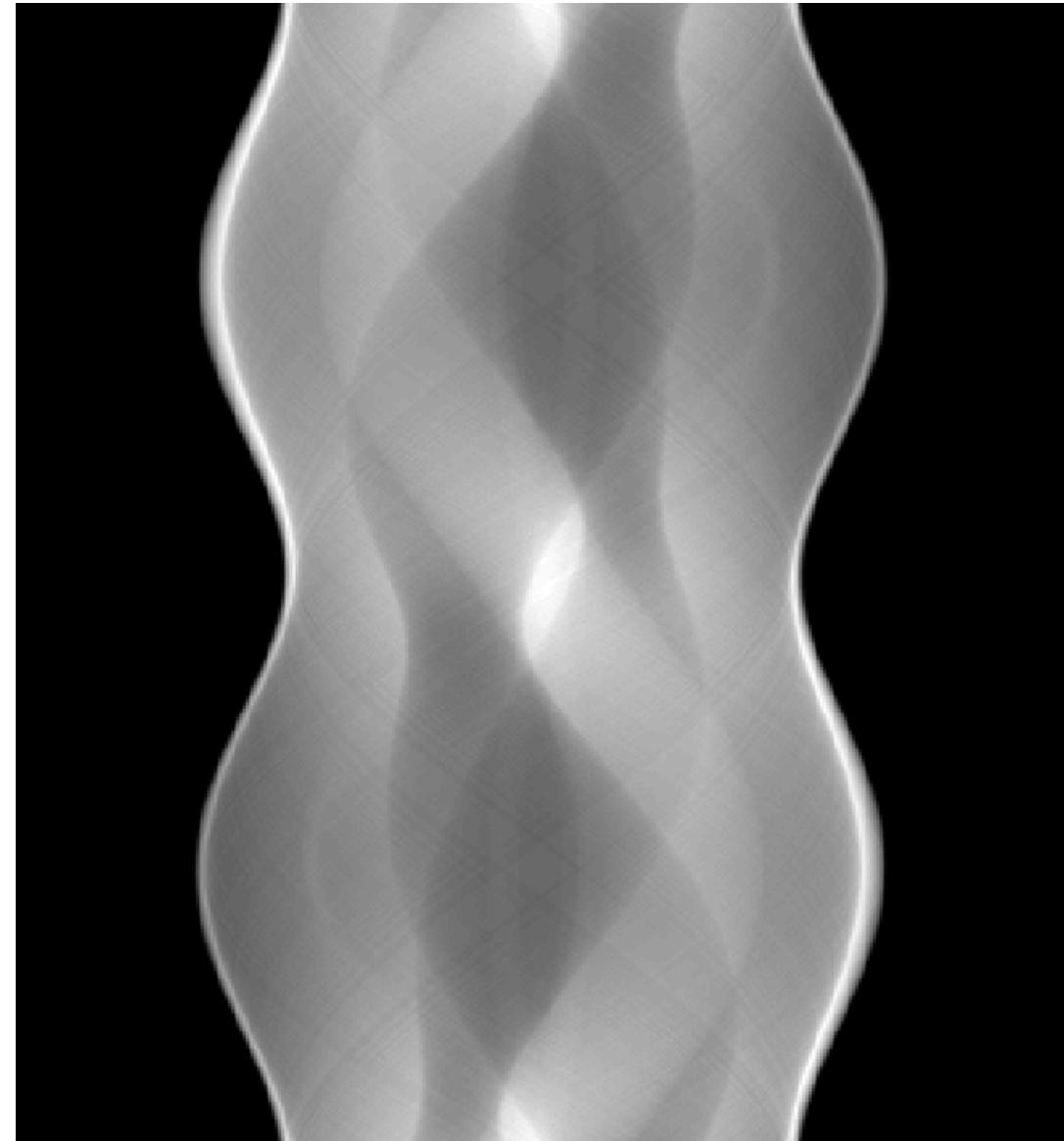
