

# Radiation Therapy Perhaps for Treatment of Covid-19

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*Abstract: Coronavirus disease 2019 (COVID-19) is a dangerous and rapidly spreading virus in the body infecting the mouth first, then infects the respiratory system leading to acute pneumonia, acute kidney failure, and other health issues. The aim of this study is to examine the usage of radiation therapy for the treatment of pneumonia to decrease the ratio of infected people with COVID-19. The proposed treatment of COVID-19 is conducted by using Radiation Therapy of a low dose (less than 5 Gray) for the treatment of pneumonia by precisely sending the radiation to the target of the affected lung. The procedure of radiosurgery is considered as a very sophisticated type of external radiation therapy. Radiation treatment is introduced to treat pneumonia by using modern methods (three-dimensional, IMRT, VMAT, and other methods). Radiation therapy is introduced to treat patients with COVID-19, which in turn decreases the death ratio of the infected people.*

*Keywords: Covid 19, radio-surgery, pneumonia, radiation therapy.*

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## 1. Introduction

Coronaviruses in humans were first discovered in the year 1965s. Other members of this family of coronavirus has been identified since then, including SARS-COV in 2003-2004. The swine flu virus in 2009-2010. Middle East respiratory syndrome in 2012. Ebola virus in 2014–2016. Nowadays, more dangerous than previous viruses, which is the new coronavirus disease 2019 (COVID-19). Most of these viruses cause extreme respiratory infection [Wang et al., 2020].

The first detection of COVID-19 was in several people with symptoms of pneumonia in Wuhan in China (December 2019), and most of the cases were related to seafood and animal market. COVID-19 spreads among animals and then spreads to humans. COVID-19 is infectious and infects people from person to another with sudden speed [Velavan&Meyer, 2020; Wang et al., 2020].

Officially named by WHO (March 6, 2020) [Website WHO, 2020]. More than 3 million

confirmed deaths due to COVID-19.

Now more than 151 million confirmed infections with COVID-19, more than 129 million infected with coronavirus viruses have been recovered [Website WHO, 2020; <https://www.worldometers.info/coronavirus/?fbclid=IwAR3NCzVepxl4s4m385nPZFeaKuIGQkvuPnlM6BgkqXVwxtMKihH4Goc1lrs#countries>].

Radiation therapy for the treatment of COVID-19 is a novel procedure used in the treatment of COVID-19 in the United States, the United Kingdom, and other countries. The treatment of COVID-19 is done with low radiation doses. That radiation therapy alone is used in treating or accompanied with other treatments for the treatment of coronaviruses. Radiation therapy contributed to decreasing lung damage or killing the cells of the COVID-19 in the lung. Radiation therapy is perhaps a method more used in modern therapies against COVID-19. Radiation therapy contributes to the treatment of COVID-19 to reduce the mortality ratio of those infected with COVID 19 [Yang et al., 2020; Metcalfe, 2020].

Radiation therapy is thought to be used for COVID-19 to treat pneumonia using low doses of energy to reduce the percentage of deaths caused by this virus. That radiation therapy contributes to save more lives of people infected by COVID-19 and is using the method (radiosurgery) in pneumonia treatment. Radiosurgery is the type of external radiation therapy that uses the radiation dose to the affected place only. More advanced method in treating modern viruses by destroying the RNA or DNA cells in the lungs infected by COVID-19 by using low radiation doses [Yang et al., 2020; Metcalfe, 2020; James Conca, 2020a, James Conca, 2020b].

The current study problem, to date, has not found effective treatments for the SARS-CoV-2, however there are therapy treatments for COVID-19. The main problem will be if the radiation therapy is not used in hospitals to reduce the death ratio of those infected by COVID-19.

The objectives of this study will be as follows:

- 1- The study aims to use radiation therapy for the treatment of COVID-19 in more hospitals to reduce the death ratio of COVID-19 infected people.
- 2- The study aims to use the best potential method which is radiation therapy for COVID-19.
- 3- The study aims to increase health awareness regarding radiation therapy for COVID-19 in hospitals.

Among the study problems presented by the current research on the main questions of radiation therapy for COVID-19. Define certain sub-questions:

- 1- What is COVID-19?
- 2- What is radiation therapy?
- 3- How radiation therapy has been used for COVID-19?

The importance of the current study stems from the fact that it is used in recent studies in the treatments of COVID-19. And be important in:

Theoretical importance:

- 1- The importance of finding a treatment method for COVID-19 for reducing the death ratio of the infected by COVID-19.

