Lin Tun
CSC621-01
Team Earth

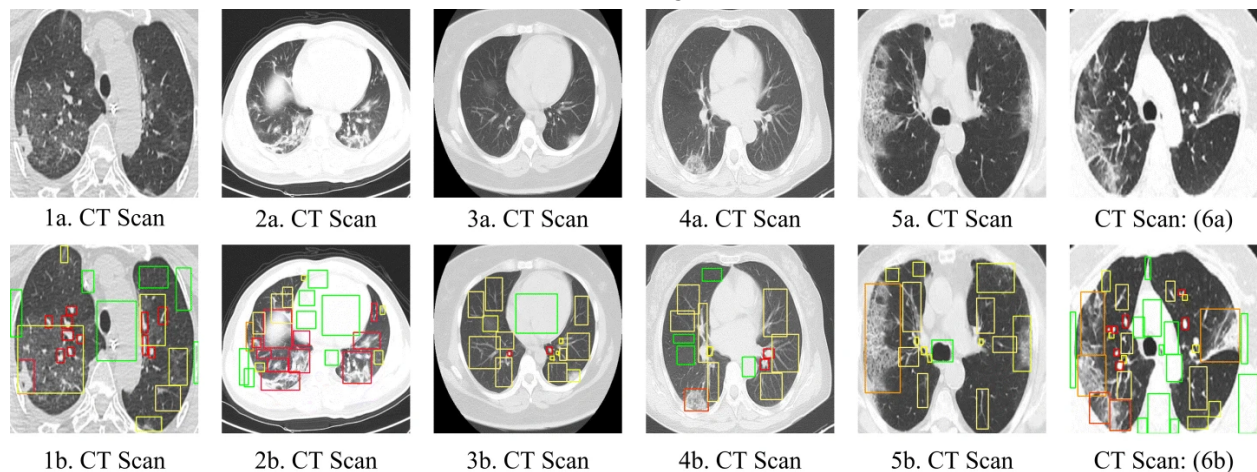Analysis of Severity of COVID-19

Sample Test of Positive Covid Test with the analysis of part that had COVID-19


| 1a. CT Scan | 2a. CT Scan | 3a. CT Scan | 4a. CT Scan | 5a. CT Scan | CT Scan: (6a) |

| 1b. CT Scan | 2b. CT Scan | 3b. CT Scan | 4b. CT Scan | 5b. CT Scan | CT Scan: (6b) |

- The images show labeled COVID-19 characteristics in descending severity order, from yellow to red colored bounding boxes.
- The green bounding boxes emphasize negative samples or background categories for the model's hard negative mining.

Example of the Covid Positive and Negative according to the research article

(a) COVID-19 Postive Samples
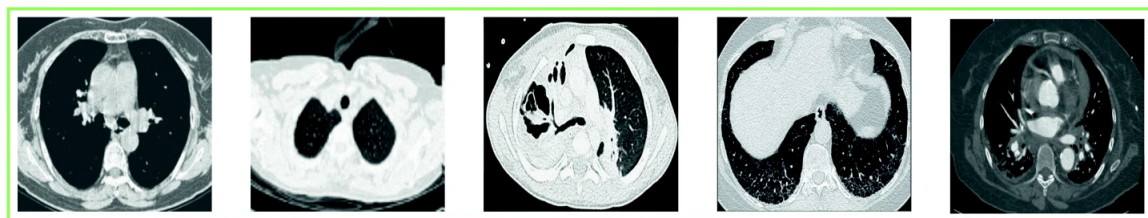
(b) COVID-19 Negative Samples

Reference from Quantifying prognosis severity of COVID-19 patients from deep learning based analysis of CT chest images.

