

## ROLE OF HIGH RESOLUTION CT IN EVALUATION OF INCIDENCE OF COVID -19 IN DIFFERENT AGE GROUP PATIENTS PREPARATION

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### INTRODUCTION

This study included calculation infection rate for a group of patients by corona virus with different age groups using a Computed tomography. the device used is a 128 –slice from the type of Philips.it is one of best type radiological diagnosis by exposing the patients radiation.it is process of examining the patient s chest, this virus spreads in the patient s lungs it covers the entire lung and lead to damage to large parts of the lungs and thus difficulty breathing and then suffocation and death. The prevalence rate in the lung varies from one person to another according to the health status, the strength of the immunity of the affected person and age as well. Form this section, the infection rate was calculated with age.

### Corona Virus

Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. Most people infected with the virus will experience mild to moderate respiratory illness and recover without requiring special treatment. However, some will become seriously ill and require medical attention. Older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease, or cancer are more likely to develop serious illness. Anyone can get sick with COVID-19 and become seriously ill or die at any age.

The best way to prevent and slow down transmission is to be well informed about the disease and how the virus spreads. Protect yourself and others from infection by staying at least 1 meter apart from others, wearing a properly fitted mask, and washing your hands or using an alcohol-based rub frequently. Get vaccinated when it's your turn and follow local guidance.

The virus can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, sing or breathe. These particles range from larger respiratory droplets to smaller aerosols. It is important to practice respiratory etiquette, for example by coughing into a flexed elbow, and to stay home and self-isolate until you recover if you feel unwell.

### What is a CT scan ???

A computerized tomography scan (CT or CAT scan) uses computers and rotating X-ray machines to create cross-sectional images of the body. These images provide more detailed information than normal X-ray images. They can show the soft tissues, blood vessels, and bones in various parts of the body. A CT scan may be used to visualize the:

### Head chest shoulders spine heart abdomen knee

During a CT scan, you lie in a tunnel-like machine while the inside of the machine rotates and takes a series of X-rays from different angles. These pictures are then sent to a computer, where they're combined to create images of slices, or cross-sections, of the body. They may also be combined to produce a 3-D image of a particular area of the body.

### Why Is a CT scan Performed?

A CT scan has many uses, but it's particularly well-suited for diagnosing diseases and evaluating injuries. The imaging technique can help your doctor.

Diagnose infections, muscle disorders, and bone fractures Pinpoint the location of masses and tumors (including cancer) Study the blood vessels and other internal structures Assess the extent of internal injuries and internal bleeding Guide procedures, such as surgeries and biopsies Monitor the effectiveness of treatments for certain medical conditions, including cancer and heart disease.

The test is minimally invasive and can be conducted quickly. One of its uses is in diagnosing and determining the rate of infection with the COVID-19.

### How Is a CT Scan Performed?

Your doctor may give you a special dye called a contrast material to help internal structures show up more clearly on the X-ray images. The contrast material blocks X-rays and appears white on the images, allowing it to highlight the intestines, blood vessels, or other structures in the area being examined. Depending on the part of your body that's being inspected, you may need to drink a liquid containing the contrast. Alternatively, the contrast may need to be injected into your arm or administered through your rectum via an enema. If your doctor plans on using a contrast material, they may ask you to fast for four to six hours before your CT scan.

When it comes time to have the CT scan, you'll be asked to change into a hospital gown and to remove any metal objects. Metal can interfere with the CT scan results. These items include jewelry, glasses, and dentures. Your doctor will then ask you to lie face up on a table that slides into the CT scanner. They'll leave the exam room and go into the control room where they can see you and hear you. You'll be able to communicate with them via an intercom.

While the table slowly moves you into the scanner, the X-ray machine will rotate around you. Each rotation produces numerous images of thin slices of your body. You may hear clicking, buzzing, and whirring noises during the scan. The table will move a few millimeters at a time until the exam is finished. The entire procedure may take anywhere from 20 minutes to one hour.

It's very important to lie still while CT images are being taken because movement can result in blurry pictures. Your doctor may ask you to hold your breath for a short period during the test to prevent your chest from moving up and down. If a young child needs a CT scan, the doctor may recommend a sedative to keep the child from moving.