2- Current study is one of the main studies that constantly accompany studies and keep pace with developments in COVID-19 treatments.

3- The importance of radiation therapy is a modern and advanced method for treating viruses.

Practical importance:

1- The importance of the current research for hospitals and researchers in the field of treatments of the COVID-19.

2- Adding and presenting new scientific results that are of interest to hospitals and researchers in the field of treatments for COVID-19.

## **2. Material and Methods**

Used radiation therapy methods perhaps for the treatment of COVID-19 patients.

### **2.1 Radiation Therapy for Lung**

Radiation therapy is a dense radiation therapy that shoots many radiation beams from multiple angles on the lungs infected with coronavirus by low radiation doses of energy. Radiation therapy is usually completed in one or a few sessions. Radiation therapy has two types; internal radiation therapy and external radiation therapy. Internal radiation therapy is used radiation doses inside the lungs. External radiation therapy uses an outside beam on the lungs and it is more common for lung treatment infected with the coronavirus. External radiation therapy uses low beams of energy from beam sources such as photons, protons, and others to kill lung cells infected with the COVID-19 by using low radiation dose [Yang et al., 2020; Metcalfe, 2020].

The patient is undergoing radiation therapy lies on a device table while a device moves around the patient. Radiation is guided to particular points in the lung with a low beam dose for the treatment of pneumonia and is called the radiosurgery method [Metcalfe, 2020; James Conca, 2020a].

Radiation treatment planning for the treatment of pneumonia is used modern methods by (three-dimensional, IMRT, VMAT, and others). For establishing an accurate treatment plan by computers for determining the location of pneumonia in the lungs. Radiation is then formed and directed to the lung from several directions, and be a low radiation dose on pneumonia with keeping on normal tissue [Yang et al., 2020; Metcalfe, 2020].

Dose levels are very low when it comes to comparison with radiation therapy regimen, and these doses are about 100 times less than the typical dose prescribed of the radiation therapy regimen. Using radiation dose less than (7Gy and 0.5–1.5Gy) for the treatment of pneumonia in lungs but the appropriate use below radiation dose levels used in the treatment of cancer. Radiation doses less than (7Gy and 0.5–1.5Gy) their effect is low on normal tissues or there is not radiation effects on normal tissues. Hence, protecting these organs (e.g. heart, liver, and some spinal cord) from radiation doses. The proposed radiation therapy for COVID-19 treatment by using low radiation dose. There is no side-effect of radiation therapy when using low radiation doses, but there is a little side-effect on normal cells from radiation, such as

fatigue or redness of the skin or anemia, etc., and this is the most common side-effect [Metcalf, 2020; James Conca, 2020; James Conca, 2020a].

## 2.2 Pneumonia and Ground-Glass Opacity (GGO)

Pneumonia: is an inflammation that indicates lung tissue inflammation that causes coughing, fever, hyperthermia, and dyspnea. The inflammation causes breathing difficulties that are the most common symptoms of pneumonia.

Ground-glass opacity (GGO): is a descriptive term referring to the area of increased opacity in the lung, which is the result of foggy opacity in the lung. That causes coughing, dyspnea, chest pain, fever, weight loss, night sweats. Ground-glass opacity (GGO) causes difficulty getting oxygen to the lung, shortness of breath, which are the most common symptoms.

## 2.3 Covid 19:

Covid 19 is a virus from the coronavirus family, is a large group of viruses that may cause disease in animals and humans. Known that some COVID-19 in humans cause respiratory infections that range from common colds to more severe diseases and as in the Middle East Respiratory Syndrome and severe acute respiratory syndrome (SARS).

COVID-19 infections can spread from people who have the infection to other people. Virus infection is spread mainly from person to person through the small droplets that a person with COVID-19 secretes, from his nose or mouth when he coughs, sneezes, or speaks [Velavan & Meyer, 2020; Wang et al., 2020].

Symptoms of COVID-19 include:

- fever, cough.
- Hyperthermia: body temperature above the normal.
- shortness of breath and other symptoms.

Prevention of COVID-19:

- Hand washing with soap and water,
- being sure to wear masks and paws in crowded places, drink plenty of fluids and eat more fruit and others.

