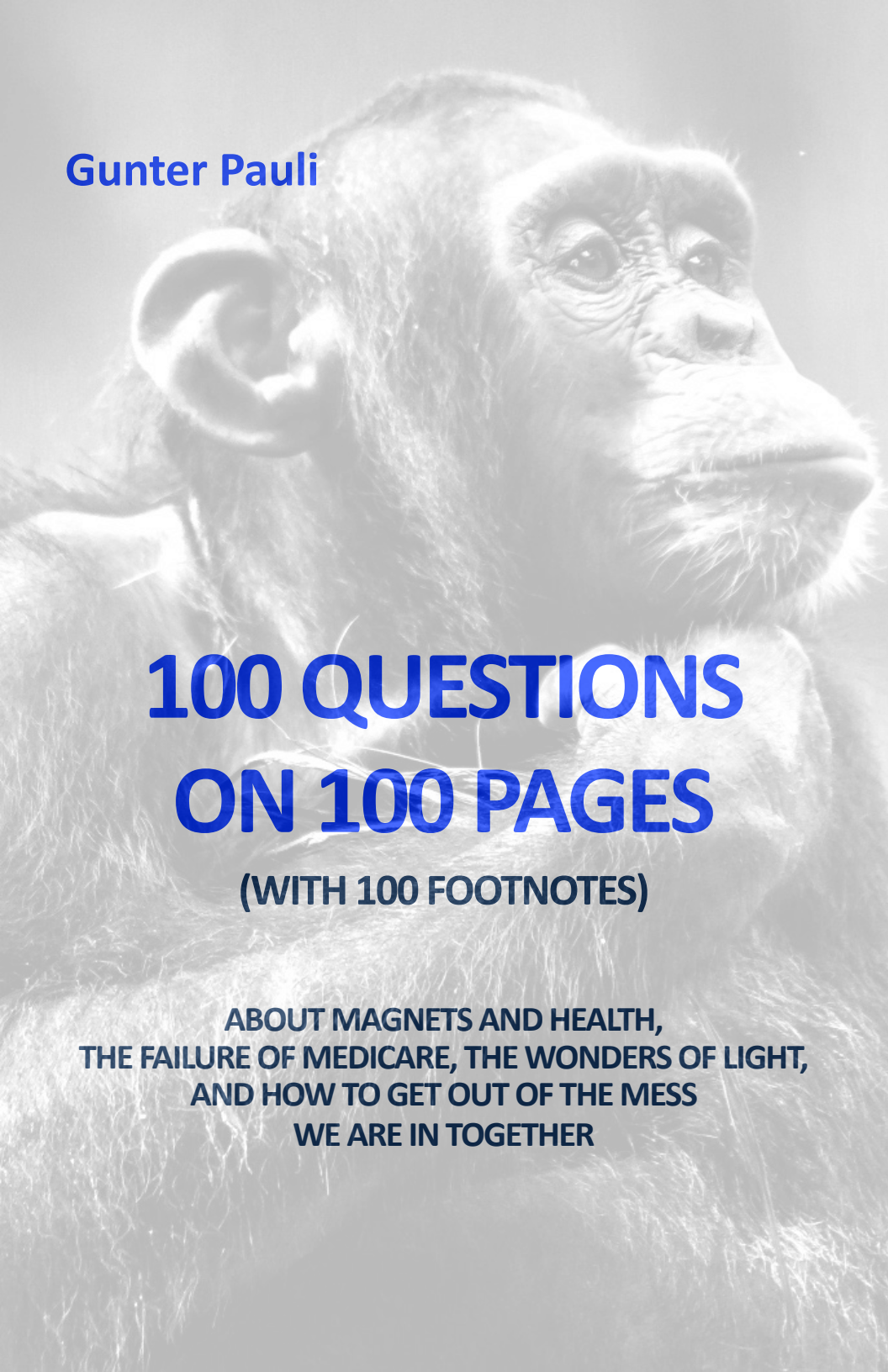
Gunter Pauli



100 QUESTIONS ON 100 PAGES

(WITH 100 FOOTNOTES)

ABOUT MAGNETS AND HEALTH,
THE FAILURE OF MEDICARE, THE WONDERS OF LIGHT,
AND HOW TO GET OUT OF THE MESS
WE ARE IN TOGETHER

2020

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If you have any questions write to

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Answers guaranteed!

DEDICATIONS

First this book is dedicated to all who suffered and succumbed to hunger, cancer, home violence, accidents, AIDS, Dengue, malaria, tuberculosis, stress and burn out, seeing no end to suffering, ultimately suicide in some cases. You have the right to ask why the world did not stop and focus on you. We failed.

Of course this book is also dedicated to the thousands of medical staff around the world who worked day and night, risking their own lives with what was available to alleviate the pain of those affected, accompanied thousands in their hardest moments. They deserve to be celebrated as the heroes of this pandemic.

RESPONSIBILITY

The content of this booklet only engages the author. The questions and answers, opinions of the scientists, entrepreneurs, financiers, policy makers and concerned citizens have all been considered and processed and remain anonymous. There are no dogmas nor interest groups associated, only the desire and the commitment to pass from analyses and insights to action.

WORDS OF THANKS

A special thanks goes to the team that supported me in the production of this booklet which was written, commented, corrected and edited within one month's time. I would like to mention Othmane and Deborah and I am indebted to many more - including those who added a strong voice regarding my questions.

“Everyone has two lives.

The second starts when you realize you only have one.”

Confucius

With increasing trade, travel, population density, human displacement, migration and deforestation, as well as climate change, a new era of the risk of epidemics has begun.

The number and diversity of epidemic events has been increasing over the past 30 years, a trend that is only expected to intensify.

Outbreak Readiness and Business Impact: Protecting Lives and Livelihoods across the Global Economy. Published by the World Economic Forum (Davos) in cooperation with the Harvard Global Health Institute January 2019

A few words to start our conversation

It all started with a Tweet: Whether or not we are ready to apply the scientific method of searching for correlations as a means to identifying the causes and effects of this hard hitting pandemic -in particular- in Wuhan and Northern Italy. Hundreds of thousands responded. Most were not nice at all, and a first salvo rang out from those who found this question offensive. When people suffer or worse, when they die, we must make an effort to ask: Why? Only then can we tackle the root causes.

So I took a deep dive into the network of science and scientists that have been associates for more than twenty-five years. I discovered the questions I ask are the same questions as many others. And the answers I gathered were the same as many others too. Then, to my dismay, I learned that a disproportionate number of those who asked for explanations and imagined the correlations amongst phenomena were treated with even more aggression and ridicule by a tight network of individuals.

I talked to medical doctors and nurses, to researchers and virologists, exchanged with epidemiologists. I realized that some

accounts (traced back to three sources) systematically attack any hint, news or snippet of information that does not align with their point of view. Hence my desire to ask questions grew, resolutely asking even more questions … and gathering answers backed by science and personal testimonials. I soon reached one hundred questions and answers. I do not doubt there are many more questions.

In the spirit of all my work, I have no time nor interest in being forced into arguments about who is “right” or “wrong". My only interest is to find better solutions, which can also arise from pertinent questions people ask regarding what they do not understand, what they do not want, and what they imagine. This short treatise offers a few clarifications without pretending to offer a comprehensive answer.

However pragmatic questions and suggestions would be incomplete without considering a few policy considerations and options. Policy makers at every level need a pragmatic framework as well as an agenda to pass onto action. We need to go beyond the raging debate regarding vaccines, electromagnetic fields, and the lockdown of a country. Everyone should have a chance to see the context within which policies are determined and implemented.

While there is room for interchange regarding the hard realities of lockdowns, along with what potentially makes sense or doesn’t. We also need to urgently look ahead and address possible options for kickstarting the economy, with a few questions on how to evolve the economy beyond the globalized model. These questions include considering the longer term expense and detriments due to being “cheap” and short-sighted by cutting costs and corners at the social, health, educational, and environmental level.

What started with a mere Tweet led me into contemplating various pockets of logic, knowledge and wisdom, and how to bring

them altogether. Another recent Tweet places the responsibility squarely on my shoulders to inspire and act hand in hand with thousands who want to liberate their country from inadequate action, tired of the fact that nothing changes. Citizens are wise and sense that interests groups are jockeying to strengthen their position and make use of weaknesses and spread fear.

However, so many citizens find themselves at the physical, mental and economic bottom, who want to move towards a society that transforms for the better. As the old saying goes: “One should not loose the chance to learn from a drama or from an error”

I have learned a lot from this process of asking more and more questions. As I prepare to provide these insights through social media and free book online, it is my hope that people will keep one key principle at the core of all reflections and actions: We are not looking to be right, nor prove others wrong. Instead we want to inspire people, and offer possible concrete steps forward with one goal in mind: We can do better together more than ever imagined before provided we are willing to evolve.

Gunter Pauli
Bogota, Easter Day 2020

Table of Content

Everyone has the right to ask questions. We ask questions and search for answers in scientific literature. Followed by checking in with experts and exploring differing points of view. We've made selections and the following is as brief as possible along with footnotes wherever appropriate.

Part 2 The Incapacity

If modern medicine is unable to bring a rapid and convincing response to a virus, and the lockdown is the main option chosen by the politicians, what options do the public have? Can we strengthen the immune system, or should we rely on the promise of a vaccine? Questions to the experts who focus on immune systems (strengthening the good) are balanced against the virologists and epidemiologists who place the harsh reality of the virus in a context of a society that has not resolved numerous other causes of death.

Part 3: Is there Better?

If we limit our debate to the definition of “good” vs. “bad”, then we loose the opportunity to embrace better. If we search for a light at the end of the tunnel, a better world could emerge. So what are some options? We checked with innovators and entrepreneurs and monitored their responses. Is there an opportunity to generate jobs and do good for a better world?

Part 4

The Governments' decision to opt for a lockdown is the first play in a difficult game. The second play of the game will decide how to revive the economy. We talk to the people who have experience in taking a community that is at the point of collapse and try to understand how to revive the local economy.

Part 5

The readers have questions about the author, the organization and the philosophy that is underpinning the actions pursued over the past 26 years.

INTRODUCTION

WHY A BOOK?

The book is structured around one hundred questions and answers. Here are the first ones to illicit the reader why this book was written.

1. What triggered the redaction of this book?

Since there is no outright explanation of cause and effect, one simple tweet pointing to the need for science to explore possible correlations between a viral outbreak and electromagnetism triggered an aggressive attack that continued weeks after the message was posted. The question is why was there such a concerted onslaught from the media in this regard? Aside from the usual and typical political fallout and attacks that were foreseeable, it is proof of radical forces that do not even want to hear questions.

2. Who is behind these attacks?

The strings of attacks oscillating between ridiculing and consternation were narrowed down by internet experts to only three sources. Some people granted themselves the right to attack and to coerce anyone who raises concerns they do not permit to be raised to shut up.