Once the CT scan is over, the images are sent to a radiologist for examination. A radiologist is a doctor who specializes in diagnosing and treating conditions using imaging techniques, such as CT scans and X-rays. Your doctor will follow-up with you to explain the results.

### What Are the Risks Associated with a CT Scan?

There are very few risks associated with a CT scan. Though CT scans expose you to more radiation than typical X-rays, the risk of cancer caused by radiation is very small if you only have one scan. Your risk for cancer may increase over time if you have multiple X-rays or CT scans. The risk of cancer is increased in children receiving CT scans, especially to the chest and abdomen.

Some people have an allergic reaction to the contrast material. Most contrast material contains iodine, so if you've had an adverse reaction to iodine in the past, make sure to notify your doctor. Your doctor may give you allergy medication or steroids to counteract any potential side effects if you're allergic to iodine but must be given contrast.

It's also important to tell your doctor if you're pregnant. Though the radiation from a CT scan is unlikely to harm your baby, your doctor may recommend another exam, such as an ultrasound or MRI scan, to minimize risk.

### What Do CT Scan Results Mean?

CT scan results are considered normal if the radiologist didn't see any tumors, blood clots, fractures, or other abnormalities in the images. If any abnormalities are detected during the CT scan, you may need further tests or treatments, depending on the type of abnormality found. Preparation and precautions to consider The scanner table is very narrow. Ask if there is a weight limit for the CT scanner table if you weigh more than 120 kilogram. Be sure to tell your doctor if you're pregnant. X-rays of any kind aren't recommended for pregnant women. You'll want to be aware of some extra precautions if contrast dye will be used. For example, special measures must be taken for people on the diabetes medicine metformin (Glucophage). Be sure to let your doctor know if you take this drug. Also tell your doctor if you've ever suffered an adverse reaction to contrast dye.

### Possible side effects or risks

Side effects and risks for a cranial CT scan involve discomfort, exposure to radiation, and allergic reaction to the contrast dye. Discuss any concerns with your doctor before the test so you can assess the potential risks and benefits for your medical condition.

### Discomfort

The CT scan itself is a painless procedure. Some people feel uncomfortable on the hard table or have difficulty remaining still. You may feel a slight burning when the contrast dye enters your vein. Some people experience a metal taste in their mouths and a warm sensation throughout their bodies. These reactions are normal and generally last less than a minute.

### Radiation Exposure

CT scans expose you to some radiation. Doctors generally agree that the risks are low compared to the potential risk of not being diagnosed with a dangerous health problem. The risk from a single scan is small, but it increases if you have many X-rays or CT scans over time. Newer scanners may expose you to less radiation than older models. Tell your doctor if you're pregnant. Your doctor may be able to avoid exposing your baby to radiation by using other tests. These may include a head MRI scan or ultrasound, which don't use radiation.

### Allergic reaction to contrast

Tell your doctor before the scan if you've ever had an allergic reaction to contrast dye. Contrast dye commonly contains iodine and may cause nausea, vomiting, rash, hives, itching, or sneezing in people who are allergic to iodine. You may be given steroids or antihistamines to help with these symptoms before you receive the dye injection. After the test, you may need to drink extra fluids to help flush the iodine from the body if you have diabetes or kidney disease. In very rare cases, contrast dye can cause anaphylaxis, a whole-body allergic reaction that can be life-threatening. Notify the scanner operator immediately if you have trouble breathing.

In this study, we do not need to give the patient the dye because we do not need to distinguish the affected cells or vesicles, but the dye was mentioned for its usefulness in other tests.

CT scan vs. MRI in photographing the chest of a person infected with the corona virus CT scans are more widely used than MRIs and are typically less expensive. MRIs, however, are thought to be superior in regards to the detail of the image. The most notable difference is that CT scans use X-rays while MRIs do not.

Other differences between MRI and CT scans include their risks and benefits.

### Risks

Both CT scans and MRIs pose some risks when used. The risks are based on the type of imaging as well as how the imaging is performed. CT scan risks include: harm to unborn babies a very small dose of radiation a potential reaction to the use of dyes. MRI risks include: possible reactions to metals due to magnets. loud noises from the machine causing hearing issues. increase in body temperature during long MRIs claustrophobia You should consult a doctor prior to an MRI if you have implants including: artificial joints, eye implants, an IUD, a pacemaker.