Quantification Results

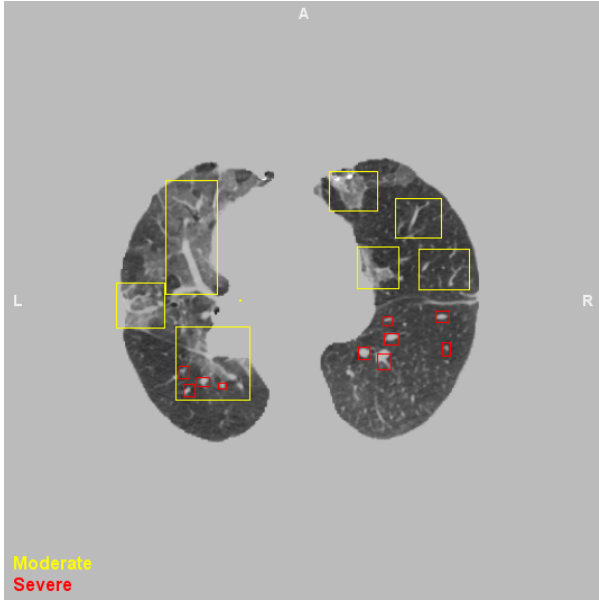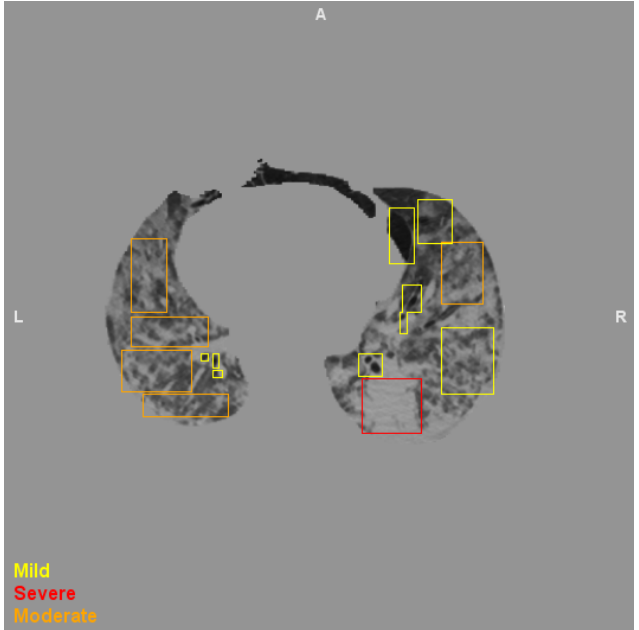## E. Severity and Consolidation Quantification

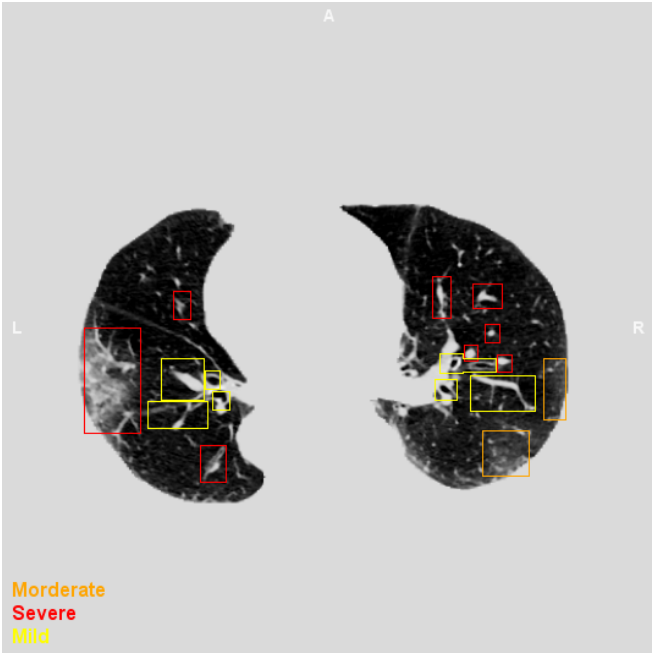The severity and consolidation quantifications are given as:

$$\text{severity score} = \frac{\text{area of infected region}}{\text{area of lung}}, \quad (14)$$
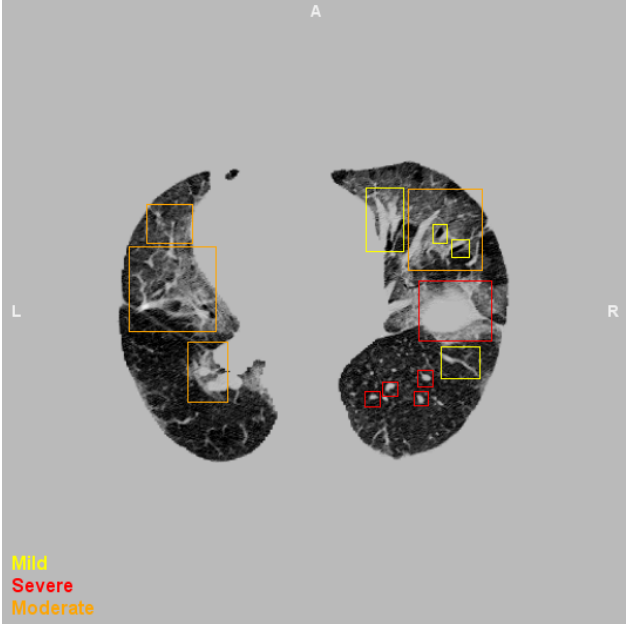
and

$$\text{consolidation score} = \frac{\text{area of consolidation}}{\text{area of lung}}. \quad (15)$$

