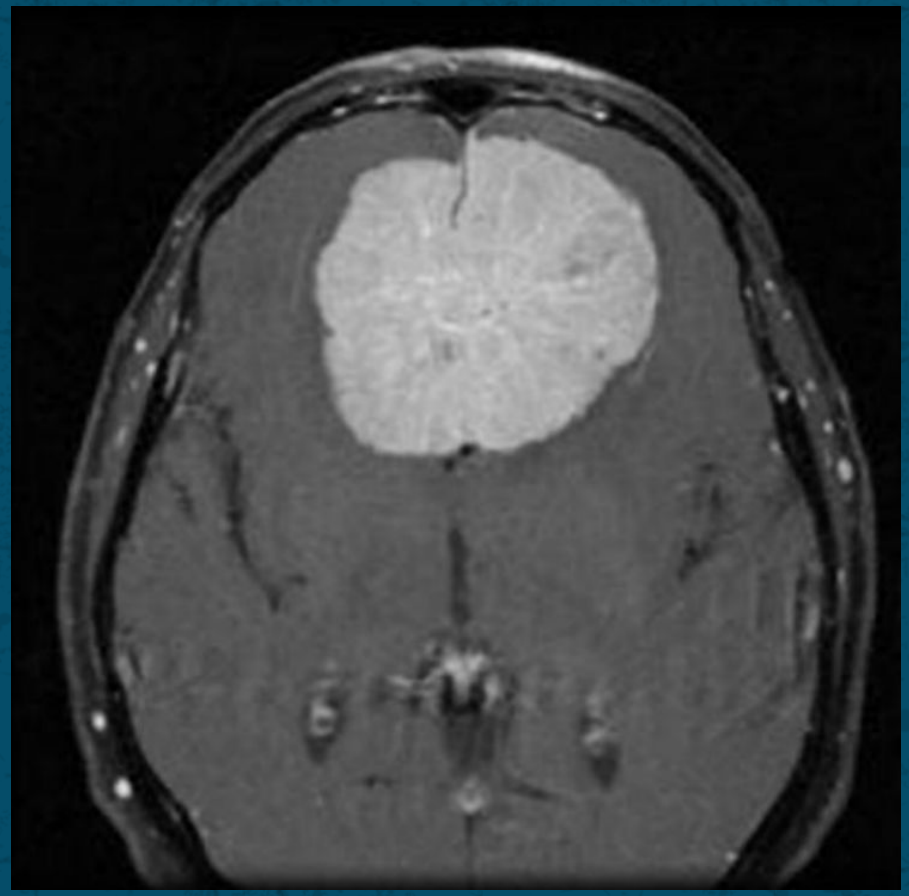
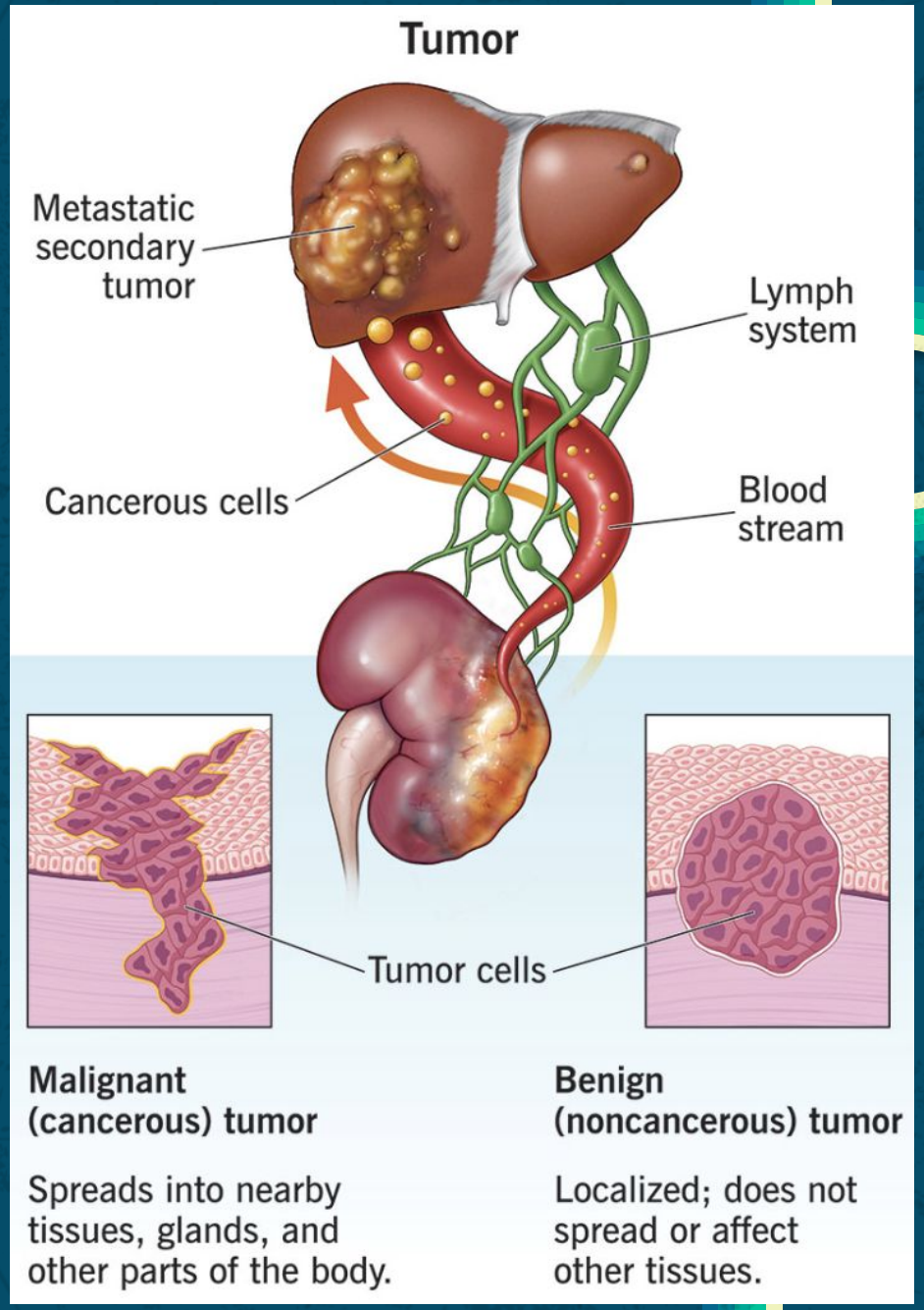


Pixels to Prognosis: Machine Learning in Tumor Detection

Sinclair Hansen

What is a Tumor?

- A mass of abnormal cells that form in your body
- Generally defined as benign or malignant



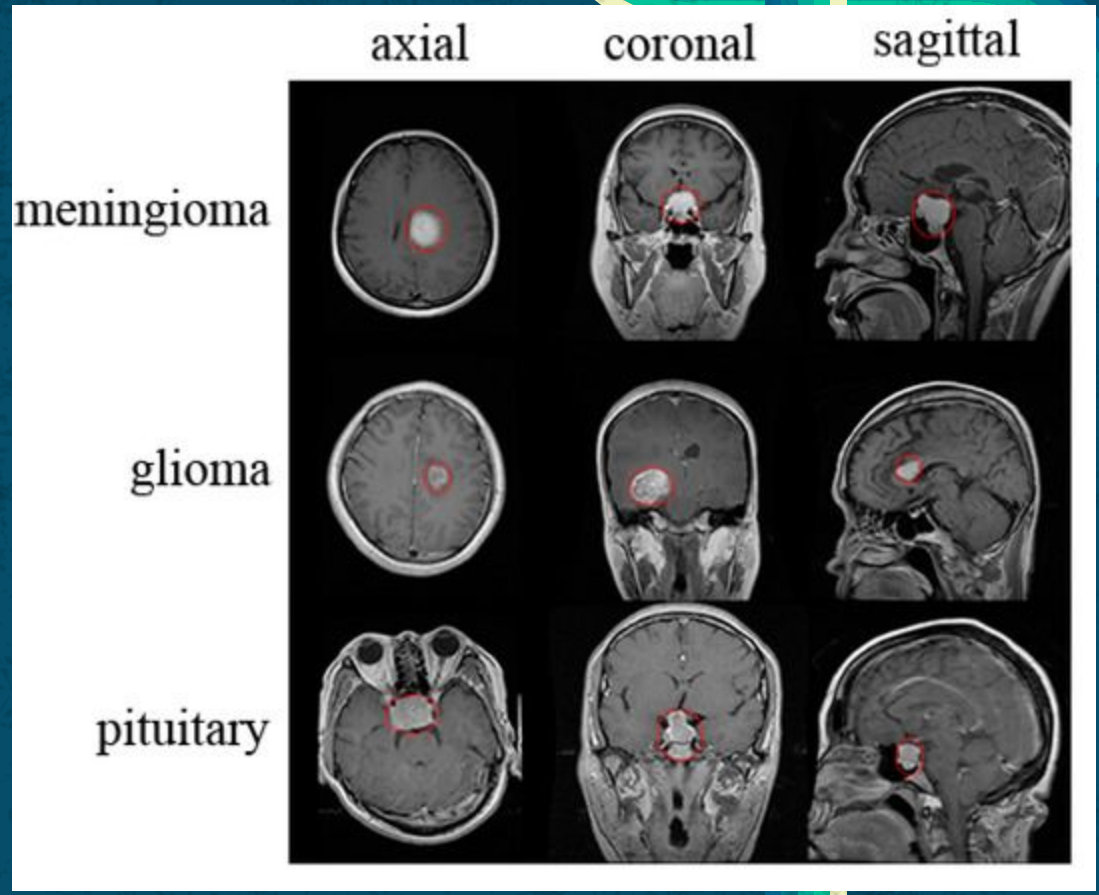
(Cleveland Clinic)

Common Types of Brain Tumors

Meningioma - Forms in the meninges, the outer three layers of tissue that cover and protect the brain just under the skull

Glioma - Arise from glial cells that surround neurons

Pituitary - Grow in pituitary gland tissue (John Hopkins Medicine)



