What is Coronavirus (COVID-19) and How to Cope with This Dangerous Virus: A Simple Explanation
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Introduction – A primer on the nature of viruses.

As an introduction to discussing the Coronavirus, let's first describe what is a virus? A virus is a nonliving, extremely small organism (which is invisible to the naked eye and even a standard laboratory microscope), and which has the ability to reproduce itself only by entering a susceptible living cell, such as the cells in a human being. We refer to this '*human person or individual*' as the ***host*** for the virus, and in the host the virus can then upon entry, reproduce itself to extremely high levels.
As such, viruses differ from most other infectious agents, such as most bacteria and parasites, which do not necessarily require entry into a living cell, in order to reproduce (or replicate). The difference in the way that a virus replicates, as compared to other microorganisms, is fundamental to what medical treatments or approaches can be used to stop the spread of a disease caused by a virus.
The current virus which is causing the pandemic (i.e. world-wide disease) is called a Coronavirus. This particular Coronavirus was given the name COVID-19 to distinguish it from viruses which are similar in chemical composition (e.g. flu viruses).
In humans, coronaviruses are included in the spectrum of viruses which cause the common cold, as well as more severe respiratory disease—specifically, severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), which are both zoonoses (i.e. diseases of animal origin which have been spread to humans). The latter two viruses resulted in virus epidemics in recent years.
While viruses such as the Coronaviruses most likely have been present on Earth for literally thousands of years, outbreaks of disease from new '*strains*' of a virus (such as coronavirus and influenza viruses), typically occur when the virus mutates (i.e. changes its genetic code). Such changes in the genetic composition allows the virus to then infect new hosts, such as humans, rather than existing in the animal species, from which it originated, or in which it may reside in an non-apparent form. A prime example, of the spread of new infectious virus resulting from a relatively simple mutation, is the seasonal flu virus. Each year, older members and others in our society are encouraged to get the latest flu vaccine, which has been modified in its manufacture to recognize the new strain of influenza virus. Immunization with the new virus vaccine reduces the chance of coming down with that year's flu. Because each virus strain is genetically unique, there are no current vaccines which can be used to prevent infection by COVID-19. Thus, there is no 'natural immunity' to COVID-19 in the world population.

Questions and Answers

- *Where did the coronavirus (COVID-19) originate (i.e. come from) and when did it originate?*
    - This particular strain of Coronavirus (COVID-19) appears to have first been identified in China in the fall of 2019. However, it is difficult to say when, where and how the first person became infected.
    - In terms of its origin, Coronaviruses may have existed for thousands of years, so it is not clear when COVID-19 might have first infected humans.
    - Other viruses similar to Coronavirus (e.g. influenza [flu virus] have natural reservoirs (which means a living host) where they can exist without causing disease in that host. This type of infection is commonly referred to as a *silent infection*. However, when a virus mutates (i.e. genetically changes), the genetic change may allow the virus to infect other species (e.g.

humans). In this case, it is no longer a silent infection, but can cause sickness in the new host.

- *Is this virus unique to humans, e.g. can my pets transmit the virus to me?*
    - While the *host range* (i.e. various animals in which the virus replicates) of the COVID-19 is yet to be clearly determined, it would appear at this time, that pets and other lower animal species are not readily susceptible to (become sick) from COVID-19. While it might be possible for the virus to be carried on the animal fur, it would appear at this point that the virus is not transmitted directly from animal pets. At the same time, individuals who live in very close contact with domesticated animals (e.g. live fowl, in marketplaces in oriental countries) are prone to become infected with viruses, such as Coronaviruses which are known to reside in an '*inapparent state of infection' (aka silent infection)* in those animals.
- *How is this virus spread in the human population?*
    - The primary way (mode) for Coronavirus transmission is from *direct contact** with a person who is already infected with the virus. *Examples of direct contact would be touching, hugging or in close proximity to a sick person who is coughing or sneezing. The virus can also be spread indirectly from an infected person. An example of *indirect contact* would be coming in contact with the virus which has been inadvertently deposited on a physical surface.
    - Because COVID-19 basically infects the respiratory system, it is transmitted from an infected person to other persons in minute droplets, e.g. sneeze, cough or by contact with a surface which has become contaminated with the virus from the infected person.
    - Consequently, the virus may already be deposited on the surface of an object which the infected person touches, coughs or sneezes upon.
    - Because the COVID-19 basically resides in the respiratory system (lungs, nose) in an infected human, it is less likely that the virus can be spread by other routes of infection (e.g. sexual transmission or ingestion on food or beverages).
- *How can I contract (i.e. become infected) this virus?*
    - Only by coming in close contact with an infected (or sick person) who has contracted the COVID-19, or a hard (e.g. package, door knob, floor, gas station pump handle) surface.
- *Why should I stay at home and avoid crowds?*
    - Persons in a group setting are commonly coming in direct contact with others, who might be carrying the infectious virus. Examples, would be via handshakes, hugs, close voice contact. This close contact (i.e. within several feet of others) increases the likelihood that the virus might be transmitted from an infected person to another person in the form of droplet (i.e. sneeze, cough).
- *Why is good hygiene important in protecting me against infection with COVID-19?*
    - In the event that you come in contact with COVID-19, regular handwashing (soap and warm water), hand sanitizers, alcohol wipes will remove or inactivate the virus from your hands.
    - By avoiding the rubbing your eyes or touching your nose you also reduce the likelihood that the virus will come in contact with the moist surfaces of your respiratory system; these are commonly referred to as '*portals of entry*' for such viruses.

