Research Article
Volume 11:12, 2021

Journal of Bioengineering & Biomedical Science

ISSN: 2155-9538 Open Access

Design Artificial Intelligence in Order to Simulation and Biomechanical Analysis Of Lung Diseases in the Form of Artificial Intelligence to Improve the Diagnosis and Treatment of Lung Diseases, Chronic Bronchitis Covid 19 Disease and Predicting A New Strain of Delta Plus Virus 2

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Abstract

Nowadays, the importance of artificial intelligence design is in the priorities of research centers, companies and researchers in order to prevent human error, increase accuracy in diagnosis, rapidly action and also industrial automation. The role of artificial intelligence on the advancement of technology, industry, etc. Nobody is hidden from anyone. Satisfactory performance of all organs of the body depends on their capacity to consume oxygen and excrete carbon dioxide. Although there are different types of lung diseases, each of these diseases has its own characteristics and causes unpleasant changes in the branches of the lungs. The diagnosis of lung disease as the fourth leading cause of death before the advent of COVID 19 has long been important for humans. Accurate detection of abnormalities in medical images (such as X-rays and CT scans) is a challenge due to blurred images at the border, different sizes, variable shapes, and uneven density. In this study, by converting images obtained from medical imaging device, CT scan and converting it into cloud points, through three-dimensional modeling and analysis, by comparing the changes of physical factors between healthy people and lung patients, factors such as: Force, air flow, pressure, resistance, as well as the amount of changes in CO_2 in the inhale and exhale, the type of disease, and the severity of lung disease are determined. Clinical studies have been performed on 480 CT scan files prepared from lung patients for simulation and analysis to achieve better results. Finally, it provides physicians with information about the type and severity of the disease, the latest treatments suggested by other physicians, available medications, and approved protocols online in order to expedite the better treatment process.

Key words:

Artificial Intelligence • Improve the Diagnosis • Covid 19 Mutant • FEA (Finite Element Analyze) • Brutal Delay Pattern • Delta Plus 2 • Predicting Mutation • Improve Diagnose • Better Treatment Process.

Introduction

Understanding the role and function of each of the different parts of the lung is crucial to comparing changes in the physical factors of a healthy person compared to a sick person in similar circumstances. The main function of the lungs is to deliver oxygen to the capillary blood of the lungs and excrete carbon dioxide [1]. To achieve this, the lungs must deliver a volume of air to the bubbles and expel them. At the same time, oxygen is absorbed into the pulmonary bloodstream, and carbon dioxide is released through the air in the bubbles. Maintaining optimal oxygen delivery and acid-base balance is another important function of the lungs. The first 15 branches of the lung, including the trachea, the right and left main bronchi, the segmental and sub-segmental bronchi to the terminal bronchioles, are a set of communication pathways that do not participate in gas exchange. This area is called the guiding area of the lung or anatomical dead space. Cartilaginous rings help keep large airways open. The division of the airways into the first 15 branches is based on the principles of fractal geometry. Reducing the diameter of the airway the distance between each division is the same, and a factor of 79% causes the airways inside the chest to condense. This

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Received: 02 December, 2021; **Accepted:** 10 December, 2021; **Published:** 22 December, 2021

geometry reduces the length of the bronchial pathway from the trachea to the lungs and minimizes the volume of dead space and resistance to convective airflow [2].