### Benefits

Both MRIs and CT scans can view internal body structures. However, a CT scan is faster and can provide pictures of tissues, organs, and skeletal structure. An MRI is highly adept at capturing images that help doctors determine if there are abnormal tissues within the body. MRIs are more detailed in their images.

### Choosing between an MRI and CT scan

Most likely, your doctor will give you a recommendation based on your symptoms whether you should get an MRI or CT scan. If you need a more detailed image of your soft tissue, ligaments, or organs, your doctor will commonly suggest an MRI. Such cases include: herniated disks, torn ligaments, soft tissue issues If you need a general image of an area like your internal organs, or due to a fracture or head trauma, a CT scan will

commonly be recommended. It is preferable to use the spiral caliper to diagnose the organs that have movement, such as the chest, for rapid imaging, and therefore it is preferable to the magnetic resonance device.

### Takeaway

Both CT scans and MRI scans are relatively low risk. Both offer important information to help your doctor properly diagnose specific conditions. Most likely, your doctor will tell you which one they recommend. Be sure to ask questions and discuss any concerns with your doctor, so you can be comfortable with the choice they recommend.

### What is a CT scan of the chest?

CT scan is a type of imaging test. It uses X-ray and computer technology to make detailed pictures of the organs and structures inside your chest. These images are more detailed than regular X-rays. They can give more information about injuries or diseases of the chest organs. In a CT scan, an X-ray beam moves in a circle around your body. It takes many images, called slices, of the lungs and inside the chest. A computer processes these images and displays it on a monitor. During the test, you may receive a contrast dye. This will make parts of your body show up better in the image. Other related procedures that may be used to diagnose problems of the lungs and respiratory tract include bronchoscopy, Broncho graph, chest fluoroscopy, chest X-ray, chest ultrasound, lung biopsy, lung scan, mediastinoscopy, oximetry, peak flow measurement, positron emission tomography (PET) scan, pleural biopsy, pulmonary angiogram, pulmonary function tests, sinus X-ray and thoracentesis.

### Why might I need a CT scan of the chest?

A CT scan of the chest may be done to check the chest and its organs for: Blockages, Injuries, Intrathoracic bleeding, Infections, Other health problems Tumors and other lesions, unexplained chest pain, A CT scan may be done when another type of exam, such as an X-ray or physical exam, is not conclusive. This test may also be used to guide needles during biopsies of thoracic organs or tumors. A biopsy is when a small piece of tissue is removed so it can be examined in the lab. CT scans can also be done to help remove a sample of fluid from the chest. They are useful in keeping an eye on tumors and other conditions of the chest before and after treatment. There may be other reasons for your healthcare provider to recommend a CT scan of the chest.

### What are the risks of a CT scan of the chest?

You may want to ask your healthcare provider about the amount of radiation used during the CT scan. You should discuss the risks related to your particular situation. It is a good idea to keep a record of your past history of radiation exposure. Tell your healthcare provider about previous CT scans and other types of X-rays. Your risks of radiation exposure may be related to the total number of X-ray exams or treatments over a long period of time.

If you are pregnant or think you may be pregnant, tell your healthcare provider. Radiation exposure during pregnancy may lead to birth defects. If you are breastfeeding, let your healthcare provider know. Ask if you should pump and save breastmilk to use after the procedure.

If contrast dye is used, there is a risk you may have an allergic reaction to the dye. Tell your healthcare provider if you have ever had a reaction to any contrast dye, or if you've had any kidney problems.

If you have kidney failure or other kidney problems, tell your healthcare provider. In some cases, the contrast dye can cause kidney failure. This is especially true if the patient has underlying kidney problems or is dehydrated. If you take the diabetes medicine called metformin with the contrast, you are at risk for developing metabolic acidosis. This is a condition where you have an unsafe change in blood pH. People with kidney disease are more prone to kidney damage after contrast exposure. There may be other risks depending on your specific medical problems. Make sure your healthcare provider knows about all your medical problems before the procedure. Certain things may make a CT scan of the chest less accurate. These include: Barium in the esophagus from a recent barium study Body piercing on the chest Metallic objects within the chest, such as surgical clips or a pacemaker.

