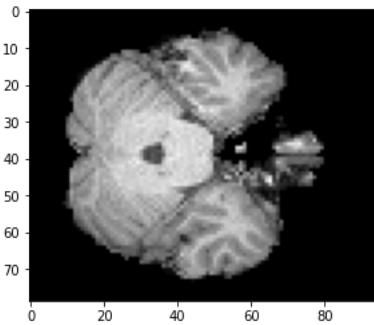
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



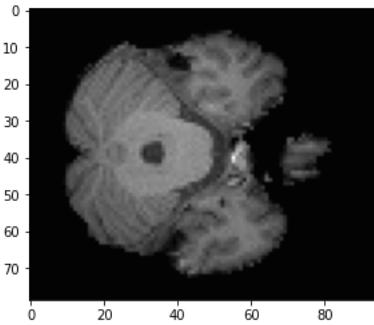
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



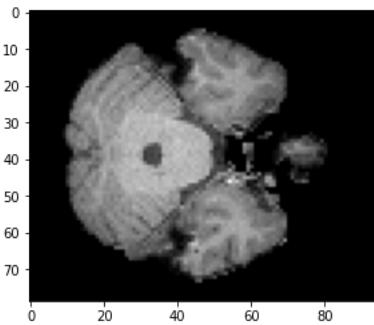
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



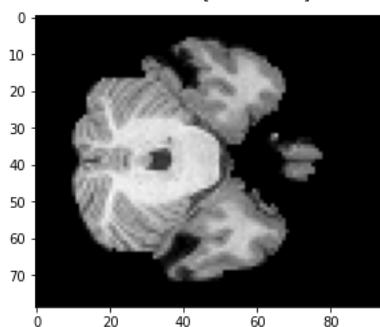
Intensity: float32
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



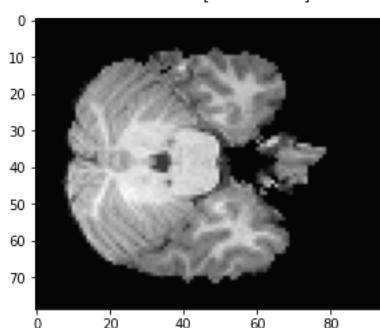
Intensity: float32
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



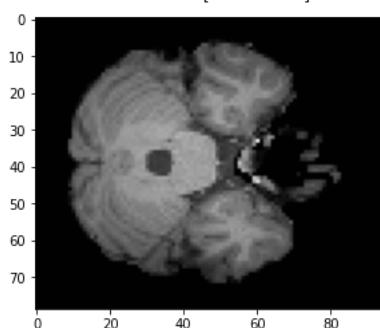
Intensity: float32
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



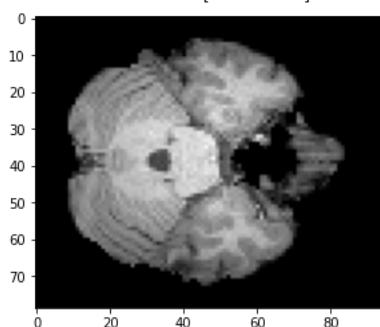
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

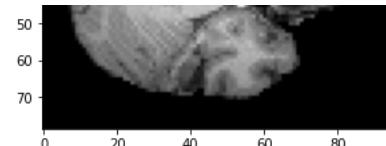


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

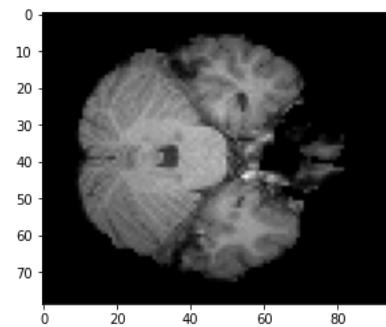


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

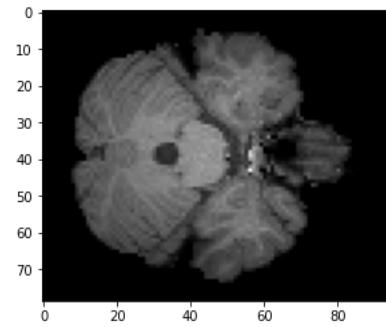




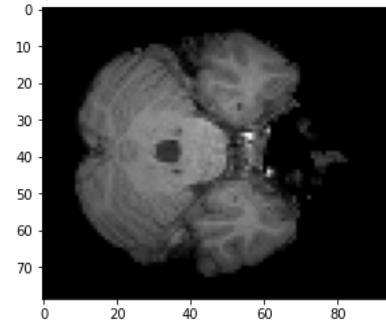
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



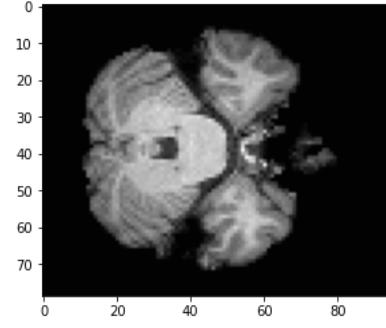
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



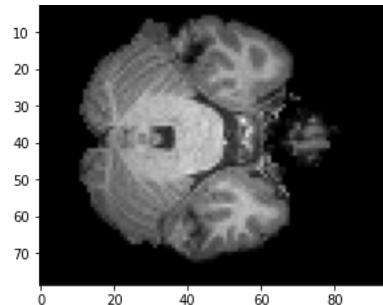
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Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



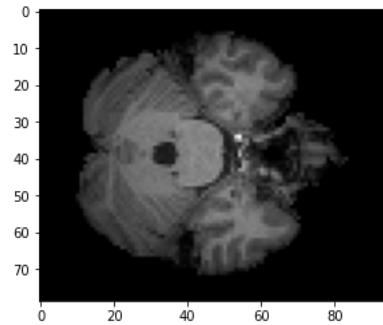
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



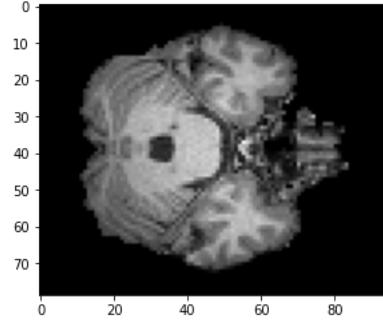
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



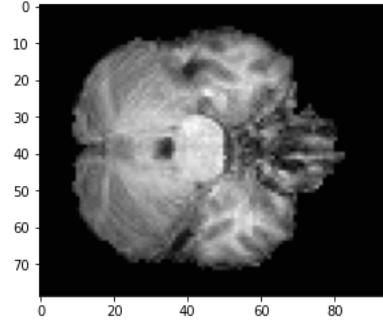
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



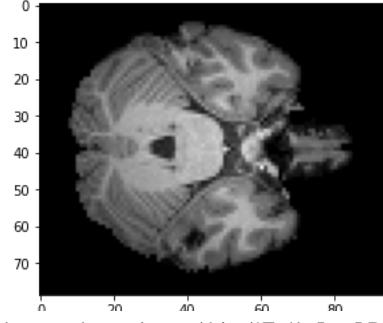
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



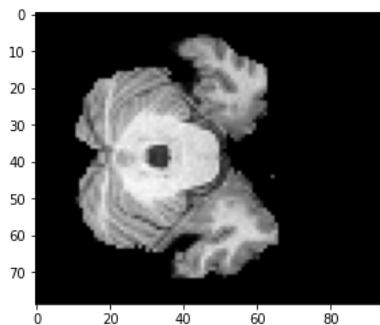
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



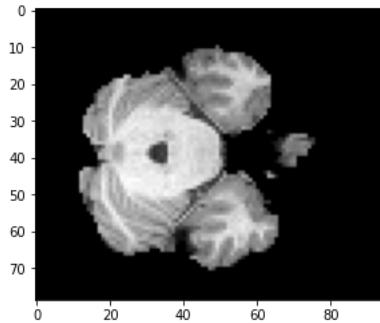
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



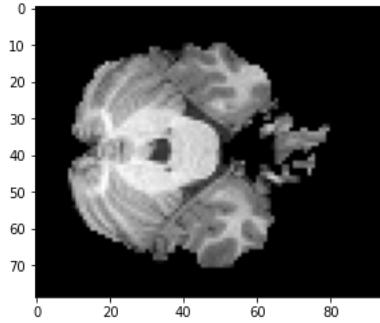
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