Lung mechanics and respiration

Exhalation mechanics is the study of the forces required to deliver air to the lungs and how to control the volume of air and the flow of gases through these forces, and the amount of this force depends on age, gender, body weight, and etc [3]. Mechanically, the respiratory system is made up of two structures: the lungs and the chest wall. The lungs have a flexible structure (such as a spring) and inside it is the chest wall. Although, at first glance, it is mistakenly thought that as the diameter of the lung ducts decreases, the resistance to airflow increases. Conversely, the large number of small air ducts in the lungs creates a large cross-section for airflow. For example, the cross-sectional area of the trachea is 2.5 cm2, while the cross-sectional area of the fallopian tubes is 300 cm. As a result, 80% of the airflow resistance is present in the first 7 divisions of the bronchi. The resistance of the remaining small airways with a diameter of less than 2 mm only is 20% .This is almost half the area of the tennis court. There are two types of pneumocystis in the lung. The pneumocystis type I is flat and makes up 95% of the cells. Pneumocystis type II make up 5% of the vesicular cells and secrete a surfactant. Surfactants are important in preventing bubbles from sticking together in the lower lung volumes and thus cause the natural exchange of gases. The capillaries are located between the ultra-thin membranes and separate the bubbles, so they are in close proximity to the air inside the surrounding bubbles. The epithelial wall of the vesicles, the endothelial wall of the capillaries, and the basement membrane between them normally block gas exchange. The thickness of this dam is less than 1 micrometer and does not interfere much with gas exchange. According to the increase in the total cross section of the respiratory tract, the resistance decreases significantly. Hence the velocity of the gas flowing through the airways is reduced. During exercise, any increase in cardiac output can be distributed within the lungs, without a significant increase in pulmonary arterial pressure [4].

Figure 1: (a) view of lung, (b) view of Cut view of Alveoli Sacs.

The role of CO2 gas in the respiratory system: The respiratory center is located in the brainstem and causes the heart to beat and stimulates breathing. The output of the respiratory center by the inputs of central and peripheral chemical receptors, mechanical receptors within the lungs, and higher centers of the brain is one of the factors in conscious control of the cerebral cortex. The respiratory center in the medulla oblongata is responsible for determining the level of ventilation. Carbon dioxide is the main factor controlling ventilation. Carbon dioxide in arterial blood is released through the blood-brain barrier, thereby lowering the pH of cerebrospinal fluid and stimulating central chemical receptors [5]. Changes in Paco2 increase or decrease ventilation to a greater or lesser extent than normal. The Changes in Paco2 increase or decrease ventilation to a greater or lesser extent than normal.

Lung simulation: As the mass of an object is composed of its constituent particles. An image also consists of a large number of these points called cloud points. The more points obtained from the medical imaging device, the more accurate the model obtained. Each of these points has a value and direction relative to the origin of the coordinates (x, y, z).

Modeling process: The files produced by the CT scan medical imaging device have an extension called Dic These files are written by an intelligent toolbox using images processing technology in the Python programming language and converts Dic files to cloud points files or with the STL extension [6] . This technology was developed by researchers at HCPSRC LTD. The cloud point file is then converted to a 3D model by the Geo-Magic for SolidWorks module. For analysis, the created 3D model was converted to IJS file extension and the analysis was performed in Ansys CFX software.

Figure 2: Sample cloud dots file in editing process stage.

Pressure force, resistance

The forces: The force required by man to breathe depends on the volume of incoming air per unit time. During inhalation, 79.3660794 ml of air enters the human lungs in each atmosphere. The amount of air needed by humans depends on important factors such as age, gender, weight, activity status and etc. For example, to enter 500 ml of air, we need a vacuum force of 6.3 atmospheres. This means to the fact that for an each vacuum of atmosphere, 79.36 ml of air enters the human lung. The oxygen content of the air is 20.6%. In general, a healthy adult male consumes about 300 ml / min of oxygen O2 and simultaneously produces about 250 ml / min of CO2 carbon dioxide. The normal range of oxygen consumption in untrained individuals is 35-40 ml per kg of body weight per minute and for women is 27-31 ml per kg of body weight per minute [7].

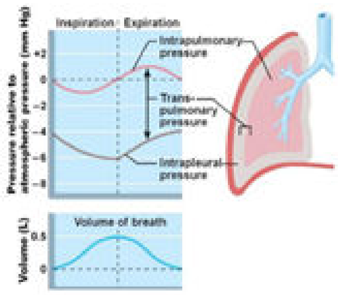

Figure 3: Pressure relative to atmosphere and volume.