In the mid-1960s, coronaviruses in humans were first discovered. There are four major coronavirus subgroupings, known as alpha, beta, gamma, and delta. The seven types of coronaviruses that can infect people and be the human coronavirus types are [Wang et al., 2020]:

- 1- 229E (coronavirus alpha)
- 2- NL63 (coronavirus alpha)
- 3- OC43 (coronavirus beta)
- 4- HKU1 (coronavirus beta)
- 5- MERS-CoV (the coronavirus beta that triggers Respiratory Syndrome in the Middle East, or MERS)

6- SARS-CoV (the coronavirus beta that causes the acute respiratory syndrome serious, or SARS)

7- SARS-CoV-2 (The coronavirus novel that causes coronavirus disease 2019 called covid 19) and type of SARS-CoV-2 in types four:

1-Type (A)

It is the closest to the SARS-CoV-2 discovered in China. Although it was found in central China's Wuhan city that was the centre of the disease outbreak. Type (A) was also in Americans who lived in Wuhan and in other patients with type (A) in the United States and Australia.

2-Type (B)

It is the most common type of SARS-CoV-2 in Asia and is discovered in East Asia and has not spread much outside East Asia.

3-Type (C)

It is the most common species in the United States. It is the most type infected people with the virus.

4-Type (D)

It is most common in Europe based. The most serious type of viruses on the human. As shown in the conclusion below. Human coronaviruses (229E, NL63, OC43, and HKU11) that are people typically infected by around the world. Sometimes the coronaviruses infecting animals and make people sick and become a new human coronavirus. Three recent cases of this are 2019-nCoV, SARS-CoV, and MERS-CoV [Velavan & Meyer, 2020; Wang et al., 2020; Carly Vandergrindt, 2020].

These four stages of covid 19 [Website Accreditation Council for Graduate Medical Education, 2020]:

1- In the first stage

There are not or only few signs of a virus in patients,

2- The second stage

The symptoms of the virus are more effective than the first stage. leads to respiratory distress syndrome and fever and other symptoms.

3- The third stage

There is COVID-19 diffused in a sick body more than the first and second stages in the respiratory system. Leads to acute respiratory distress syndrome then pneumonia, and other health issues.

4- The fourth stage

COVID-19 has spread more effectively than a third stage in the patient's body in all respiratory system. Leads to acute pneumonia, then to acute kidney failure, and other health issues, as shown in results and discussions below.

Coronaviruses when infecting humans. The virus attacks through the mouth, nose, or eyes, and then the virus is transmitted to the cells of the pharynx, where these cells contain ACE2 Protein, and the coronavirus is linked to ACE2 Protein. Then the virus will create infected DNA. This DNA of the virus is specific to the virus and attacks other cells. Then it attacks the lungs and leads to pneumonia. Fluids accumulate inside the lungs, and leads to

difficulty in the passage of oxygen to the lungs, then leads to kidney failure and other health problems. The strain can become more popular if a virus has a random shift it makes it easier to infect people, and it spreads to others [Velavan & Meyer, 2020].

The proposed radiation therapy is using for the treatment of coronaviruses by sending a low radiation dose for the treatment of pneumonia. The radiation therapy method is used for the treatment of coronaviruses by damaging the RNA of infected cells. Radiation therapy is using a low radiation dose for damaging the RNA. Radiation therapy using for the treatment of coronaviruses for low death risk of people infected with COVID-19 [James Conca, 2020a; James Conca, 2020b].

Prevention of COVID-19 in the radiation therapy room:

- wear complete medical clothes
- wear a muzzle and mask and paws
- radiation therapy device sterilizing
- sterilizing radiation therapy room