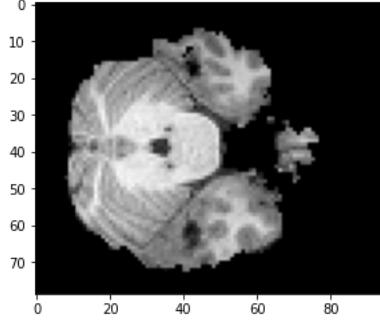
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

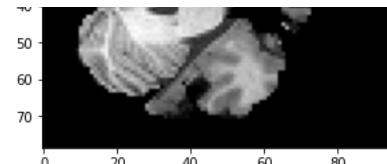


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

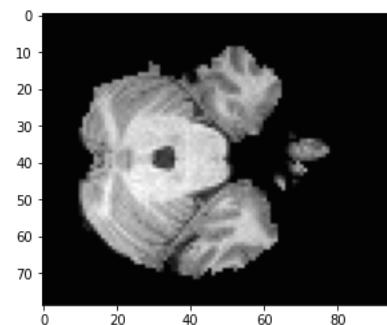


Intensity: float32
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

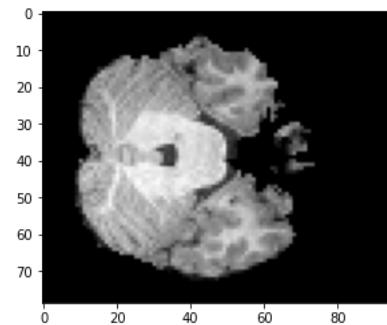




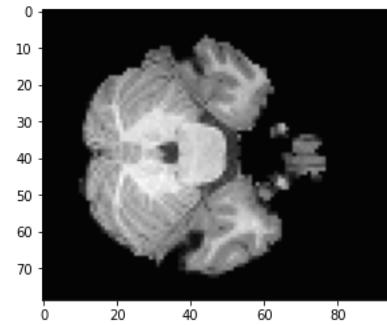
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Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



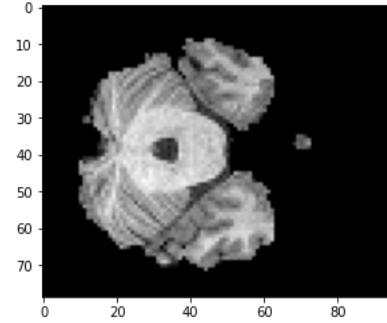
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



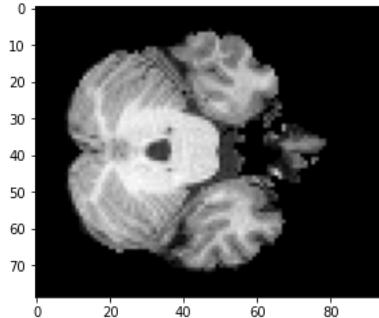
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



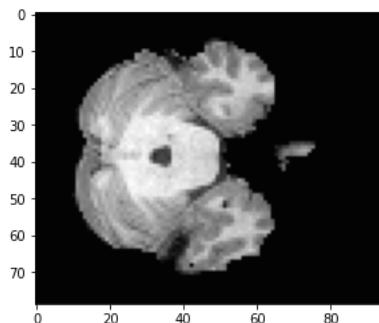
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Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



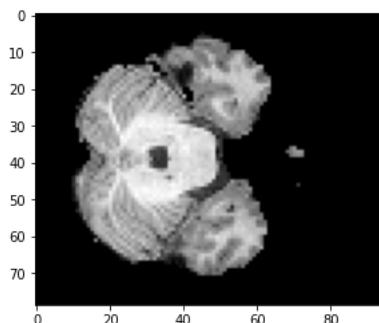
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



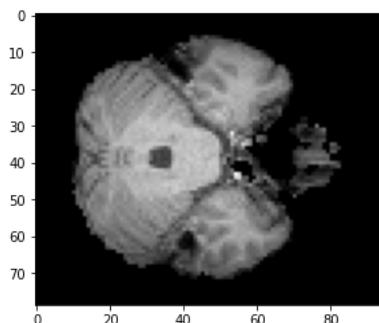
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



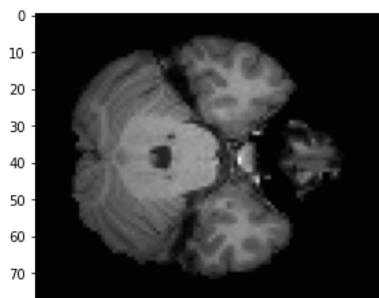
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

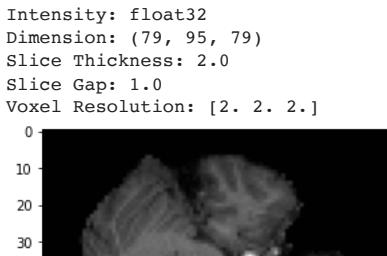
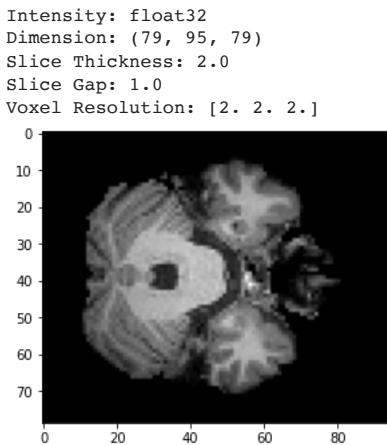
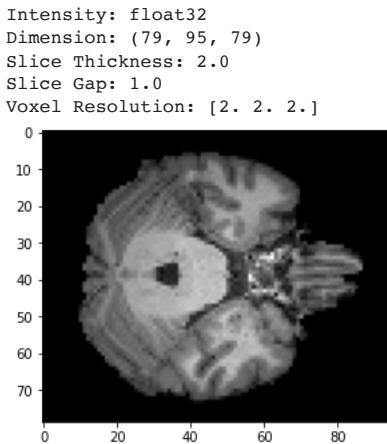
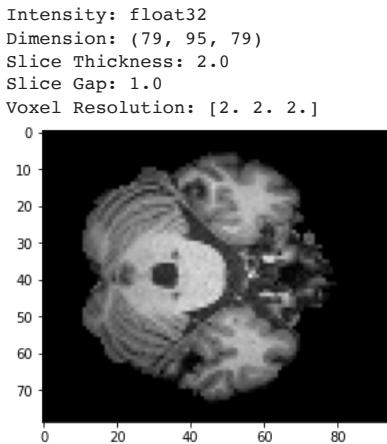
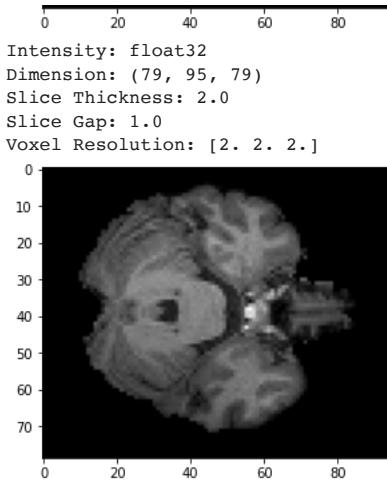


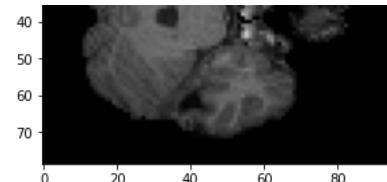
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Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



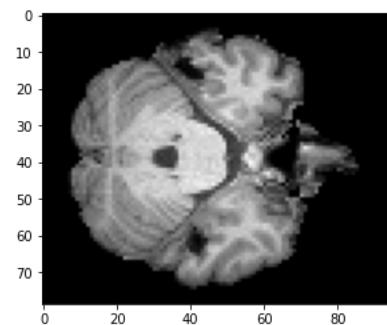
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Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



