Why No Icing on the ARV Cake?

One of the best things about being a kid is birthday parties. And what is a birthday party without a cake? Even for an adult a surprise birthday party or a dinner out with family or friends can be highlighted by the tradition of singing Happy Birthday and blowing out all the candles on the cake. Such memories. But did anyone ever get a birthday cake with candles but no icing on the cake? Highly doubtful. Who would ever forget to ice the cake? No one.

If it is not obvious yet, we live in the Age of Pandemics. This dawned forty years ago when AIDS suddenly appeared, approximately twenty years after vaccines had almost vanquished polio. Pandemics have ravaged humanity since before the Black Plague of 16th Century Europe. Smallpox, polio, tuberculosis, and influenza cut swaths through populations leaving families, cities, and nations poorer. Some pandemics arrive, last a year or so and vanish, not to return for another century or two. Others like influenza continue circling the globe, mutating as they go. Many scientists think Covid-19, caused by the SARS-Cov-2 virus, will become an annual nuisance like influenza and people will have to take an annual corona vaccination to prevent reinfection. Most pandemics arise from the unseeable world of viruses, new ones emerging from the biome when least expected. Epidemics like Ebola, Zika, SARS or MERS appear and before you know it, they are gone, often suppressed through the diligent work of the World Health Organization (WHO) and national centres for disease control - CDCs.

Some epidemics appear suddenly, cause panic and before you can say abracadabra they disappear. Others like HIV and tuberculosis linger for decades, even centuries. While HIV/AIDS has been the most devastating new disease of our lifetime, for the last four centuries tuberculosis has killed more people on Earth than any other disease – up to 25% of all those who have lived during that time. That includes my grandmother. While people continue to celebrate birthdays and lead productive, loving, successful lives; far too many have been cut down in the prime of life due to HIV, TB or Covid-19 with far too few candles on their birthday cakes. Although scientists have made huge strides improving HIV therapy, they continue to be blindsided when previously unknown viruses arise and therapeutics developed specifically for one viral wave are ineffective when the next microbial wave rolls in to knock humanity off its feet. Why? Are scientists missing something? Did a piece of the scientific puzzle fall off the table and go missing? Or did researchers just forget to put the icing on the antiviral cake?

I first became interested in HIV therapies when there were no drugs to treat AIDS. When the scientist met me in a cramped windowless room at the Multi-Centered AIDS Cohort Study - MACS – at UCLA in Los Angeles, California in 1985 she informed me, “You are HIV positive. As you know, there are no drugs to treat this disease and we may never have a drug to treat this disease because we have never had a drug that could treat a retrovirus.” OK I thought, I may have five years to live if I am lucky. What am I going to do? At that moment I had no idea.

By 1986 people with AIDS were excited about the potential of AZT and activists such as ACT UP were marching to demand its release. The first drug approved to treat HIV - AZT was finally approved in September 1987 at the unaffordable price of $18,000 a year. Originally developed to treat cancer, the side effects of AZT were too strong for cancer patients to take. However, people dying of AIDS were lining up to swallow it, even though it supposedly extended life only about six months. It was their only hope. I started taking AZT on New Year’s Day 1989, but to save money and avoid side effects I took it at only half-dose. Luckily, that turned out to be the most effective dose, although AZT was never particularly effective. My research in 2001 working with one of Zimbabwe’s top immunologist demonstrated that overall, AZT was not even as effective as aspirin in improving health of people with HIV.

Obviously, AZT would not save my life or add many candles to my cake, so in 1990 I started to carefully experiment on myself with various proposed complementary treatments for HIV. The first two I tried, the herb St John’s Wort and the amino-acid N-acetylcysteine showed no effect at all. The third try with aspirin amazingly almost doubled my CD4 white blood cell count! But my CD4 only stayed up for one year. Still, aspirin provided hope and it was far better than AZT alone. After observing this phenomenal increase in CD4 count I was intensely curious to explain this effect scientifically. Immediately I plunged into the medical school libraries at the University of California Los Angeles (UCLA) and the University of Southern California (USC) and over the next few years read hundreds of medical journal articles and dozens of books about virology and immunology and how the knowledge developed by those scientific disciplines intersected. The questions were, how do viruses affect the human immune system? How does the immune system affect viruses? How do human immune cells communicate? I thought if aspirin could help against HIV, then maybe there was something else out there to discover. In fact, there was. Ten years later I started taking selenium. The transitory benefit aspirin provided increasing CD4 count was far surpassed by selenium. Selenium’s benefit was more potent and lasted longer. Selenium was the real thing. After years studying selenium, I realized it is the key to the immune system - by far the strongest nutritional element to increase CD4 count, maintain immunity and overall good health. It also works as a broad-spectrum antiviral against most viruses that make people sick, not just HIV.