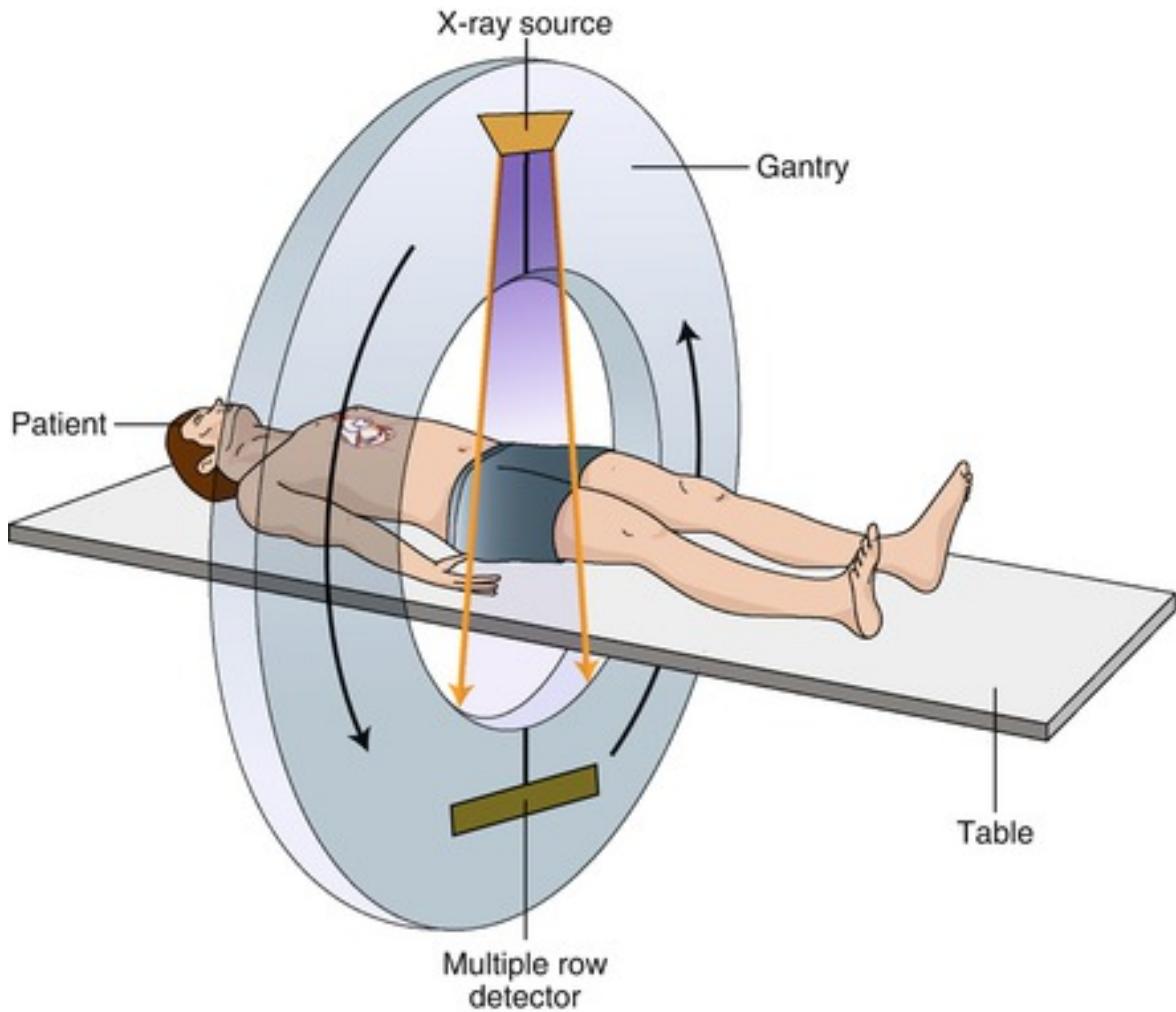