#### **How do I prepare for a CT scan?**

If you are having a computed tomography angiography (CTA), you will be given specific instructions when you make your appointment. Other options will be discussed with you and your doctor. Please remove all piercings and leave all jewelry and valuables at home.

**CONTRAST MEDIA:** CT scans are most frequently done with and without a contrast media. The contrast

media improves the radiologist's ability to view the images of the inside of the body.

Some patients should not have an iodine-based contrast media. If you have problems with your kidney function, representative when you schedule the appointment. You may be able to have the scan performed without contrast media or have an alternative imaging exam.

**ALLERGY:** Please inform the access center representative when you schedule your CT scan if you have had an allergic reaction to any contrast media. IV contrast will not be administered if you have had a severe or anaphylactic reaction to any contrast media in the past. If you had mild to moderate reactions in the past, you will likely need to take medication prior to the CT scan. These plans will be discussed with you in detail when you schedule your exam. Any known reactions to a contrast media should be discussed with your personal physician. **EAT/DRINK:** If your doctor ordered a CT scan without contrast, you can eat, drink and take your prescribed medications prior to your exam. **MEDICATION:** All patients can take their prescribed medications as usual. Based on your medical condition, your doctor may request other specific preparation.

#### **What happens after a CT scan of the chest?**

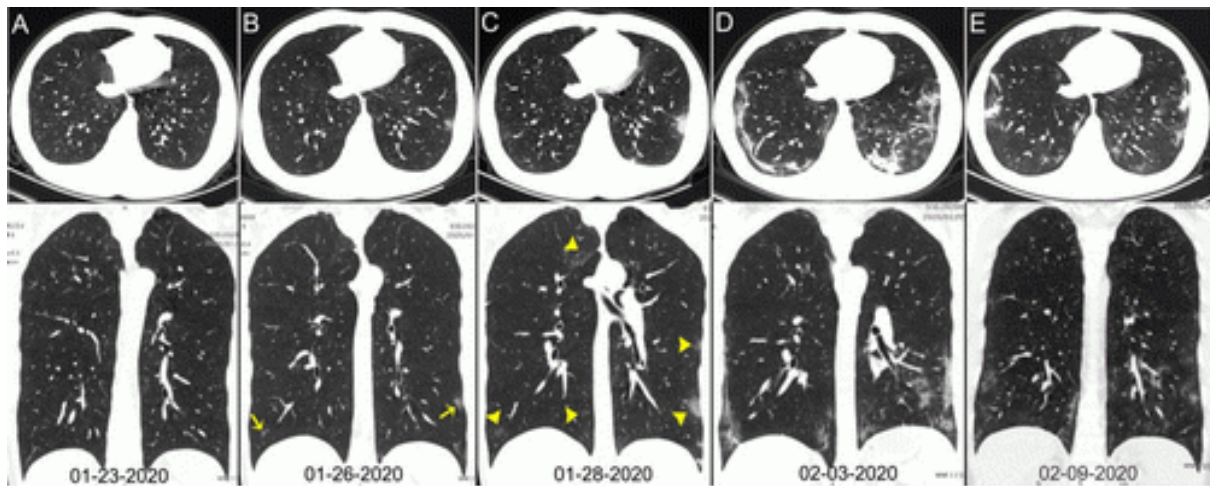
If contrast dye was used during your procedure, you may be watched for a period of time for any side effects or reactions to the contrast dye. These include itching, swelling, rash, or trouble breathing. Tell your healthcare provider if you notice any pain, redness, or swelling at the IV site after you return home. These could be signs of an infection or other type of reaction. If you are given contrast by mouth, you may have diarrhea or constipation after the procedure. Otherwise, you don't need any special care after a CT scan of the chest.



**Fig Computed Tomography (CT) Scan.**

CT Provides Best Diagnosis for Novel Coronavirus (COVID-19). CT scans can detect coronavirus in patients before RT-PCR lab testing.