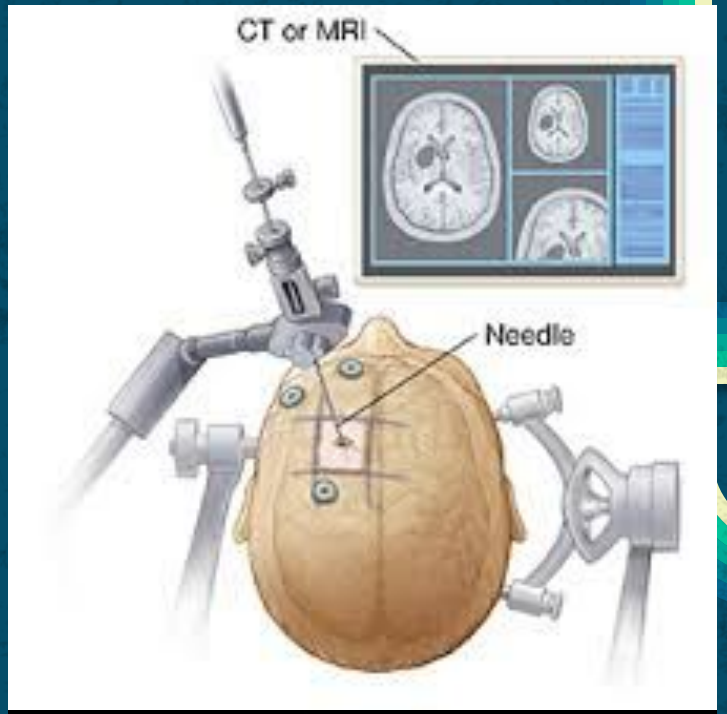
(Badza)

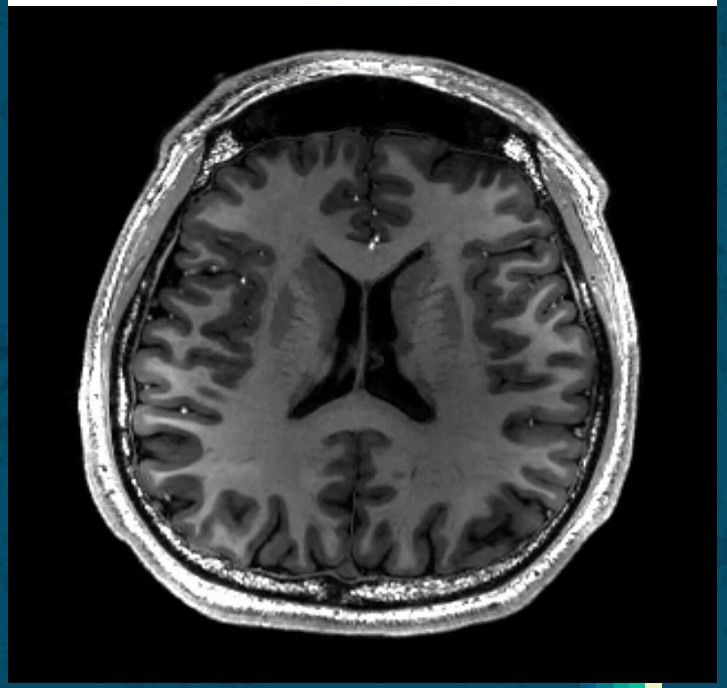
Symptoms

In some cases a tumor can be felt or seen raised above the surface of the skin

Other symptoms include:

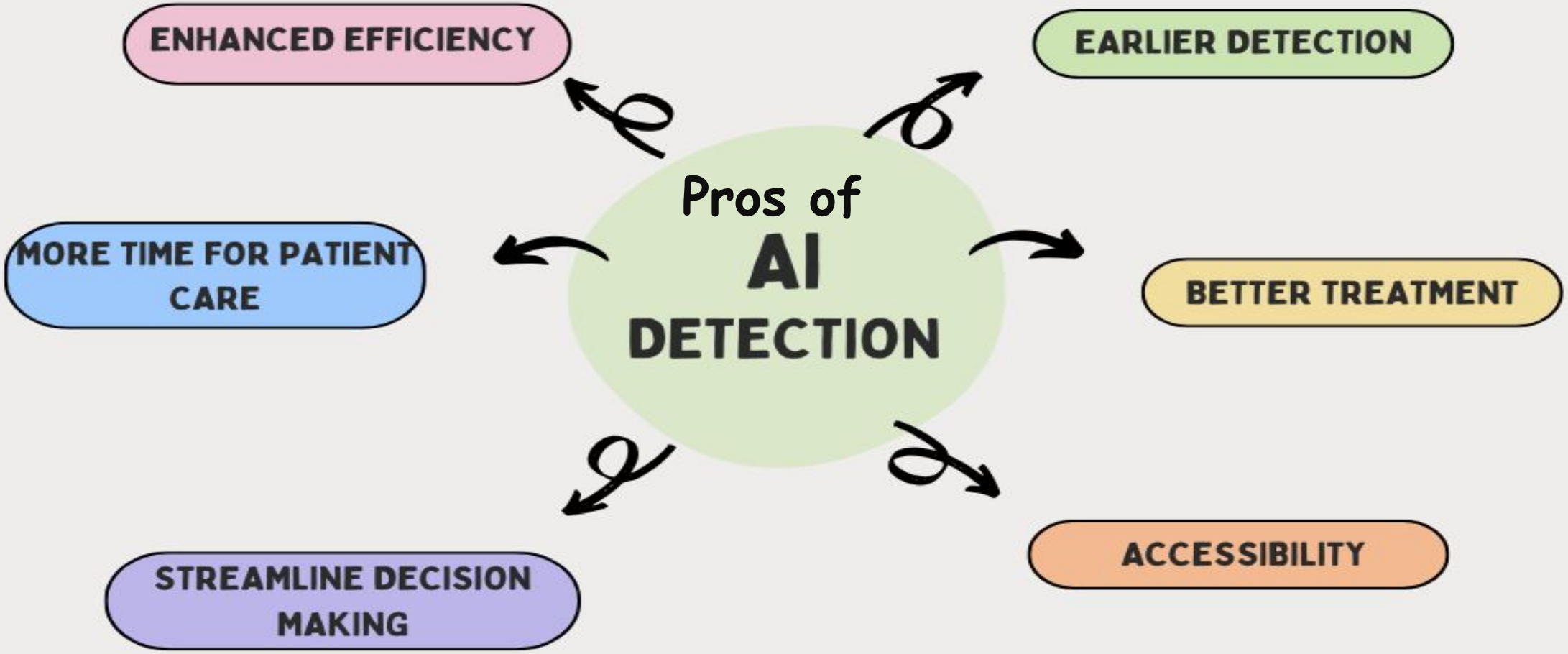
- Fatigue
- Fever/Chills
- Night Sweats
- Loss of Appetite





(Cleveland Clinic)