Our Database of Positive Covid Patients

Moderate Severe	Mild Severe Moderate
2.000000-ROUTINE CHEST NON-CON-50599	2.000000-ROUTINE CHEST NON-CON-70218
Manual of severity score Severity score=$\frac{278.86205291748047\ cm^3}{37097.71881866455\ cm^3}$=0.00752 Algorithm of severity score Severity score=$\frac{327.2011413574219\ cm^3}{37097.71881866455\ cm^3}$=0.00882	Manual of severity score Severity score=$\frac{1279.5641784667969\ cm^3}{1649.4746017456055\ cm^3}$=0.77574 Algorithm of severity score Severity score=$\frac{524.3537521362305\ cm^3}{1649.4746017456055\ cm^3}$=0.31789
Jaccard Index: 0.42064870518260133	Jaccard Index: 0.34470577992263585

2.000000-ROUTINE CHEST NON-CON-97100	2.000000-ROUTINE CHEST WITH CONTRAST-49240
Manual of severity score Severity score=$\frac{277.4413146972656\ cm^3}{4330.8995361328125\ cm^3}$= 0.06406 Algorithm of severity score Severity score=$\frac{227.7649154663086\ cm^3}{4330.8995361328125\ cm^3}$= 0.06414	Manual of severity score Severity score=$\frac{13.640693664550781\ cm^3}{5027.218231201172\ cm^3}$=0.00271 Algorithm of severity score Severity score=$\frac{30.601181030273438\ cm^3}{5027.218231201172\ cm^3}$= 0.00609
Jaccard Index: 0.6030444689337103	Jaccard Index: 0.13849750326007443

3.000000-0.625mm bone alg-30767	601.000000-COR 3X3-19359
Manual of severity score Severity score=$\frac{507.95562744140625\ cm^3}{2267.6545486450195\ cm^3}$= 0.224 Algorithm of severity score Severity score=$\frac{323.6978073120117\ cm^3}{2267.6545486450195\ cm^3}$= 0.14275	Manual of severity score Severity score=$\frac{581.5799153745174\ cm^3}{2312.5352719960215\ cm^3}$= 0.25149 Algorithm of severity score Severity score=$\frac{357.3633382966518\ cm^3}{2312.5352719960215\ cm^3}$= 0.15453
Jaccard Index: 0.5372794191561497	Jaccard Index: 0.5199053111240223
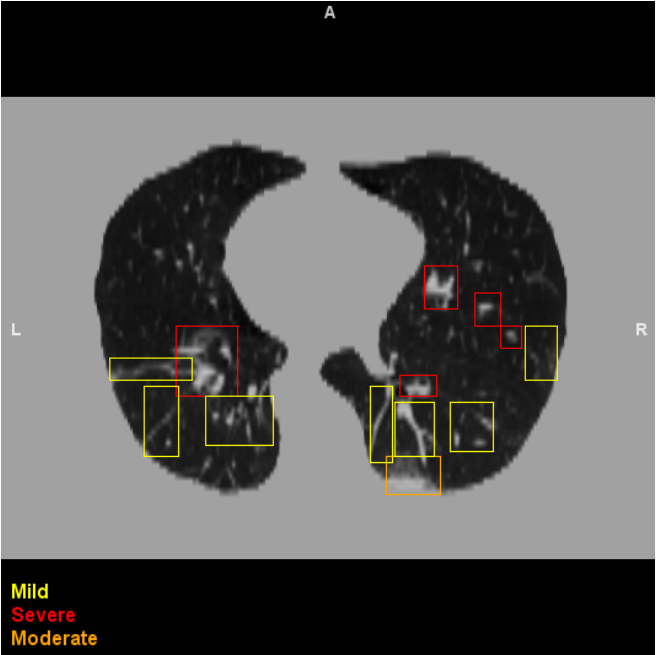
601.000000-COR 3X3-53956
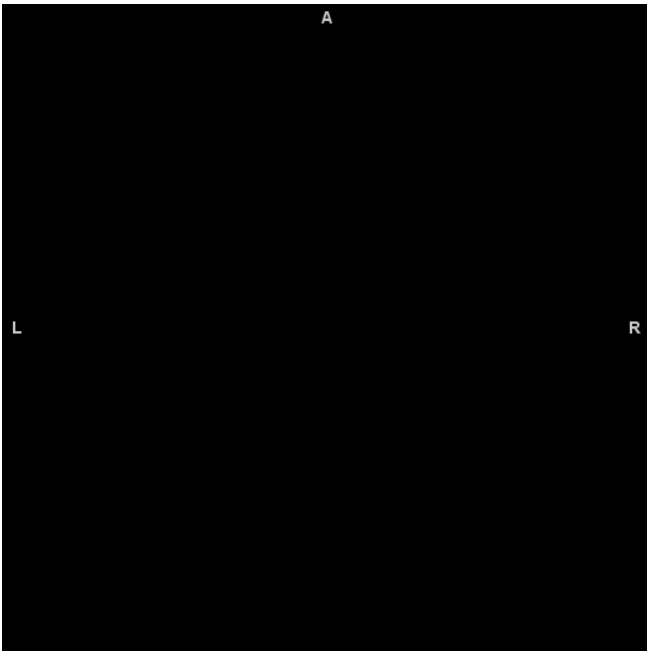
Manual of severity score