Name	Diameter	length	Number	Total cross area	Total volume cm 3	Total resistance (Pa. s/m 3)
trachea	18 mm	120 mm	1	2.54 cm 2	30.54 cm 3	911. 88 (Pa. s/m 3)
Main bronchi	12.2 mm	4.76 mm	2	2.34 cm 2	11.8 cm	860.61 (Pa. s/m 3)
labor bronchi	0.83 mm	1.9 mm	4	2.16 cm 2	4.11 cm	798.41 (Pa. s/m 3)
Segmental bronchi	0.45 mm	0.76 mm	8 generations (2 to 4)	1.97 cm 2	1.5 cm 3	770.58 (Pa. s/m 3)
Sub-segmental bronchi	0.53 mm	1.27 mm	16 generations (2 to 4)	2.54 cm 2	3.24 cm 3	1.544 (Pa. s/m 3)
Terminal bronchi	0.45 mm	0.76 mm	16	-	3.24 cm 3	1.544 (Pa. s/m 3)
bronchioles	0.35 mm to 0.049 mm (generation 5 to 16)	1.07 mm to 0.112 mm (generation 5 to 16)	32 generation (5 to 16)	3.08 cm to 123 cm2	3.29 (cm 3 to 13.84 cm 3)	1.777.49 (Pa. s/m 3) to 236.48 (Pa. s/m 3)
terminal respiratory bronchioles	0.35 mm to 0.049 mm (generation 5 to 16)	1.07 mm to 0.112 mm (generation 5 to 16)	generation (17 to 19) 524, 288	123.58 cm 2 to 533.66 cm 2	3.29 (cm 3 to 13.84 cm 3)	1.777.49 (Pa. s/m 3) to 236.48 (Pa. s/m 3)
respiratory bronchioles	0.036 mm (generation 7 to 19)	0.070 mm (generation 7 to 19)	32 to 524, 288 (generation 7 to 19)	533.66 cm (generation 7 to 19)	37.36 cm 3 (generation 7 to 19)	63.41 (Pa. s/m 3)
Alveoli sacs	0.029 mm (generation 20 to 22)	0.075 mm (generation 20 to 22)	4.194.304 (generation 20 to 22)	2.770.4 (generation 20 to 22)	165.82 cm 3 (generation 20 to 22)	18.02 (Pa. s/m 3)
Alveoli sacs	0.025 mm (generation 23)	0.075 mm (generation 23)	8.388.608 (generation 23)	4.117.7 4 cm (generation 23)	308.83 (cm 3 (generation 23)	18.26 (Pa. s/m 3)

Table 1: Complete table of average dimensions of adult human lung in 23 branches (length, width, diameter, area, volume, resistance).

Pressure: Pressure is a quantity of a fence defined as a force per unit area. Pressure has a value but no direction. But the force is directed. The flow pressure drop at low resistances is low and proportional to the air flow. In this case, the flux pattern is layered. At higher fluxes, the airflow is turbulent, and the rate of pressure drop at higher resistances is greater than the flux. If the airflow pattern is multilayered and the flux is related to linear pressure, it has its maximum value.

$$(1)\ P = \frac{F}{A}\ (1) \sigma_n = lim \frac{\delta F_n}{\delta A}\ \text{(1) General pressure formula}$$

$$\frac{1}{\sqrt{cf}} = AL, (R_e \sqrt{c_F}\ ) + c(2)\ \text{Friction coefficient for turbulent flow}$$

$$(2) \frac{d}{d_n}(PUA) = 0 \frac{d}{d_X}[\ (PUA)] = -A \frac{d_p}{d_x} \text{(3) Fluid flow in a duct}$$

Resistance: Air velocity, type of air flow, layered or turbulent, as well as the physical properties of the airways (radius and length) are the main factors determining the resistance of the airways. Among the physical properties, the radius of the airways is the main factor. In the case of laminar flow (spindle flow pattern) the resistance increases by 4 ^squared and in the case of turbulent flow (turbulent flow pattern) the resistance increases by ^ 5 squared. Because as the volume of the lungs increases, the diameter of the airways in the lungs increases. The amount of flux resistance can increase due to the accumulation of discharge or other contaminants. Also, by distilling water vapor (present in exhalation), its flow characteristic changes. Simultaneously with the flux characteristic, the viscosity of the flux also changes, which is itself due to the ratio of gases in the breathing air as well as the air temperature. Pulmonary circulation is a low-resistance circuit so that the resistance of the pulmonary arteries is about 0.1 of the systemic circulation resistance. Passive contraction of the respiratory tract causes positive bubble pressure during exhalation until the lungs are at rest and the bubble pressure is again equal to atmospheric pressure [8].

