

VIRUSES: Just the Facts

Dr. Jon Lieff, author of *The Secret Language of Cells*

- Viruses are the most dominant life form all over the world and inside of each of us.
- They contain more varied genes than all other creatures combined.
- Viruses in the ocean kill large percentages of particular bacteria each day which greatly influences cycles of carbon, oxygen, and CO₂ in the ocean and in the atmosphere.
- Viruses are the major source of information transferred back and forth among all cells. Examples include transport of resistance genes for bacteria to fight against antibiotics and genes transferred among cancer cells to fight anti-cancer medications.
- Viruses communicate among themselves with signals. While the first signals from bacteria were discovered decades ago and only now are being deciphered, the first virus signals were discovered three years ago and much more needs to be learned to help with emerging viruses like COVID. Many signals have already been found in the viruses that cause hepatitis, polio, measles, and flu. When scientists are able to better understand these virus signals, new treatments will be developed against infectious viruses and bacteria.
- It is already known that the novel coronavirus (technically called SARS-CoV-2), the virus that causes the illness COVID-19, has great capabilities, with fifteen genes that produce at least twenty-nine proteins. Each of these proteins has multiple elaborate functions related to human cells.
- Many viruses travelling inside our bodies can be very helpful such as supporting friendly bacteria in the gut and helping them fight off dangerous invading bacteria. Active viruses are, also, engineered to fight cancer and they have been used to inject genes into cells to reverse genetic diseases such as hemophilia.
- A large amount of very ancient virus genes are embedded in each of our cell's DNA (up to 50%), where they can make copies of themselves, each slightly different, and paste these copies throughout our cell's DNA. Many of these virus genes actively produce important RNAs and proteins. Prominent examples include the molecule that enabled the human placenta to develop and the digestive enzyme amylase from the salivary gland. Hundreds of other old virus genes are vital to the developing human embryo (especially the unique human brain), and stem cells throughout the body. Embryonic stem cells have more products related to these viral genes than any other types of cells—two percent of all RNA produced in stem cells. Negative embedded virus genes cause as many as a hundred diseases.

Contact: Kim Weiss/PR By the Book
kim@prbythebook.com