Severity score=$\dfrac{49.83823755419254\ cm^3}{5065.439931783557\ cm^3}$= 0.00983
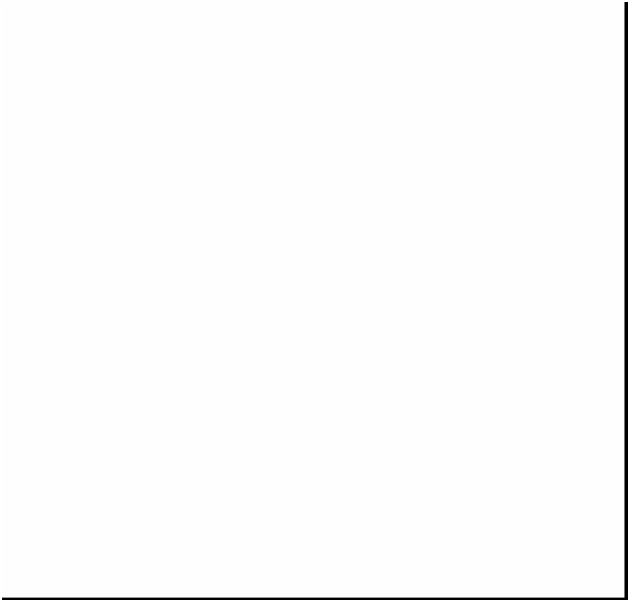
Algorithm of severity score

Severity score=$\dfrac{7.805810321927071\ cm^3}{5065.439931783557\ cm^3}$= 0.00154
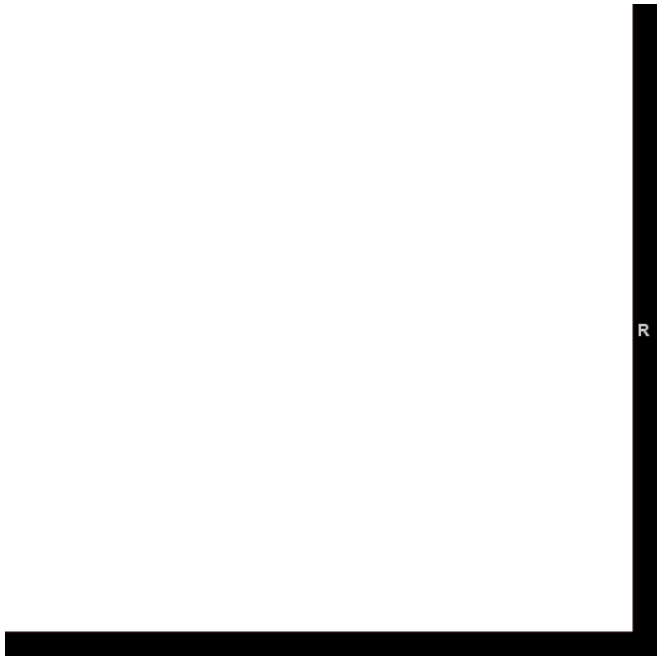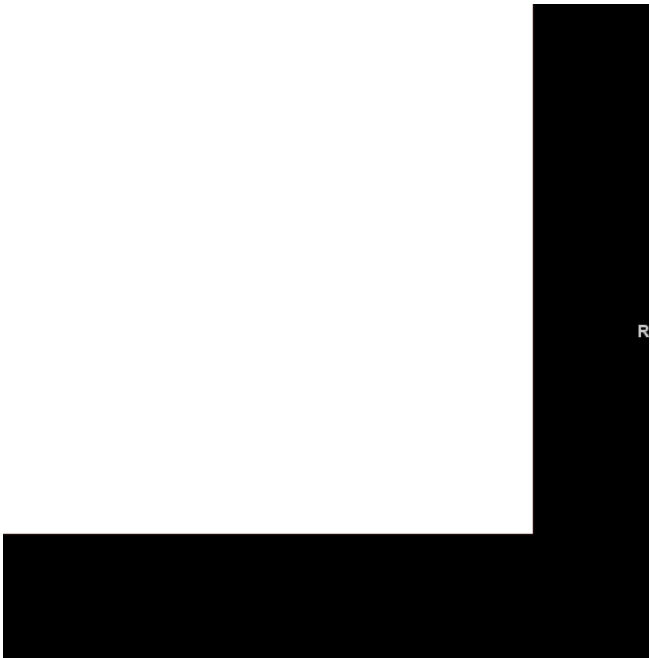
Jaccard Index: 0.07560746111695356