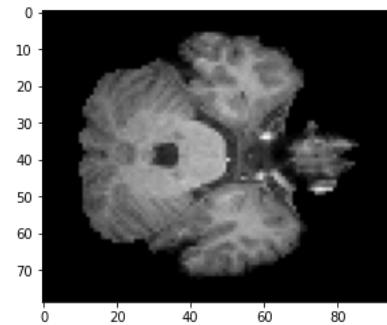




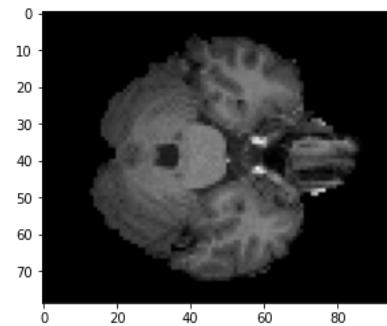
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



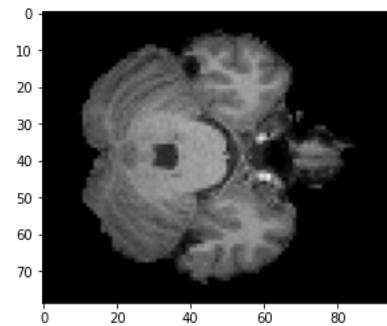
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



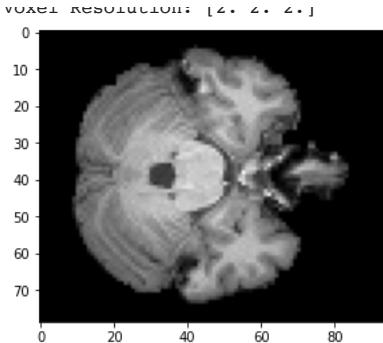
Intensity: float32
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



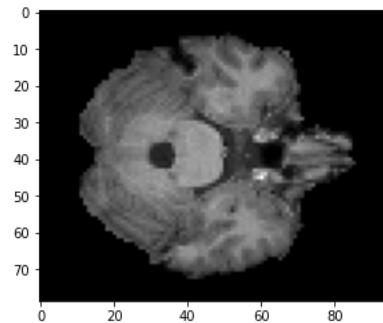
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



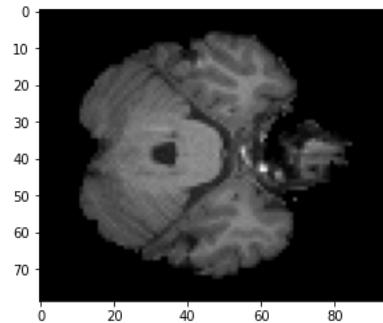
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



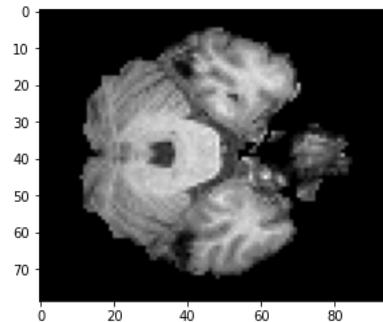
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



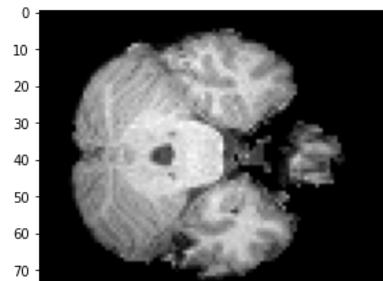
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

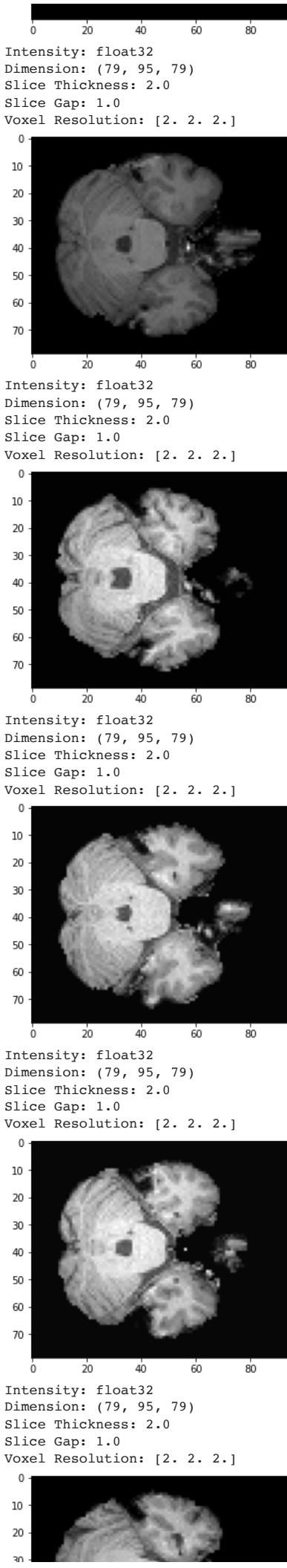


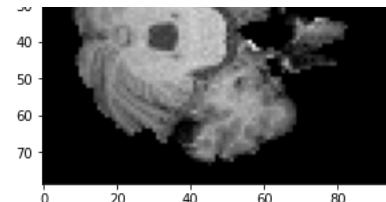
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



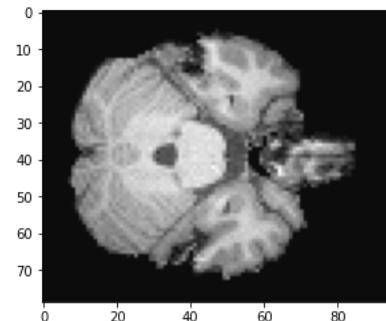
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



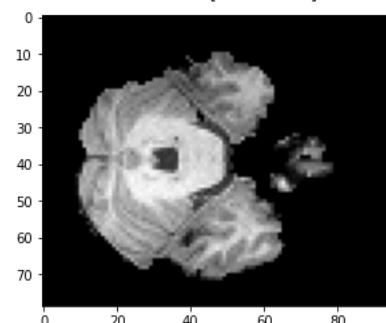




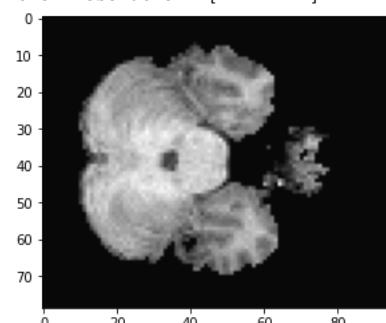
Intensity: float32
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



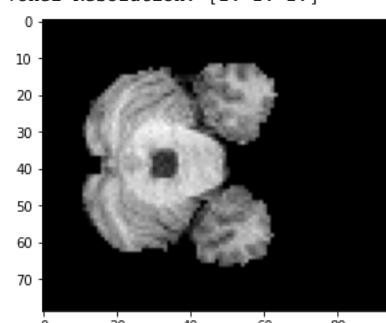
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

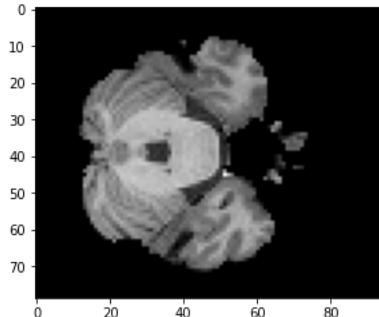


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

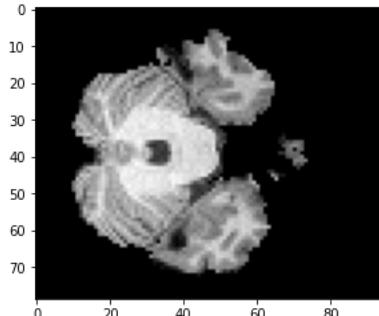


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0

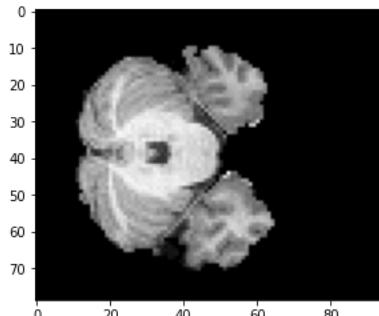
Voxel Resolution: [2. 2. 2.]