# SINOGRAM RECONSTRUCTION FOR COMPRESSED SENSING IN COMPUTED TOMOGRAPHY

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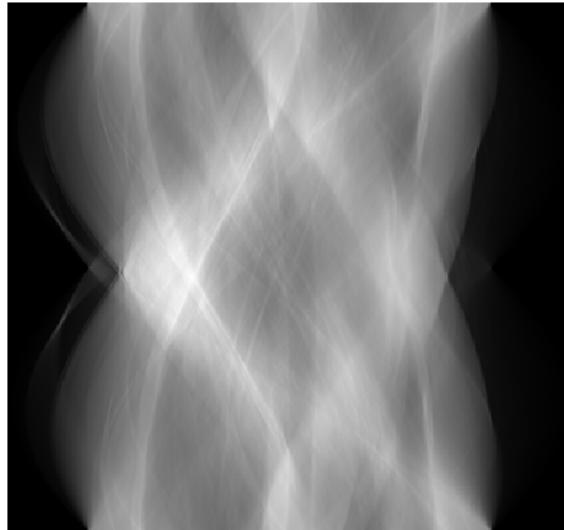


## HOW IT ALL WORKS

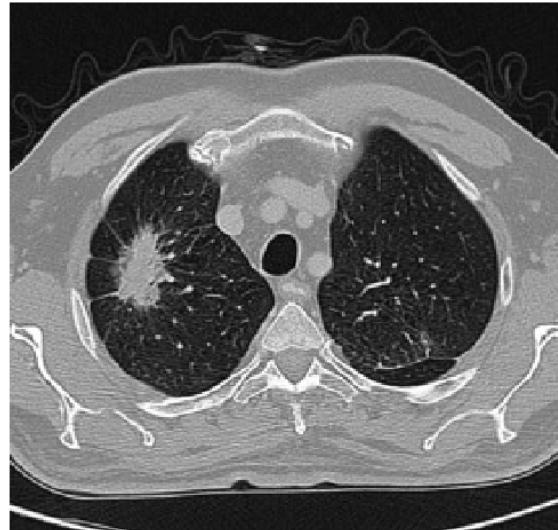
Computed Tomography (CT) is a medical imaging technique that uses a series of X-ray measurements called sinograms taken from different angles to produce tomographic images of specific areas of the body. The default CT machine implies the X-ray source and detector which aggregates the X-ray that goes through the human body. Depending on the ray attenuation coefficient at different parts of the body, we can distinguish between them.

# FILTERED BACK PROJECTION

Sinogram



Reconstructed Image

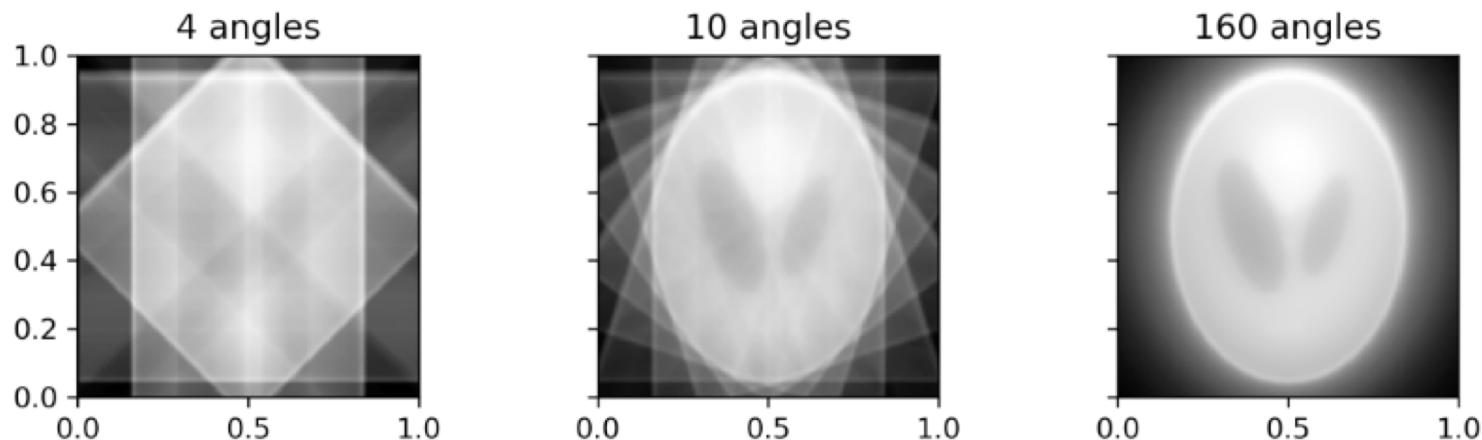


CT scanner produces raw data format called **Sinogram**, which should be reconstructed to get an actual Image.

The most widely used CT reconstruction technique is the filtered back projection (FBP) algorithm. This method strongly relies on the famous Fourier and Radon transforms.