### 3. Results and Discussions:

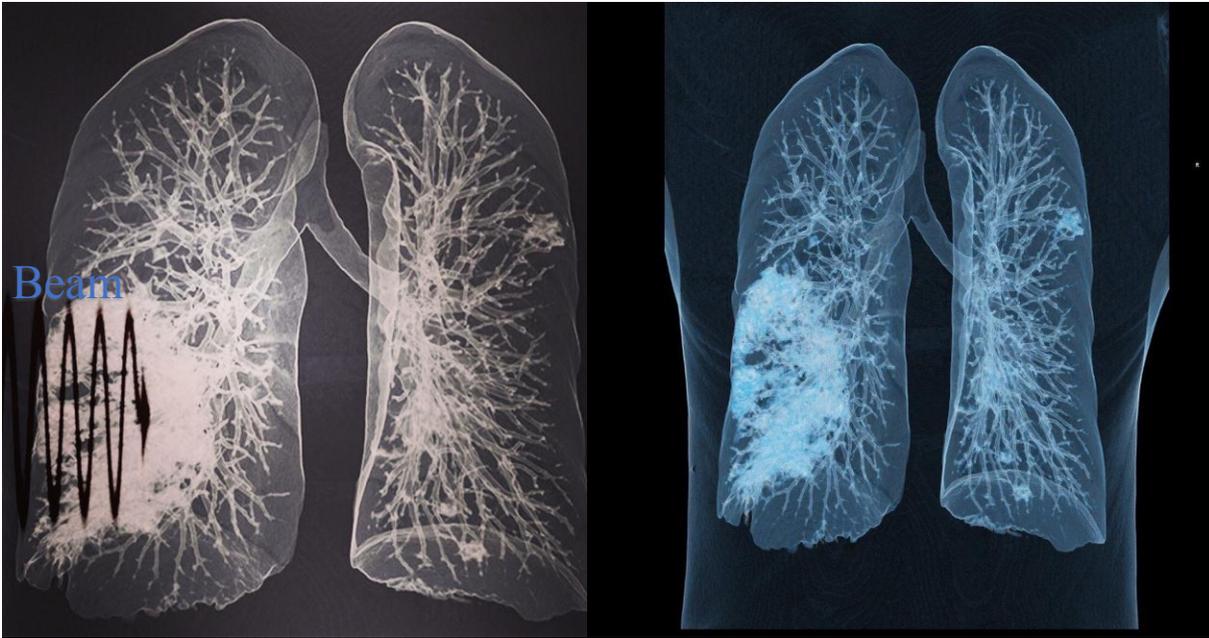
Study research being on COVID-19. Radiation therapy methods perhaps are used for the treatment of COVID-19 to decrease the death ratio of the infected people by COVID-19. The study will take the shapes for explaining to patients infected by COVID-19 and the proposed treatment is done by radiation therapy for patients infected with COVID-19. As in



shapes below:

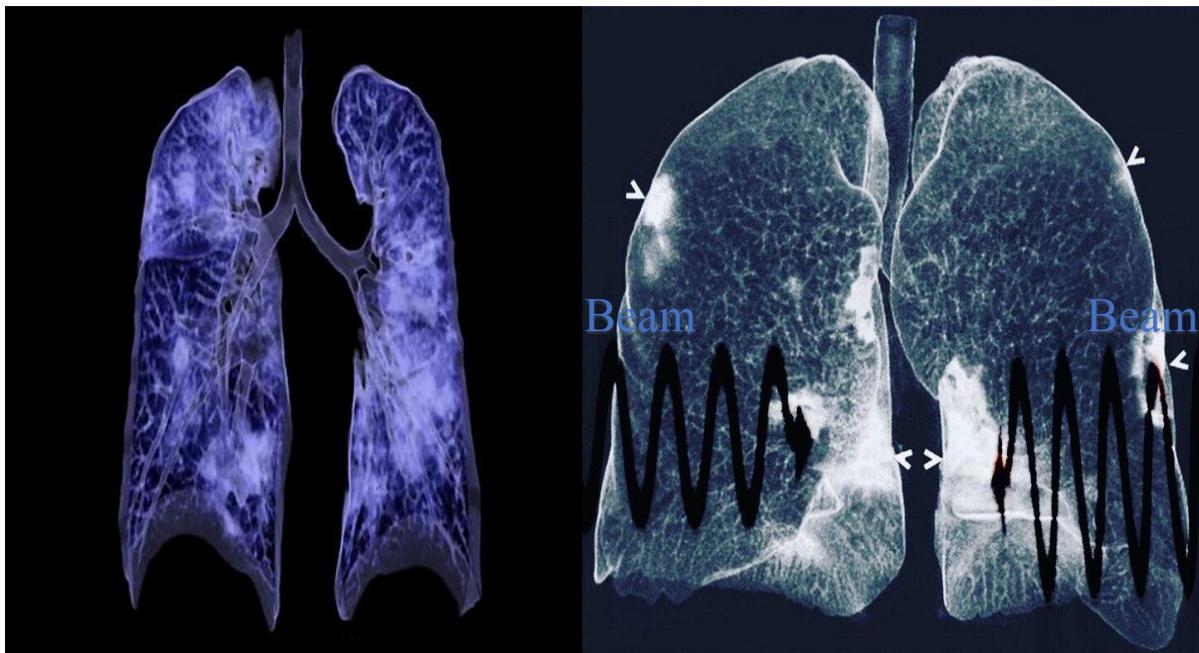
**Figure 1.** Patient infected with COVID-19 [Mo Hong'e, 2020]

In figure 1: Notice a patient infected by SARS-CoV-2. A patient had pain, acute coughing, and hyperthermia. Perhaps treatment of the patient with radiation therapy. Radiation therapy is using reduced doses of radiation for the treatment of pneumonia.