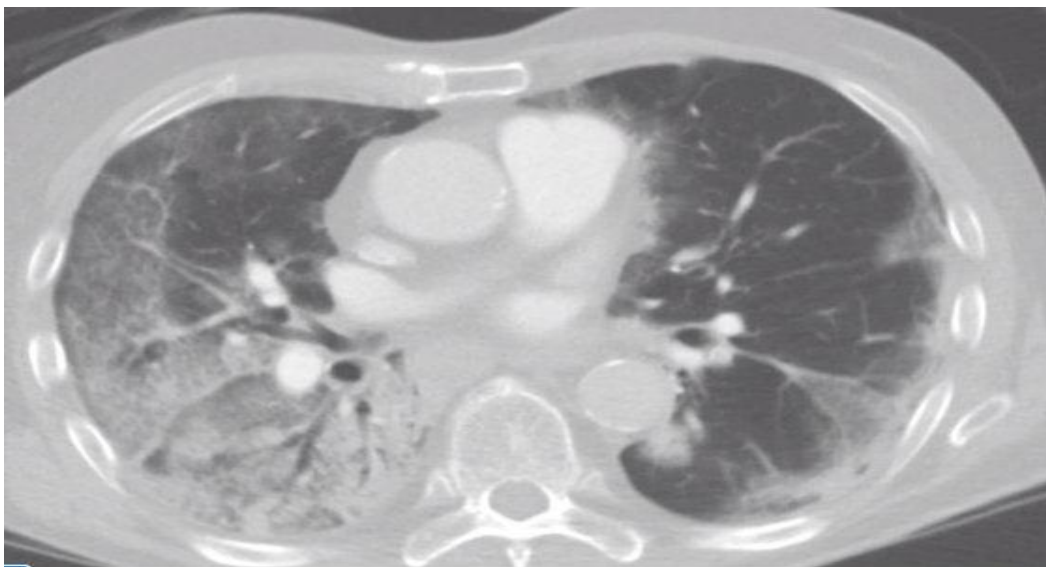




Chest CT images of a 29-year-old man with fever for 6 days. RT-PCR assay for the SARS-CoV-2 using a swab sample was performed, with a positive result. (A column) Normal chest CT with axial and coronal planes was obtained at the onset. (B column) Chest CT with axial and coronal planes shows minimal ground-glass opacities in the bilateral lower lung lobes (yellow arrows). (C column) Chest CT with axial and coronal planes shows increased ground-glass opacities (yellow arrowheads). (D column) Chest CT with axial and coronal planes shows the progression of pneumonia with mixed ground-glass opacities and linear opacities in the subpleural area. (E column) Chest CT with axial and coronal planes shows the absorption of both ground-glass

opacities and organizing pneumonia. Image courtesy of *Radiology*.

February 26, 2020 — In a study of more than 1,000 patients published in the journal *Radiology*, chest CT outperformed lab testing in the diagnosis of 2019 novel coronavirus disease (COVID-19). The researchers concluded that CT should be used as the primary screening tool for COVID-19 (also called SARS-CoV-2).<sup>[1]</sup> In the absence of specific therapeutic drugs or vaccines for COVID-19, it is essential to detect the disease at an early stage and immediately isolate an infected patient from the healthy population.



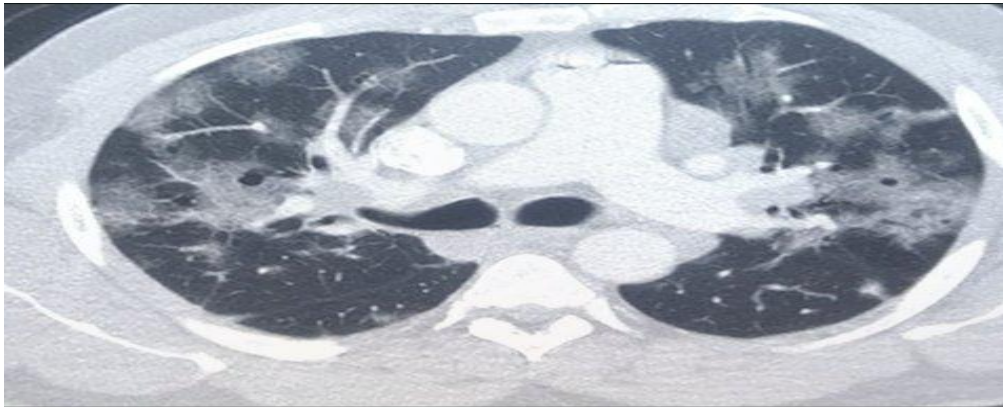
**Fig (CT) Scan the chest of patient infected with the corona virus.**