3. What is at stake when you are not allowed to even ask questions?

As the opposition mobilizes its forces to try to put a stop to a mere question, the reverse of the intended effect is taking place. The desire and the determination of citizens like me -and several thousand others- to claim their right to ask a simple question is strengthened. It would be easy to debate the facts, as we are doing

in this briefing, provided one has the right to speak up. But something bigger is at stake for a mere tweet to be so attacked: Democracy. History warns that intimidation techniques deployed by the Nazis began with verbal abuse, but ended with the use of force and even extermination.

4. How does the industry address concerns of science and citizens?

When listening to questions raised by the US Senator Richard Blumenthal (D-CT) in the Senate Committee Hearing on Commerce, Science, and Transportation in February 2019, the wireless communication's industry representatives admitted there were no studies that investigate the biological effects of 5G Wireless Technology[1]. While the opposition systematically attacks whoever questions the deployment of such technology, the industry in the United States admitted they do not have evidence to refute citizen's concerns, nor able to refute their counter arguments. This is a surprising situation.

5. Are the lack of answers and aggressions a disappointment ?

The pandemic and the incapacity of the entire system to respond to a health crisis involving one virus is disappointing. At the same time, dozens of other illnesses and causes of mortality are left unaddressed. This exposes a deeper risk to face: The undermining of free speech and the power of a few technocrats. If raising questions on anything that does not fit with the logic that a few determine to be "the truth" and a priority above all else, then we will have to brace ourselves for another worrying world order. Unfortunately the

[1] Transcript of the February 6, 2019 Committee Hearing on https://www.youtube.com/watch?v=ekNC0J3xx1w

blunt strategy to force any voices to shut down that are not in line with the "admissible," intimidates many. It does not intimate me! On the contrary, it has strengthened my resolve to undertake research, find solutions, point in the right directions and share insights gained.

6. How can we overcome these aggressions based on dogmas?

While I am determined to continue to ask questions, I also remain firmly determined to learn more about the sciences and share my impressions. And hope enough wisdom exists to respond to my queries with more questions so we can learn together. Unlike the aggressors who are driven by dogma or commercial interests, I submit myself to the scientific method: The never ending search for cause and effect, leading to changes in hypotheses as required by findings. Scanning for correlations expands vistas to explore new horizons that were not previously considered, leading to innovative pathways so urgently needed.

7. What is the purpose of this series of questions?

The purpose of this book is not to undermine the present state of scientific knowledge. Nor act against leading technologies. The purpose is to motivate policy makers, scientists, entrepreneurs and members of civil society to focus on how we can do better together. It is clear that the present state of affairs in health care, including the use or misuse of the precautionary principles in relation to the introduction of new technologies, does not merit our appreciation or applause.

We (everyone who collaborated) want to enlighten the reader on an urgently needed debate on health, magnetism and radiation.

Then, it seems key to share insights on how we can improve our health and strengthen our immune system, while others worry about (and wish to impose) “medicine that cures”. The ideal is for society not to be split between the good and the bad, the right and the wrong. Our goal is to point to the pathways that embrace the better. And why not much better.

8. Do you realize this booklet will create a stir?

I did not come into the world to please everyone. I have learned to navigate the waves and with a clear conscience embrace what my scientists, my antennas in society, consider much better for all. The main issue that preoccupies me now is to figure out how to steer these insights into policy action. And this requires a solid debate on one hand, reaching people’s mind, heart and soul. Then people will make up their mind and move to action for the better.

PART 1

Q&A FROM
MY WORLD OF SCIENCE

The question series start with a review of magnetic fields, electromagnetic frequencies and a search for a better understanding what science has studied. This permits us to understand the present, and what is required to determine policies in line with the precautionary principles that aim to protect citizens from possible risks.

9. Are magnetic fields natural or man-made?

The Earth's magnetic field was born 3.45 billion years ago. A magnetic field (MF) is inescapable on Earth. Scientists calculated that the Earth's magnetic field protected early life from harmful solar wind and radiation. People, plants and animals are and have always been exposed[2]. More, all living organisms experienced since the beginning of evolution the Earth's variations of magnetic fields, gravity, light, temperature and water. Every thing adapted. All of these factors, except gravity, changed over millions of years.

Magnetic fields influence life in general and even the very biological processes which determine life have evolved in its presence. Over the past century, the Earth's magnetic field has been complemented by human innovations through the construction of massive infrastructures from electric networks reaching every corner to tens of thousands satellites flying permanently around the Earth; and, wireless communications keeping us in touch with one another wherever we are.

[2] The Earth's Magnetic Field is 3.5 billion years old. Wired Magazine https://www.wired.com/2010/03/earths-magnetic-field-is-35-billion-years-old/

10. Can magnetic fields destroy forms of life?

The electricity that comes out of every power socket has low electromagnetic fields. High frequency radio waves to transmit information – whether via TV antennas, radio stations or mobile phone base stations – are more powerful. Electromagnetic waves with a higher frequency (shorter wavelength) carry more energy than lower frequency (longer wavelength). Some electromagnetic waves carry so much energy they have the ability to destroy molecules.

Few people realize that every thought and emotion of a living being is a measurable frequency[3]. All human body systems are regulated by electromagnetic signals. Therefore, it is essential to evaluate how electric and magnetic fields impact humans, and all living species that combine to make life on this planet what is. What we need to understand is how electromagnetic fields impact life from the cellular level upwards. This is not a human-centered challenge, it must include all forms of life, including bacteria and viruses.

11. What is the difference between man-made and natural EMF?

Man-made electromagnetic fields (EMF) created by electricity, microwaves and radio frequencies have relatively long wavelengths with a low frequency. Some EMF are unable to break chemical bonds as X-rays do. However, all types of human-made electromagnetic fields and radiation, in contrast to those that are natural, are polarized. This implies that this radiation has increased biological activity. Explained by their ability to generate

[3] Rahm T, Heise E, Schuldt M. Measuring the frequency of emotions-validation of the Scale of Positive and Negative Experience (SPANE) in Germany. *PLoS One*. 2017;12(2):e0171288. Published 2017 Feb 8. doi:10.1371/journal.pone.0171288

interferences, magnifying intensity in specific places[4]. The industry knows this, and yet has not capable of explaining what this increased radiation intensity in locations implies for people (and the ecosystem) exposed to it. This obliges science and industry to advise policy makers not about the electromagnetic fields and radiation of one device, but the radiation of all of them combined in a real context.

12. What is the difference between electric and magnetic fields?

The intensity of electric fields from power lines outside a house are reduced by walls, buildings, and trees. When power lines are buried in the ground, the electric fields at the surface are hardly detectable. Magnetic fields on the other hand arise from the motion of electric charges. A magnetic field is only produced once a device is switched on and current flows. The higher the current, the greater the strength of the magnetic field. These magnetic fields are not blocked by common materials such as the walls of buildings[5], so they affect us even when not in a line of sight.

13. Can humans sense ElectroMagnetic Fields?

Today everyone is exposed to a complex and increasing mix of weak electric and magnetic fields, both at home and at work, on holidays and while on the road in cars and public transportation, even in hospitals, from power sources, domestic appliances and

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[4] Panagopoulos DJ, Johansson O, Carlo GL. Polarization: A Key Difference between Man-made and Natural Electromagnetic Fields, in regard to Biological Activity. *Sci Rep*. 2015;5:14914. Published 2015 Oct 12. doi:10.1038/srep14914

[5] Information on Electromagnetic Fields provided by WHO see: https://www.who.int/peh-emf/about/WhatisEMF/en/

industrial equipment, to telecommunication systems and broadcasting. Fortunately over millions of years of evolution, living organisms developed specific mechanisms for the perception of natural electric and magnetic fields. Still, our generation of human beings is the first to be continuously subjected at varied and increasing doses and frequencies of magnetic fields all day and night long, all life long.

Magnetoreception allows an organism to detect a magnetic field. It is well described for honeybees, salmon, turtles, birds, whales, fruit flies, sea slugs and bats. This wildlife uses the geomagnetic fields in its navigation during an annual migration, or simply to find their way back home after a wave or gust of wind disoriented them. Dogs can be trained to locate buried magnets.

New scientific research unveiled that humans can also detect these magnetic fields[6]. If humans can subconsciously detect natural geomagnetic fields, then they can certainly sense polarized human-made ones as well. We have a sixth sense. Now that we know we have this sensitivity, we should also recognize that some people have an over-sensitivity.

14. How does the body detect magnetic fields?

Biological systems are able to detect even the most discrete magnetic fields through "windows" that include membranes, cells and tissue[7]. Sometimes these "windows" function through brain functions, the central nervous system, and could even be activated

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6 Kirschvink J, Shimoji s, Matani A. Evidence for a Human Geomagnetic Sense. eNeuro, 2019 March 18.

7 Clites BL, Pierce JT. Identifying Cellular and Molecular Mechanisms for Magnetosensation. *Annu Rev Neurosci*. 2017;40:231–250. doi:10.1146/annurev-neuro-072116-031312

via transduction (the introduction of new DNA)[8]. The sensitivity of a biological system to even very weak magnetic fields has been widely described in scientific literature[9]. We know that the size, strength and/or the frequency of magnetic fields have an impact on the biological functions of living species.

15. Why must we study the impact of magnetic fields on biology?

The frequency and intensity of exposure to magnetic fields has increased and is accelerating with rapid advances in science and technology. The proliferation of the Internet of Things (IoT) could soon reach an average concentration of 1 million devices per square kilometer[10], wireless communications, security monitoring systems, baby phones, GPS and satellites in orbit.

Therefore, it is necessary to systematically and continuously study the influence of magnetic fields on the body and the living environment around us. Now the static magnetic fields (like antennas) operate within a confined geometrical space. Since these magnetic fields are difficult to shield and can freely penetrate buildings and the body, we need to study their effect on biological life. We know for example that static magnetic fields interact directly with ions, proteins and magnetic material found inside the body (like

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[8] M. S. Markov, "'Biological windows': a tribute to W. Ross Adey," Environmentalist, vol. 25, no. 2–4, pp. 67–74, 2005.

[9] W. R. Adey, "Models of membranes of cerebral cells as substrates for information storage," BioSystems, vol. 8, no. 4, pp. 163–178, 1977.
W. R. Adey, "The sequence and energetic of cell membrane coupling to intracellular enzyme systems," Bioelectrochemistry and Bioenergetics, vol. 15, no. 3, pp. 447–456, 1986.
M. S. Markov, "Electromagnetic field influence on membranes," in Interfacial Phenomena in Biological System, M. Bender, Ed., pp. 171–192, Marcel Dekker, 1991.

[10] CLX Forum 2019, March 26. https://medium.com/clx-forum/1-million-iot-devices-per-square-km-are-we-ready-for-the-5g-transformation-5d2ba416a984

iron in haemoglobin)[11]. The question to ask is: "What does this mean for our health and wellbeing?"

