



## A Review of The Performance of Artificial Intelligence in The Analysis of Chest CTs for The Diagnosis of COVID-19

Sirous Golchinheydari

Core trainee in H&FMH unit, Charring Cross Hospital

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**Address for Correspondence:** Sirous Golchinheydari

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### Abstract:

During the COVID-19 pandemic, chest CTs was used as an alternative for diagnosis of COVID-19. This resulted in the use of artificial intelligence as an independent assessor and in aiding the radiologist in the diagnosis of COVID-19. In this short review, we assessed the accuracy, sensitivity and specificity of AI software employed. The average accuracy, sensitivity and specificity were found to be 94.38%, 91.64% and 91.10% respectively. Despite the limitations of AI, it proved to be a valuable and reliable tool in diagnosis of COVID-19

### Introduction

Artificial intelligence (AI) has become a regular topic of discussion among radiologist. During the COVID-19 pandemic, an illness which primary involved the respiratory system, there were many new methods used to facilitate diagnosis. Chest CTs were used in the early days of the pandemic due to reverse transcription polymerase chain reaction (RT-PCR) showing some false negatives and a lack of the laboratory equipment. Therefore, chest CTs were employed as an alternative method for diagnosis. (12). AI was employed in the diagnosis of COVID-19 through chest CTs and was used in several different countries. This short review article focuses on the accuracy, sensitivity and specificity of AI methods used. Thereby, it assesses the possible role of AI in identifying COVID-19 suggestive findings in chest CT.

### Methods

A literature review was conducted using PubMed database in search for studies with criteria terms “computed tomography”, “CT”, “AI”, “artificial intelligence”, “COVID-19”, “coronavirus sars-cov-2”. Only one database was used in order to ensure articles from high-standard publications were included. Articles that were reviews, unrelated to chest CTs and not primarily focusing on assessing the accuracy, sensitivity and specificity of an AI software were discarded. The search for articles was up to October of 2022.

### Results

38 studies resulted out of the search, including literature reviews and original articles. 1 article could not be accessed. 5 article were excluded due to reporting the use of AI in assessing chest X-rays. 7 articles were excluded due to being

reviews and 14 were excluded due to assessing other factors related to AI use in chest CTs. 11 articles were reviewed.

The reviewed articles included a varied range of accuracies, sensitivities and specificities. The

average accuracy was reported at 94.38%. The average sensitivity and specificity was reported at 91.64% and 91.10% respectively.

Study	Accuracy	Sensitivity	Specificity
Fusco et al. (2021)	89.1%	-	94.5%
Stephanie et al. (2020)	90.8%	84%	93%
Pedro et al. (2021)	-	93%	80%
Verma et al. (2022)	99.58%	99.69%	-
Gashi et al. (2021)	94%	-	-
Warman et al. (2020)	96.8%	98.33%	94.95%
Yao et al. (2021)	-	91.5%	90.5%
Zhang et al. (2021)	-	96.97%	91.16%
Owais et al. (2021)	-	84.61%	99.36%
Lessmann et al. (2020)	-	82%	80.5%
Bai et al (2020)	96%	95%	96%

### Discussion and conclusion

AI has shown promising results in aiding and independent diagnosis of Chest CTs as is evident from the results. Its use however seems to still be limited and under study.

The value of chest CTs in practice has been questioned despite the sensitivity of chest CTs in diagnosis of COVID-19 being very high. (13) The main drawback being distinguishing between COVID-19 and other viral pneumonias, such as influenza, which contributed heavily to the drop in specificity in some studies. (14)

AI was used early in the pandemic It showed to have an accuracy of around 95%. Despite this, there does not seem to be much scope in integration of AI in diagnosis. In the UK, suggestion that in 7 to 10 years, this technology may begin to replace current standard care. (15) There were several limitations admittedly with the studies and the use of AI in diagnosis of disease. Firstly, AI will need to be able to distinguish between COVID-19 and other viral pneumonias. Secondly, there is no predicting how a lung will respond to various insults and there is significant overlap between response depending on host factors and health, this further complicates the use of AI in diagnosis. Finally,

several studies on this topic attempted to include data from various populations in the world but for AI to be reliable, the algorithm would need to be reliable in all populations.

As with COVID-19, there are studies investigating the use of The next step for AI would be to predict the severity of the disease based on chest CT findings.

This review concludes that AI empowered algorithms constitute a tool with a great future in clinical context. They can also be useful in resource limited environments where only imaging methods are available, lacking the actual gold standard that is molecular testing for COVID-19 diagnosis.

### Conflict of interest

The author has no conflict of interest to declare

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