Here is a Example of COVID-19 Pneumonia Chest CT Scan Scroll Through Find more radiology images of the various COVID presentations in this PHOTO GALLERY - How COVID-19 Appears on Medical Imaging According to the latest guidelines published by the Chinese government, the diagnosis of COVID-19 must be confirmed by reverse-transcription polymerase

chain reaction (RT-PCR) or gene sequencing for respiratory or blood specimens, as the key indicator for hospitalization. However, with limitations of sample collection and transportation, as well as kit performance, the total positive rate of RT-PCR for throat swab samples has been reported to be about 30 to 60 percent at initial presentation.

In the United States, similar RT-PCR test kits used by the Centers for Disease Control and Prevention (CDC) to test patients and confirm coronavirus infections were cleared for clinical use in the U.S. by an emergency approval by the U.S. Food and Drug Administration (FDA) Jan. 30. However, when these kits were sent to states, local authorities performed verification testing for quality control and found the tests are not 100 percent accurate, and showed some false negative results.

"As we've pushed tests out to the state, they did what we would expect as part of the normal procedures, which is do the verification in their own laboratories. There were problems identified with the test kits. That is a normal part, unfortunately, of these processes. We obviously would not want to use anything but the most perfect possible kits," She said the CDC is working with the FDA to resolve the issues. However, the CDC still considers it a priority to get the kits out to patients as soon as possible. CT might offer an alternative way to help diagnose COVID-19 positive patients.



Included in the study were 1,014 patients who underwent both chest CT and RT-PCR tests between January 6 and February 6, 2020. With RT-PCR as reference standard, the performance of chest CT in diagnosing COVID-19 was assessed. For patients with multiple RT-PCR assays, the dynamic conversion of RT-PCR test results (negative to positive, and positive to negative, respectively) was also analyzed as compared with serial chest CT scans.

The results showed that 601 patients (59 percent) had positive RT-PCR results, and 888 (88 percent) had positive chest CT scans. The sensitivity of chest CT in suggesting COVID-19 was 97 percent, based on positive RT-PCR results. In patients with negative RT-PCR results, 75 percent (308 of 413 patients) had positive chest CT findings. Of these, 48 percent were considered as highly likely cases, with 33% as probable cases. By analysis of serial RT-PCR assays and CT scans, the interval between the initial negative to positive RT-PCR results was 4 to 8 days.

"About 81 percent of the patients with negative RT-PCR results but positive chest CT scans were re-classified as highly likely or probable cases with COVID-19, by the

In the current public health emergency, the low sensitivity of RT-PCR implies that a large number of COVID-19 patients would not be identified quickly and may not receive appropriate treatment or isolation. In addition, given the highly contagious nature of the virus, they carry a risk of infecting a larger population.

#### CT Imaging May Offer Better Sensitivity Than RT-PCR Testing for Coronavirus

"Early diagnosis of COVID-19 is crucial for disease treatment and control. Compared to RT-PCR, chest CT imaging may be a more reliable, practical and rapid method to diagnose and assess COVID-19, especially in the epidemic area," the *Radiology* study authors wrote.

Chest CT, a routine imaging tool for pneumonia diagnosis, is fast and relatively easy to perform. Recent research found that the sensitivity of CT for COVID-19 infection was 98 percent compared to RT-PCR testing sensitivity of 71 percent. For the current study,

comprehensive analysis of clinical symptoms, typical CT manifestations and dynamic CT follow-ups," the authors wrote. A couple early CT imaging patient case studies coming out of China in the past month reported COVID-19 was preliminarily diagnosed from CT scans in several patients before they started to show positive RT-PCR test results. Additional COVID-19 radiology research can be found at Special Focus: COVID-19.