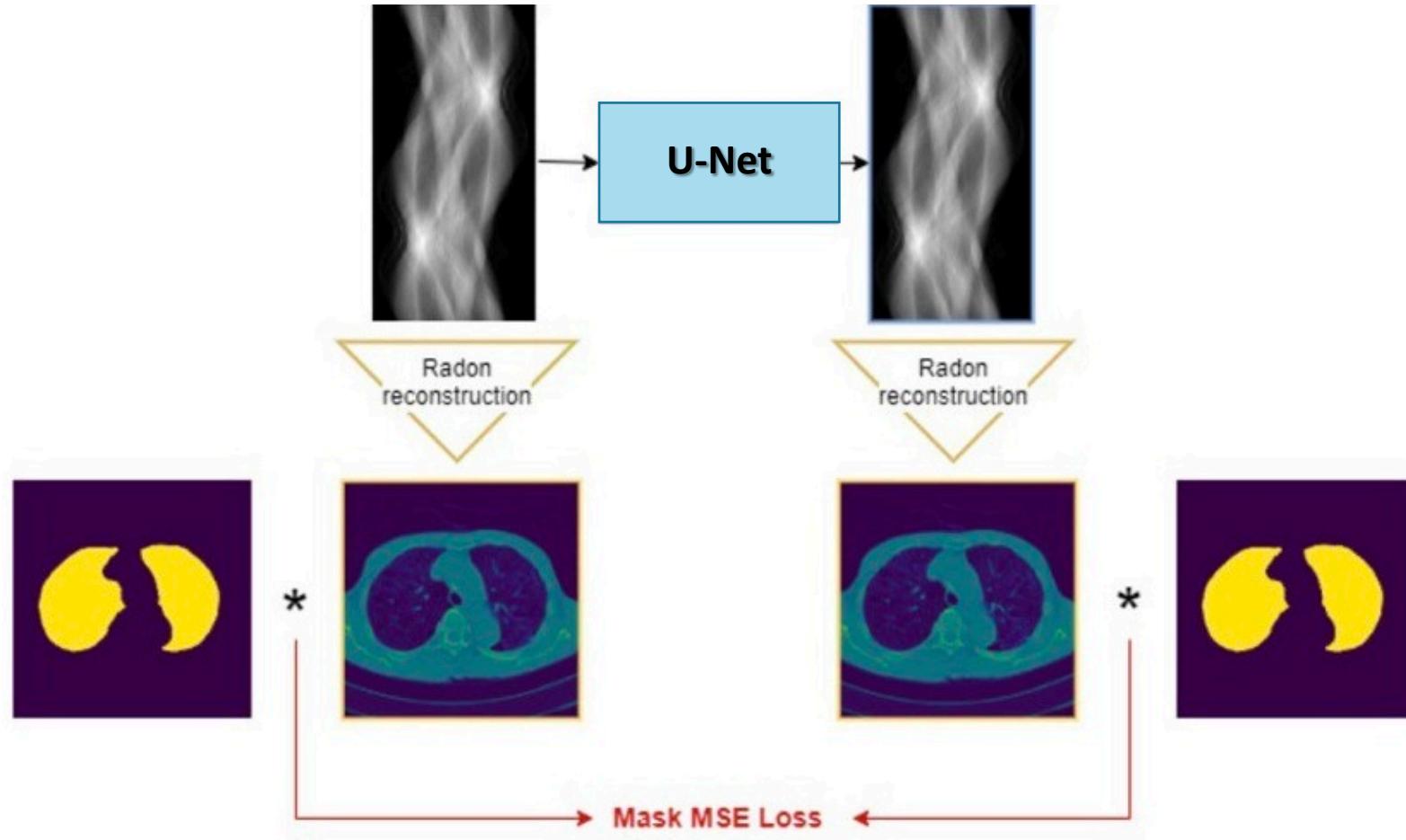
# COMPRESSED SENSING PURPOSE IN COMPUTED TOMOGRAPHY

An important objective in CT is to **reduce the radiation dose** without significantly degrading the image quality. This is where compressed sensing can help: the radiation dose can be reduced by producing diagnostic images from a limited number of projections or by shortening the exposure time of an X-ray.