Friction: In practice, we face friction (elastic currents) and on the other hand, to move the fluid, the lungs like pumps to increase the energy of the fluid. Also, if the ambient temperature and liquids are different, we will have a temperature transfer [9].

$$\text{Resistance} = \Delta PA - a_{0/current}\ (5.4)$$

Navier-Stokes equations in most applications of fluid mechanics, such as aerodynamics and turbochargers, the Navier-Stokes equations are used to analyze the fluid flow velocity field. There are also methods such as flow performance in fluids that can be used to analyze flow analytically.

$$F = \frac{DP}{Dt}\ \text{(5) The force acting on the fluid mass}$$

$$\delta \sum F = \frac{\delta}{\delta t} \int_{CV} v_p\, d\forall + \int v_p v\, .\check{n} dA\ \text{(6) The force acting on a fluid mass in integral form}$$

$$\delta F = \frac{D(V \delta M)}{Dt}\ \text{(7) The force applied to the mass of the fluid in differential form}$$

In the above equation δF, we show the force on the mass δm. In this method, the value of δm can be considered as a constant.

Diagnosis of lung diseases

Diagnosis of pulmonary obstruction: As mentioned earlier, the first 15 branches of the lung play the role of the airways. Any infection in the bronchi and bronchioles causes deformation of the pulmonary duct, stenosis and pressure .changes, increased resistance and number of breaths. Changes in lung airway resistance and pressure depend on the type of disease, the type of infection, and the severity of the disease. As mentioned earlier, the resistance value increases by 4^ squared, and in turbulent flow conditions (turbulent flow pattern), the resistance increases by ^ 5 squared [10]. Such as asthma and chronic bronchitis. In diseases associated with airway obstruction due to endogenous mucosal mass inside the pulmonary duct, smooth muscle contraction of the ducts as well as dynamic airway compression is evident. The most characteristic feature of the obstructive pulmonary disease pattern is a decrease in expiratory flow velocities. This means that in patients with pulmonary obstruction, the ratio of expiratory force to vital capacity force decreases per second. In these conditions, the patient was able to apply less than 33% of the required force or 70% of the lung volume in the first second of exhalation. Also in these diseases, the force reduction is in the range of 1.4 to 3.4. The hallmark of restrictive pattern disease is a decrease in the expiratory force ratio per second, but due to decreased lung compliance and increased elasticity, the flow rate may be even higher than normal [11] . Unlike COPD, the ratio of expiratory force per second to vital capacity force is normal or more than normal. In restrictive disease, the amount of residual respiratory volume and total lung volume is also less than the desired amount.

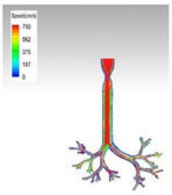

Figure 4: View of CPOD diseases in the finite element analyze simulation speeds(cm/s).

Asthma: As mentioned before. The bronchi are the main route for air to reach the right and left lungs. And transports air to other airways such as the bronchioles. Inflammation of the bronchi and bronchioles can cause narrowing of the airways and asthma attacks. The disease causes wheezing, chest tightness and severe breathing problems. There are different types of asthma that can affect the function of the bronchi. Sensitivity to a substance can lead to an allergic reaction that eventually causes inflammation in the airways and bronchi, eventually closing the airways completely [12]. The level of resistance in the patient is significantly increased. This increase is due to severe inflammation of the pulmonary conduction ducts. The rate of increase is approximately equal to the power of five compared to a healthy person. As a result, the flow rate in the bronchioles is significantly reduced, which is a special symptom of asthma attacks [13].