- *Can I become infected by eating foods which might be 'contaminated' from contact with an infected person?*
    - While there are no absolutes with COVID-19, it is less likely that infection might occur from contaminated food since the virus would be rendered inactive, once it comes in contact with the digestive system in the stomach.
- *What is considered a hard surface and why might some surfaces be more difficult to decontaminate (destroy or remove the virus from)?*
    - An example of a hard surface would include; table tops, kitchen/bathroom sinks, door knobs and floors.
    - Some surfaces are more porous (e.g. cardboard containers) and are difficult to decontaminate because the virus (being extremely small) can reside in the very tiny spaces of cardboard material.
    - Additionally, because the virus has a somewhat-protective outer covering (called an envelope), it is difficult to render members of the Coronavirus family non-infectious unless the individual virus particle has come in direct contact with the disinfectant.
- *If the clinical symptoms of COVID-19 are similar to the seasonal flu and/or common cold, why is COVID-19 considered more dangerous than the others?*
    - When we compare COVID-19 to the seasonal flu and other viruses e.g. the often referred 'common cold', indeed this virus is more dangerous. However, when compared to other viral epidemics from the past (e.g. Spanish flu, SARS and MERS), COVID-19 may be comparable in terms of incidence of disease (*i.e. morbidity*) and frequency of death (i.e. *mortality*).
    - At the same time, it would appear that because COVID-19 has an affinity for infecting specific portions of the lung, it is more dangerous for older individuals or persons whose immune system has been weakened (*i.e. immune compromised*), and whose immunological response to the virus differs from that of children and young adults.
- *What does asymptomatic mean? And why can a person acquire the COVID-19 virus without* ***knowingly*** *coming in contact with an infected person?*
    - The term ***asymptomatic*** means not showing any symptoms of being sick.
    - A person may not realize that he or she is infected, because it takes several days between the time when a person first comes in contact with (aka time of infection) the virus, and for the first symptoms of illness to occur. During that period (incubation), the virus is multiplying rapidly inside the person. The newly replicated virus then is ***shed*** (transmitted) from that person to others; primarily through interpersonal contact (e.g. coughing, hugging, hand-shake, or touching inanimate objects).
    - It is also possible that individuals differ in their susceptibility to COVID-19, and thus not exhibit same degree of illness upon infection. Such factors which may account for differences include that person's genetic makeup, age, sex, and state of health and nutrition.
- *If I become infected, how long must I stay in isolation from others?*
    - Most certainly you should stay isolated from others until all symptoms of illness have subsided. *As an example, how long would you want to stay away from friends, or family members, if you came down with the flu?*

- Until we have further guidance on this, regarding the transmissibility of COVID-19, from our U.S. health officials, common sense should prevail. Don't venture out in public until you have fully recovered from this virus or any other virus, which is transmissible via personal contact.

- *If the COVID-19 is considered to be most dangerous for older persons or immune compromised individuals, why is it still important to apply the same standards of quarantine to young persons?*
  - While the frequency of serious illness and death is highest in these groups, all persons are susceptible to infection and transmission of the disease to others. Thus, common gathering places serve as a means by which the virus can be transmitted to others regardless of age.
  - While younger adults who contract COVID-19 are less likely to die from the virus, data collected thus far indicate adults 20-54 years of age are being infected at a higher rate than the very young and older persons. Not only does this put other young adult (who they associate with) at increased risk of infection, but also their families and older persons whom they come in contact with.
- *Why will it take so long to get a vaccine for COVID-19, and when will a vaccine be available to the general public?*
  - In our country, approval of new biologics (e.g. vaccines) require Food and Drug Approval before that product can be used to treat healthy individuals. This commonly requires a series of tests to show safety tests (i.e. determine that it does not harm the individual receiving the vaccine) and efficacy tests (i.e. determine that it works to prevent disease). In the past these tests take months to years to complete. This is not to say that some of these FDA requirements could not be modified, and the time to administer the new vaccine shortened. Rather it needs to be recognized that a new vaccine for COVID-19 would only be effective, if the vaccine prevents further spread of the virus. Even then the new vaccine will not have application in treating persons who are already infected with the virus.
- *Are there other 'medicines' available to treat COVID-19?*
  - The briefings made by U.S. health officials to the general public on March 18th and 19th and appear to indicate that there were several new approaches to treat persons who are ill with the virus. One of these potential treatments is a family of drugs which has been effectively used to treat other non-viral diseases.
  - The effectiveness of such drugs will certainly help reduce the severity of the COVID-19 epidemic.
  - It would also appear that other drugs might do likewise and it was reported that our government is rapidly screening candidate therapeutics. As an example, today's briefing mentioned the use of immune serum (i.e. blood serum from a person who recovered from the virus) which could be directly administered to another sick person thus reducing the severity of that person's disease.
- *How soon will there be tests available to test everyone who may be ill or who might have unknowingly come in contact with an infected person?*
  - Briefings of the general public made by the President Trump's team of specialists on March 18th and 19th indicated that literally thousands of tests for presence of COVID-19 are being produced and distributed for testing of those regions of the country, where there have been reported higher number of persons with the COVID-19 illness. It is reasonable that the tests

will be used preferentially in those states where the highest frequency of infections are occurring.