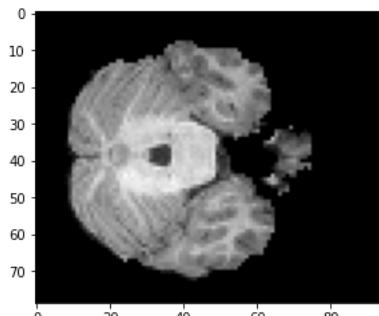
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

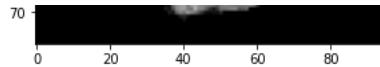


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

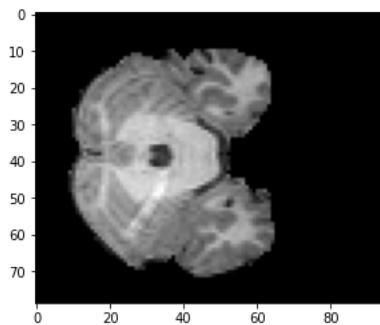


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

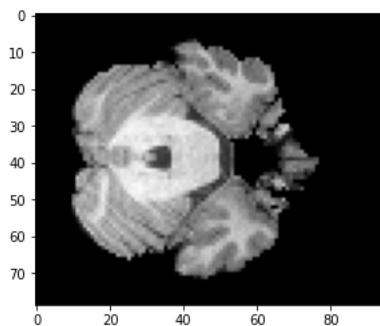




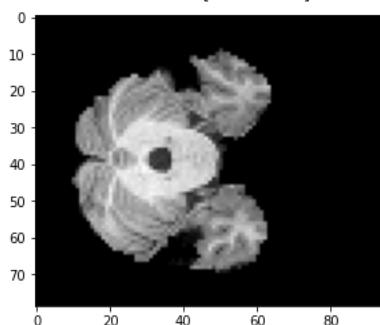
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



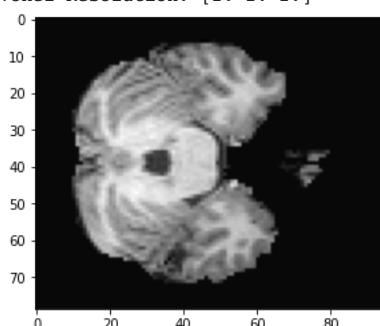
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

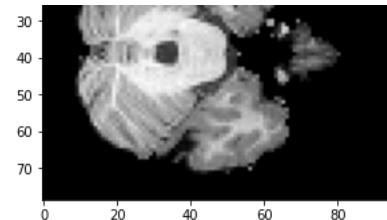


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

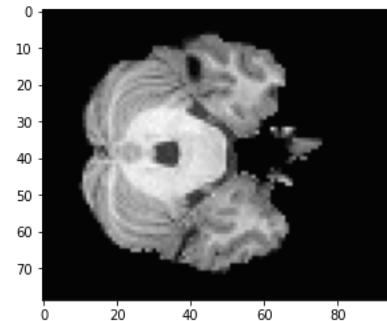


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

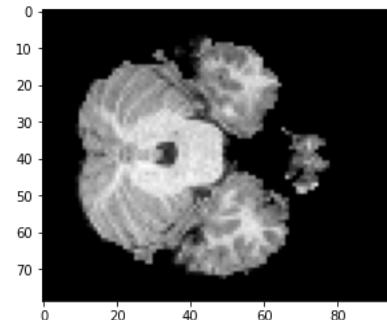




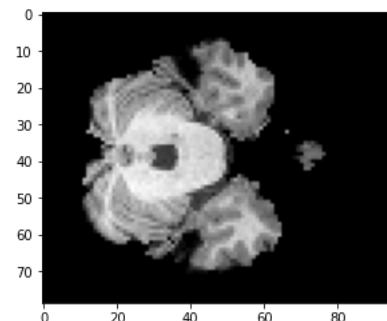
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



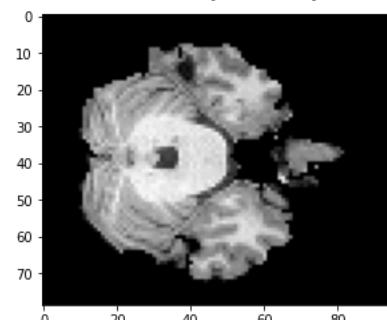
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

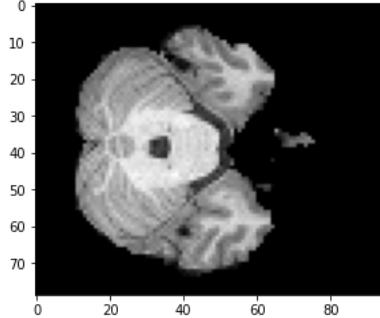


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

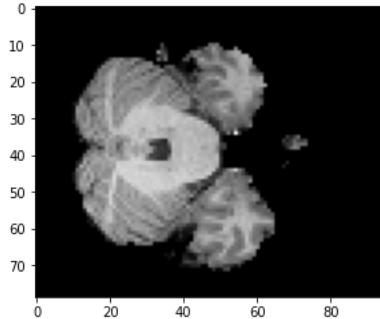


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0

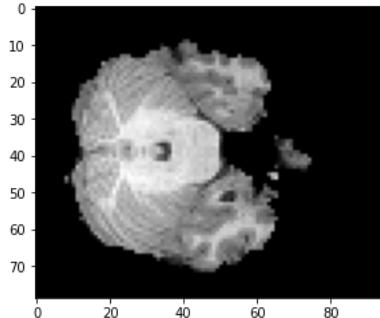
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



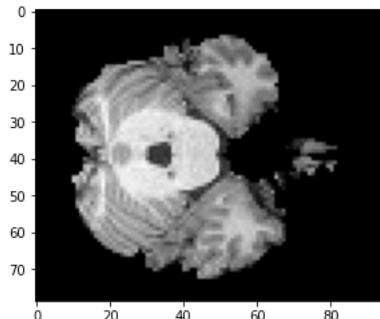
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



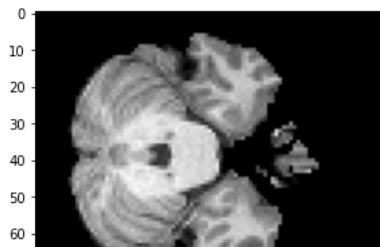
Intensity: float32
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

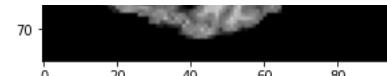


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

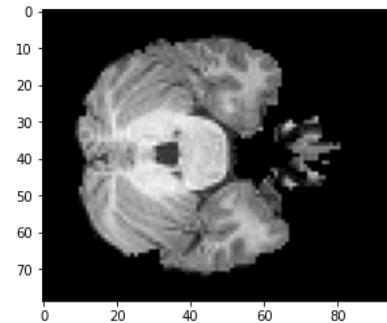


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

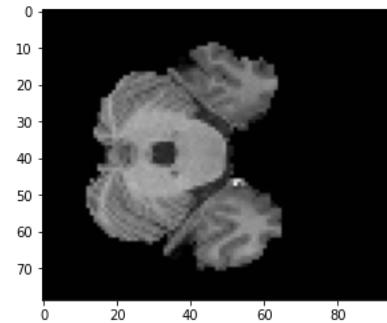




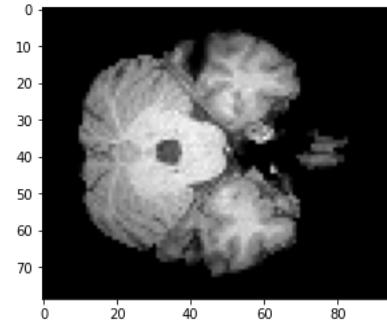
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



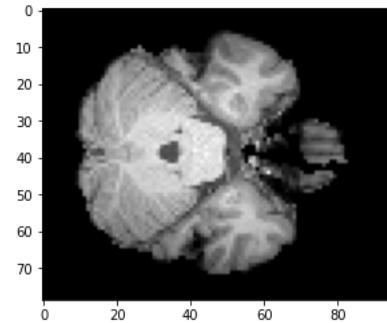
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