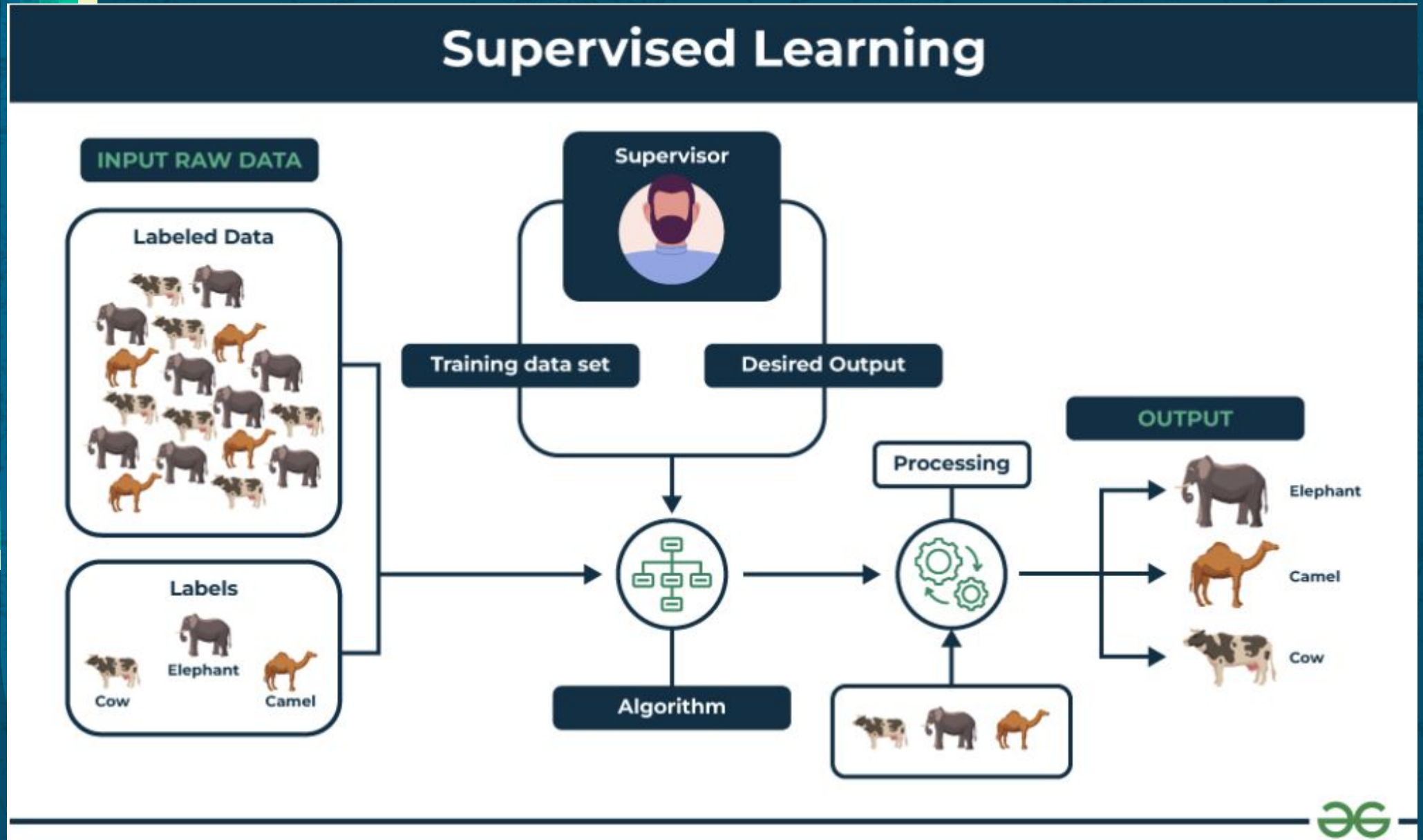
Using AI to Detect Tumors

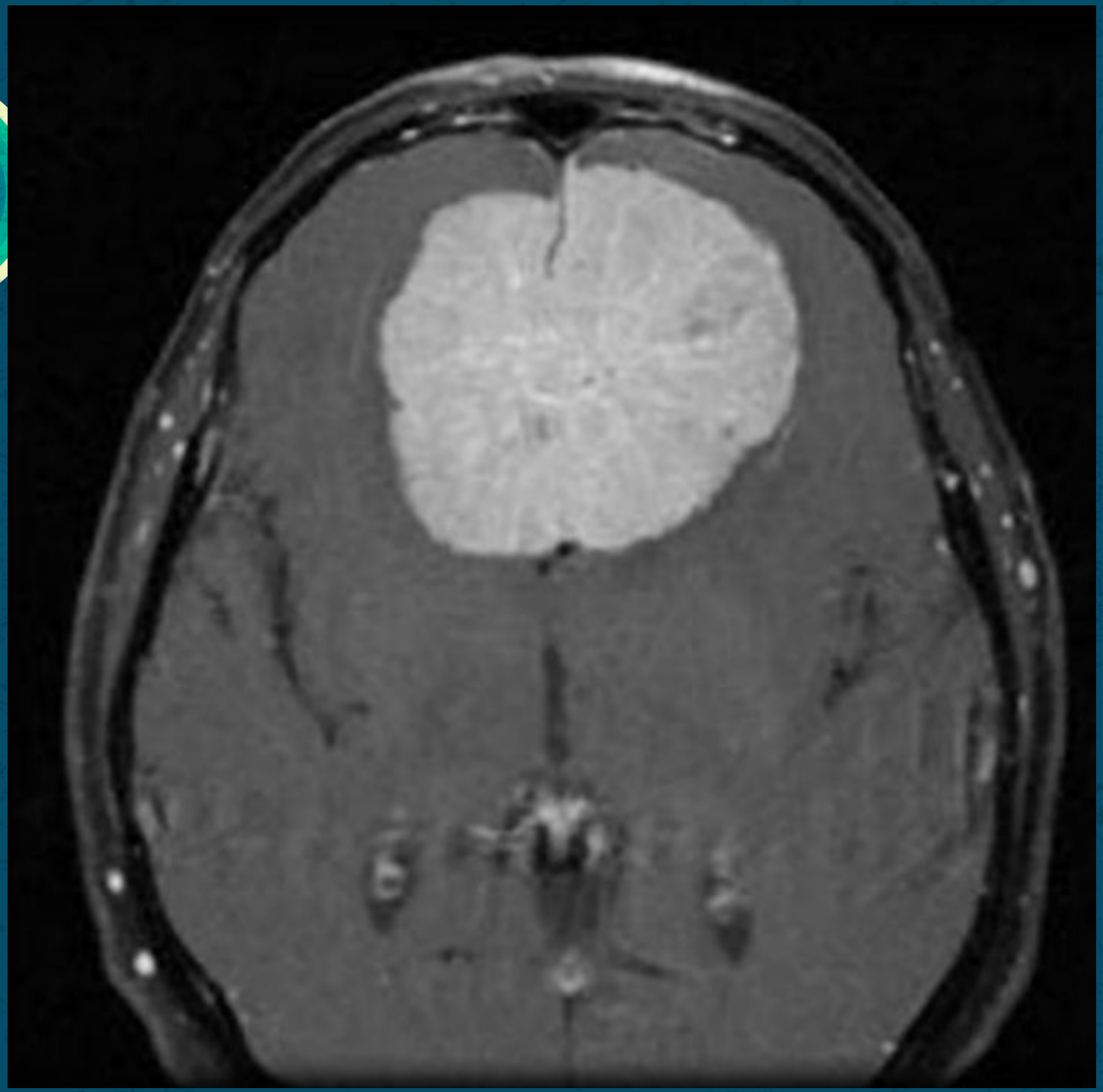

Pros of
AI
DETECTION
ENHANCED EFFICIENCY
EARLIER DETECTION
MORE TIME FOR PATIENT CARE
BETTER TREATMENT
STREAMLINE DECISION MAKING
ACCESSIBILITY