The goal of the CDC is to prevent the spread of COVID-19 as long as possible so the country's healthcare system can prepare for its potentially inevitable arrival. However, she said it is not possible to catch all the cases of COVID-19.

"We never expected we'd catch every traveler with novel coronavirus from China. It would be impossible," Messonnier explained. "We're not seeing spread here in the United States yet, but it is possible, even likely, that it may eventually happen. Our goal continues to be slowing the introduction of the virus into the U.S. This buys us more time to prepare our communities for more cases and possibly sustained spread." She said this new virus represents a tremendous public health threat. "We

don't yet have a vaccine for this novel virus, nor do we have a medicine to treat it specifically. We are taking and will continue to take aggressive action to reduce the impact of this virus, and that it will have on the communities in the U.S.," The CDC is working with state, local and territorial health departments to ready the public health workforce to respond to local cases and the possibility this outbreak could become a pandemic.

The CDC has a contingency plan for large influenza pandemics, which the CDC is adapting for a COVID-19 outbreak. She said it is very informative in terms of what people can expect in the coming weeks if the virus starts spreading in our community. The document is a Morbidity and Mortality Weekly Report (MMWR) recommendations and report titled "Community Mitigation Guidelines to Prevent Pandemic Influenza, United States"

"These materials will serve as a blueprint for the community interventions we will use here in the U.S.," Meissonier explained. "If you're watching the news, you may be hearing about schools shutting down and businesses closing in countries in Asia to reduce the potential spread of this virus. The day may come where we need to implement such measures in the U.S. communities."



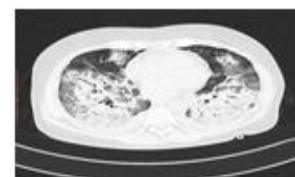
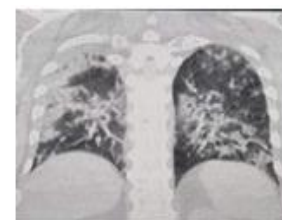
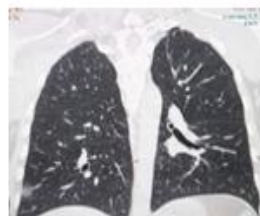
**Pfizer-Biotech COVID-19 Vaccine Gets Full Approval from FDA.**

Similarities and Differences of CT Features between COVID-19 Pneumonia and Heart Failure RSNA21 Will Require Proof of Vaccination, Masks.

**Work and accounts**

This study took a set of random samples for several patients, for different age groups, and for several waves of this virus and after conducting a radiological survey of the patients using the spiral scanner, the patients were classified according to the incidence of the disease and into four categories. Normal, mild, moderate, sever. they were diagnosed according to age groups, and the results and classifications we obtained were as follows.

state	Age	State	Age	state	age	State	Age
Normal	30-40=4	Mild	30-40=8	moderate	30-40=5	Sever	30-40=0
	40-50=12		40-50=20		40-50=16		40-50=5
	50-60=9		50-60=10		50-60=14		50-60=10
	60-70=4		60-70=12		60-70=9		60-70=13
	70-100=4		70-100=5		70-100=13		70-100=28
	33		54		57		56
	19 mal + 14 female		31 mal + 23 female		37 mal + 20 female		38 mal + 18 female