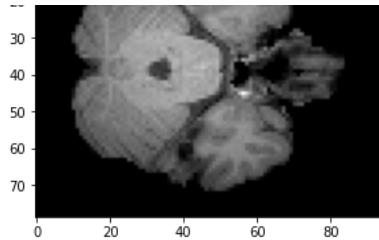


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

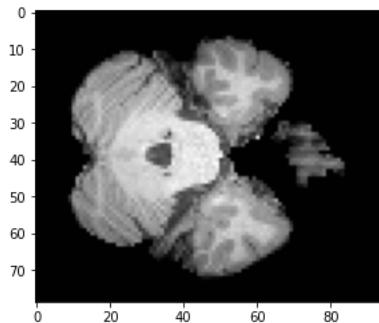


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

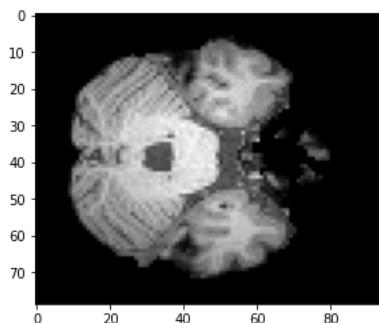




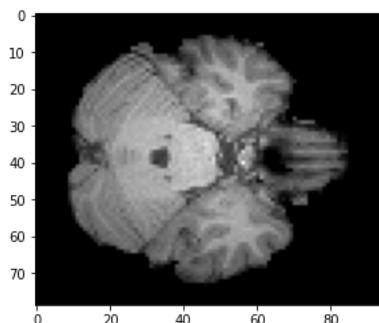
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



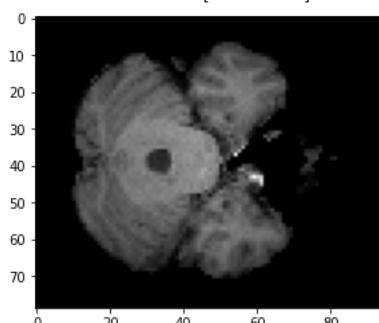
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

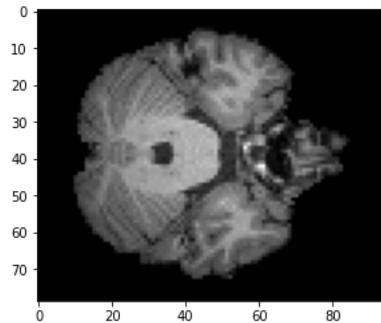


Intensity: float32
Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



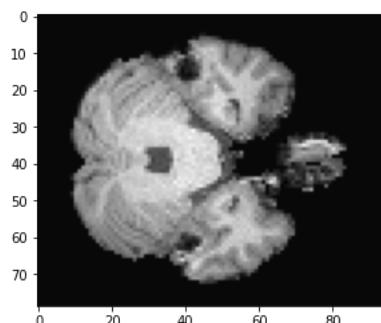
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



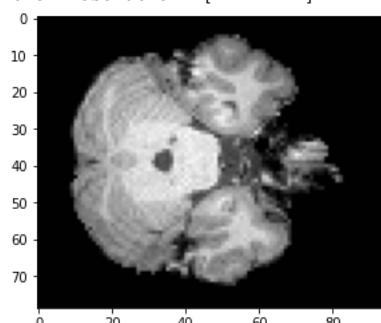
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



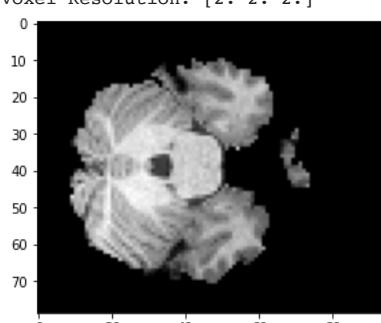
Intensity: float32

Dimension: (79, 95, 79)

Slice Thickness: 2.0

Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]



Intensity: float32

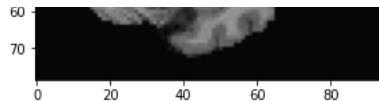
Dimension: (79, 95, 79)

Slice Thickness: 2.0

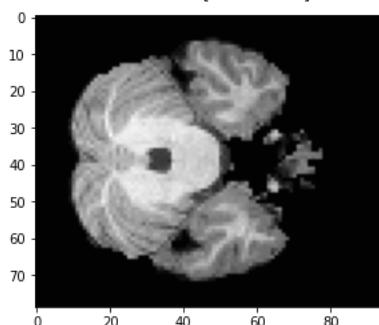
Slice Gap: 1.0

Voxel Resolution: [2. 2. 2.]

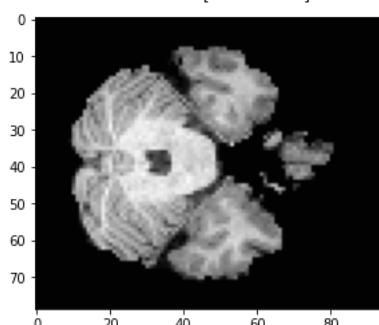




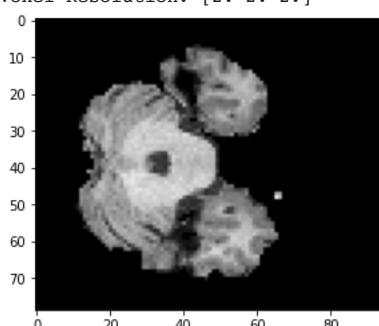
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



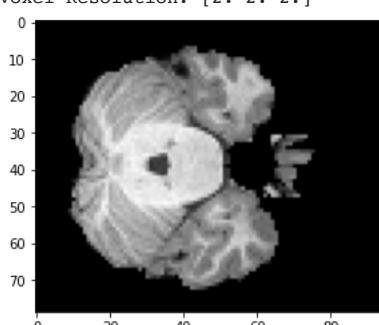
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Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



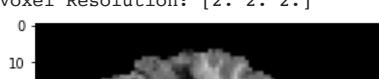
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

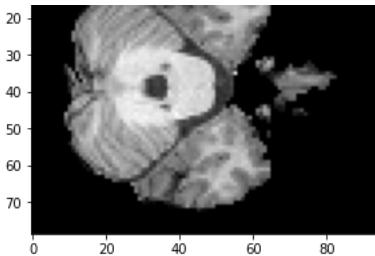


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

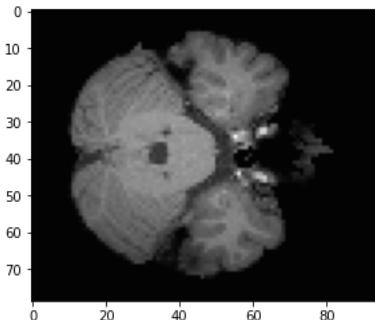


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

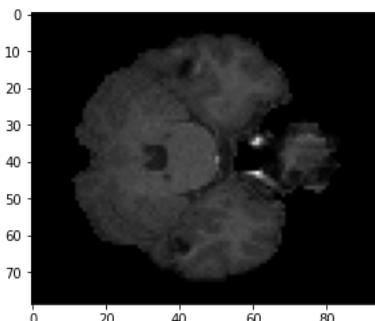




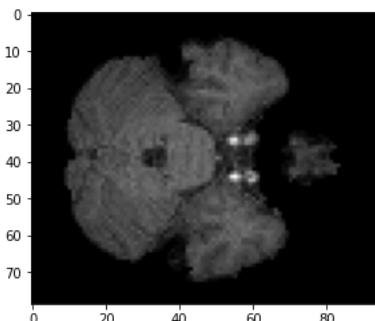
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



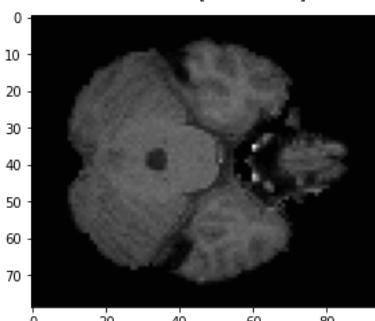
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

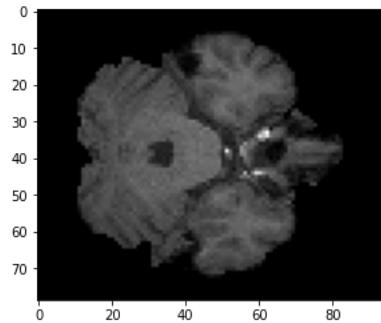


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

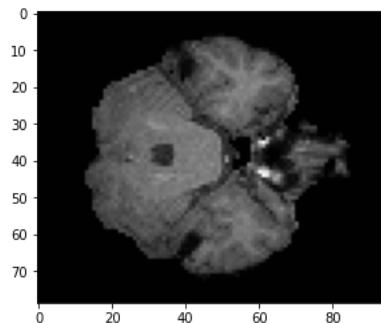


Intensity: float32
Dimension: (79, 95, 79)