FBP reconstructed images are susceptible to the influence of the projection dose, reducing the dose can easily lead to higher image noise and fringing artifacts. As an example, you can see FBP evaluation for a standard test image called **Shepp-Logan phantom**.

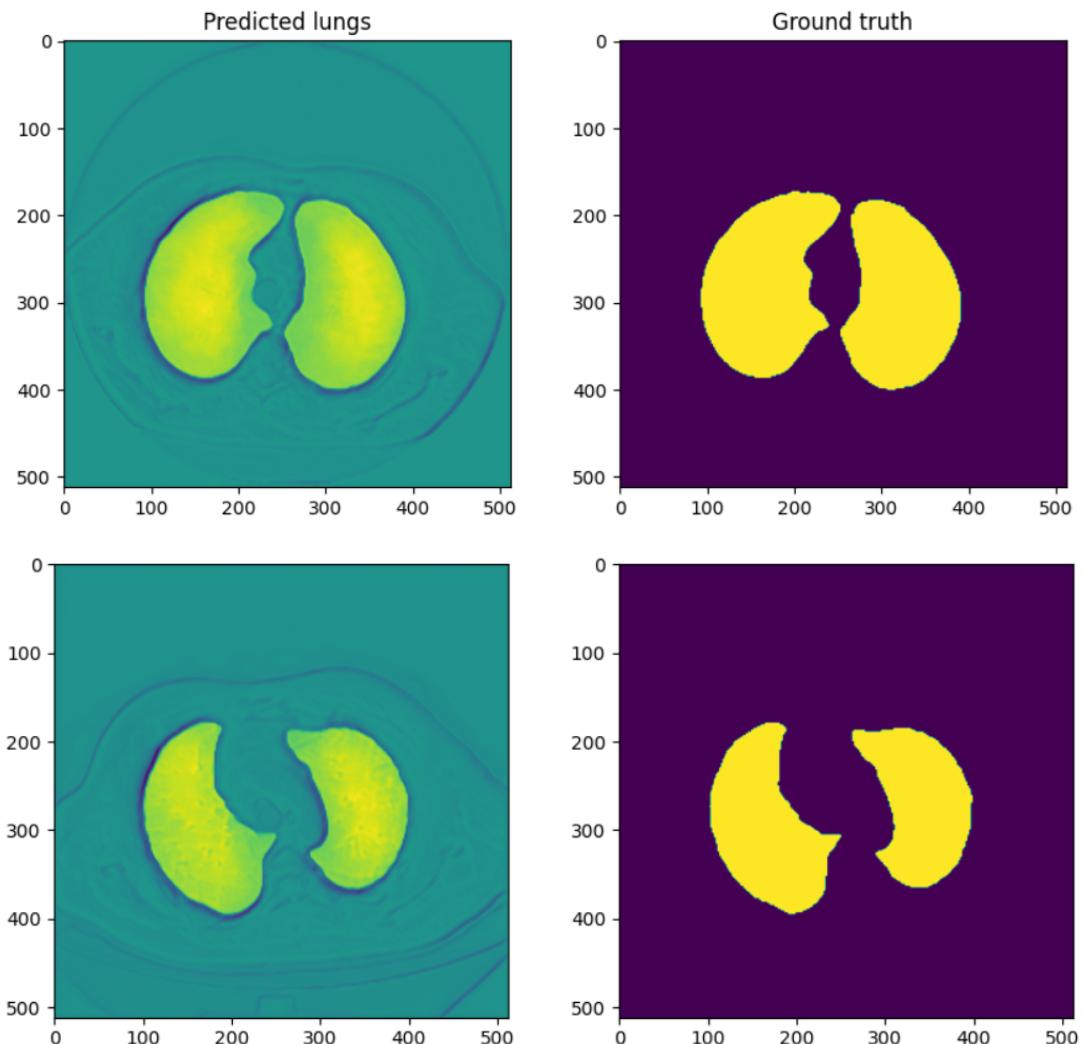
# SUGGESTED PIPELINE



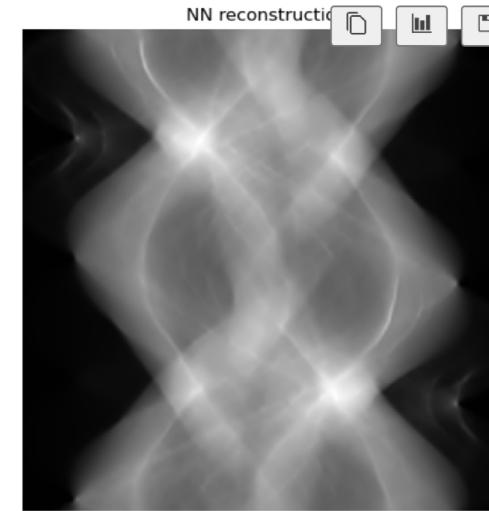