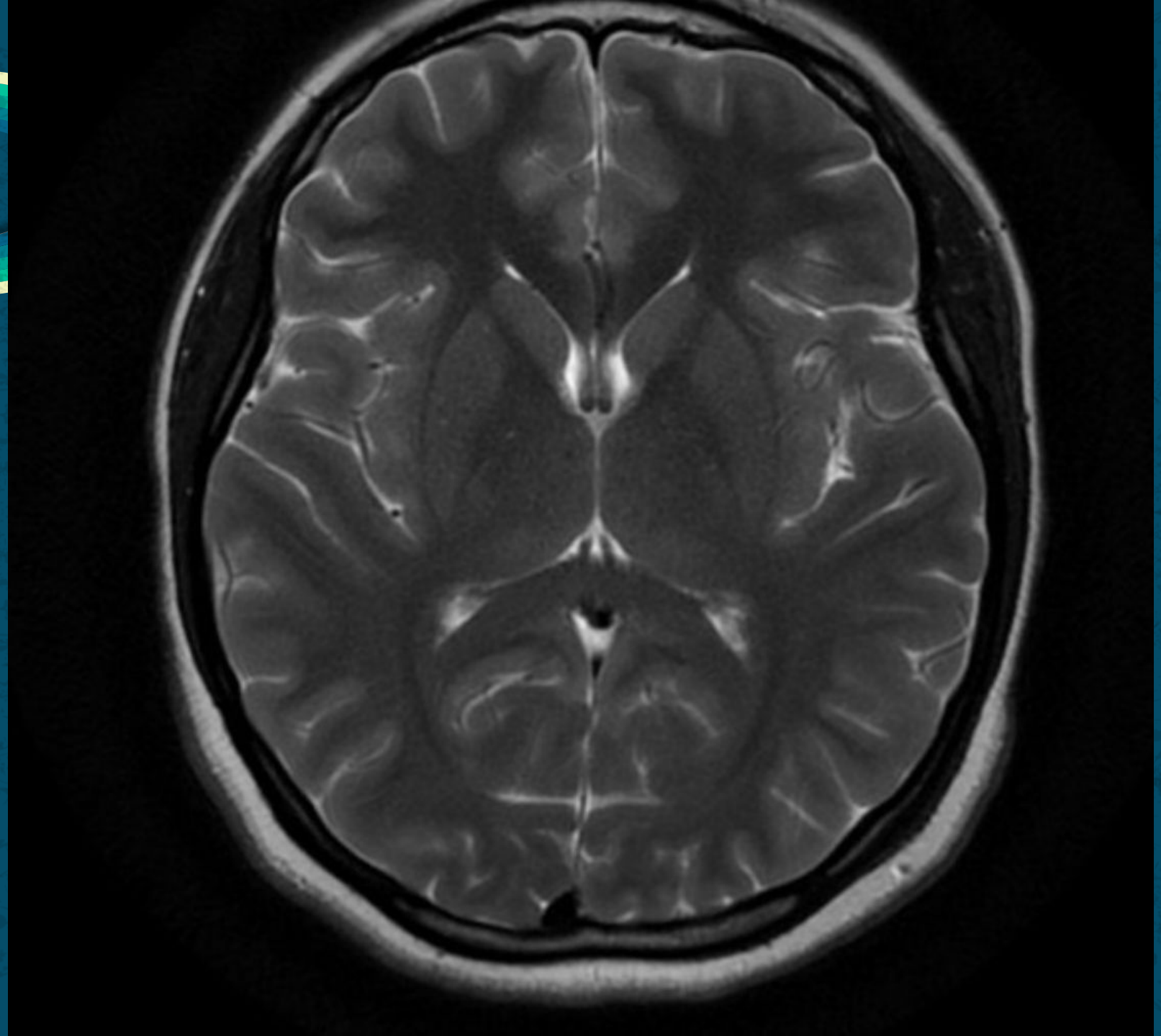
Building a Model

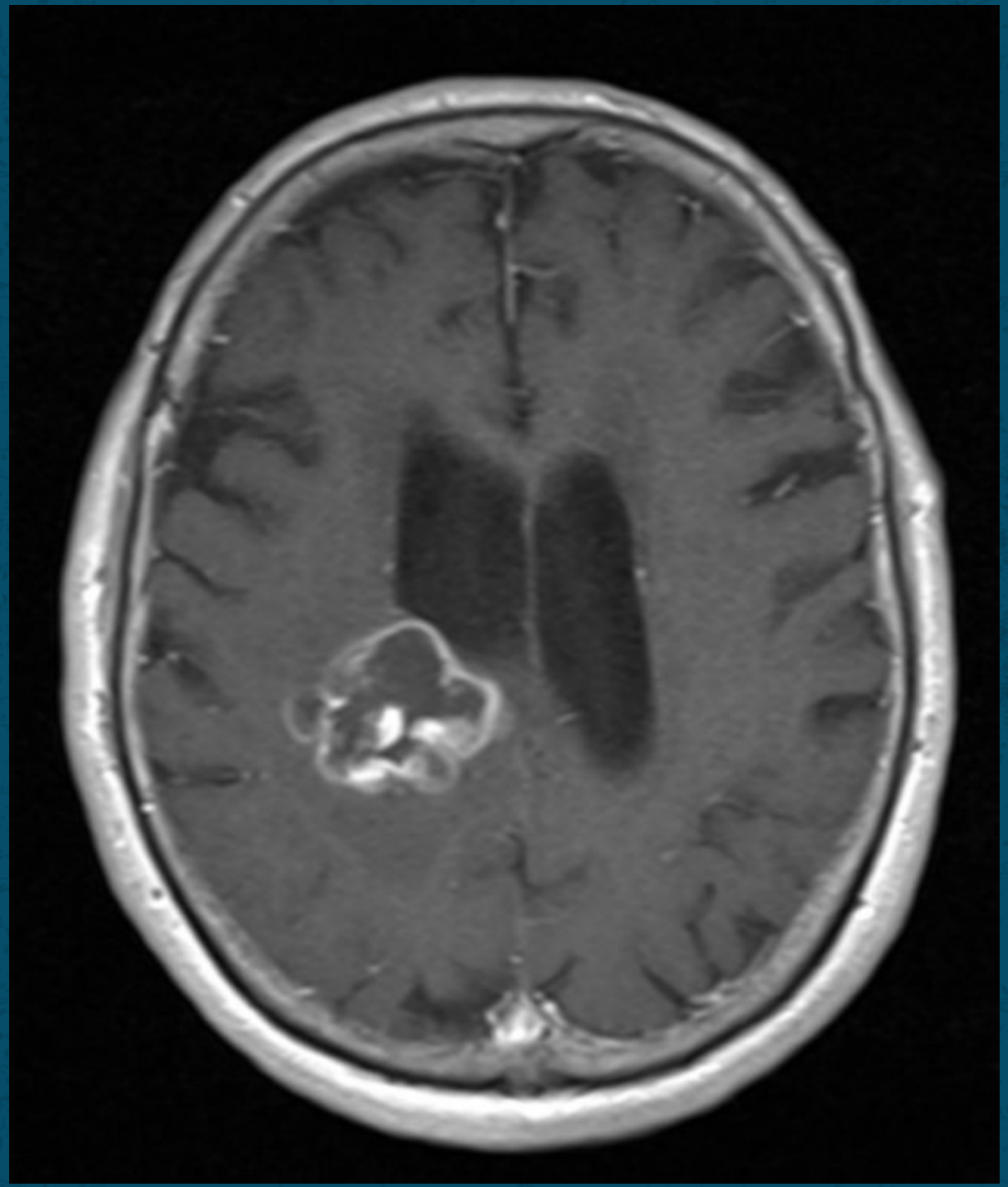
```
# Simple training loop
num_epochs = 5
train_losses, val_losses = [], []


model = TumorClassifier(num_classes=4)
model.to(device)

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

for epoch in range(num_epochs):
    # Training phase
    model.train()
    running_loss = 0.0
    for images, labels in tqdm(train_loader, desc='Training loop'):
        # Move inputs and labels to the device
        images, labels = images.to(device), labels.to(device)

        optimizer.zero_grad()
        outputs = model(images)
        loss = criterion(outputs, labels)
        loss.backward()
        optimizer.step()
        running_loss += loss.item() * labels.size(0)
    train_loss = running_loss / len(train_loader.dataset)
    train_losses.append(train_loss)
```