16. Are there positive contributions of magnetic fields on biology?

Research on magnetic fields goes back more than a century. The better understanding of biological effects of magnetic fields has resulted in remarkable medical breakthroughs such as the transcranial magnetic stimulation (TMS) and the magnetic resonance imaging (MRI). These innovations have contributed to an amazing advance in understanding the brain. A new form of TMS has recently been applied to relieve patients from severe depression with suicidal tendencies.[12]

The advances in health care recently determined that static magnetic fields have the potential to serve as a complimentary treatment increasing the effectiveness of chemotherapy to fight tumors[13]. Since static magnetic fields influence cell growth, it can inhibit the proliferation and the structure of cancer cells. The killing effect of drugs on cancer cells is enhanced deploying radiowaves. This undoubtedly can be used to save lives of people suffering from cancer, the second most important cause of death (after hunger).

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[11] World Health Organization, "Static Fields," Environmental Health Criteria, 232, Geneva, Switzerland, 2006.

[12] American Journal of Psychiatry on April 6, 20202 reporting on Stanford Accelerated Intelligent Neuromodulation Therapy (SAINT) through https://www.sciencedaily.com/releases/2020/04/200407072716.htm

[13] S. Strieth, D. Strelczyk, M. E. Eichhorn et al., "Static magnetic fields induce blood flow decrease and platelet adherence in tumor microvessels," Cancer Biology & Therapy, vol. 7, no. 6, pp. 814–819, 2008.
D. Strelczyk, M. E. Eichhorn, S. Luedemann et al., "Static magnetic fields impair angiogenesis and growth of solid tumors in vivo," Cancer Biology and Therapy, vol. 8, no. 18, pp. 1756–1762, 2009.
R. R. Raylman, A. C. Clavo, and R. L. Wahl, "Exposure to strong static magnetic field slows the growth of human cancer cells in vitro," Bioelectromagnetics, vol. 17, no. 5, pp. 358–363, 1996.

17. How can we avoid the negative effects of magnetic fields?

The flip side of the coin is that radio waves of certain frequencies and strengths can impact cells positively and negatively. Any *excessive* exposure to magnetic fields leads to a stress on the immune system[14]. Since magnetic fields can be turned effective in cancer treatment, it is at the same time an indication that doses that are too high can be detrimental. The challenge is to define what the safe limit is. The World Health Organization (WHO) claims the present standards of electromagnetic fields and radiation are safe. The only proviso added by the WHO is that safety is only guaranteed as long as one remains within the permitted guidelines

One of the challenges is that Governments apply different standards and some, including Italy apply stricter standards than the recommended (but not imposed) standards of the European Union[15]. In addition, there are different standards for what is considered an occupational health risk and precautionary principles suggested (but not imposed) for home use.

18. Is there a synergy generated by many devices in one place?

This is an issue that has not yet been addressed very effectively: As we add more and more devises to our living environment, and as we rapidly increase the number of sources, the intensity and the volume of electromagnetic fields at home, in the

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[14] Kıvrak EG, Yurt KK, Kaplan AA, Alkan I, Altun G. Effects of electromagnetic fields exposure on the antioxidant defense system. *J Microsc Ultrastruct*. 2017;5(4):167–176. doi:10.1016/j.jmau.2017.07.003

[15] Comparison on International Policies for Electromagnetic Fields. 2018, Bilthoven, the Netherlands. National Institute for Public Health and the Environment. Ministry of Health, Welfare and Sport.

office, on the street and even in hospitals, the question arises: What is the safe level for devices used together?[16] While each one of these could be -individually- within the limits of tolerance, there is insufficient research available on the combination of dozens of wireless devices operating simultaneously, drenching us in a shower of electromagnetism. Who has researched not the cause and effect of one device in a laboratory, but a blend of emissions in an office or a hospital?

19. Is the potential negative effect new to the scientific community?

The negative effect of man-made magnetic fields has been well described in scientific literature for decades. For example, research has observed the exposure to magnetic fields might cause oxidative stress, genetic mutation, and even apoptosis[17]. Magnetic field exposure has been described as an initiator of a process that increases free radical formation in brain cells, leading to the destruction of DNA strands and cell death. These findings resulted in the definition of guidelines for exposure of the human body (for all body parts except arms and legs) to magnetic fields[18].

Scientific research described the effects of magnetic fields on cells. The increased risk of genotoxicity has been firmly established.

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[16] Kim JH, Lee JK, Kim HG, Kim KB, Kim HR. Possible Effects of Radiofrequency Electromagnetic Field Exposure on Central Nerve System. *Biomol Ther (Seoul)*. 2019;27(3):265–275. doi:10.4062/biomolther.2018.152

[17] N. Mohtat, F. L. Cozens, T. Hancock-Chen, J. C. Scaiano, J. McLean, and J. Kim, "Magnetic field effects on the behavior of radicals in protein and DNA environments," Photochemistry and Photobiology, vol. 67, no. 1, pp. 111–118, 1998.
L. Dini, "Phagocytosis of dying cells: influence of smoking and static magnetic fields," Apoptosis, vol. 15, no. 9, pp. 1147–1164, 2010.

[18] International Commission on Non-Ionizing Radiation Protection (ICNIRP), "Guidelines on limits of exposure to static magnetic fields," Health Physics, vol. 96, no. 4, pp. 504–514, 2009.

"Genotoxic effect" means the magnetic field potentially damages the genetic information within a cell. This could cause mutations, which may lead to cancer[19]. The study of these risks in vivo (on animals) is rather limited and therefore plays only an indicative role[20]. One could be wondering why research on this has not been undertaken more rigorously?

Additional research did indicate that exposure to magnetic fields induced stress in rats, which could be observed especially in the brain[21]. Further research uncovered a change of copper, manganese, cobalt and iron concentration in liver and kidneys of rats exposed to static and low-frequency magnetic fields[22].

20. Are there studies of the combined effect of MF with pollution?

While there are isolated and singular tests, researchers have to realize that our bodies and the ecosystems upon which we depend suffer from environmental and industrial pollution, in addition to this rapid increase in magnetic fields. Pollution causes multiple stress conditions, including DNA damage both at the nuclear and

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19 J. Miyakoshi, "Effects of static magnetic fields at the cellular level," Progress in Biophysics and Molecular Biology, vol. 87, no. 2-3, pp. 213–223, 2005.

20 AGNIR, "ELF electromagnetic fields and the risk of cancer. Report of an Advisory Group on Non-Ionising Radiation," Documents of the NRPB, vol. 12, no. 1, 2001.

21 S. Amara, T. Douki, C. Garel et al., "Effects of static magnetic field exposure on antioxidative enzymes activity and DNA in rat brain," General Physiology and Biophysics, vol. 28, no. 3, pp. 260–265, 2009.

22 D. Duda, J. Grzesik, and K. Pawlicki, "Changes in liver and kidney concentration of copper, manganese, cobalt and iron rats exposed to static and low-frequency (50 Hz) magnetic fields," Journal of Trace Elements and Electrolytes in Health and Disease, vol. 5, no. 3, pp. 181–186, 1991.

mitochondrial levels[23], and even cell death[24]. The combined exposure to ever increasing magnetic fields and toxic agents from air and water pollution is thus recognized as an important priority for research in order to better protect human health[25]. We wonder why there is such limited research on magnetic fields, and why there is even less interest in studying magnetic fields in this real context of environmental degradation.

21. What is the impact of magnetic fields on bacteria and viruses?

A key question to ask is the potential impact of magnetic fields on bacteria and viruses. To date, the majority of studies in this regard have focused impacts on the human body, plants and animals. We must search for the impact of magnetic fields on livings systems at home, university, and in a community. We need to verify the impact on the whole system including invisible forms of life, especially those that typically stress our immune system. Could research confirm or dismiss how magnetic fields render bacteria and viruses more or less potent?

The study of the impact of magnetic fields on viruses in the context of health hazards has to be studied in detail. However there are clear indications that all ramifications have not been sufficiently considered. A pioneering paper by virologists from the Italian

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[23] L. Potenza, C. Martinelli, E. Polidori et al., "Effects of a 300 mT static magnetic field on human umbilical vein endothelial cells," Bioelectromagnetics, vol. 31, no. 8, pp. 630–639, 2010.

11 B. Tenuzzo, C. Vergallo, and L. Dini, "Effect of 6 mT static magnetic field on the bcl-2, bax, p53 and hsp70 expression in freshly isolated and in vitro aged human lymphocytes," Tissue and Cell, vol. 41, no. 3, pp. 169–179, 2009.

[25] S. Amara, C. Garrel, A. Favier, K. Ben Rhouma, M. Sakly, and H. Abdelmelek, "Effect of static magnetic field and/or cadmium in the antioxidant enzymes activity in rat heart and skeletal muscle," General Physiology and Biophysics, vol. 28, no. 4, pp. 414–419, 2009.

National Research Institute published in 1997 confirms that a 50Hz electromagnetic field activates the herpes virus that has latently infected a human[26].

This herpes virus has since been scientifically established as a cause of cancer claiming up to 200,000 victims worldwide annually[27]. Complementary studies established that more than 3.7 billion people under the age of 50 – or 67% of the world's population – are infected with herpes simplex virus. Herpes is a lifelong infection, which often has mild or no symptoms, but can be detected by the presence of antibodies for herpes virus in the blood[28]. Now it has been established that the activity of the herpes virus in the body can be triggered by electromagnetic fields. Why have there been no more studies verifying this trigger effect on dozens of other viruses?

Prof. Luc Montaigner, the 2008 Nobel Laureate for discovering the HIV virus stated in his interview with CNews France that the introduction of 10,000 new 5G antennas could have contributed to the spread of the Coronavirus[29].

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[26] Grimaldi, Settimio & Pasquali, Emanuele & Barbatano, L & Lisi, A & Santoro, N & Serafino, A & Pozzi, Daniela. (1997). Exposure to a 50 Hz electromagnetic field induces activation of the Epstein-Barr virus genome in latently infected human lymphoid cells.. Journal of environmental pathology, toxicology and oncology : official organ of the International Society for Environmental Toxicology and Cancer. 16. 205-7.

[27] Cancer Research UK. A vaccine to prevent infection with a common herpes virus, the Epstein-Barr Virus (EBV), could help prevent up to 200,000 new cancers worldwide per year, say Cancer Research UK experts to mark the 50th anniversary of EBV's discovery, today (Monday March 24, 2014). https://www.cancerresearchuk.org/about-us/cancer-news/press-release/2014-03-24-developing-a-vaccine-for-the-epstein-barr-virus-could-prevent-up-to-200000-cancers-globally-say
Khan G, Hashim MJ (2014). "Global burden of deaths from Epstein-Barr virus attributable malignancies 1990-2010". *Infectious Agents and Cancer*. **9** (1): 38. Published online 2014 Nov 17. doi: 10.1186/1750-9378-9-38

[28] https://www.who.int/news-room/detail/28-10-2015-globally-an-estimated-two-thirds-of-the-population-under-50-are-infected-with-herpes-simplex-virus-type-1

[29] For the full review of the interview: https://www.cnews.fr/france/2020-04-18/tout-savoir-sur-le-professeur-luc-montagnier-dont-les-propos-sur-le-Coronavirus.