**Figure 2.** Patient infected with pneumonia [Website Siemens Healthineers]

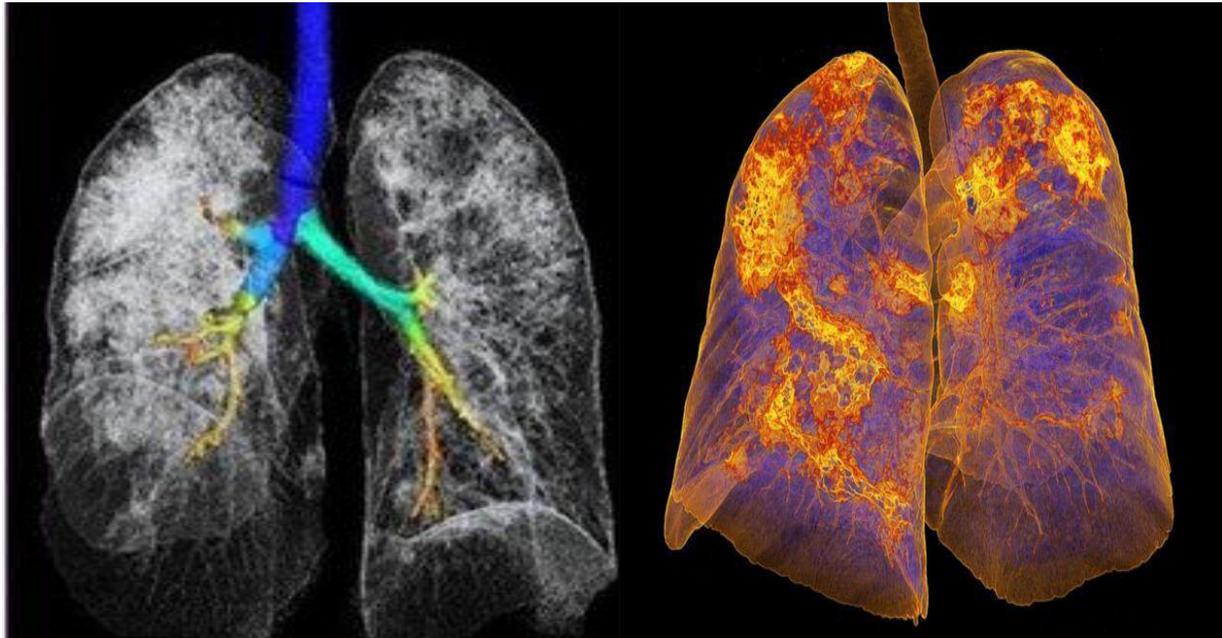
In figure 2: notice a patient infected with SARS-CoV-2. A patient had pain, acute coughing, hyperthermia, and dyspnea. Perhaps treatment for the patient by radiation therapy. Radiation therapy is using reduced doses of radiation for the treatment of pneumonia.



**Figure 3.** Patient infected covid 19 in lungs [Pontes et al., 2020]

In figure 3: notice a patient infected with SARS-CoV-2. A patient had pain, acute coughing, hyperthermia, dyspnea, and other health issues. This is the stage that is dangerous for a patient whose virus is spread in the lungs. Perhaps treatment for the patient by radiation therapy. Radiation therapy is done using a low radiation dose for the treatment of pneumonia. The