To analyze the negative COVID-19 patients' lungs, overlay the CT Scan of positive Covid patient
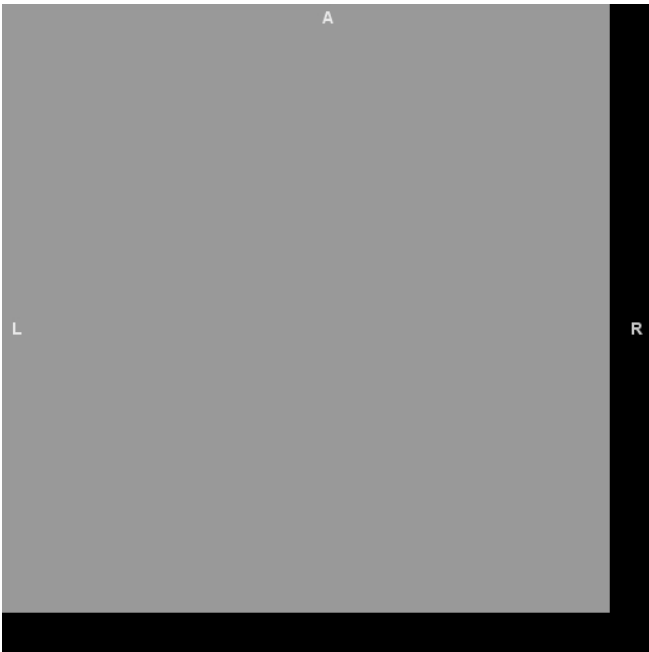
Example of Covid Positive patient	1.000000-NA-51699
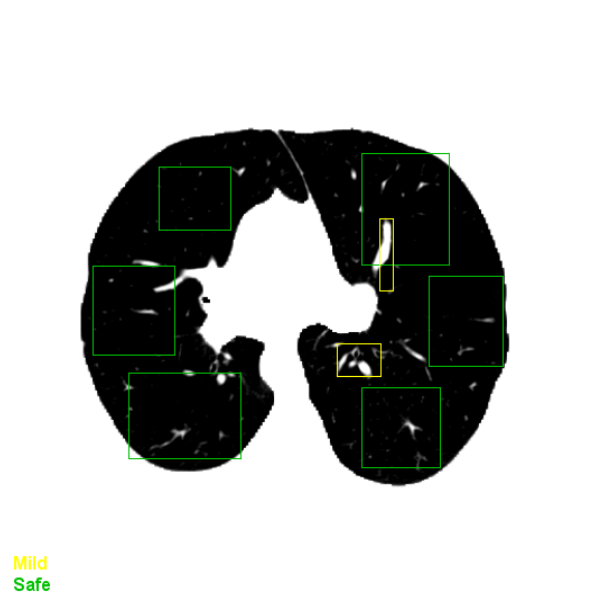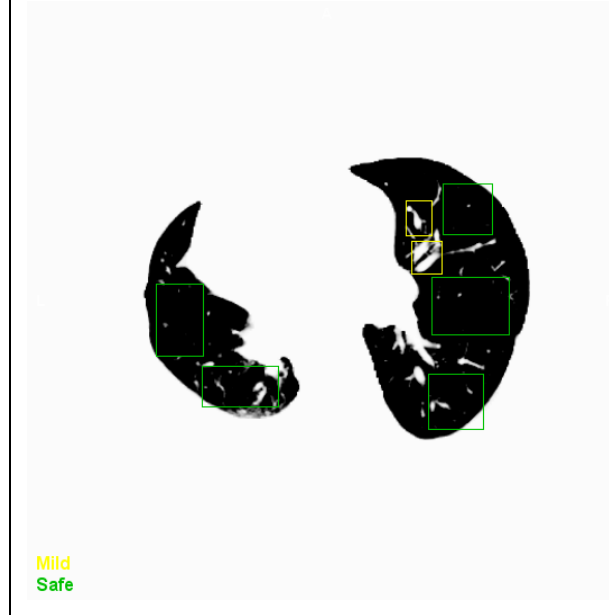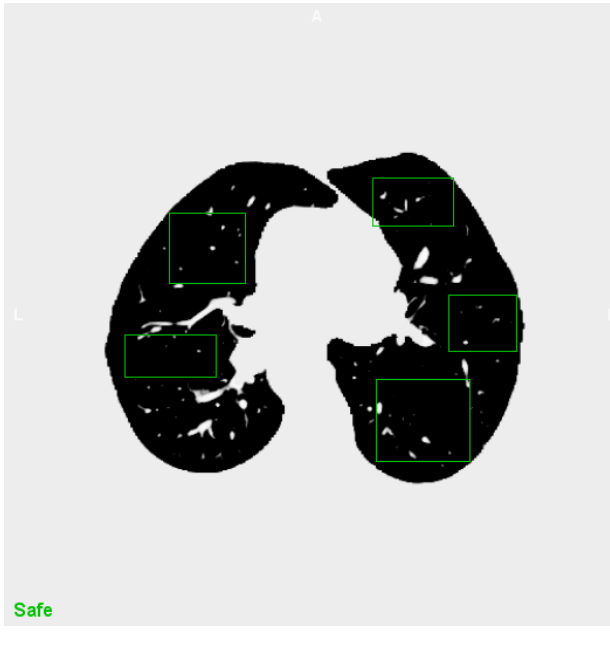