- *Why should I not go for testing unless I feel sick?*
    - The current test is based on finding evidence (presence of the virus in your system) that you have already come in contact with another infected individual and showing signs (i.e. symptoms) of infection. This result would be scored positive for the COVID-19 infection.
    - A negative test would simply mean that you currently are not at the stage of transmitting the virus, if infected.
- *How does the current test recognize that a person has become infected with COVID-19?*
    - It is my understanding that an individual is considered infected with COVID-19, if the virus can be recovered (e.g. on a test sample) from that individual, and is found positive upon laboratory testing of that biological test sample. Traditionally, such samples may involve a swab of the nose or throat from that person to obtain a sample for testing.
- *How long will the quarantine last?*
    - I think that the length will be determined by the success of: reducing the rate of spread of the virus and the success of predicting the spread using the testing. This past week's reporting indicates that testing has been accelerated and placed in strategic areas of the U.S. where the most cases are occurring.
- *Should I be afraid to go outdoors?*
    - Individuals who are currently healthy should not be afraid to go outdoors; i.e. to do outdoor activities, which do not bring them in close contacts with others, especially groups of persons. Gardening, hiking, bicycling, walking, jogging in the open air should be encouraged. In contrast, avoid close contact such as found traveling on airlines, trains and going in restaurants, bars. This is the reason why large gatherings such as churches, schools, theatres, athletic events have been cancelled to restrict individuals from coming into close contact with potentially infected persons.
- *Should I wear a mask when I go out in public?*
    - To clarify this question! If you have symptoms consistent with those typical of COVID-19 infection (e.g. fever, dry cough and perhaps fatigue) you should not venture out in public. Stay at home.
    - If you do **not** have symptoms associated with the virus, wearing a mask (i.e. common dust mask) will most likely **not** protect you from infection, if you were to come in contact with the virus through an aerosol emanating from a person who is infected and coughing, or sneezing. As of today it would appear that due to the shortage of masks health care workers are being encouraged to be prudent in their use of masks because of the environment (e.g. hospitals, clinics) where they may be in close contact with an infected/sick person.
- *What are the common symptoms associated with COVID-19 infection?*
    - It would appear that the most common symptoms for COVID-19 are fever and dry cough. Some individuals also have reported sore throat, fatigue, aches and pains, headaches and shortness of breath. Realizing that many of the same symptoms accompany the flu virus and common cold, individuals having these symptoms, particularly the fever and dry cough, might consider being tested and taking appropriate measures to prevent the spread of their illness (whatever) to others.

- *What is **social distancing** and why is it important and how does it differ from a quarantine?*
    - Social distancing is the current term for separating yourself apart (i.e. creating a space) from others when out in public. Recommendations from our health care professionals is a minimum of 6 feet. This space separation between individuals is very important in that it (i.e. the distance) lessens the likelihood that if a person who is ill were to cough or sneeze in your presence, that you would come in contact with the virus which may (or may not) be contained in a droplet from that person.
    - In general, the term *quarantine* refers to the process (which has been used for centuries) to prevent disease spread from a specific locale. This practice* was very effective in stopping the spread of a number of contagious diseases in the past.
    - In a sense the intentional 'isolation' of infected or potentially infected individuals or groups from coming into contact with other susceptible persons meets the following definition.

    *(Webster definition: quarantine is the period of forty (40) days which a vessel suspected of carrying a contagious disease is detained before entry into a port).

- *Why is it important to break the **'chain of infection'** for the Coronavirus?*
    - The Coronavirus, like many other viruses which cause respiratory illness, are transmitted from person-to-person, either directly through interpersonal contact or indirectly in the case of handling an inanimate object which is contaminated. The medical term for this type of transfer is commonly referred to as the *'chain of infection'*. It is possible therefore to *'break the chain'* by reducing the likelihood that the virus will spread to another susceptible person through the recommended practices noted previously, e.g. social distancing, hand washing, cleaning of potentially contaminated surfaces. Such simple personal daily practices will systematically reduce the spread of the Coronavirus as well as other respiratory viruses to which we are exposed.

In that updates, on the status of all aspects of the COVID-19 pandemic, are changing literally every day; we encourage all persons to go daily to *cdc.gov>coronavirus* for the latest relevant information on diagnosis, treatment, and spread of this disease which is challenging the faith and strength of humanity.