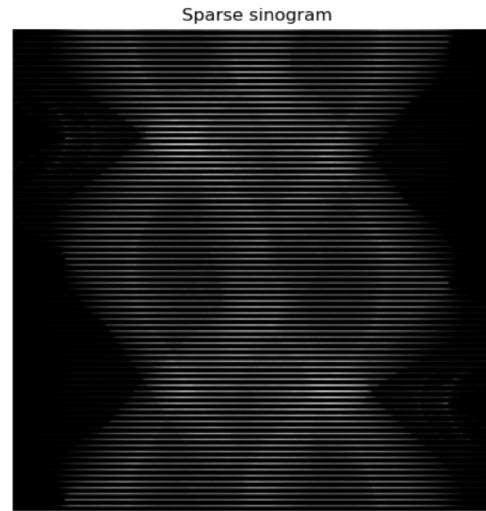
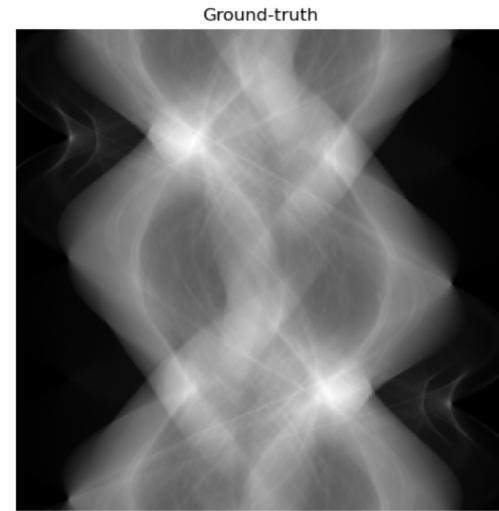
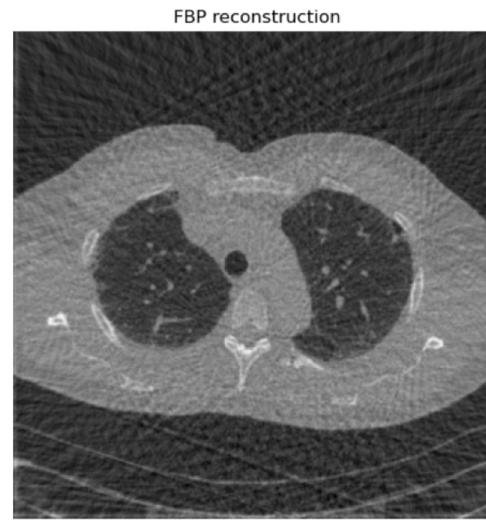
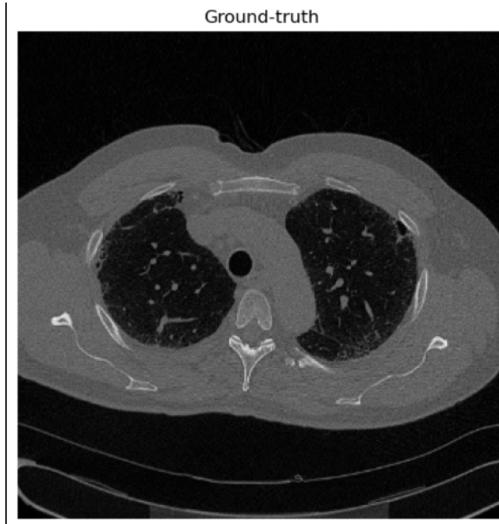
# SEGMENTATION

The lungs segmentation problem was solved by training U-Net on manually labeled data. Detailed dataset description can be found at:

<https://www.kaggle.com/datasets/sandorkonya/ct-lung-heart-trachea-segmentation>

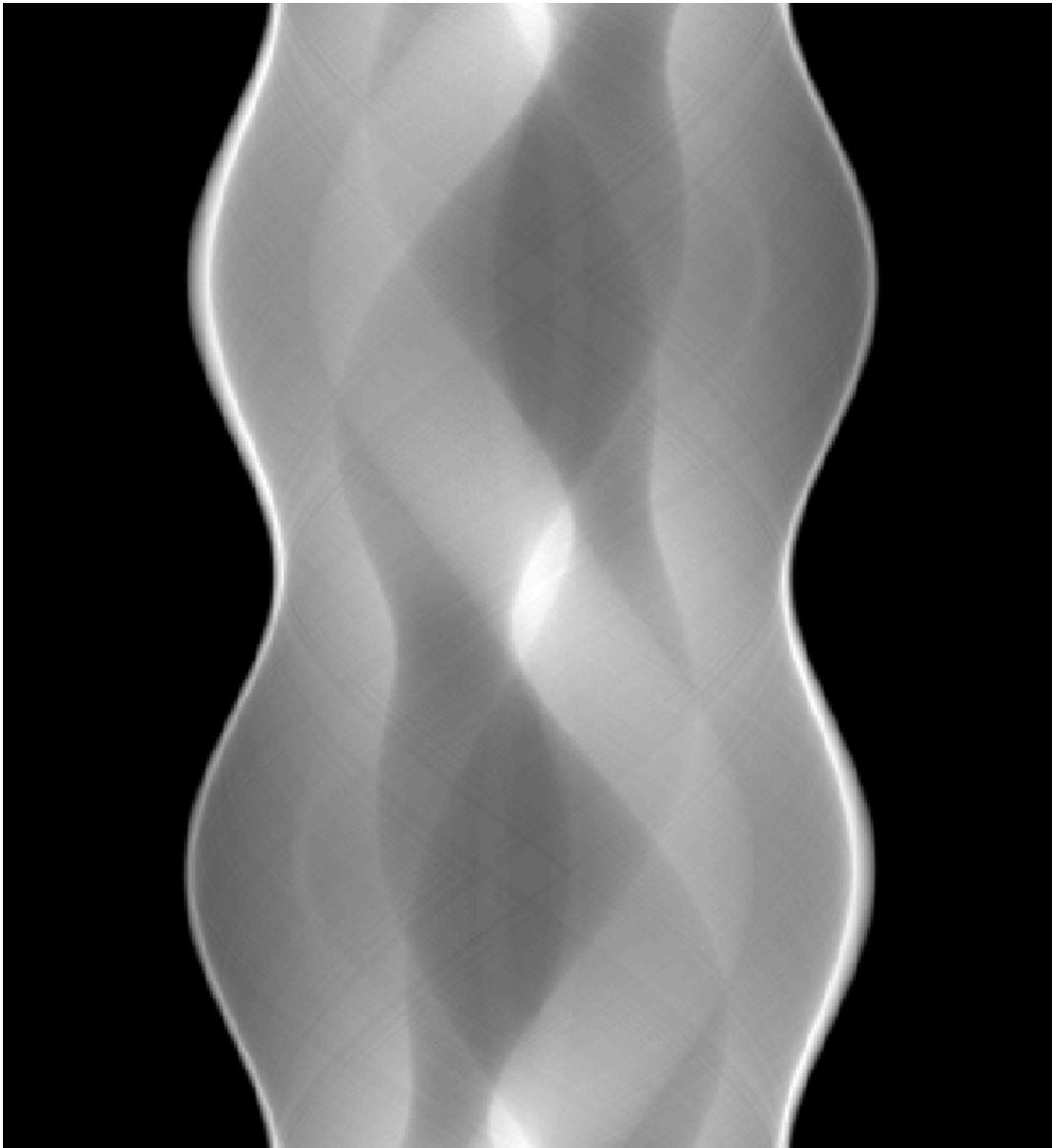


# RESULTS



# RESULTS

Approach	PSNR	SSIM
FBP (All)	12.82	0.33
Model (All)	21.80	0.62
FBP (Lungs)	27.88	0.91
Model (Lungs)	35.65	0.9437



THANK YOU FOR  
ATTENTION