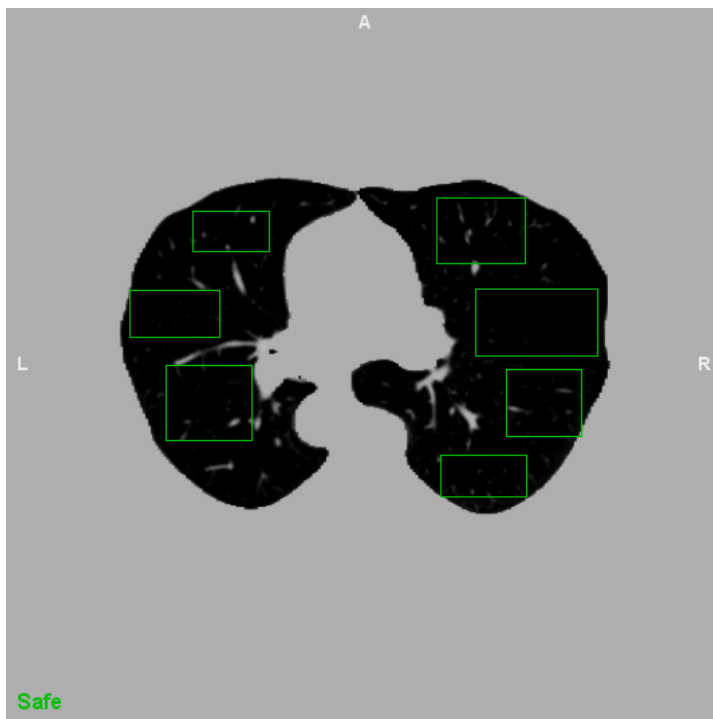| 2.000000-CHEST WITHOUT CONTRAST-71297	2.000000-CTA PE-14198

| 2.000000-NA-07089 | 2.000000-NA-11876 |

Our Database of Negative Covid Patients

| 1.000000-NA-51699 | 2.000000-CHEST WITHOUT CONTRAST-71297 |
| 2.000000-CTA PE-14198 | 2.000000-NA-07089 |

2.000000-NA-11876