Diagnosis of Covid 19

The process of progression of Covid 19 disease: The most important aspect of the corona virus is that it affects many molecular pathways. Viruses are unable to replicate because they lack the molecular machinery to produce proteins, so they use victim cells to spread their genetic material by hijacking machines into cells [14]. Viruses are unable to replicate because they lack the molecular machinery to produce proteins, so they use the victim's cells to spread their genetic material to reproduce through acquiring intracellular components. In his research, Andrew Emily concluded that the corona virus can completely alter cell metabolism and damage the cell nucleus in three to six hours. Researchers at Boston University also found that the virus began to destroy lung cells from the beginning of its entry into the lungs. According to Dr. Rafael Viscoide, an infectious disease specialist at Johns Hopkins University of Medical Sciences, the virus travels from the trachea to the lungs after multiplication, causing more respiratory problems such as bronchitis and pneumonia [15]. Pneumonia is characterized by symptoms of shortness of breath with cough and affects the alveolar air sacs. In pneumonia, the thin layer of alveolar cells is damaged by the virus, in which the body responds by sending immune cells to the lungs to fight the virus. The corona virus surrounds the cell membrane of the cell and holds most of the cell's genetic information. Normally, the cell nucleus controls and regulates normal functions [16]. The coronavirus surrounds the cell membrane of the cell and holds most of the cell's genetic information. Normally, the cell nucleus controls and regulates normal functions. Infection of the cell nucleus by the Covid 19 virus rapidly and adversely alters cell function. Blockage of cells that play an important role in the essential exchange of oxygen and carbon dioxide during respiration and kills these cells. The corona virus also emits signals that increase inflammation and trigger a specific biological activity that leads to faster cell death, eventually leading to pneumonia, acute respiratory distress and lung failure. As the disease progresses, glass turbidity is seen on CT scans. . A type of turbidity found in viral respiratory infections in parts of the lungs. And as the disease progresses, these areas become dull, and in some places scattered and thick. Radiologists call it the "crazy paving pattern"[4] Impaired oxygen flow causes the lungs to fill with fluid, such as pus and dead cells. Pneumonia or lung infection occurs [17]. The most unpleasant possible condition is known as acute respiratory distress syndrome. In this condition, the lungs become so full of fluid that respiratory support is ineffective and the patient dies. Covid 19 virus after proliferation, unlike obstructive pulmonary disease, it attacks the lower branches of the lungs. This is where oxygen gas is exchanged with carbon dioxide. The primary Covid 19 virus rapidly multiplies after entering the respiratory tract by infecting ciliated cells. As a result of reduced respiratory power, the volume of air entering and the amount of oxygen in the blood decreases. The virus causes widespread inflammation. The body succumbs and leads to multiple organ failure. If the body's immune system can't fight off the virus, it spreads to every corner of the body, causing more damage. At this stage the treatment will be very aggressive and the result will be extra oxygenation of the extracellular membrane. In acute COVID 19 disease, the main problem is that the immune system is now out of control and damaging the body. When blood pressure drops to dangerous levels, it can lead to septic shock. Acute Respiratory Distress Syndrome, caused by widespread inflammation in the lungs, stops the oxygen needed to survive. There is also a possibility of kidney damage as a result of not purifying the blood and damaging the intestines. On the other hand, there is no guarantee that the current vaccine formulation will be effective, as the virus has found new mutations over time [18]. It is easy to find the symptoms of COVID-19 associated with acute respiratory distress syndrome on X-ray with the help of a radiologist. However, acute respiratory distress syndrome is not easy in the early stages with the help of radiologists. Because the symptoms of COVID-19 can be similar to other viral infections such as RSV pneumonia. Symptoms of COVID-19 can be similar to other viral infections such as RSV pneumonia. The ciliated cells, clean the nasal membrane of fine airborne particles and dust. The mucous cells in the nasal wall moisturize the air entering the body.

Mutant type of Delta and Predicting a new type of virus Delta Plus 2 mutant: The emergence of a mutant version of the virus in