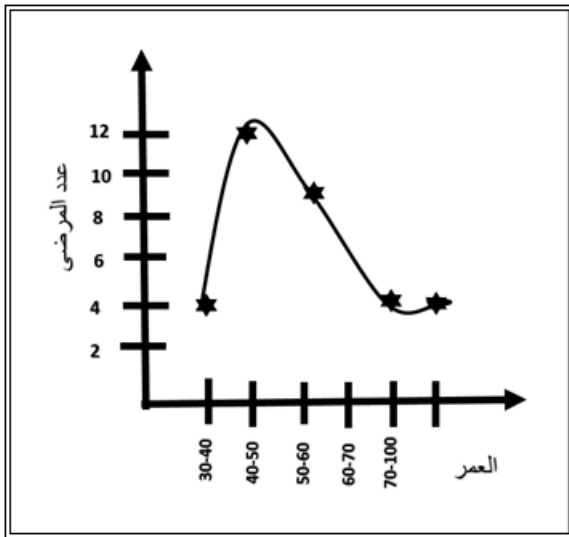
Normal

Mild

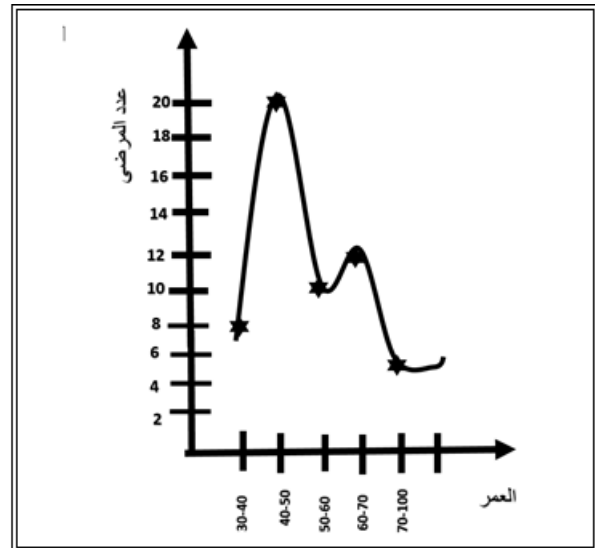
Moderate

Sever

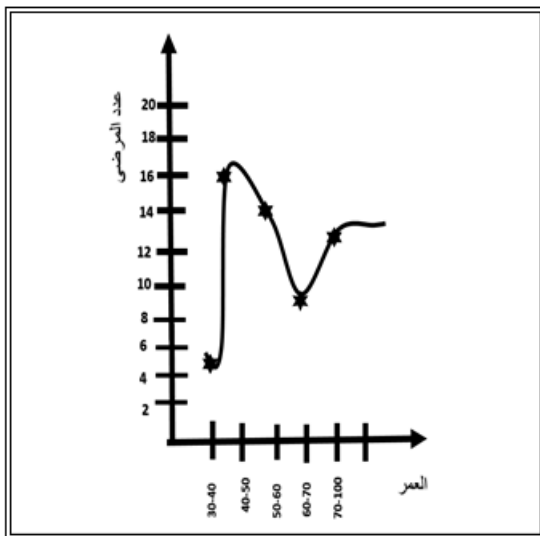




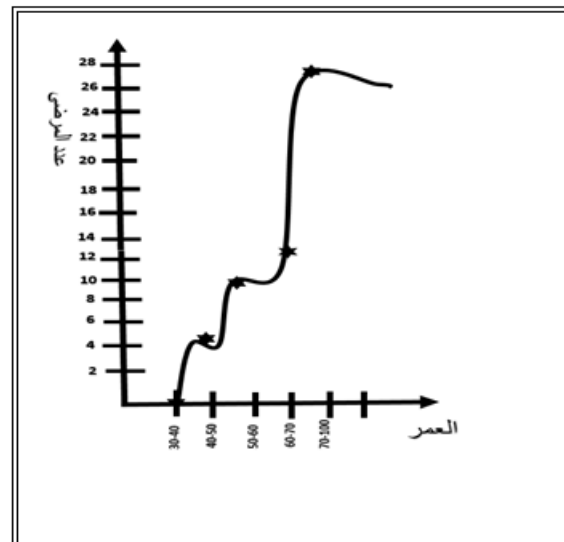
Normal



Mild



Moderate



Sever

**CONCLUSIONS**

Through this study, it was found that the groups that were studied in the various waves of corona are the infection rate in the older age groups. They are the most vulnerable group to infection, and they are the ages of 70 years and above, who are severely injured, and the least ages, i. e. from 60 to 70 are also exposed to severe infection, but the lowest percentage is from the oldest ages. the infection rate for young people, which ranges from 40 to 50, is in the medium and few cases, and they are more than the rest of the groups, or the young ages and up to the age of 40 years are the least group of all age groups. Therefore, it was also found through the study and the random statistics of patients that the rate of male infection in severe, moderate and moderate cases is greater than females, and in general that males are more exposed than females to this virus. we advise these older age groups to take caution and prevention of the virus by

taking the vaccine and staying away from infected or suspected people.

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