22. How do viruses and MF combined debilitate the immune system?

People with weak immune systems can have more severe symptoms and more frequent recurrences, leading to complications and even death. And, to complete the argument: citizens with a higher viral load (amongst others due to herpes) are more susceptible to succumb to the Coronavirus, even when young at age[30]. They will not die from from complications caused by the Coronavirus, their impaired (and sometimes unknown) health conditions succumb under the additional stress caused by the Coronavirus.

Virologist Michael Skinner working at Imperial College London confirms that it is very possible that some patients could have a particular genetic makeup that make them more likely to respond badly to an infection with this Coronavirus. An example of such susceptibility is provided by the herpes simplex virus, which causes cold sores[31]. We know from previous question (21) that this herpes virus is latently present in a large group of the world population, and could potentially be activated due to exposure to 50 Hz electromagnetic fields.

23. Does research demonstrate the negative impact on other life?

The research team from the Italian National Research Institute verified in more detail the impact on tadpoles exposed to

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30 Prof. Dr. Michael Skinner, Imperial College of London in Why do some young people die of Coronavirus, The Guardian, 2020, April 9 https://www.theguardian.com/world/2020/apr/09/why-do-some-young-people-die-of-Coronavirus-covid-19-genes-viral-load

31 McKie R, Why do some young people die of Coronavirus? As reported in The Guardian on April 9, 2020 https://www.theguardian.com/world/2020/apr/09/why-do-some-young-people-die-of-Coronavirus-covid-19-genes-viral-load

the same radiation as viruses. The study confirmed a significant impact: Only 45% of the exposed tadpoles transformed into frogs. Whereas the non-irradiated individuals had an 85% successful metamorphosis[32]. It is alarming that this research has not been repeated or expanded. As one can expect it has been ridiculed as too small. We should embark into a broader analysis to understand the greater impact on all forms of life.

24. Is Electromagnetic Hypersensitivity a real or imagined illness?

In 1970, a report from the former Soviet Union, described the "microwave syndrome" among military personnel working with radio and radar equipment, who showed symptoms that included fatigue, dizziness, headaches, problems with concentration, memory, and sleep disturbances. Similar symptoms were found in the 1980s among Swedes working in front of cathode ray tube monitors. The same symptoms were reported in Finns.

Most people are unaware of their exposure to electromagnetic fields, which have no smell, color, or visibility. Electromagnetic Hypersensitivity (EHS) has ranged in the population from 1.5% in Sweden to 13.3% in Taiwan. The objectively observed changes amongst people suffering from EHS based on reactions of the eye pupil, changes in heart rhythm, damage to erythrocytes, and disturbed glucose metabolism in the brain led to the recommendation to give EHS an International Classification of

[32] Grimaldi, Settimio & Pozzi, Daniela & A., Lisi & Rieti, Sabrina & V., Nanni & Ravagnan, Giampietro & L., Giuliani & T., Eremenko & Volpe, Pietro. (2000). Influence of the magnetic field on the tadpole metamorphosis. International Journal of Radiation Medicine. 1. 96-103.

Diseases, and to have it accepted as electromagnetic field-related health problems[33].

Meanwhile the debate continues about an accepted biological mechanism to explain hypersensitivity of citizens to magnetic fields especially as occupational hazards. Medical experts recognize EHS as a reality. However a fervent group still believes EHS is imaginary and the doses of electromagnetic fields and frequencies do not have any effect. Too many traditional scientists would not accept the ever stronger evidence since there is no established explanation of cause and effect. However, those who discard the emerging evidence on EHS should consider the scientific fact that people who believe they will get better, statistically do get better. So let's ask more questions!

25. Does people's perception have an impact?

The "Placebo effect" is sometimes used to explain a condition whereby a patient feels better after receiving placebo (or fake) treatment. Recently, researchers are finding that a placebo can also have specific, measurable effects on the brain and body. The Italian neuroscientist Fabrizio Benedetti, one of the pioneers of placebo research, identified multiple placebo effects.[34]. Placebo painkillers can trigger the release of natural pain-relieving chemicals called endorphins. Patients with Parkinson's disease respond to placebos

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[33] Hedendahl L, Carlberg M, Hardell L. Rev Environ Health. 2015;30(4):209-15. doi: 10.1515/reveh-2015-0012

Belyaev I, Dean A, Eger H, Hubmann G, Jandrisovits R, Kern M, Kundi M, Moshammer H, Lercher P, Müller K, Oberfeld G, Ohnsorge P, Pelzmann P, Scheingraber C, Thill R. EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses. Rev Environ Health. 2016 Sep 1;31(3):363-97. doi: 10.1515/reveh-2016-0011.

[34] Benedetti F, Carlino E, Pollo A. How placebos change the patient's brain. *Neuropsychopharmacology*. 2011;36(1):339–354. doi:10.1038/npp.2010.81

with a flood of dopamine. Fake oxygen, given to someone at high altitude, has been shown to cut levels of neurotransmitters called prostaglandins (which dilate blood vessels, among other things, and are responsible for many of the symptoms of altitude sickness).

None of these biological effects are caused by placebos themselves, which are by definition inert. They are in fact triggered by our psychological response to fake treatments. It can be called "mind over body" as described in the book by Jo Marchant[35] paraphrasing the "mind over matter" concept. She asks the question why on one hand the skeptics are so resistant to any suggestion that the mind influences health, while she wonders what drives people to believe claims that are not proven, but still seem to work?

The responses are complex and not fully understood but include our expectation that when we think we will feel better, we will feel better (which in turn is affected by all sorts of factors such as one's previous experience with treatment, how impressive or invasive a treatment is, and whether one is an optimistic person)! If in addition, the patient feels listened to and looked after, then the positive effect can even amplify.

26. Is there proof that when people believe it is bad, it will be bad?

When scientists like Dr. Benedetti accept the positive effect, scientists also accept that the mere presence and thought about the negative effect, can have a negative impact. This is known as the "the nocebo effect". There are several scientific studies delivering proof

[35] Marchant Jo. Cure: A Journey into the Science of Mind over Body. 2016, Canongate, UK, 368 pages.

but the most authoritative was published by The Lancet[36]. This established medical journal reported on the research analyzing the deaths of tens of thousands of adult Chinese-Americans, and randomly selected, matched with hundreds of thousands of controls coded “white” on the death certificate. Chinese-Americans, but not whites, die significantly earlier than normal (1.3-4.9 yr) if they have a combination of disease and a birth year which Chinese astrology and medicine consider ill-fated.

As demonstrated by the study, the more strongly a group was attached to Chinese traditions, that more years of life are lost. The results hold for nearly all major causes of death studied. The reduction in survival seems to be the result -at least partly- from psychosomatic processes, thus the state of mind.

27. If the concerns of people are not addressed, what will happen?

It is too quick of a conclusion to state that Chinese traditions cause premature death, just like it is too quick to claim that all magnetic fields are causing harm. The Western Scientific framework does not permit speaking in definite terms. There is always a “but” combined with a “need to study more”. However, based on extensive scientific research it is possible to say the correlation does exist at positive and negative levels in the minds of people, we must therefore take this non-rational fact into account when determining policy.

This urges the scientific community to adopt a much more holistic approach: If people believe (from astrology to the increase of electromagnetic radiation) there is a negative impact, then no one

[36] Phillip, D.P. and T.E. Ruth, e.a. (1993). Psychology and Survival. The Lancet 1993 Nov 6;342(8880):1142-5. DOI:10.1016/0140-6736(93)92124-c

can dismiss that it is likely to have an impact on up to 13% of the population[37]. Worse, the presence of concerns which are not sufficiently addressed by government, industry and science are certainlyto fail the confidence of people. This is likely to enhance the EHS.

28. If there are no definite and final conclusions what do we do?

The scientific discussion with inconclusive results has led to a frontal assault on anyone who questions the "facts" that there is a correlation between health and electromagnetic fields. The scientific rationale that traditionally aims at better understanding scientific phenomena has due to this polarization left the space of academic research and is entering the political arena. We notice that positions are defended along party lines, not according to conclusive scientific evidence.

29. If there is a call for more research, what can we do now?

There is a growing concern that the biologically active human-made electric and magnetic fields (EMFs) may be at the root of some health concerns. As we evaluate the hypotheses, study the framework conditions, observe behavior, then we must accept that human-made EMFs are more bioactive than natural electromagnetic fields. Therefore we have to create the space for more questions than answers. In the mean time, ***the precautionary principle must prevail*** while we increase our search for better scientific, technological and industrial solutions than we have been able to design and implement to date.

[37] Hedendahl L, o.c. footnote 30 p. 30.

PART 2

THE INCAPACITY

30. The health care system cannot cope. What to do next?

When a virus ends up on the radar screen of a virologists, and citizens become aware they run the risk of infection and possibly premature death, especially those with an overload of viruses, a depressed immune system and those of age, then politicians are forced to intervene. The politicians freaked out when the news broke about the spread of infections from China to the rest of the world with no cure at hand. An infectious and potentially deadly virus spreads - as viruses do - rapidly. The framework of the public response is complex and has been disappointing. Modern medicine stands empty handed. There are not enough face masks, there are not enough ventilators, there are no proven drugs or vaccines, and intensive care units are overwhelmed. Dramatic images of people dying in the hallway of a New York hospital to be buried in a public pit sent a hard message to everyone.

31. Is the Coronavirus the most fatal viral attack?

The call (from virologists and the industry) to lock down the world population until the vaccine is available[38] surprised anyone who studies the statistics related to this virus. The mortality rates of the novel Coronavirus is 2-3% for the persons infected. The rates for Severe Acute Respiratory Syndrome (SARS), which was first identified in Guangdong (China) reached 10%. The death rate from the Middle East Respiratory Syndrome (MERS) first detected in Saudi Arabia even went up to 34%[39]. Even with its relatively low fatality rates, the Coronavirus was declared a pandemic and all attention focused on this “situation”. Right or wrong, the world was suddenly conscious of

[38] Lockdowns may need to last until a vaccine. Cover of CNN on April 9, 2020.

[39] https://www.worldometers.info/Coronavirus/Coronavirus-death-rate/

the hard reality around it: There is no cure and no health care system anywhere able to handle the situation. The Western World experienced for the first time what the Third World faces every time the Dengue virus creates havoc with 400 million annual infections.

32. How to defend oneself when medicine has no cure?

This reality of having no cure combined with a tight lockdown forced people to bypass their doctors. Massively, citizens ignored the calls not to fall prey to “fake cures". Out of desperation citizens reached for vitamins and minerals they believe will strengthen their immune system and shield them from the worst, in case the virus does infect them. Almost overnight, people looked for natural over-the-counter alternative remedies that have long been discredited by the pharmaceutical industry. Some of these products even had received a “gag order”, a formal prohibition to sell. Still, people searched for a remedy, a product that will reduce the risk. Numerous medical doctors, who all too often are close to the pharmaceutical industry, went public against what they labelled “fake news” and “false claims”. However, since there was (and still is) no credible treatment but social distancing, communities all around the world have witnessed a historic rush to natural medicine to the point of diminished stocks of vitamin C, D and zinc pills in the stores.