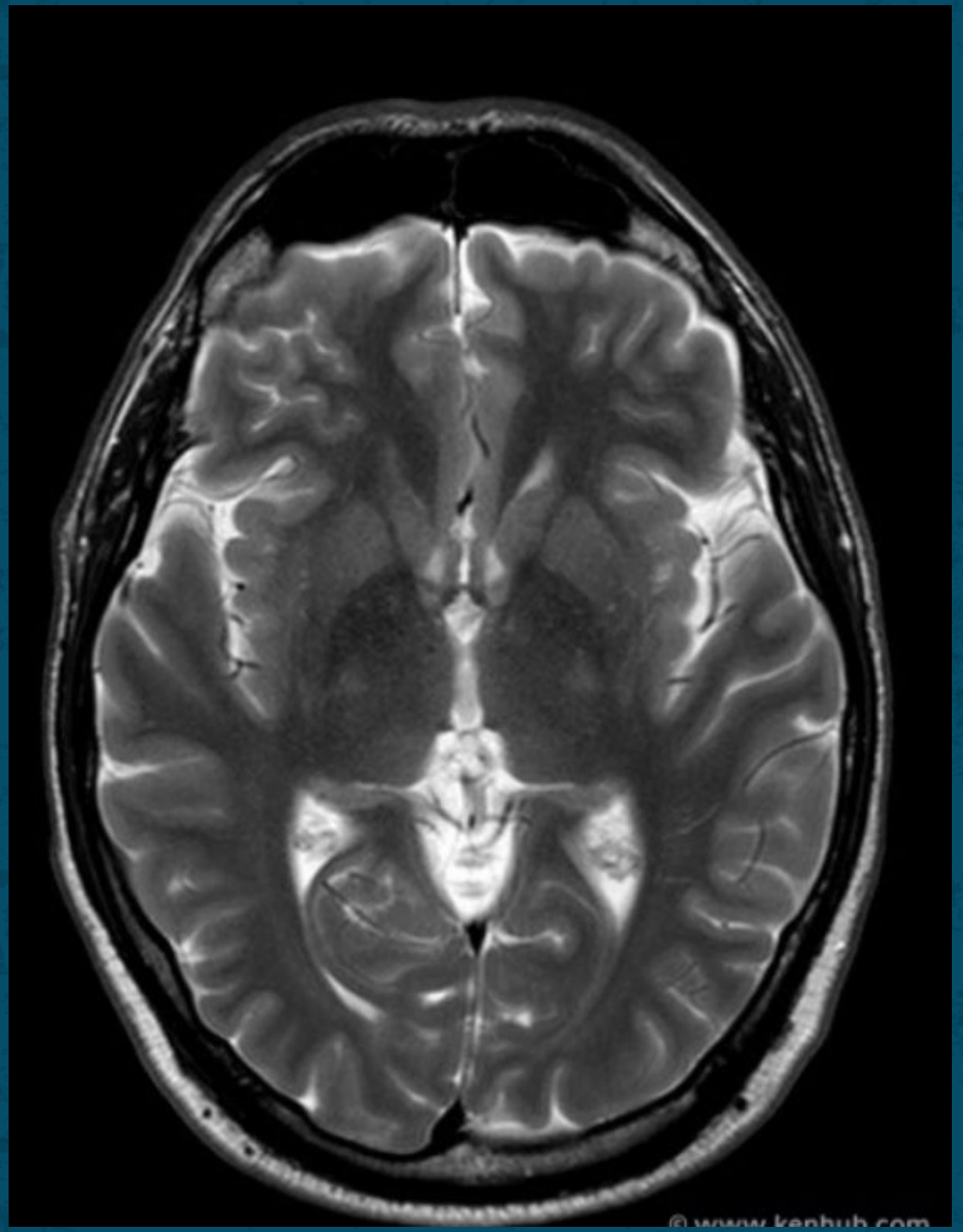
Training a Model

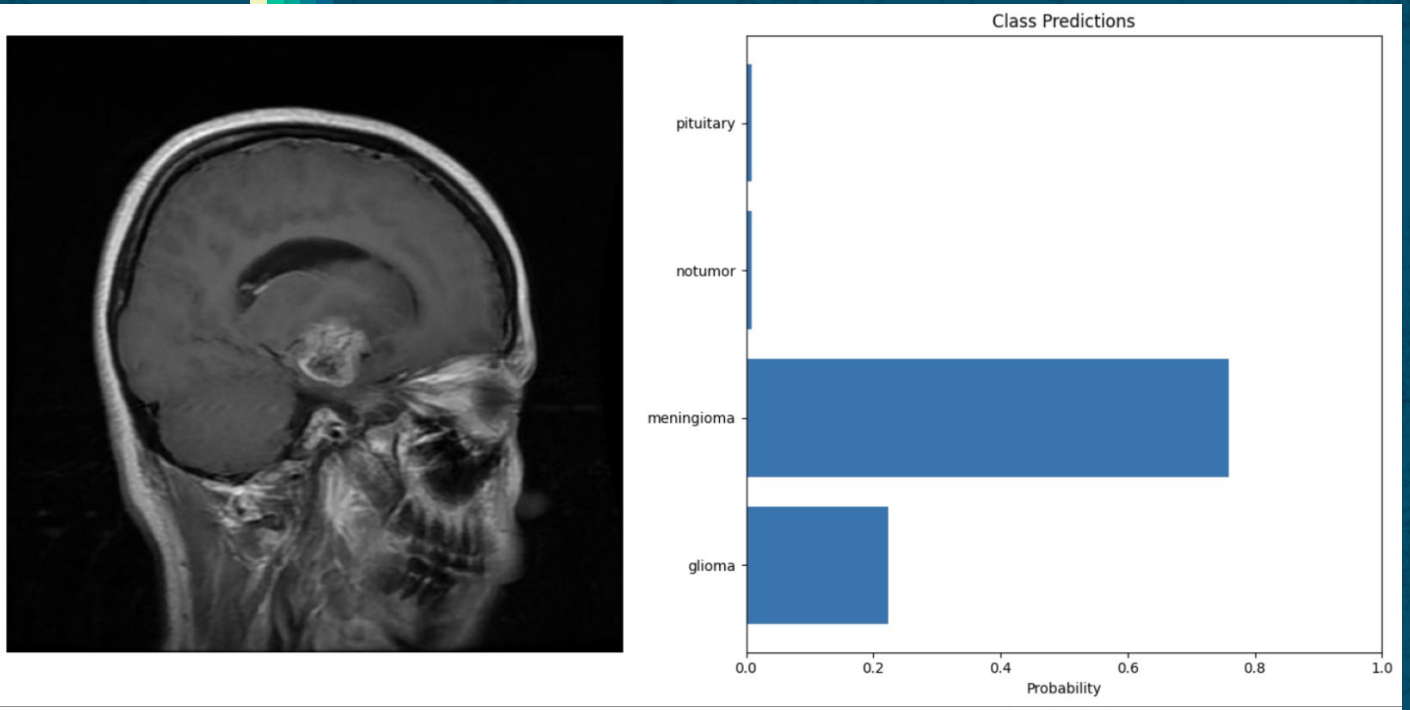


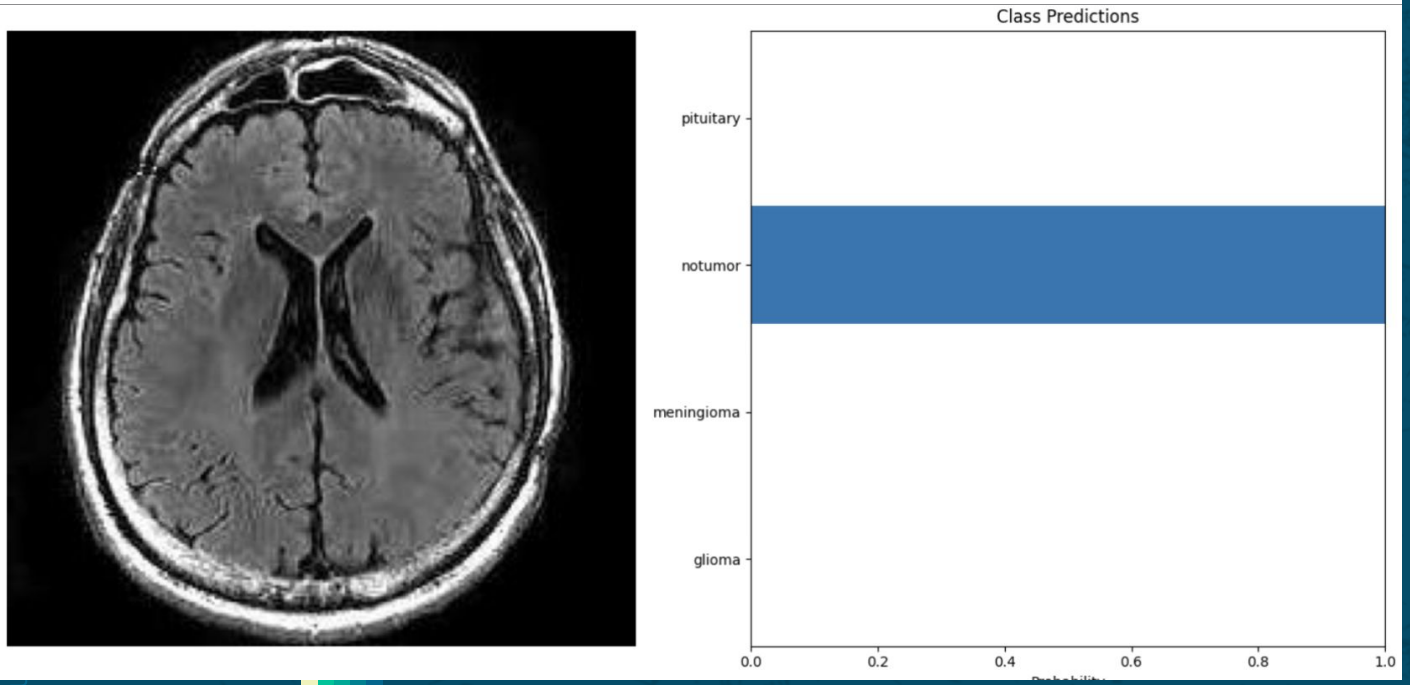






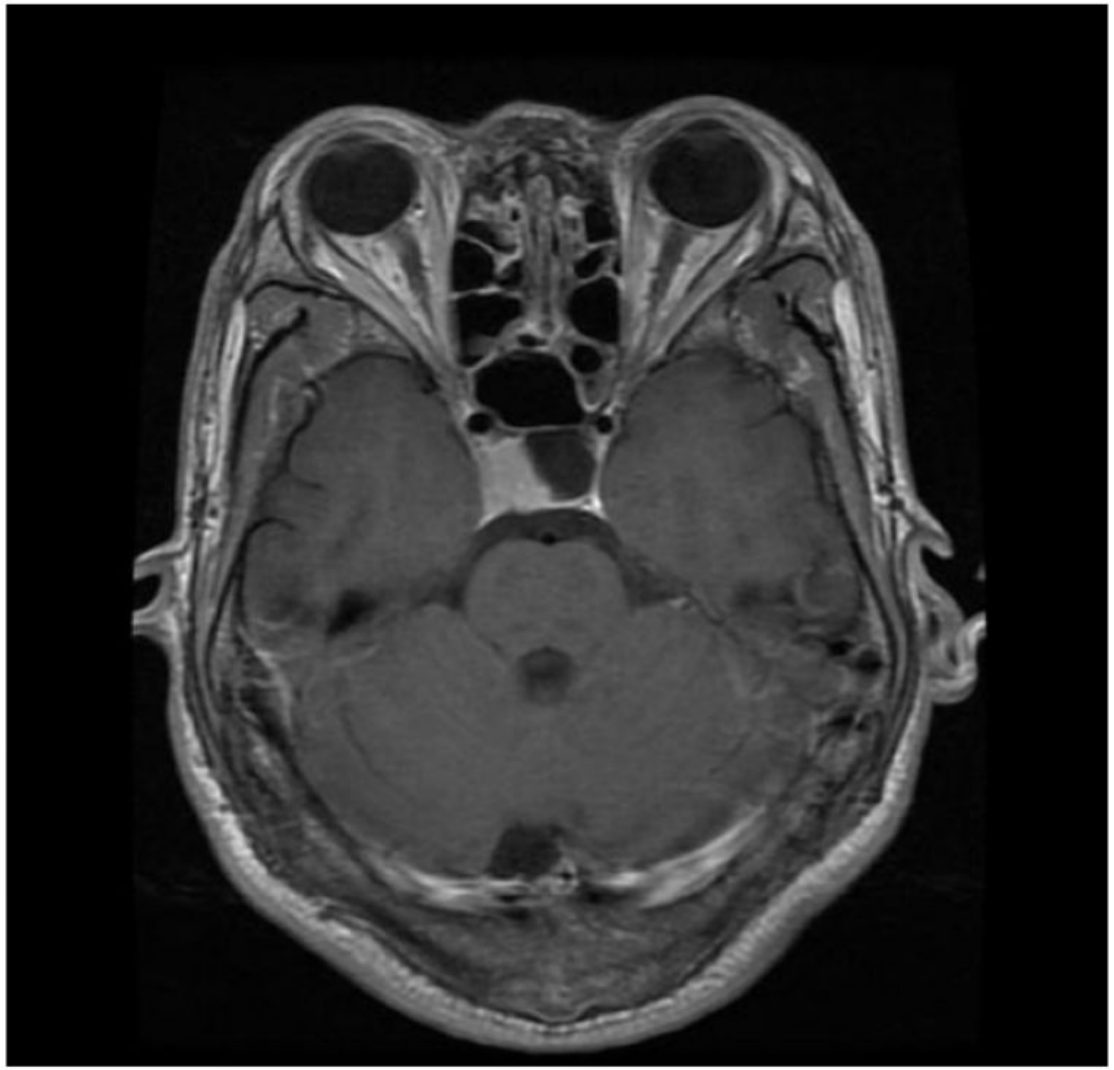


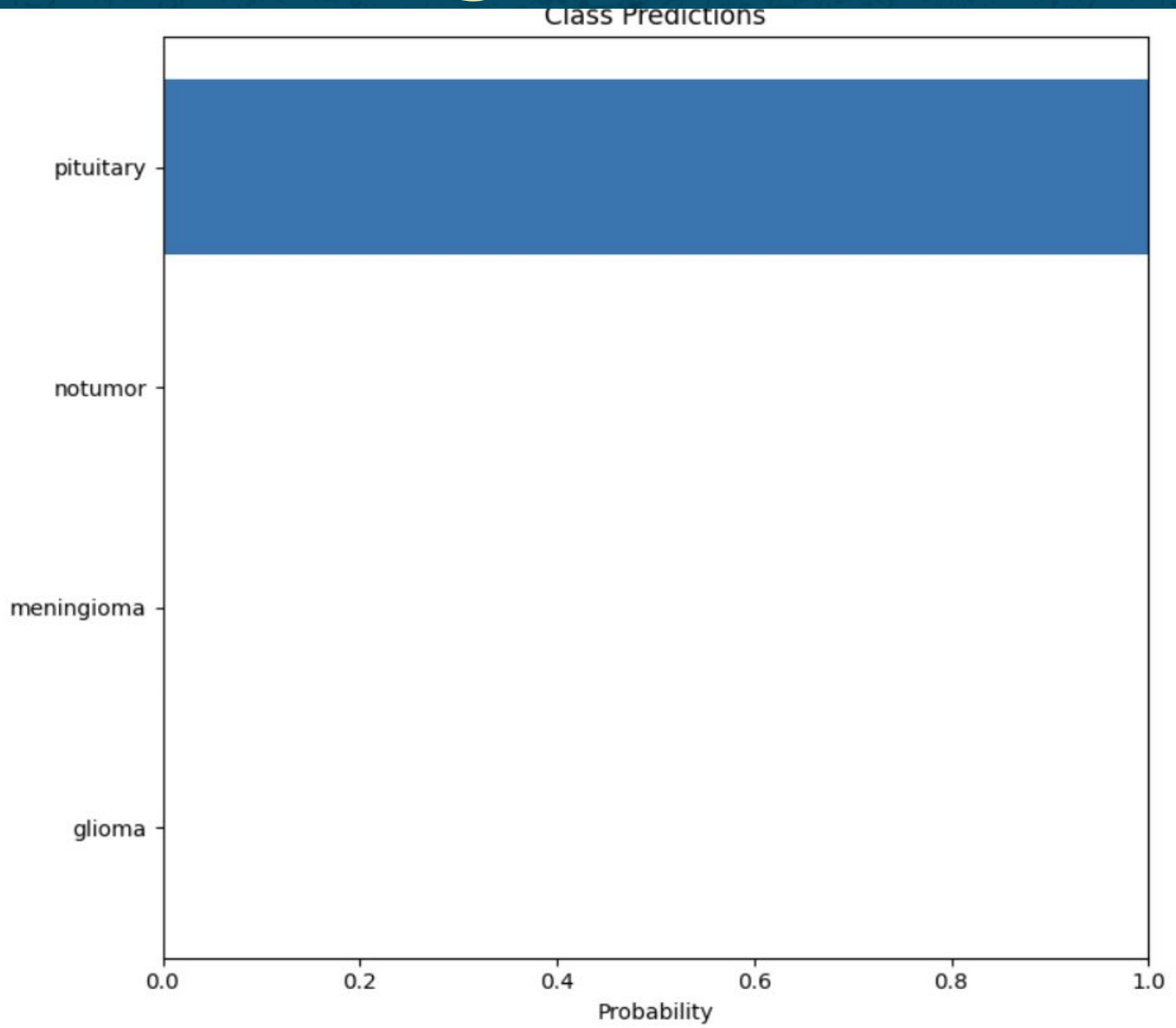




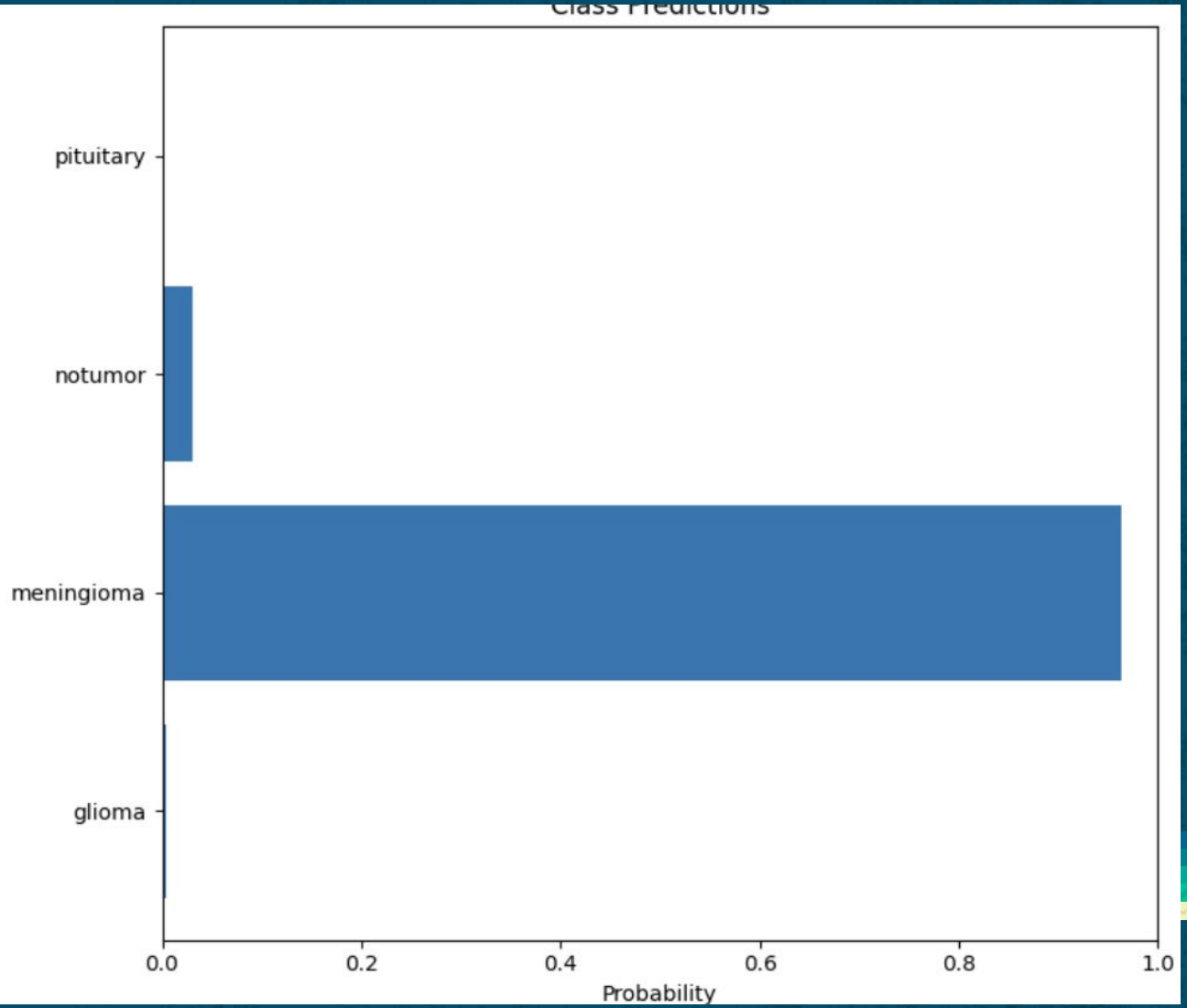
Certainty of the Models

Results from Testing Set

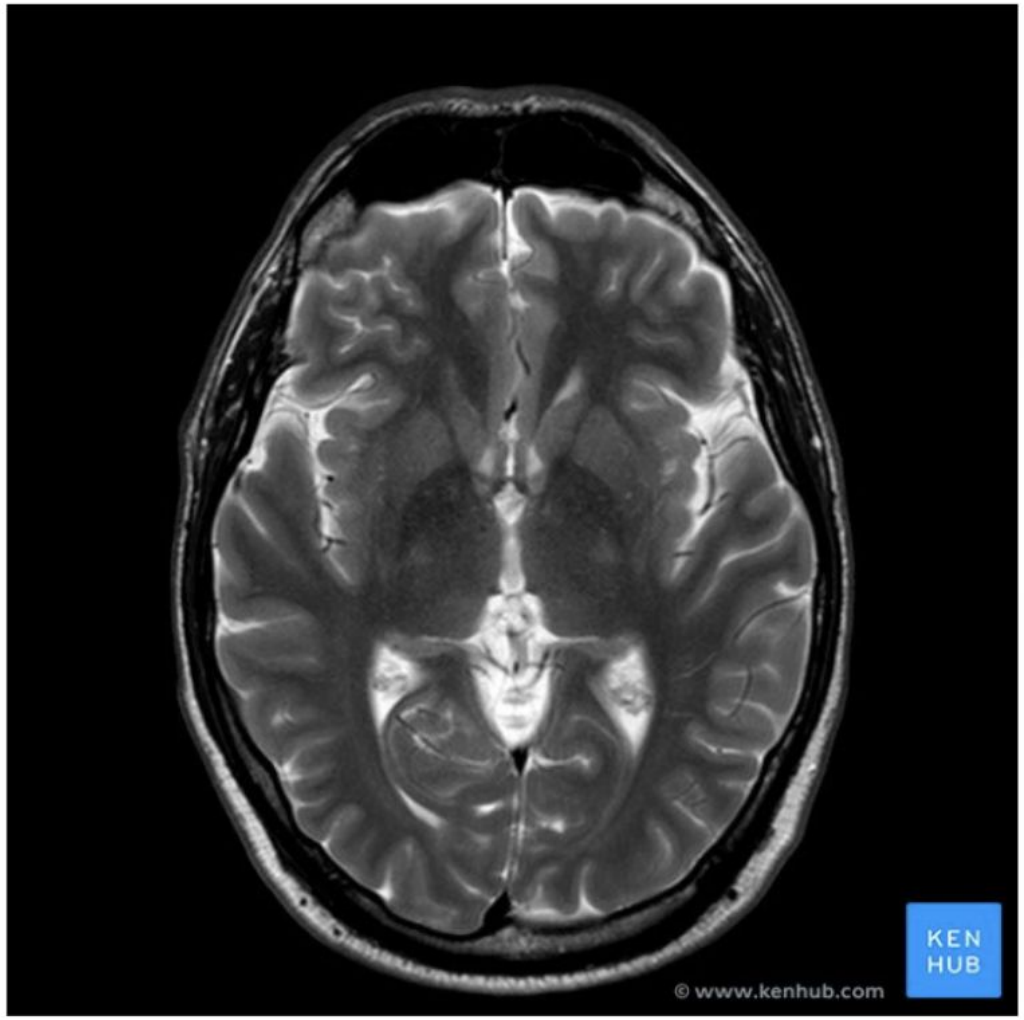