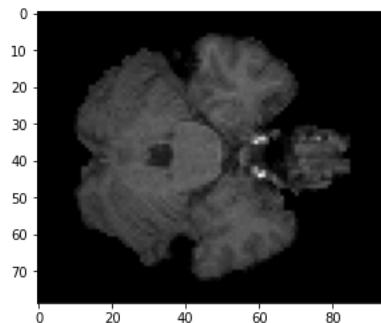
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Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



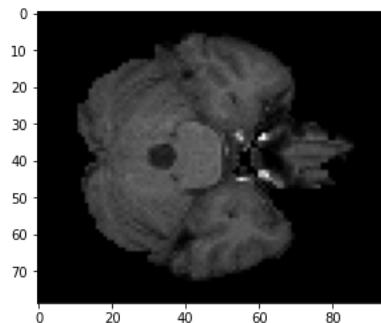
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

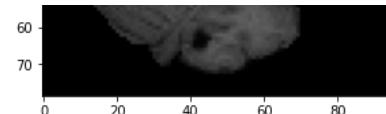


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

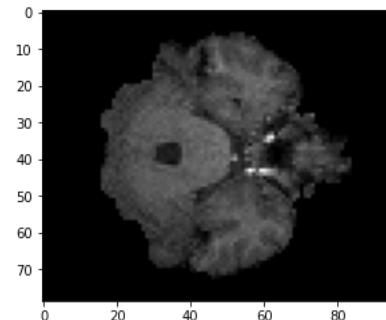


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

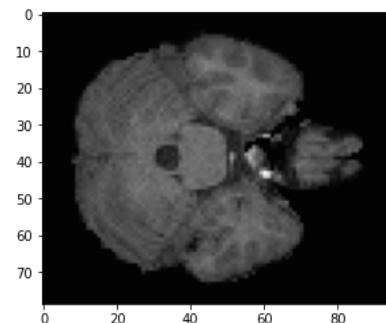




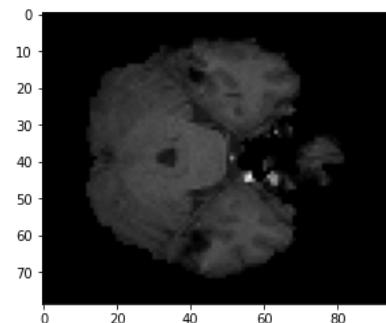
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Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



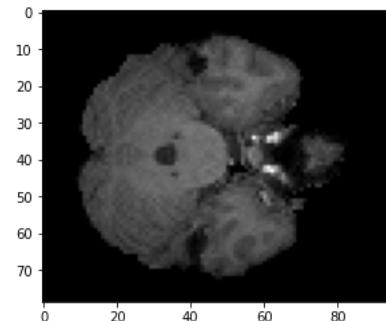
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

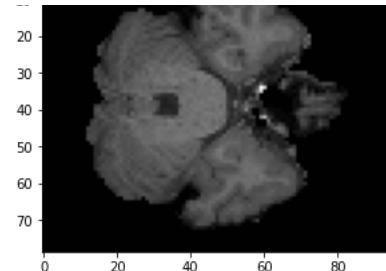


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

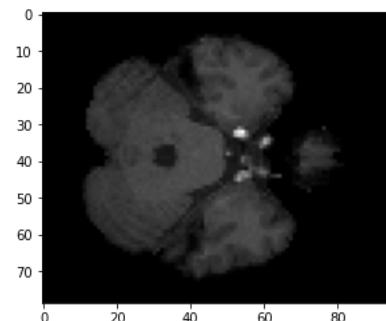


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

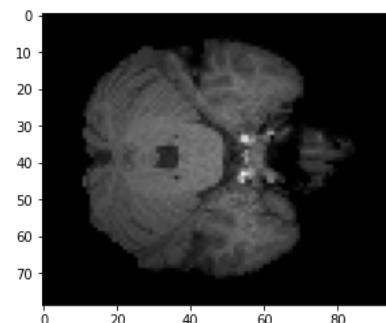




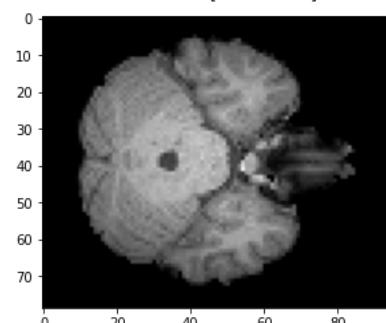
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



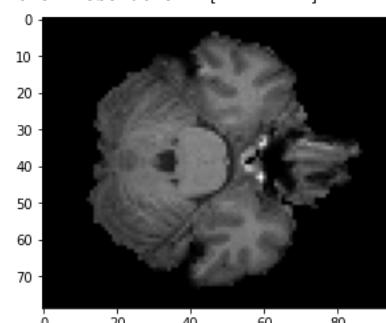
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

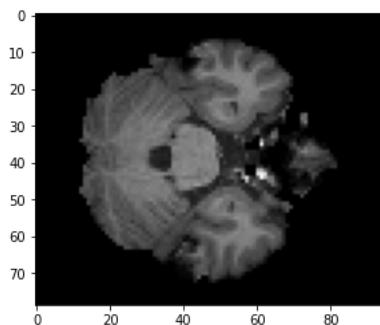


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

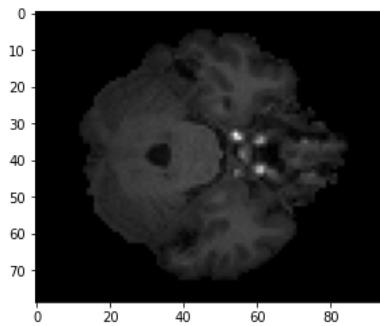


Intensity: float32

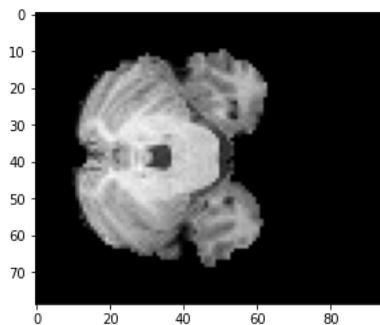
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



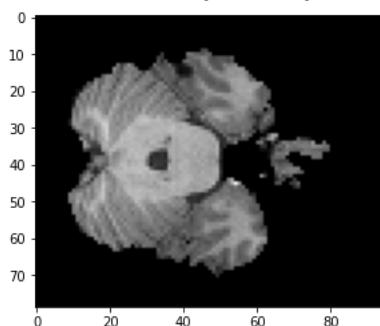
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

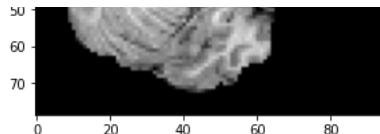


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

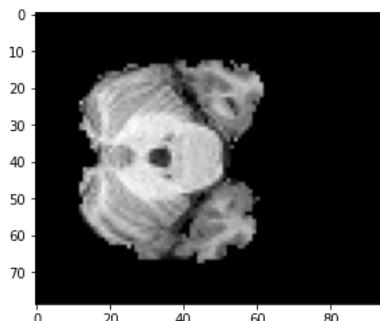


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

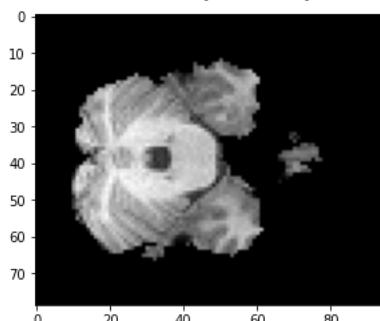




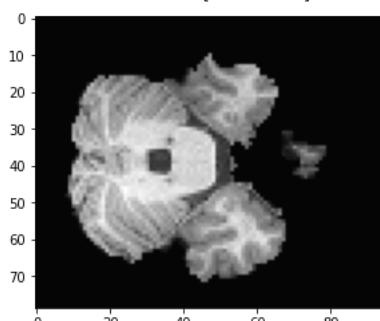
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