33. Are novel medicines permitted?

The daily uninterrupted attention on the Coronavirus through the media convinced the public at large that solutions are theirs to test and find. However, the natural medicines got a strong boost through public initiatives. When on February 11, 2020 the US Government National Institute of Health approved clinical trials for

the intravenous Vitamin C treatment of the COVID-19 pneumonia, the Vitamin C treatment received a credibility label overnight.

When on March 1, 2020 the Orthomolecular News Service (OMNS)[40] reported that Vitamin C was working for patients in China and Korea, the demand went viral worldwide. Soon after studying the statistics of patients administered with Vitamin C, several Chinese media reported the treatment in several public hospitals. While numerous medical doctors continued their negative assessment of Vitamin C, pointing to the risk of nausea and kidney stones as side effects, and the counter indications for cancer patients, the verdict is clear: People will go for Vitamin C and risk nausea.

34. Do people have a choice when traditional medicine fails?

While the traditional media argued that vitamin C cannot slow or stop the virus they are seemingly missing the point: People have no options. Just like the Governments decided to lock their population down knowingly ruining the economy, people tend to seek alternative recourse. Scientists from the United States and Japan made an effort to describe the scientific rationale for Vitamin C therapy to the public at large[41]. The detailed explanation of the cause and effect between Vitamin C and its capacity to fight attacks on the immune system, resulted in thousands of clinics to administer this treatment to an ever larger part of the population that believes it is a viable option. Hence an acute shortage of Vitamin C.

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[40] Saul AW. News media attacks vitamin C treatment of COVID-19 Coronavirus. Orthomolecular Medicine News Service, March 1, 2020. http://orthomolecular.org/resources/omns/v16n15.shtml

[41] Richard Z Cheng, MD, PhD; Hanping Shi, MD, PhD; Atsuo Yanagisawa, MD, PhD; Thomas Levy, MD, JD; Andrew Saul, PhD. Early large dose intravenous Vitamin C is the treatment of choice for 219-nCov Pneumonia. Orthomolecular Medicine News Service, 2020 February 16.

35. How do viruses normally spread around the world?

Few virologists seem to be aware of the latest science on how viruses spread. While there is no doubt that personal contact with those carrying the virus represents the major cause of contamination, the typical rapid distribution has been neglected[42]. Millions of airborne viruses fly around each one of us every day. Billions of microbial travelers descend everywhere on Earth, transported by air currents around the world. Viruses hitch rides on air currents and on particles of soil or vapor from sea spray, and arrive much farther than ever imagined.

Scientists discovered a deluge of airborne microbes, finding that a single square meter of the planet's surface could be showered with hundreds of millions of viruses — and tens of millions of bacteria — in a single day. For the first time, scientists have analyzed the vast quantities of viruses that are swept up and swirling about in the atmosphere, sometimes traveling thousands of miles from their point of origin. This explains the predictions of some scientists that an estimated 80% of the world's population will be exposed to the Coronavirus in spite of all the lockdown measures[43] [44].

36. What causes the rapid spread of infectious diseases in regions?

It is important to clarify the following point: The failure of an effective treatment of infectious diseases is in the first place not

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[42] Verhagen, Josanne H.Herfst, SanderFouchier, Ron A. M.How a virus travels the world. doi: 10.1126/science.aaa6724.

[43] Reche, I., D'Orta, G., Mladenov, N. *et al.* Deposition rates of viruses and bacteria above the atmospheric boundary layer. *ISME J* 12**,** 1154–1162 (2018). https://doi.org/10.1038/s41396-017-0042-4

[44] 80% of population could become infected by Coronavirus as reported in BBC quoting Health Secretary Jeane Freeman on March 3, 2020. https://www.bbc.com/news/live/uk-scotland-scotland-politics-51698000

caused by a deficiency of drugs, or inexistent vaccines. We should not even blame the viruses for jet-streaming from continent to continent. The first and foremost reason that infectious diseases result in fatalities is an unfortunate mix of unhealthy lifestyle, stress and burnouts, lack of exercise, wrong eating habits laced with excessive sugar and the wrong fats, processed food that does not contain a life force, polluted water and air, an excessive exposure to antibiotics. Unfortunately we should add that it has not been helpful to have a medical system that cures symptoms instead of addressing root causes, and a lack of understanding nor proactive initiatives of how we can strengthen our immune system.

37. Who failed to protect the citizens?

If our body is stressed; if our mind borders burnout; if our fruits and vegetables lack nutrition; if our meat is laced with hormones from force-fed animals with feed not previously digested throughout evolution; if the air we breath and the water we drink do not meet high health and safety standards; and, if our homes are loaded with volatile organic compounds that require continuous activation of our body's defense mechanisms, then when a virus attacks, there is an increased risk that we all will succumb. The success of a virus is the failure of our society embracing a lifestyle that is not conducive to health, and certainly not to happiness. The success of the virus is the failure of a health care system that receives over one trillion dollars annually in the United States[45]. The member

[45] https://www.taxpolicycenter.org/briefing-book/how-much-does-federal-government-spend-health-care

states of the European Union invest each year 1.5 trillion Euros and the medicare system is still not able to handle one virus[46]?

38. Can we really protect ourselves against viruses?

The world seems to ignore there are ten times more viruses around than there are bacteria[47]. Thus a necessary focus on protecting ourselves against viruses, building intensive care units, maintaining sufficient stocks of all relevant equipments for a pandemic is impossible to stem the continuous exposure we have to thousands of different viruses that can and will travel the world and will cause infections. We need a comprehensive approach and a set of solutions beyond the search for a vaccine.

39. Can vaccines offer the solution?

Influenza epidemics in the USA affect up to 25% of the population each year with coughs and fevers. Up to 800,000 people are hospitalized resulting in 61,000 death in the last fully documented year of 2018[48]. There are hundreds of varieties of influenza viruses[49]. Due to the constant evolving nature of influenza viruses, the WHO updates the composition of its recommended vaccine that targets the 4 most representative virus types in

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46 https://ec.europa.eu/eurostat/statistics-explained/index.php/Healthcare_expenditure_statistics#Health_care_expenditure

47 Microbiology by numbers. Editorial. *Nat Rev Microbiol* **9,** 628 (2011). https://doi.org/10.1038/nrmicro2644

48 Figure 1: Estimated Range of Annual Burden of Flu in the U.S. since 2010 https://www.cdc.gov/flu/about/burden/index.html

49 Types of influenza viruses. https://www.cdc.gov/flu/about/viruses/types.htm

circulation for each geographical region of the world[50]. It is a game of statistics since it is virtually impossible to have a vaccine against all 200 identified influenza viruses. This explains why the proposal to protect a population from this health risk by depending solely on vaccines is not realistic. It does potentially represent a bonanza for the pharmaceutical industries. An urgent shift in approach is required: Strengthening the immune system so the body can produce its own antibodies, and only use vaccines in pockets of high risk.

40. What is the most secure way to protect against viral infections?

While we could limit the spread and risk of infection through draconian measures of a lockdown that take the economy down with it, the key to survival and life forward in the presence of potentially fatal viruses which have been around since the beginning of time is to strengthen the immune system. This starts by exercising every day, offloading mental, emotional and environmental stress (fight for clean air and water, refuse antibiotics in your food, eat real food with real nutrition), which goes hand in hand with a few pragmatic steps known for ages. Ensuring the body has what it needs to nourish its capacity to respond to inevitable viral, bacterial and fungal attacks. We also urgently need to reconnect with Nature. Did you know that each of the women of the first communities in the Southern Cape of Africa knew the nutritious and medicinal value of over 300 leaves, flowers, roots, and seeds?[51]

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[50] Final Composition 2019-2020. http://www.euro.who.int/en/health-topics/communicable-diseases/influenza/news/news/2019/3/who-releases-recommendations-for-the-20192020-northern-hemisphere-seasonal-influenza-vaccine

[51] Berg Lasse (transator Perry Frank). Dawn over the Kalahari. Real Africa Books. 2011 267 pages.

41. Does increased life expectancy increase the risk of infections?

As life expectancy in developed countries has increased, so too has the incidence of age-related illnesses[52]. Aging is associated with a decline in normal functioning of the immune system described as 'immunosenescence'. This contributes to an increased incidence of infection and malignancy, even to poorer vaccine response in older people. So even if we develop a vaccine against the Coronavirus, mass applied in retirement homes, steps will still be urgently required to strengthen the immune system.[53]

While some people age healthily, the conclusion of many studies compared them with younger people: The elderly are more likely to contract infectious diseases. The older one is the greater the chance to die from respiratory infections, influenza and of course the Coronavirus. Pneumonia and respiratory infections are a leading cause of death in people over 65 worldwide. No one knows why and how this happens, but scientists observed that this increased risk correlates with the reduced function of the thymus gland which produces T cells to fight off infection (see question 55).

42. How to start leading a healthier life? What is the first thing to do?

First and foremost, increase exercise, one of the pillars of healthy living[54]. Exercise improves cardiovascular health, lowers blood pressure, helps control body weight and protects against a

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[52] https://www.health.harvard.edu/staying-healthy/how-to-boost-your-immune-system

[53] Lord JM. The effect of ageing of the immune system on vaccination responses. *Hum Vaccin Immunother*. 2013;9(6):1364–1367. doi:10.4161/hv.24696

[54] Sander R. Exercise boosts immune response. *Nurs Older People*. 2012;24(6):11. doi:10.7748/nop.24.6.11.s11

variety of diseases. Just like a healthy diet, exercise can contribute to good health, a healthy immune system. Such blood circulation stimulation allows the cells and substances of the immune system to move through the body more freely doing their job more efficiently. A simple formula derived from common sense. Instead of forcing people to keep distance between one another (with prescriptions of precise measures), we should rather impose fines on people who do not exercise without a valid reason!

43. What are side effects from being forced to stay inside for long?

Our exposure to the sun is key. Our sedentary lifestyle has deprived us from contact with sunshine. As long as people lived and worked on farms, everyone had an abundant dose of sun. Today, we are falling dramatically short of it. This idea that we have to stay inside at all costs to avoid an infection must be balanced with the urgent need to expose our body to a daily minimum of 15 or 30 minutes of sunshine, which ensures that our body synthesizes Vitamin D[55]. This is key to a healthy functioning immune system. So, keeping people inside without exercise and without sun compromises their immune system.