India, along with the disease Black Fungus or Mucormycosis, signaled a new and dangerous mutant species called Delta. Mucormycosis is a fungal disease that exploits of weakened immune system and enters the body through the sinuses. It precipitates the sinuses. If the immune system is unable to control the disease, it attacks the base of the brain. After the onset of the first symptoms of Covid 19, such as fever, headache, eye pain, etc., a delayed pattern; it creates very favorable conditions for the growth of other microorganisms such as bacteria and fungi [19]. There are still no signs of lung involvement. At this time, the smallest diseases and infections with a previous background are activated in the main organs of the body, such as: gastrointestinal, heart, kidney, sinuses, any incomplete treatment of diseases in childhood, etc. In the delayed pattern, the disease can be asymptomatic for 9 to 12 days in respiratory system, such as coughing or shortness of breath. At this time, the Delta plus 2 virus replicates by repositioning itself. It then suddenly attack like lightning strikes the victim's lungs. Unfortunately, in the delayed pattern, the person often has no symptoms of coughing or shortness of breath, which is why the patient prefers to stay in home quarantine [20]. And continue with common treatments. Research shows that Remdesiver 100 (2020) mg is still one of the most effective drugs. Some doctors' focus on the patient's lungs is not enough, and the slightest underlying disease should be inspection and considered. The author calls this method of virus function a brutal delay pattern. In describing the brutal delay pattern, for example, a 46-year-old female patient weighing 82 kg with covid19 disease Delta Plus type. From the beginning of the disease, the author recorded the patient's clinical symptoms during quarantine [21-24]. For the first 9 days, the patient did not have any of the initial symptoms of lung involvement, such as coughing, shortness of breath, increased respiration rate per minute, and etc. In the early morning hours of the tenth day, the first cough started and after two days, 55% of the patient's lungs were involved. Which was improved by transfer to the intensive care unit by oxygenation and treatment with rimidsiver drug and antibiotics such as ceftriaxone. On the first day of use of Remidsver, the lung involvement continued up to 58%but by continuing treatment and stopping the virus moving forward, the patient recovered after 6 days. Favipiravir tablet medicine had no effect on controlling the initial treatment of Delta plu

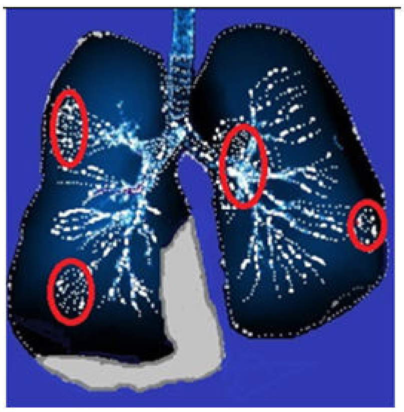

Figure 5: Virus spreading in red circles in the finite element simulation (Lung involvement rate 60%).

Artificial intelligence to diagnose the type of lung disease: Artificial intelligence is equipped with four sensors to detect data: force, current, temperature and CO2 measurement And connects to the computer via USB port. After transferring the data to the computer via USB port, the necessary calculations and analysis are performed to determine the values of the effective parameters in the disease. Also web-based artificial intelligence will also be able to useful provide patient information's online to the treating physician, even at home. This information is graphical and visual. Also information's such as: the type and severity of the disease, the latest treatments suggested by other physicians, available medications, and approved protocols online in order to expedite the better treatment process .

Conclusion

Diagnosis of diseases was performed using chest CT scan images by converting Dic files to STL and making 3d model, simulation was performed. After performing various stages of medical data processing, we extracted a list of effective parameters in diagnosing diseases. To diagnose the disease, the effective factors in the disease were compared between healthy and sick individuals in similar conditions such as age, sex, weight and so on. The diagnosing calculations are performed by artificial intelligence through data obtained from the patient. We analyzed the amount of changes in the factors of diseases in comparison with a healthy person and used them to determine the type of disease. Left and right lungs Can be separated and analyzed separately. In order to eliminate errors, we took action by increasing the contrast as well as removing images of poor quality or images that the patient was likely to move during imaging. We also tested some filters to extract additional features such as Gabor filter, GLCM, image temperature map, lung abnormality, lung pixel intensity and lung affected area based on thermal map. In patients with pulmonary obstruction such as asthma and chronic bronchitis, the rate of inflammation of the pulmonary ducts and the amount of high resistance and low current intensity in asthma attacks is slightly higher than in chronic bronchitis. The rate of increase in resistance is equal than the power of four to five initial values of resistance, and as a result, the pressure drop in the ducts and the number of breaths is higher, as shown in diagrams and In order to eliminate errors, by the Python software, we designed an artificial intelligence that is equipped with four sensors, force, pressure, heat and measuring the amount of co2 gas, these four sensors play a key role in data processing in artificial intelligence. Diagnosis of medical imaging can be confusing for inexperienced radiologists, while boring for experienced people. Diagnosis of COVID 19 is difficult in the early stages and may be confused with pulmonary pneumonia. Glass opacity is seen on CT scan. A type of turbidity found in viral respiratory infections in parts of the lungs. As the disease progresses in these areas, the opacity of the glass changes to dark and opaque, and in some places it is scattered and thick. Radiologists call it the "crazy paving pattern." The exclusive focus of a limited number of physicians on the lung is not sufficient to treat patients with the COVID 19 disease of the delta and gamma mutations types. Because according to the weakening of the immune system, a good opportunity for other microorganisms; Even with the slightest history of previous disease, it causes bacterial, fungal, etc. and other infections in the early stages of the diseases. The simulation results show that the distribution of airflow in the lungs is dependent on the rate of lung infections. Obviously, the higher the degree of suffocation, the lower the air emission. The immune system's response to these infections sometimes occurs simultaneously and is known as the "cytokine storm." . We also predicted a new mutant of the corona virus and described the brutal delay pattern and mutant type of the Delta plus 2 virus and its behavior In Section 6.22.