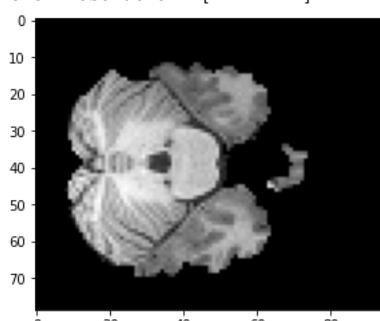
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



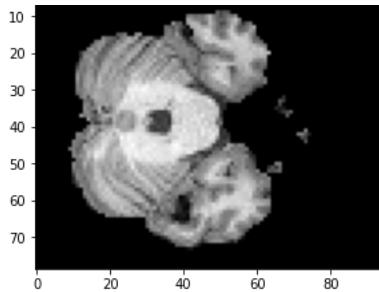
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



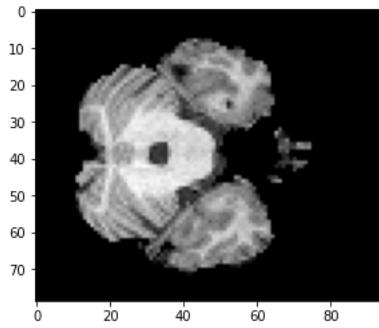
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



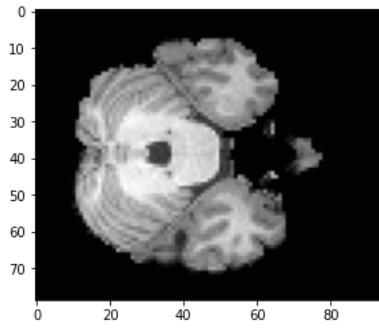
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



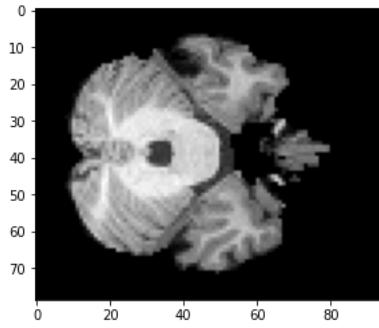
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



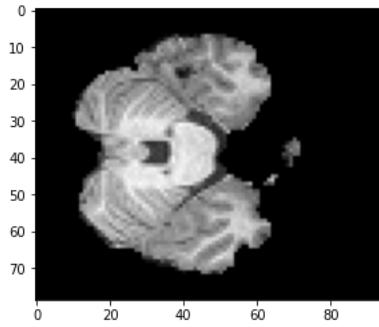
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



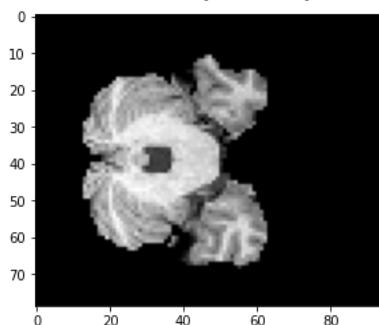
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



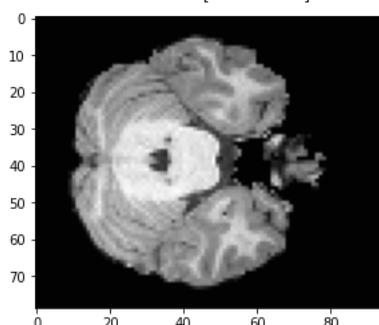
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



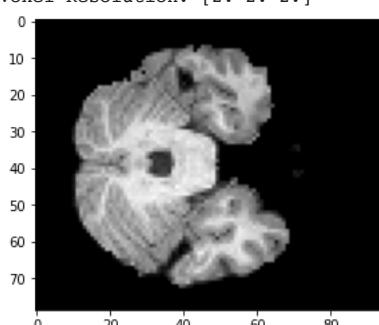
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



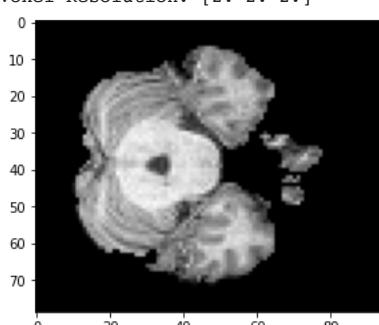
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



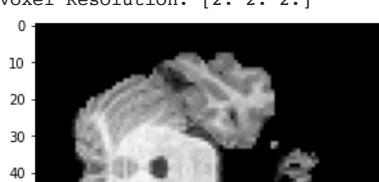
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

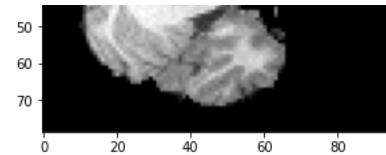


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

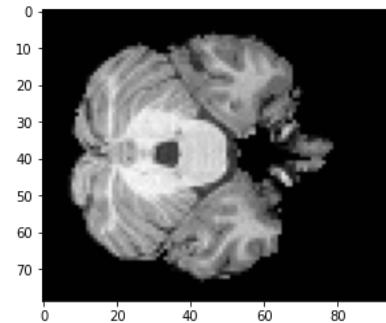


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

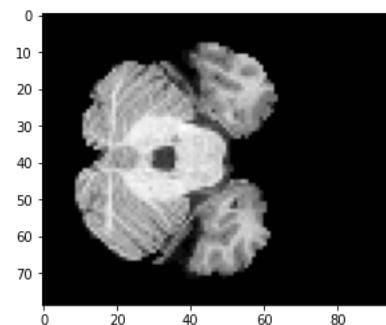




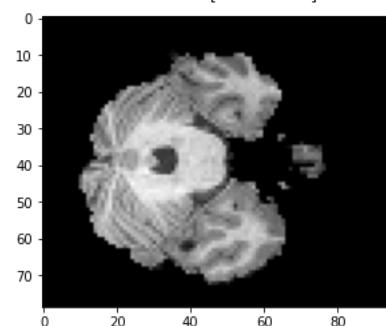
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



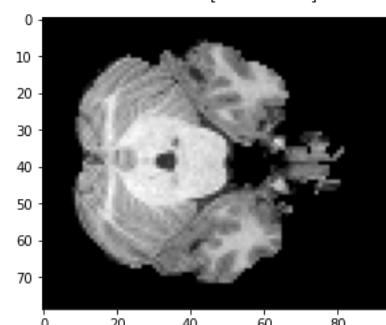
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



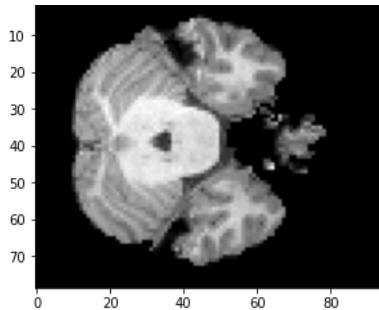
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



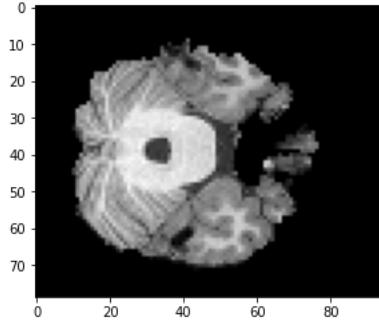
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



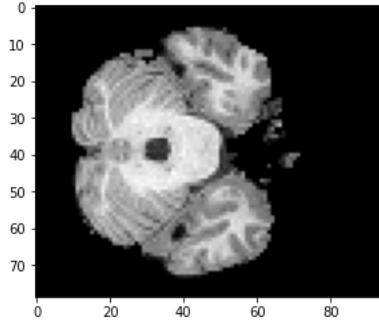
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



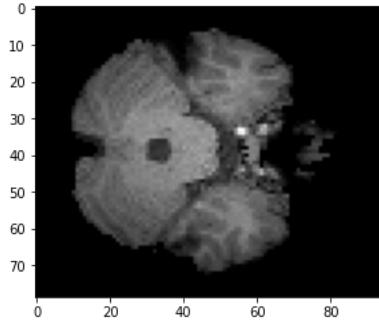
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