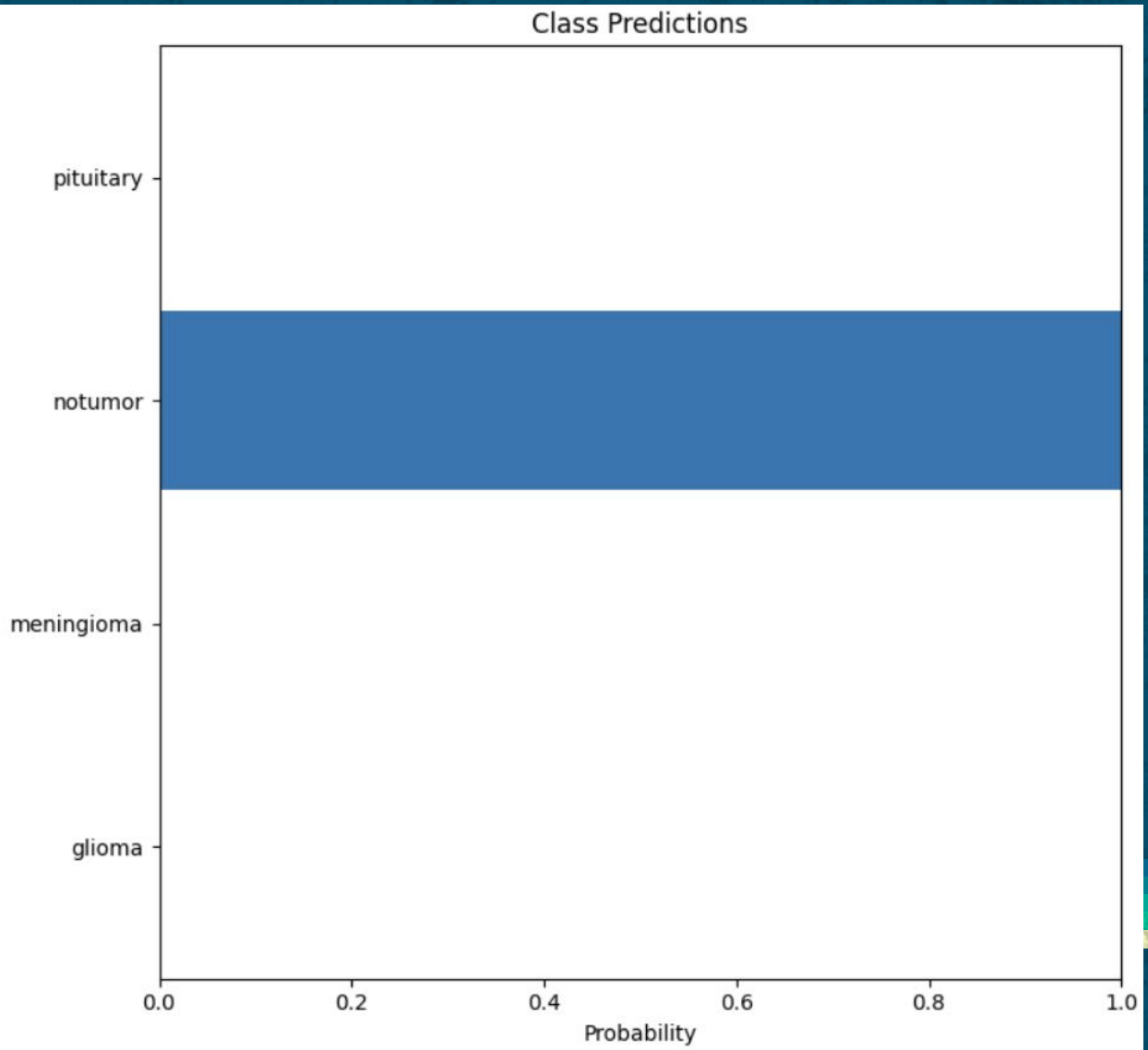


Results from Outside Sources

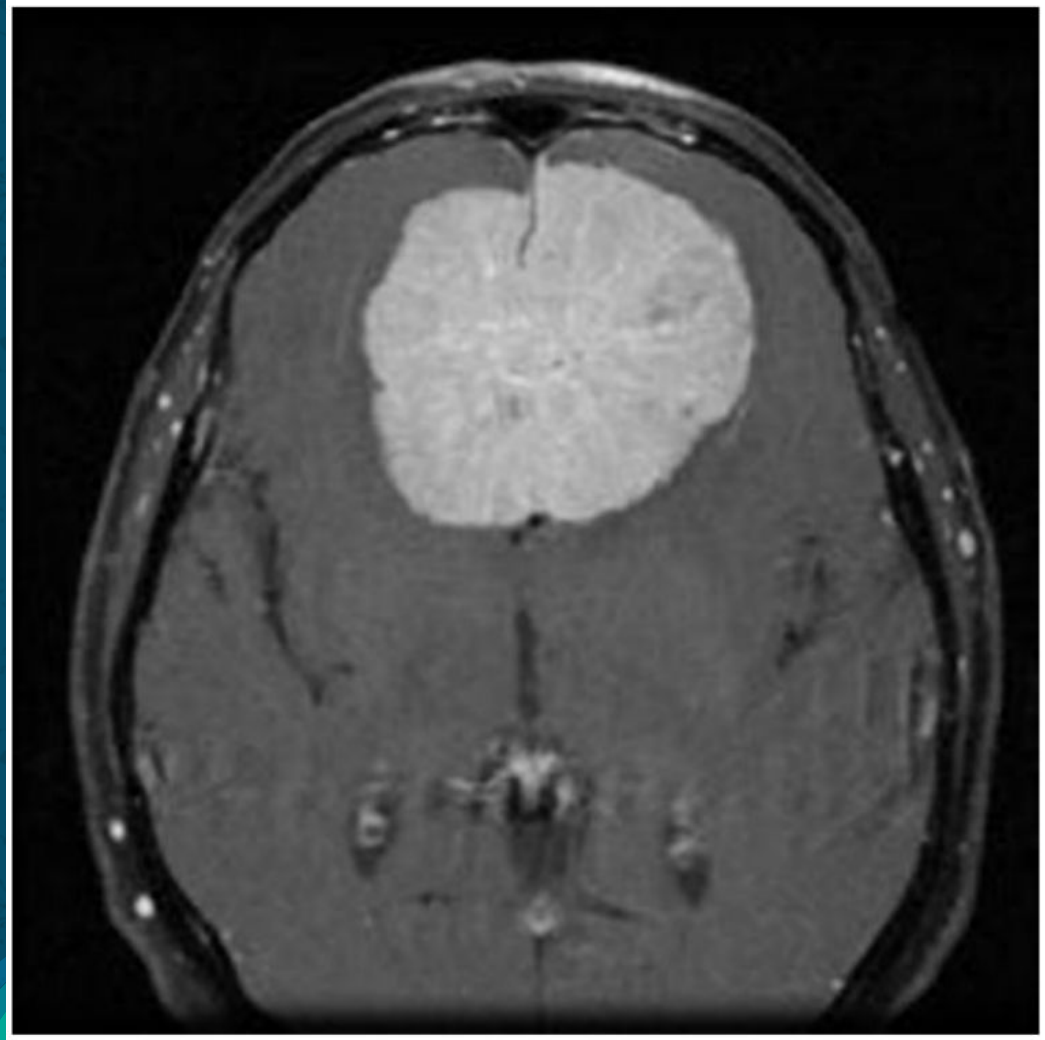


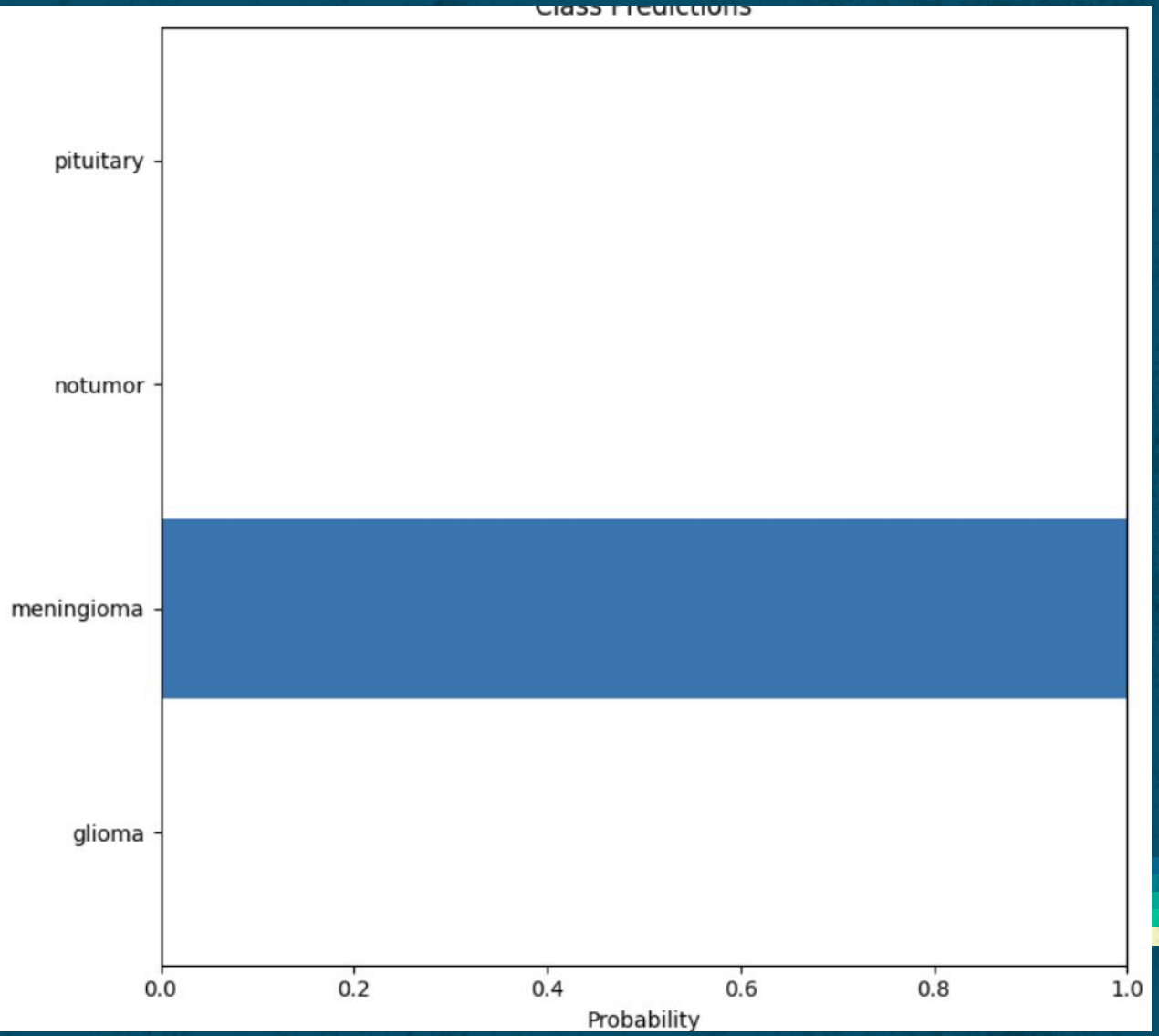
Pituitary



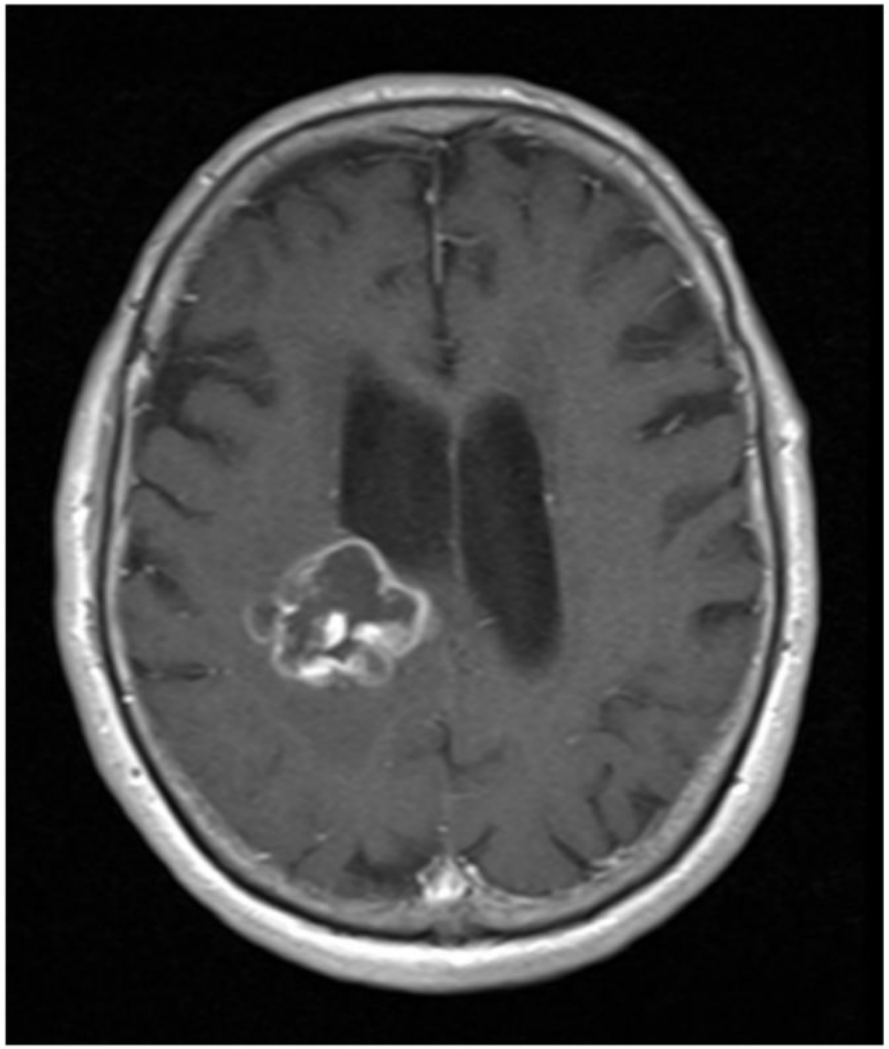


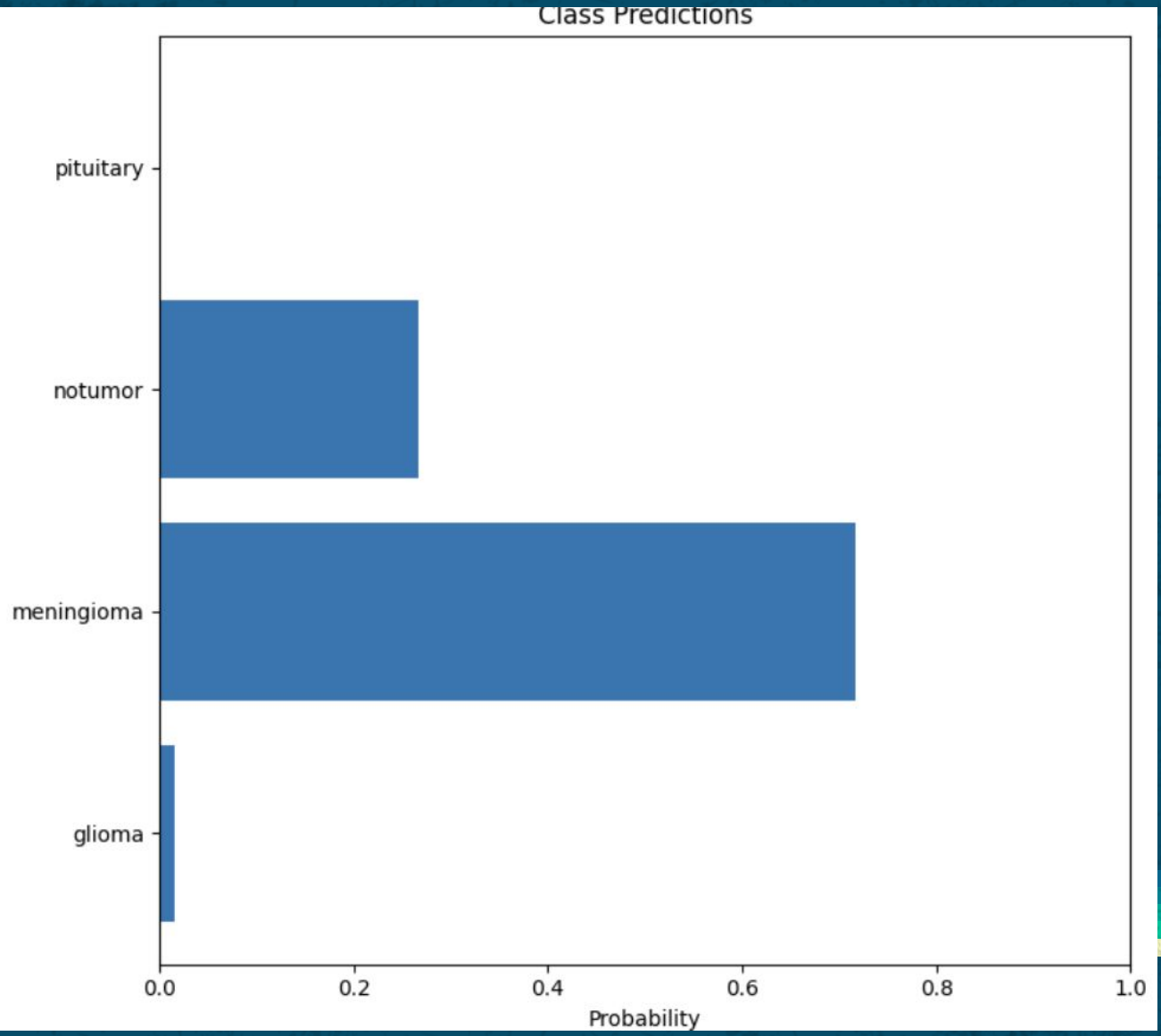
No Tumor





Meningioma





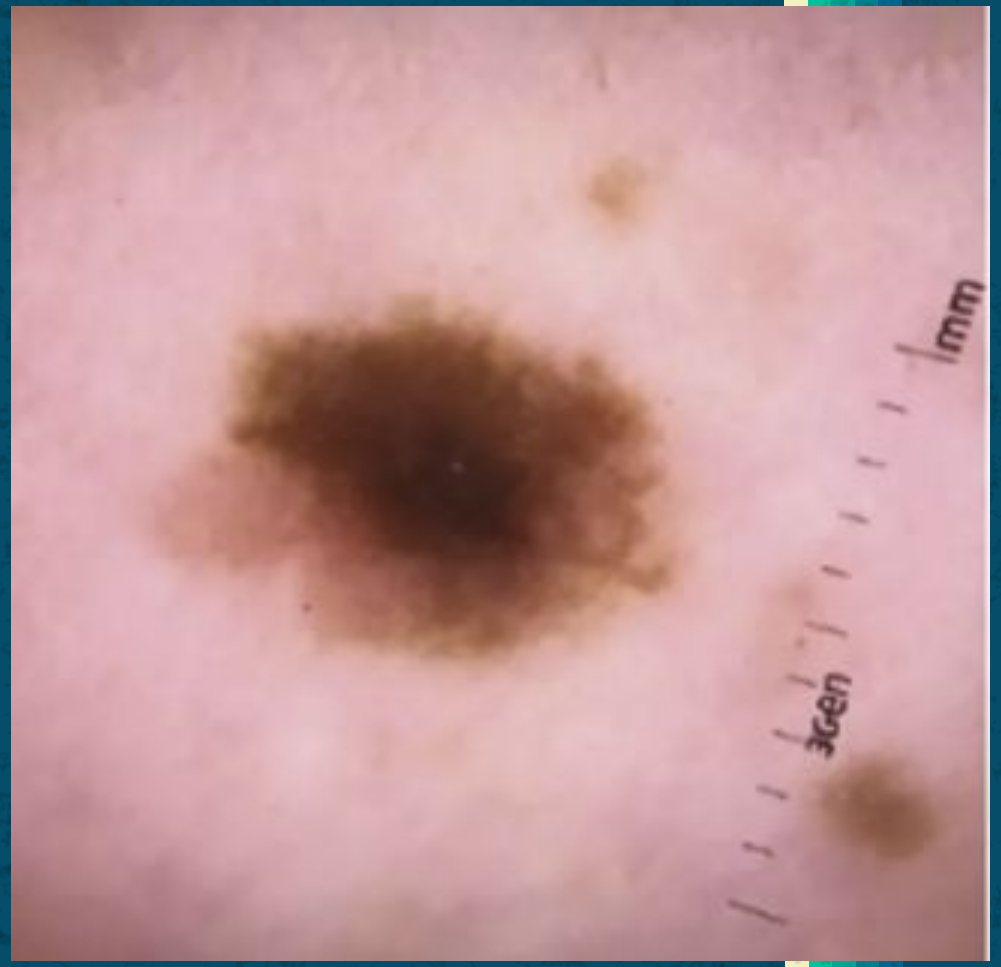
Glioma

The Setbacks of AI

- Tens of thousands of **quality** images are required for a reliable model
- The model needs to predict edge cases accurately (Mitchell)

AI Lacks Transparency

We are unable to see what AI “thinks” and how it makes decisions (Mitchell)



AI in Hospitals

Looking to the Future

In the US, approximately 75% of hospitals are utilizing AI-driven solutions for improved patient care and operational efficiency.

The AI in healthcare market is projected to grow to $20.65 billion in 2023.

The AI in healthcare market is projected to grow to $187 billion by 2030.

Nearly 60% of hospitals have integrated AI powered telemedicine solutions to offer remote healthcare services

(HealthfulHelps)

Thank you!

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