44. Which vitamins should be prioritized?

Vitamin D can modulate the innate and adaptive immune responses. Vitamin D has been used -unknowingly- to treat infections such as tuberculosis before the advent of effective antibiotics. Tuberculosis patients were sent to sanatoriums where treatment included exposure to sunlight which was thought to directly kill the

[55] Nair R, Maseeh A. Vitamin D: The "sunshine" vitamin. *J Pharmacol Pharmacother*. 2012;3(2):118–126. doi:10.4103/0976-500X.95506.

tuberculosis. Now we know that it is in fact the sun that metabolizes Vitamin D expressed in immune cells (B cells, T cells and antigen presenting cells). Multiple cross-section studies associate lower levels of vitamin D with increased infection risk[56].

45. Will the virus go away as the weather gets warmer?

A shortage of exposure to the sun in the winter in the Northern Hemisphere leads to a cycle of Vitamin D deficiency. This - rather than the lower temperatures - explains the seasonality of the flu and increased incidence of respiratory diseases. The shorter days and the extended time confined inside deprives our immune system of its natural capacity to synthesize Vitamin D. The hypothesis that the summer and higher temperatures will put a stop to the flu is *wishful thinking*. The average American spends 93% of a 24-hours day indoors[57]. Our modern lifestyle with very short periods outside prevents us from triggering our natural defenses. The first recommendation is to strongly advise people to exercise outside and catch the sun. We cannot insist enough times.

46. So will the virus spread also in the summer?

As the lockdown continues and people are prohibited from going outdoors, there's less exposure to the warming sun. The obligation to remain inside small apartments, with closed windows, may also increase demand for heating or air-conditioning.

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[56] Aranow, Cynthia. "Vitamin D and the immune system." Journal of investigative medicine : the official publication of the American Federation for Clinical Research vol. 59,6 (2011): 881-6. doi:10.2310/JIM.0b013e31821b8755

[57] Wagner CL, Taylor SN, Hollis BW. Does vitamin D make the world go 'round'?. *Breastfeed Med*. 2008;3(4):239–250. doi:10.1089/bfm.2008.9984

Computers, video games, and extensive television programming have become more readily available, increasing time spent indoors without any exercise. Because of such changes in current lifestyles, humans are now more dependent on oral vitamin D supplementation than in our recent past[58].

The longer we remain trapped indoors without sufficient sunlight or exercise with controlled temperatures, the more we increase the risk of the continuation and the spread of infectious diseases. Researchers have linked exposure to microbiological materials -of various kinds in indoor-air- and dust circulated by ventilation systems, to increased levels of infection. It is a known phenomenon: The flu in summer (caused among other things by air-conditioning and no exposure to the sun) is as virulent as the winter flu. Thus, the hypothesis that the Coronavirus pandemic will continue during summer while forcing people in a prolonged lockdown is *a self-fulfilling prophecy*.

47. <u>If we need to expose to the sun - what about applying sunscreen?</u>

There are further complications that hamper the effectiveness of natural defense mechanisms. Excessive exposure to the sun and the subsequent risk of skin cancer has resulted in a culture of avoiding sunshine. Hence when exposed to the sun we tend to cover ourselves with sunscreens as protection against the harmful effects of ultraviolet radiation. Resulting in further deprivation of Vitamin D production. An example of an unforeseen consequence of an otherwise wise behavior. The solution is to

[58] Wagner CL, o.c. p. 53

balance the two, to avoid the sun between 10am and 2pm, and limit exposure to thirty minutes.[59]

48. What does cholesterol have to do with the virus?

There is a second major challenge in our quest to strengthen the immune system's natural response to viral attacks. The body requires an abundance of cholesterol in the skin in order to produce Vitamin D[60]. During the past decades, the medical world has vilified cholesterol and targeted its reduction. The medications are blockbusters that generated a pharmaceutical goldmine[61]. The total revenue for pharmaceutical companies in the fight against cholesterol topped US$35 billion in 2010. Pfizer alone earned US$80 billion since 1997, outstripping the success of Viagra as the world's top selling drug[62]. There are 11 million Americans who take cholesterol reducing pills. The medical profession claims that 25 million Americans should be on this drug. It remains a bonanza, even after the patents have expired

The Lancet reported that patients suffering from the viral infection underwent a sharp decrease in their level of cholesterol

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[59] Neale RE, Khan SR, Lucas RM, Waterhouse M, Whiteman DC, Olsen CM. The effect of sunscreen on vitamin D: a review. *Br J Dermatol*. 2019;181(5):907–915. doi:10.1111/bjd.17980

[60] Probhu Anika, Luu Winnie, Sharpe Laura J, and Andrew J. Brown. Cholesterol-mediated Degradation of 7-Dehydrocholesterol Reductase Switches the Balance from Cholesterol to Vitamin D Synthesis, Journal of Biological Chemistry, 291, 8363-8373. 2016 February 17. doi: 10.1074/jbc.M115.699546

[61] Statins: the drug firms' goldmine. https://www.telegraph.co.uk/news/health/news/8267876/Statins-the-drug-firms-goldmine.html

[62] https://www.ft.com/content/d0f7af5c-d7e6-11de-b578-00144feabdc0

(TC)[63]. The Journal of Biological Chemistry reports that constant low levels of cholesterol may favor inflammations. Thus, the combination of (1) insufficient cholesterol to produce Vitamin D due to the strategy of reducing cholesterol in patients considered high risk; and, (2) the lack of sun, creates unforeseen consequences in an already complex health situation.

49. Must the body be healthy to be able to metabolize Vitamin D?

Vitamin D is not one chemical but a complex set of molecules. The natural type is produced in the skin from cholesterol, *7-dehydrocholesterol*. Sunlight is key to start this process: Ultraviolet energy converts the precursor to vitamin D3. The first stop is in the liver, where vitamin D picks up extra oxygen and hydrogen molecules. However, it cannot function until it has traveled to the kidney where it acquires a final pair of oxygen and hydrogen molecules to become *1,25 dihydroxyvitamin D*; scientists know this active form of the vitamin as calcitriol, but for ordinary folks the name is "vitamin D"[64]. In short, any stress on the skin, liver and/or kidney will limit the capacity to metabolize Vitamin D. A healthy body is indispensable.

50. What role does Vitamin C play in the defense mechanism?

Vitamin C is the next micronutrient that assists in the effectiveness of an immune system response to a viral attack. It is a potent antioxidant. Vitamin C supports the barrier function against

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[63] Hu, Xingzhong and Chen, Dong and Wu, Lianpeng and He, Guiqing and Ye, Wei, Low Serum Cholesterol Level Among Patients with COVID-19 Infection in Wenzhou, China (February 21, 2020). Available at SSRN: https://ssrn.com/abstract=3544826

[64] https://www.health.harvard.edu/staying-healthy/vitamin-d-and-your-health-breaking-old-rules-raising-new-hopes

pathogens potentially protecting against environmental oxidative stress. Vitamin C accumulates in cells, and assists ultimately in microbial killing[65]. A massive intake of Vitamin C will not necessarily cure anyone from a Coronavirus infection. This being said, it does not make sense to contradict anyone in favor of Vitamin C as some have done since the latter plays an important role in the resilience of the immune system.

51. How to secure a daily supply of Vitamin C?

While humans can synthesize the required Vitamin D doses thanks to the sun and cholesterol, a healthy liver and kidney, citizens of modern society have lost their capacity to metabolize Vitamin C. Many animals still have this metabolic pathway, but humans lost it millions of years ago. So, since we cannot produce it, we either eat fresh food rich in Vitamin C, or are obliged to ingest supplements. The challenge is that Vitamin C is sensitive to acids and therefore even when the intake meets the daily recommended doses, absorption may fall short of requirements. Hence the valid option to have intravenous administration of Vitamin C[66].

52. During a lockdown, fresh food is hard to find. Any alternatives?

During winter, the consumption of fresh -organic- orange and mandarin juice has been celebrated over the ages as a necessary preventive health measure. However, fresh rose hip, chili peppers,

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[65] Carr AC and Maggini S. Vitamin C and Immune Function. Nutrients. 2017 Nov 3;9(11). pii: E1211. doi: 10.3390/nu9111211.

[66] Mikirova N, Casciari J, Riordan N, Hunninghake R. Clinical experience with intravenous administration of ascorbic acid: achievable levels in blood for different states of inflammation and disease in cancer patients. *J Transl Med*. 2013;11:191. Published 2013 Aug 15. doi:10.1186/1479-5876-11-191

guavas, blackcurrants, thyme, parsley, kale, kiwis, broccoli, Brussels sprouts, lemons and lychees are all rich in Vitamin C, but may not be widely available during the winter season, let alone during a lockdown. One of the worst downsides of the lockdown is the above fruits and vegetables are rarely available even in producing countries. Unfortunately, the industrial farming and the excessive processing of food has deprived many fruits and vegetables of their full nutritional value. An apple today that does not come from the local garden may only have 10% of the goodies it used to have[67]. This leaves everyone who wishes to build-up their immune system to scramble for supplements.

53. Are Vitamins C and D sufficiency to rebuild the immune system?

Modern medicine and the pharmaceutical industry focuses on anti-inflammatory drugs, antibiotics, infusions to maintain blood pressure at normal levels, and ventilators to force oxygen into blood. These address the hardship of the patients, prolong their life and hopefully facilitates the immune system in producing antibodies. However, we need to address the causes of our incapacity to face up to the assault of viruses. Whereas exercise, healthy food, vitamin C and D have been identified and endorsed as effective ingredients in a strategy to strengthen the immune system, much more is needed. One of the key missing elements is zinc[68].

54. What is the role of zinc in our defense mechanism?

Our body is deprived of zinc. A healthy human body contains a few grams of zinc stored in cells. As is the case with Vitamin C, the

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[67] Scheer R and Doug Moss. Dirt Poor: Have Fruits and Vegetables Become Less Nutritious. Scientific American, 2010 February. https://www.scientificamerican.com/article/soil-depletion-and-nutrition-loss/

[68] Shankar AH, Prasad AS. Zinc and immune function: the biological basis of altered resistance to infection. *Am J Clin Nutr*. 1998;68(2 Suppl):447S–463S. doi:10.1093/ajcn/68.2.447S

primary issue is to ensure its absorption in an ever more acidic body due to an unhealthy diet and lifestyle. Modern nutrition has gained attention regarding beneficial and adverse effects of high protein, high fat and low carbohydrates[69]. However, beyond being advised to reduce fat, and balancing the rest, the medical system has mainly offered drugs to contain health crises rather than suggesting pragmatic steps to address nutrient deficiency, which would enhance the capacity of the immune system.

Zinc stimulates enzymes, strengthens the immune system's response and powers biological processes that are instrumental in controlling inflammation[70]. The administration of zinc has the potential to reduce not only the number and duration of pneumonia, and the total amount and duration of antibiotic use due to pneumonia. Zinc could ultimately reduce mortality, especially among the elderly[71].