Acknowledgements

Prof DR. Hussein Vatan Poor .Dr. Mehrad Shashani, Dr.Mehdi Mahjoub, Royal society of medicine for covid 19 series and Sadat Abad center Clinic.

References

1. Choi, Eun-Sook, Al Faruque Hasan, Kim Jung-Hee, and Cho Jang-Hee, et al. "Immunochromatographic Assay to Detect A-Tubulin in Urine for the Diagnosis of Kidney Injury." J Clini Lab Ana 34, (2020): e23015.
2. Assandri, Roberto, Buscarini Elisabetta, Canetta Ciro, and Scartabellati Alessandro, et al. "Laboratory Biomarkers predicting COVID-19 severity in the Emergency room." Arch Medical Res 51, (2020): 598-599.
3. Wang, Dawei, Hu Bo, Hu Chang, and Zhu Fangfang, et al. "Clinical Characteristics of 138 Hospitalized Patients with 2019 Novel Coronavirus–Infected Pneumonia In Wuhan, China." *Jama* 323, (2020): 1061-1069.
4. Huang, Chaolin, Wang Yeming, Li Xingwang, and Ren Lili, et al. "Clinical Features of Patients Infected with 2019 Novel Coronavirus in Wuhan, China." lancet 395, (2020): 497-506.
5. Guan, Wei-jie, Ni Zheng-yi, Hu Yu, and Liang Wen-hua, et al. "Clinical Characteristics of Coronavirus Disease 2019 In China." *New England J Med* 382, (2020): 1708-1720.
6. Aronson, Jeffrey K, and E Ferner Robin. "Biomarkers—a General Review." Curr Proto Pharmacol 76, (2017): 9-23.
7. Long, Chunqin, Xu Huaxiang, Shen Qinglin, and Zhang Xianghai, et al. "Diagnosis of the Coronavirus Disease (COVID-19): rRT-PCR or CT?." European J Radiol 126 (2020): 108961.
8. Fang, Yicheng, Zhang Huangqi, Xie Jicheng, and Lin Minjie, et al. "Sensitivity of chest CT for COVID-19: comparison to RT-PCR." Radiol 296, (2020): E115-E117.
9. Ai, Tao, Yang Zhenlu, Hou Hongyan, and Zhan Chenao, et al. "Correlation of Chest CT and RT-PCR Testing for Coronavirus Disease 2019 (COVID-19) In China: A Report Of 1014 Cases." Radiol 296, (2020): E32-E40.
10. Bishop, Joshua D, V Hsieh Helen, J Gasperino David, and H Weigl Bernhard. "Sensitivity Enhancement in Lateral Flow Assays: A Systems Perspective." *Lab on a Chip* 19, (2019): 2486-2499.
11. Choi, Eun-Sook, Faruque Hasan Al, Kim Jung-Hee, and Cho Jang-Hee, et al. "Immunochromatographic Assay to Detect A-Tubulin in Urine for the Diagnosis of Kidney Injury." J Clinc Labo Ana 34, (2020): e23015.
12. Das, Dipankar, Kammila Sriram, and R Suresh Mavanur, et al. "Development, Characterization, and Application of Monoclonal Antibodies against Severe Acute Respiratory Syndrome Coronavirus Nucleocapsid Protein." Clinic Vaccine Immunol 17, (2010): 2033-2036.
13. Kubina, Robert, and Dziedzic Arkadiusz. "Molecular and Serological Tests for COVID-19. A Comparative Review of SARS-Cov-2 Coronavirus Laboratory and Point-Of-Care Diagnostics." Diagnostics 10, (2020): 434.