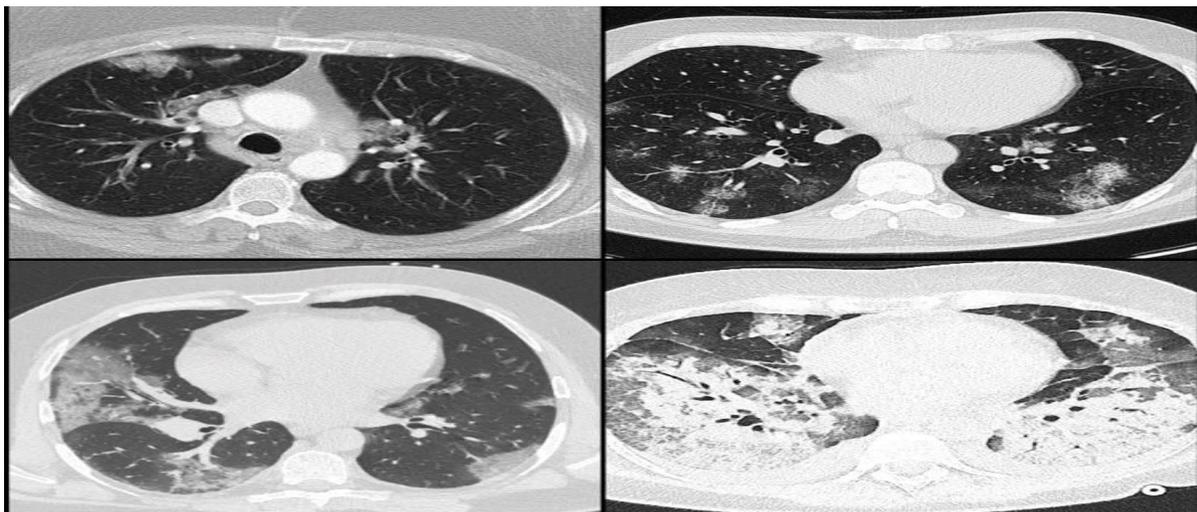
proposed Radiation therapy is done for the treatment of COVID-19 with other therapies of COVID-19.



**Figure 4.** Patient infected with COVID-19 in both lungs [Yak, 2020]

In Figure 4 In Figure 4: notice a patient infected with SARS-CoV-2 in the dangerous stage. The stage is more dangerous for a patient whose virus is spread in all the patient's body. A patient had acute pain, acute coughing, high hyperthermia, acute dyspnea, and other health issues. Maybe the patient are treated only with radiation therapy. Radiation therapy is done using a low radiation dose for the treatment of pneumonia. Radiation therapy perhaps merge is done for the treatment of COVID-19 with other therapies of COVID-19 in this stage.

The patients infected by COVID-19. Shown in figure 5 how to spread a virus stages in the lungs, and shown COVID-19 spreads in both lungs.



**Figure 5.** The stages of COVID-19 spreads in the lungs by CT scan

#### 4. Conclusion

The study was conducted for treatment of COVID-19 by perhaps radiation therapy to reduce the death ratio of those infected by COVID-19. Perhaps Radiation therapy for the treatment of COVID-19 in seven cases:

- 1- Radiation therapy is using a low-dose of radiation to kill pneumonia.
- 2- In the first and second phases, it is less risky and more proportion for treatment of the COVID-19, a quarantine is carried out in a sick's house or in the hospitals, and in the third and fourth phases it is more risky and less proportion for treatment, quarantine is carried out in hospitals and they require respiratory equipment, medication and other treatments.
- 3- Perhaps radiation therapy is carried out using a low radiation dose to treat COVID-19, it is used to treat patients more effectively in the first and second stages for the treatment of pneumonia.
- 4- Perhaps radiation therapy is conducted using a low radiation dose to treat COVID-19, it is used to treat patients less effectively in the third and fourth stages for the treatment of pneumonia. Radiation therapy is done better when combined with one of the other therapies for COVID-19 and will be more effective treatment for pneumonia in the third and fourth stages.
- 5- Type (B) is derived from a type (A). While type (C) is derived from a type (B). And type (D) is a variant of type (B). The proposed radiation therapy is done using a low radiation dose for treatment of COVID-19 better for type (A), type B, type (C), and then to type (D). Less dangerous types of SARS-CoV-2 are type (A) and type (B), while more dangerous types of SARS-CoV-2 are type (C) and type (D) respectively.
- 6- Radiation therapy is alone or in combination with other treatments for pneumonia. It will be a more effective treatment to treat COVID-19 to reduce the death ratio of those infected by COVID-19.
- 7- If radiation therapy is used to treat COVID-19, it will save tens of thousands of lives infected by COVID-19.

#### Recommendations

The researcher suggests that radiation therapy for COVID-19 to be used in more hospitals to reduce the death ratio of those infected by COVID-19.

#### Abbreviations

COVID 19:	Coronavirus Disease 2019
GGO:	Ground glass nodules.
RT:	Radiation therapy
IMRT:	intensity modulated radiation therapy
VMAT:	volumetric modulated arc therapy

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