55. How can we access zinc and healthy food with zinc?

While society at large is aware of the thyroid gland and the need to supply iodine through mandated blending into salt, there has been no comparable initiative -yet- to secure sufficient zinc. When there is a shortage of iodine the thyroid expands. When the thymus gland lacks zinc, it shrinks leading to a lower production of white

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[69] Merino J, Kones R, Ferré R, et al. Negative effect of a low-carbohydrate, high-protein, high-fat diet on small peripheral artery reactivity in patients with increased cardiovascular risk. *Br J Nutr*. 2013;109(7):1241–1247. doi:10.1017/S0007114512003091

[70] Prasad AS. Zinc in human health: effect of zinc on immune cells. *Mol Med*. 2008;14(5-6):353–357. doi: 10.2119/2008-00033.Prasad.

[71] Barnett JB, Hamer DH, Meydani SN. Low zinc status: a new risk factor for pneumonia in the elderly?. *Nutr Rev*. 2010;68(1):30–37. doi:10.1111/j.1753-4887.2009.00253.x.

blood cells[72]. The medical community links zinc deficiency to pneumonia, respiratory infections and a reduced capacity to fend off herpes infections (again!). Unfortunately, zinc is not as abundant as Vitamin C in our food. Vegetarians may be more rapidly deprived of a good daily dose of zinc since meat is a rich source of it. Shellfish are a healthy and abundant low calorie source of zinc, as are chickpeas, lentils, beans, hemp, sesame seeds, cashews, almonds and dark chocolate! A 100 grams bar of 85% dark chocolate offers 30% of the daily needs in zinc[73].

56. Does the Coronavirus cause the highest infection and mortality?

There are a many different viral infections in the world. In over 100 countries up to 400 million people get infected each year of the Dengue virus through the bite of a mosquito that also spreads *Zika* and *chikungunya*. About 100 million get sick from this viral infection, and are incapacitated for extended periods. Tens of thousands die[74]. The incapacitation rates are 25%, implying a tremendous cost in terms of revenue and purchasing power, mainly affecting citizens with a very modest income. The average mortality rate is 0.25% which is more than double our Western rates for the flu. There was never lockdown ever pronounced when these waves of Dengue fever flatten communities, cause overruns on hospitals. These field hospitals are even less equipped than the hospitals in Coronavirus affected cities.

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[72] Gammoh NZ, Rink L. Zinc in Infection and Inflammation. *Nutrients*. 2017;9(6):624. Published 2017 Jun 17. doi:10.3390/nu9060624

[73] Ten Best Foods that are High in Zinc reported in https://www.healthline.com/nutrition/best-foods-high-in-zinc

[74] Center for Disease Control and Prevention. https://www.cdc.gov/Dengue/about/index.html

Worldwide, 200 million people are infected with malaria annually. The estimated number of deaths stood at over 400,000 worldwide for years in a row. Children under 5 years of age are the most vulnerable group affected by malaria. In 2018, they accounted for 67% (272,000) of all malaria deaths worldwide.[75]. The malaria pandemic has been raging for decades with mortality rates equal to the Coronavirus. Despite annual investments of billions of dollars much more effort is needed. The latest breakthrough was the free distribution of insecticide-laced protection nets. While this helped at first it has its limits with only a 50% coverage of the high risk zones[76].

57. What about suicides, car accidents, addictions, cancer and hunger?

When we consider the Coronavirus in a wider societal context, there are other dramatic causes of death. None of which get a fraction of attention and action requested today by virologists for the Coronavirus pandemic. Never have measures been taken to fight the dramas that unfold every year with multiple mortality rates of what even the worst case scenarios for the Coronavirus predict. The figures below provide an overview of the different orders of magnitude unfolding dramas year after year.

Every 40 seconds[77] a person commits suicide, leading to a shocking 800,000 victims worldwide annually. The same number of people die every year from contagious HIV, another viral infection,

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[75] World Health Organisation https://www.who.int/news-room/fact-sheets/detail/malaria

[76] Tizifa TA, Kabaghe AN, McCann RS, van den Berg H, Van Vugt M, Phiri KS. Prevention Efforts for Malaria. *Curr Trop Med Rep*. 2018;5(1):41–50. doi:10.1007/s40475-018-0133-y

[77] https://www.who.int/news-room/detail/09-09-2019-suicide-one-person-dies-every-40-seconds

which seems to have been mostly contained. However, it has been impossible to reduce the number below 800,000 fatalities a year[78].

The number of casualties from car accidents worldwide tops 1.35 million[79]. The last available report on fatalities caused by addictions confirms that in 2017, 8.5 million people died from smoking-related diseases, while 2.5 million succumbed to alcoholism and more than half a million to drug abuse[80]. Smoking is still permitted all around the world.

Cancer kills nearly 10 million people per year worldwide. This implies that one in six people die from cancer[81] with an annual economic cost to the world economy surpassing one trillion dollars.

Now, the hardest number of all is undoubtedly hunger: Every ten seconds a child dies from hunger, and 10% of the +100 million citizens who face acute hunger die every year. That is more than HIV, malaria and tuberculosis combined[82]. Battling hunger seems to fade, and on the flip side of the nutrition spectrum, obesity is rising with over 4.7 million people dying of it annually[83]. There are 880 million people suffering from hunger and a nearly equal number from obesity.

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78 https://www.who.int/gho/hiv/epidemic_status/deaths_text/en/

79 https://www.who.int/news-room/fact-sheets/detail/road-traffic-injuries

80 Peacock A, Leung J, Larney S, et al. Global statistics on alcohol, tobacco and illicit drug use: 2017 status report. *Addiction*. 2018;113(10):1905–1926. doi:10.1111/add.14234

81 https://www.who.int/news-room/fact-sheets/detail/cancer

82 https://www.theworldcounts.com/challenges/people-and-poverty/hunger-and-obesity/how-many-people-die-from-hunger-each-year

83 https://www.theworldcounts.com/challenges/people-and-poverty/hunger-and-obesity/statistics-about-obesity

The drama for each of the families affected by the Coronavirus is harsh and each patient deserves all attention and every effort to not only alleviate the pain, but also to fight for their lives. However, the hard numbers above make many of us wonder why suicide, HIV, cancer, hunger, and obesity do not even get a glimpse of the resolute response the Coronavirus has received.

58. What explains why only a Coronavirus causes a world lockdown?

These harsh numbers are telling a lot about the world's real priorities. The Coronavirus epidemic has been converted into the one single issue that dominates, determines and directs every detail of our lives. While devastating and horrific situations document the hardship faced by many hundreds of thousands of children dying from malaria or hunger doesn't receive such a worldwide reaction, let alone a lockdown. Is the political leadership in a state of complacency regarding malaria and Dengue affecting those far away from the centers of power? In the end this is an ethical question.

59. What will happen to our Communities and the World Economy?

Not only do we have to face the virus now, we also have to face the way Governments will deal with their answers to the imminent collapse of the economy. Perhaps the rebuilding of economic and social tissue will permit resilient communities to emerge. Can you imagine everyone going back to old habits once the lockdown is over? At the same time, will there be an awareness with an increase in motivation to adopt healthier lifestyles, rebuilding and strengthening our immune system? And will new policies be aimed at creating resilience in communities by strengthening the local economy based on local resources?

60. Do you believe in vaccines?

A determined part of the medical community today imagines one solution only: A vaccine. It is beyond any doubt that the discovery of vaccines have been very instrumental in fighting infections and diseases. However, as we have witnessed and experienced, we cannot rely on one option only. Vaccines will be part of the comprehensive approach, but with hundreds of mutating viruses in all climates and all corners of the world annually and its proven decrease in effectiveness in an older population, we cannot rely on vaccines only.

Vaccination does not lead automatically to immunization. Current vaccination recommendations have largely neglected the growing number of risk populations that have reduced immunological functions, with increased infection leading to impaired vaccine responsiveness. Changes in life style and nutrition have fostered the development of "new epidemics" in developed countries. Obesity and allergies have become huge medical issues diminishing the effectiveness of vaccines.

The Dengue vaccine introduced "after due research and tests" had to be pulled back just recently because of severe adverse effects after 830,000 children had already received the shot[84]. After this bungled and fast track introduction, no effective alternative has been found even when these viral attacks exceed the number of infections by the Coronavirus[85].

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[84] Wilder-Smith Annelies, Flasche Stefan, Smith Peter, Vaccine-attributable severe denge in the Philippines. 2019, The Lancet, volume 394, issue 10215, p2151-2152. DOI:https://doi.org/10.1016/S0140-6736(19)32525-5

[85] Wiedermann U, Garner-Spitzer E, Wagner A. Primary vaccine failure to routine vaccines: Why and what to do?. *Hum Vaccin Immunother*. 2016;12(1):239–243. doi:10.1080/21645515.2015.1093263

The number of elderly people is expected to rise to 25% of the world wide population by 2050 due to advances in average life expectancy[86]. Even with improvements in medical care and new therapeutic interventions, there is a continuous increase in cases of cancer, cardiopulmonary, metabolic or autoimmune diseases. Any patient of age with the above described conditions is very prone to viral infections and does not respond to vaccines which are marketed based on clinical trials performed in selected, healthy and mostly young populations.

61. Should everyone be vaccinated?

I'm afraid the virologists and their industrial backers are ready to tackle the Coronavirus by forcing a top-down vaccination of all and everywhere. Their partners in the media will vilify anyone objecting to their new "goldmine". Governments will have to pay the bill. Even when there are many other steps that can and need to be taken to ensure public health, none of these will have a strong backing from the pharmaceutical industry. The strange situation may even arise that people are forced into a total and long term lockdown until the Government can provide a shot to everyone.

The priority is to prepare for a healthy life, and where needed, a vaccination can be offered as a complementary strategy to citizens most at risk, such as the patients on cholesterol reducing drugs, and those who lack daily sun exposure. We need to start improving health now and the portfolio of actions is simple and low cost!

However, a blanket application vaccinating everyone would equal to attempting to kill a fly with a sledgehammer. While it may be very effective in squashing the fly, it will cause a lot of unintended

[86] United Nations 2002; www.un.org/esa/population/publications/wordaging19502050

consequences and leave a lot of other flies unattended. As long as one doesn't know about these adverse effects and inherent ineffectiveness, it is an unintentional side-effect. However, the moment one is aware of the adverse effects one is causing, yet continues to do so, then one causes collateral damage. This is morally and ethically unacceptable.

PART 3

IS THERE BETTER?

Since the discussion started with EMF, we should explore if there are alternatives already on the market that offer solutions that have not been mainstreamed. This would be a very welcome opportunity to generate jobs and to offer better services. Let us explore the options.

62. Are you in favor or against breakthroughs in telecom technology?

The question should be rephrased. Are we capable of responding to the basic needs of People and Nature? Despite all the science and technology and despite Europe and North America ploughing 2.5 trillion Euros annually into a health care system we took recourse to a lockdown to handle a "situation" and ruin the economy on the way. Therefore, we have the right to ask which technologies are better; much better indeed. The network of committed people I relate to are dedicated since decades to finding better solutions. We take the required time to ensure that we learn fast and figure out how to act fast. Our move is a positive move: ***We are not against anything: We are in favor of better!***

63. Is there better than what is implemented today?

No one can claim to have the perfect solution or have all the answers. On the other hand, there are clearly options that have not -yet - been considered despite their merit. Many new technologies improve technological performance and address concerns that have pre-occupied us throughout this treatise. This ultimately presupposes that we have the right and the freedom to explore without being forced to subject ourselves to externally imposed dogmas and threats.