14. Le Bert, Nina, T Tan Anthony, Kunasegaran Kamini, and YL Tham Christine, et al. "SARS-Cov-2-Specific T Cell Immunity in Cases of COVID-19 and SARS, and Uninfected Controls." *Nature* 584, (2020): 457-462.
15. Ledsgaard, Line, Kilstrup Mogens, Karatt-Vellatt Aneesh, and McCafferty John, et al. "Basics of antibody phage display technology." Toxins 10, (2018): 236.
16. Emanuel, Ezekiel J, Persad Govind, Upshur Ross, and Thome Beatriz, et al. "Fair Allocation of Scarce Medical Resources in the Time of Covid-19." *New England J Med* 382, (2020): 2049-2055.
17. Moons, Karel GM, G Altman Douglas, Vergouwe Yvonne, and Royston Patrick, et al. "Prognosis and prognostic research: application and impact of prognostic models in clinical practice." BmJ 338 (2009).
18. Wynants, Laure, Van Calster Ben, S Collins Gary, and D Riley Richard, et al. "Prediction Models for Diagnosis and Prognosis of Covid-19: Systematic Review and Critical Appraisal." bmJ 369 (2020).
19. Yadaw, Arjun S, Li Yan-chak, Bose Sonali, and Iyengar Ravi, et al. "Clinical Features of COVID-19 Mortality: Development and Validation of A Clinical Prediction Model." Lancet Digital Heal 2, (2020): e516-e525.
20. Wolff, Robert F, GM Moons Karel, D Riley Richard, and F Whiting Penny, et al. "PROBAST: A Tool to Assess the Risk of Bias and Applicability of Prediction Model Studies." *Ann Internal Med 170, (2019): 51-58.*
21. Xu, Tao, Mandal Mrinal, Long Richard, and Cheng Irene, et al. "An Edge-Region Force Guided Active Shape Approach for Automatic Lung Field Detection in Chest Radiographs." Comput Med Imag Graph 36, (2012): 452-463.
22. Candemir, Sema, Jaeger Stefan, Palaniappan Kannappan, and P Musco Jonathan, et al. "Lung segmentation in chest radiographs using anatomical atlases with nonrigid registration." IEEE transactions on medical imaging 33, (2013): 577-590.
23. Da Nobrega, Raul Victor M, P Rebouças Filho Pedro, B Rodrigues Murillo, and PP da Silva Suane, et al. "Lung Nodule Malignancy Classification in Chest Computed Tomography Images Using Transfer Learning and Convolutional Neural Networks." Neural Comput Appl 32, (2020): 11065-11082.
24. Zotin, Aleksandr, Hamad Yousif, Simonov Konstantin, and Kurako Mikhail, et al. "Lung Boundary Detection for Chest X-Ray Images Classification Based on GLCM and Probabilistic Neural Networks."Procedia Comp Sci 159 (2019): 1439-1448

How to cite this article: Lambert,Edward, Majd Rahbar, Hooman, Angarski Sofia, Moradi Elaheh, Vahidi Mehdi. "Design Artificial Intelligence in Order to Simulation and Biomechanical Analysis Of Lung Diseases in the Form of Artificial Intelligence to Improve the Diagnosis and Treatment of Lung Diseases, Chronic Bronchitis Covid 19 Disease and Predicting A New Strain of Delta Plus Virus 2 ." J Bioengineer & Biomedical Sci11 (2021) : 274.