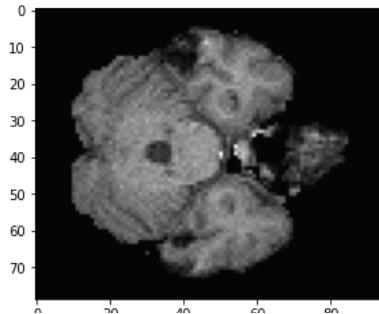
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



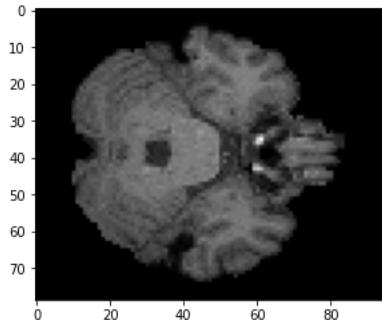
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



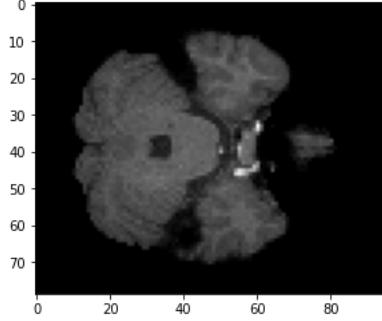
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



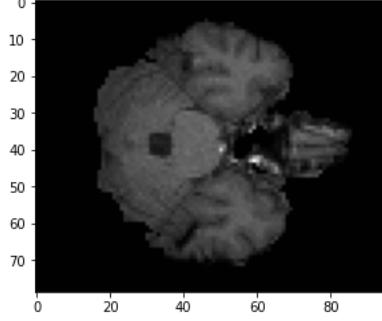
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



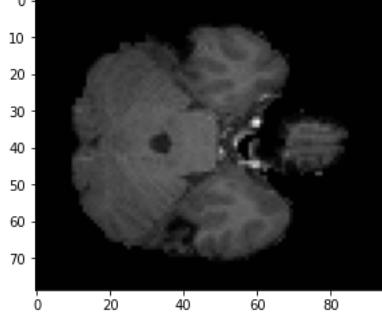
Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]

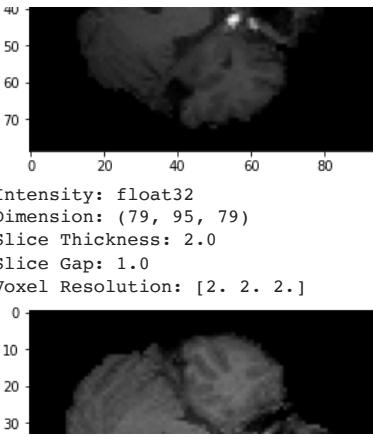


Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]



Intensity: float32
Dimension: (79, 95, 79)
Slice Thickness: 2.0
Slice Gap: 1.0
Voxel Resolution: [2. 2. 2.]





```

valid_dataset=BRAIN_MRI_Dataset(
    df=valid,
    imfolder='./',
    train=True,
    transform=None
)

train_loader = DataLoader(
    train_dataset,
    batch_size=5,
    #num_workers=4,
    shuffle=True,
)

valid_loader = DataLoader(
    valid_dataset,
    batch_size=4,
    #num_workers=4,
    shuffle=False,
)

```

▼ Model Building

```

class ConvNet3d(nn.Module):
    def __init__(self):
        super(ConvNet3d, self).__init__()
        self.conv_layer1 = nn.Conv3d(1, 6, 3, padding=1)
        self.pool = nn.MaxPool3d(3, 3)
        self.conv_layer2 = nn.Conv3d(6, 16, 3, padding=1)
        self.fc1 = nn.Linear(16*8*8*10, 512)
        self.fc2 = nn.Linear(512, 2)

    def forward(self, x):
        x = self.pool(F.relu(self.conv_layer1(x)))
        x = self.pool(F.relu(self.conv_layer2(x)))
        x = x.view(x.size(0), -1)
        x = F.relu(self.fc1(x))
        x = self.fc2(x)
        return x

```

▼ Training the model

```

#fit the model
model = ConvNet3d().to(device)

criterion = nn.CrossEntropyLoss()
optimizer = torch.optim.SGD(model.parameters(), lr=0.001)

n_total_steps = len(train_loader)
print("training datasets:", n_total_steps)

print("validating datasets", len(valid_loader))

print("valid_loader:", valid_loader)

# Create lists to store the training loss and accuracy for each epoch
train_losses = []
train_accs = []

for epoch in range(30):
    for i,(images,labels) in enumerate(train_loader):

        images = images.to(device)
        labels = labels.to(device)

        #forward pass
        outputs = model(images)
        loss = criterion(outputs, labels)

        # Calculate accuracy
        _, preds = torch.max(outputs, 1)
        acc = torch.sum(preds == labels).item() / len(labels)

        #backward and optimise

```

```

optimizer.zero_grad()
loss.backward()
optimizer.step()

# Append the current loss and accuracy to the lists
train_losses.append(loss.item())
train_accs.append(acc)

print(i, images.shape)

print("number of epochs completed:", epoch)

print('Finished Training')

20 torch.Size([5, 1, 79, 79, 95])
21 torch.Size([5, 1, 79, 79, 95])
22 torch.Size([5, 1, 79, 79, 95])
23 torch.Size([5, 1, 79, 79, 95])
24 torch.Size([5, 1, 79, 79, 95])
25 torch.Size([5, 1, 79, 79, 95])
26 torch.Size([5, 1, 79, 79, 95])
27 torch.Size([5, 1, 79, 79, 95])
28 torch.Size([5, 1, 79, 79, 95])
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41 torch.Size([5, 1, 79, 79, 95])
42 torch.Size([5, 1, 79, 79, 95])
43 torch.Size([5, 1, 79, 79, 95])
44 torch.Size([5, 1, 79, 79, 95])
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65 torch.Size([5, 1, 79, 79, 95])
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67 torch.Size([5, 1, 79, 79, 95])
68 torch.Size([5, 1, 79, 79, 95])
69 torch.Size([5, 1, 79, 79, 95])
70 torch.Size([5, 1, 79, 79, 95])
71 torch.Size([5, 1, 79, 79, 95])
72 torch.Size([5, 1, 79, 79, 95])
73 torch.Size([5, 1, 79, 79, 95])
74 torch.Size([5, 1, 79, 79, 95])
75 torch.Size([1, 1, 79, 79, 95])
number of epochs completed: 29
Finished Training

```

▼ Testing the model

```

with torch.no_grad():
    true_positive = 0
    true_negative = 0
    false_positive = 0
    false_negative = 0

    n_correct = 0
    n_samples = 0
    n_class_correct = [0 for i in range(2)]
    n_class_samples = [0 for i in range(2)]

```

```

for images, labels in valid_loader:
    images = images.to(device)
    labels = labels.to(device)
    outputs = model(images)

    #max returns (value,index)
    _,predicted = torch.max(outputs,1)

    n_samples+=labels.size(0)
    n_correct+=(predicted==labels).sum().item()

    for i in range(4):
        label=labels[i]
        pred=predicted[i]
        if (label == pred):
            n_class_correct[label]+=1
        n_class_samples[label]+=1

        if label == 1 and pred == 1:
            true_positive += 1
        elif label == 0 and pred == 0:
            true_negative += 1
        elif label == 0 and pred == 1:
            false_positive += 1
        elif label == 1 and pred == 0:
            false_negative += 1

acc = 100.0 * n_correct / n_samples
print(f'Accuracy of the network:{acc}%')
print("True Positive Rate: ", true_positive)
print("True Negative Rate: ", true_negative)
print("False Positive Rate: ", false_positive)
print("False Negative Rate: ", false_negative)

Accuracy of the network:75.0%
True Positive Rate: 7
True Negative Rate: 32
False Positive Rate: 0
False Negative Rate: 13

```

```

from google.colab import drive
drive.mount('/content/drive')

```

```

def generate_heatmap(model, img, target_class):
    model.eval()
    #img = img.to(device)
    with torch.no_grad():
        logit = model(img)
        prob = F.softmax(logit, dim=1)
        prob = prob[0][target_class]
        grad = torch.autograd.grad(outputs=prob, inputs=img, retain_graph=True,
                                   create_graph=True)[0]
        grad = grad.view(grad.size(1), -1)

```

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