Medicine has come a long way from the days of AZT – only the second specific antiviral drug ever approved. Almost every year pharmaceutical companies make step-by-step progress improving AIDS therapies. Today ARV drugs

are more effective with fewer side effects and easier to take than ever. The most exciting leap forward came in 1996 at the International AIDS Conference in Vancouver, Canada when protease inhibitors were announced. The protease inhibitor class of drugs stopped the mass dying. The veil of desperation, tears, and premature death of the early AIDS Crisis finally lifted. The crying could stop - at least in America, Europe and the advanced industrialized countries that could afford the expensive new drugs. As usual, Africa had to wait. It waited nearly twenty years for AZT and more than a decade for protease inhibitors to arrive. A few in Africa are still waiting.

The pharmaceutical industry built its layer cake of antiretroviral drugs – ARVs – one layer at a time. The first layer was reverse transcriptase inhibitors (RTIs) - then improved RTIs. The second cake layer was protease inhibitors (PIs) - then improved PIs. The third layer includes integrase inhibitors and fusion inhibitors. The most profitable industry in the world, built a therapeutic cake for HIV that was highly effective, generally affordable, available to most people and easy to take. As Dr Pangloss in Voltaire's Candide would have proclaimed, "It is the best of all possible therapeutic cakes." But the painstakingly assembled antiviral layer cake still lacks icing. Why? The main reason is icing is not profitable enough. The icing could not be patented. What is the icing? Selenium.

Selenium is a mineral found on the periodic chart of basic chemical elements. It is found in every cell of the human body as part of both the cell's and the body's detox mechanisms. An essential trace element required for health; biologists refer to selenium as the "universally protective element". That is why not only every cell in the human body requires selenium, but most viruses that make people sick also need it. Where do viruses get it from? They get it from you. Frankly, viruses are selenium thieves.

As the universally protective element, selenium is concentrated in the cells and organs of the immune system. That is because the immune system requires a larger amount to do its job cleansing the body of infectious microbes. When viruses infect the body and redirect selenium towards their own replication, they drain a person's selenium reserves. That is how viruses, bacteria – and cancer – subvert the ability of the immune system to mount an effective immune response. Falling selenium levels in the body affect the thymus gland and how many CD4 cells it produces. As selenium levels fall, the body's CD4 count declines in tandem. To reverse this CD4 decline one can increase selenium intake with supplements. One cannot achieve this quickly through diet alone.

While taking ARVs will gradually increase one's CD4 count if they are HIV positive, adding selenium supplements speeds this up dramatically. In treating HIV ARVs and selenium do two different things. ARVs suppress viral replication quickly, strongly, and usually completely. That allows CD4 count to gradually recover. Working quite differently, selenium supplements act directly on the thymus gland where CD4 and CD8 immune cells are produced. When one increases selenium in the body, that nudges an immunological switch that causes the thymus to produce more CD4 cells and fewer CD8 cells. When selenium falls, the opposite happens. That is probably the most accurate explanation of how HIV causes AIDS - by depleting the body of its essential selenium. That is the same way the Ebola virus cause Ebola virus disease and many other viruses cause the diseases they do. How ARVs increase CD4 count has never been explained adequately. ARVs do this much slower than selenium supplements do. Since science is based on both logic and cause and effect, ARVs probably increase CD4 count by suppressing the selenium depleting effect of viral replication, allowing selenium resources to gradually recover. That signals the thymus to increase CD4 production.

So why do most doctors and governments fail to use selenium to help their HIV patients? Why is there no icing on the ARV cake? Just like icing on a cake, selenium therapy is complementary to ARV treatment and improves the therapeutic result. Icing does not replace the cake any more than selenium replaces ARVs. They are complementary. They are much better together.

By 1997 there was enough scientific proof to conclude selenium is quite beneficial against HIV disease, but larger studies were needed. By 2002 over thirty-two medical journal articles explained how selenium helps against HIV. They reported not only does selenium reduce viral replication working as an NF-*kappa*B inhibitor (NF*k*BI), it also works as an immune booster increasing CD4.

Finally, in 2006 the Nigerian Institute for Medical Research reported that adding just 200mcg of selenium to HAART AIDS therapy more than doubled the increase in CD4 count (+120 vs. +50) in advanced AIDS patients, and it tripled the increase in haemoglobin carrying oxygen (+30g/l vs. +10g/l). Then in 2016 the journal AIDS reported just 200mcg selenium daily can slow HIV progression to AIDS by 43.6%. Doubling the dosage of selenium in these two studies would have resulted in much more dramatic improvements.

Despite modern day Dr Panglosses assuring us otherwise, HIV therapeutics are not yet perfect for all. Approximately 5% of AIDS patients never recover adequate immune function. Newer waves of pandemics continue to roll towards shore including Ebola, Zika, Covid-19 and, still out to sea, Covid-25, plus other unimagined ones. The continuing failure of doctors, scientists, governments, and the WHO to address the problem of the uniced cake of HIV therapy is a major setback in our understanding of how to defend humanity from the next viral onslaught.

How many beloved people will not live to blow out another set of candles due to viral pandemics? As the poet Bob Dylan sang, "The answer my friend is blowing in the wind. The answer is blowing in the wind."

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