64. Are we asking to stop progress?

There is no doubt that wireless data transmission and geolocalisation have revolutionized society. There is no need - and no call from my side - to stop this trend. In fact I am one of the voices declaring the internet - with barely 30 years of development- is still in its infancy. For example it is timely to shift from the present simplistic 2D data transmission of pictures, documents and videos to the upcoming full 3D world that will unfold.

65. Is this shift from 2D to 3D without 3D glasses possible today?

This shift from 2 to full 3D presentations, just like the capabilities of our eyes, will require a volume and speed in data transmission that neither 5G nor its planned successors can imagine today. The 3D presentation is already possible, and goes beyond the holograms. Holograms are nice presentations, but do not have the data and light density to look real. The latest technologies create lights fields[87] (instead of pixels on a fixed base). Light has waves and photons. These photons are made visible over the waves, and are refreshed all the time just like a TV does. Only, this requires at least a one hundred fold increase of data processing, which requires a hundred fold more powerful data transmission.

66. If it exists why has this 3D not yet been implemented?

It is clear that our present communication system, with all its electromagnetism was permitted to roll-out unfettered, and yet it is falling short of the grand potential once promised for citizen based internet. This has been illustrated recently when operators like

[87] For more information: https://lookingglassfactory.com/product/8k

Netflix were requested, due to the lockdown download overload, to slow down the streaming of films so as to avoid breaking the back of the Internet.

Or, during a popular event, when two thousand or so people try to send a picture -not even a video- at the same time, clogs the internet. When millions of people send their New Year wishes at midnight, a mere SMS, sometimes arrives hours later. When the fans of Juventus take a picture of the latest goal of Ronaldo, the picture will not arrive until after the game. The present net, even with 5G, cannot cope with the speed and the volume that the minds and the eyes of human beings can process.

67. Why can't the industry increase frequencies and bandwidth?

The future of the internet lies in communication systems operating at 2-3 Terrabits per second. 5G offers -in ideal circumstances -no more than single Gibabits per second and to achieve that performance it requires the installation of millions of disturbing antennas in line of sight. Wireless radio (and satellite) communications are limited in number of frequencies and bandwidth. When every network provider increases the volume and the speed through their "pipeline", there are obviously risks of interferences. As soon as there are more than seven IoT devices in your home, or when there is too much metal around, then the system may fail.

68. Does Internet and wireless communication consume power?

Even when network operators invest more in securing bandwidth to avoid interferences, the core logic of avoiding dropped

calls and continuous streaming is underpinned by the need for more power, thus a higher consumption of energy. This explains why the internet is one of the sectors that doesn't really get involved in the efforts to reduce energy consumption, and the abatement of greenhouse gas emissions. The media talks about a “tsunami of data” that could consume one fifth of global power[88]. The industry was conspicuously absent from the Paris Agreement that aimed to reduce the impact on climate change. The energy used in our digital consumption is set to have a bigger impact on global warming than the entire aviation industry[89]. While there are efforts by companies like Google to demonstrate that they source green power, billions of routers at home and in the office are humming 24 hours all year, and millions of consumer servers require unlimited access to power.

69. Is there a framework to guide better technologies to go forward?

This is why the present debate needs to be pulled out of the simplistic and partisan logic of a fight “for or against”, “conspiracy or plot”. It needs to be placed into the field of science and technology. All innovations in the pipeline or being developed will have to alleviate legitimate concerns for health and safety, while these breakthroughs will overcome obvious limitations in performance as described.

When we observe the options made available to us by Nature, singling out what offers the best advantages - without the

[88] ‘Tsunami of data’ could consume one fifth of global electricity by 2025, reported in The Guardian on December 11, 2017. https://www.theguardian.com/environment/2017/dec/11/tsunami-of-data-could-consume-fifth-global-electricity-by-2025

[89] Harris John, Our phones and gadgets are now endangering the planet, reported in The Guardian on July 17, 2018. https://www.theguardian.com/commentisfree/2018/jul/17/internet-climate-carbon-footprint-data-centres

downsides as discussed - our network of scientists quickly converge towards something that was already described in the Old Testament. Genesis 1:3, the first words of God were: “Let there be Light”.

70. How can light ever be a medium for data transmission?

Light has the advantage of having built the largest infrastructure in the world. There is no need to invest in much more. Every light bulb can be converted into a satellite. Every public street light can be turned into a hotspot. Light has - apart from an electric current - no electromagnetic radiation even when transmitting at hundreds of Gigabits per second. This provides a possible solution to the challenges society questions and faces. Alexander Graham Bell called his invention *a photophone* and considered it his greatest achievement[90].

71. Why is this not industrialized?

The transmission of data needs a light source that can be controlled. This was not available at the time when Thomas Bell imagined this new form of communication. When LED lamps were invented then experts in theoretical physics realized that the vision of over one hundred years ago could finally be implemented. When Prof. Dr. Suat Topsu, then Professor in theoretical physics at the University of Paris Sanclay, was requested by his wife to shut down all wireless communications at home during her pregnancy, within days he engineered a data transmission system via LED lamps for home use. He called it visual light communications. Prof. Harald Haas from Edinburg University gave it a very smart name: LiFi, instead of Wifi.

[90] Bell Alexander Graham. ”On the Production and Reproduction of Sound by Light: the Photophone". American Association for the Advancement of Science, Proc., Vol 29., October 1880, pp. 115–136.

A new standard and potentially a new industry was born. Today there are dozens of companies offering LiFi applications, and hundreds of research centers from the University of Parma (Italy), Eindhoven University of Technology (the Netherlands), to Shanghai University (PRC) and Madanapalle Institute of Science and Technology (India) that have followed the lead provided by Paris and Edinburg. It is expected that this is a new Internet boom in waiting.

72. Can this technology meet (and beat) the expectations of 5G?

The capacity to transmit data with light modulation over LED lamps already reaches 256 GB/s in laboratories, an amazing 256 times better than the best promises of 5G. The prospects are solid to reach 2 TB/s within two to three years. In addition, the number of available light frequencies for transmission is estimated at a billion, which is so much better than the one thousand odd radio frequencies provided by 5G[91].

73. Does LiFi not create electromagnetic fields?

The debate on electromagnetic frequencies and radiation needs to be urgently embedded in a wider context that takes into account society's needs and concerns. However, the solutions must also respond to the people's desire to communicate faster. The imminent shift to 3D associated with the expectation of increased data transmission capacity a thousand fold holds a major promise. There is a clear preference for something that performs better while reducing implied risks, as well as securing a fast transition to an

[91] For more information on this technology refer to my book available on http://www.lulu.com/shop/gunter-pauli/lifi-communication-at-the-speed-of-light/ebook/product-23516849.html

economy where jobs are abundant and democracy is thriving. We have an opportunity to provide communication capacity to every home with a lamp.

74. Does LiFi work during the day?

The full spectrum of light includes light that is invisible to the human eye. Thus, a LED lamp can emit non-visible light like infrared. This light permits anyone to connect during day with only a fraction of the energy of visible light during the day.

75. Do I have to buy a new device or do I buy a shield to block RF?

When one takes a close look at the current phones one realizes that apart from the antenna and the capacity to connect through bluetooth, hotspots and cellphone networks, every phone built over the past couple years has already been fitted with all that's required to connect through light!

The two -front and back- cameras are designed to capture light. These are huge gateways for data. Additionally, the screen has 3, 5 or 7 LEDs to provide the backlight. Thus even the screen permits sending and receiving data. There is an infrared (IR) sensor in the front of the phone to regulate the intensity of the screen. The invisible IR light source is powerful enough to operate WhatsApp! And later models of phones have a powerful torch. It is perfectly possible to embed a code in between one of the hundred million flickers and identify the owner of the phone. All of this connects to an existing light infrastructure, connecting to a backbone of hundreds of thousands of kilometers of optical fibers.

76. So what is preventing this technology from spreading?

First we need to realize that any new technology takes time to become standard. WiFi was a breakthrough, but even this easy to use innovation had to wait no less than 17 years before it was finally integrated into a handheld device. So patience for new technologies is the norm.

Second, the industry needs to agree on a new standard, and as is usually the case, companies with competing interests have different patent portfolios. The giants of the world, and the newcomers to the industry, are all keen to carve out their niche or build their monopoly. The industry has announced working groups to amend existing LiFi standards[92].

Third, new business models emerge around disruptive technologies. Once these models are proven and generate a continuous cash flow, there is huge resistance to loosing these guaranteed revenue streams. Apple (and others) are paid a commission for transmitting data over a specific network. These are trillions of micropayments each day that are documented in the greatest detail permitting the tracking of all communications and most importantly, to establish invoices that get paid! This provides a steady and stable income to the hardware suppliers, and allows them to control every user as soon as the device is connected to a carrier. Now the more content that flows through their phones and devices, the more commission they can request. How do we expect the Androids and the Apples of this world to relinquish this income?

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[92] IEEE 802.11™ Launches Standards Amendment Project for Light Communications (LiFi) as report in https://beyondstandards.ieee.org/general-news/ieee-802-11-launches-standards-amendment-project-for-light-communications-lifi/

77. Are these companies concerned about the health of their users?

There is no doubt that the leadership of these corporations is committed. However, their R&D departments are crowded with scientists that work with the industry's focus on speed and bandwidth. Electromagnetic radiation and the risks - real or perceived - associated with their devices is an afterthought. We may one day end up with a situation comparable to smoking and asbestos. The industry told the policy makers and the public at large there is no documented danger. When the danger was known, then there's no need for consumer protection since its use is an individual choice. And, when the science accumulated and the public resisted the misinformation, a few Governments took the lead and soon others followed saving millions of lives and billions of medicare costs. The least we can request is that the legal framework permits the rapid introduction of light-based communications next to the existing radio frequency so that we can reduce risks and improve performance - immediately.

The position is clear: we do not call to prohibit anything. Provided that people are increasingly aware of the alternatives, they will have the capacity to make informed choices.

78. Can LiFi permit access to the internet by poor people?

The responsibility of the Government is to permit these technologies to be deployed. That is all, securing a dramatic increase in access to the Internet at low cost and providing information so no one is left out. A survey by teachers in Manizales (Colombia)[93], the

[93] Survey undertaken by the teachers of the Santa Louisa School in Santa Maria, Manizales, Colombia. Private communication April 6, 2020.

Capital of the coffee farming region during the lockdown, unveiled that only 6% of the families in shanty towns had access to the internet, and nearly none had a bandwidth sufficient to stream videos. The only option for home schooling, as designed by a team of teachers, is audio streaming in brief snippets of no more than 3 minutes via pre-paid phone connections. So, in addition to saving energy and reducing exposure to electromagnetic fields and radiation - we could finally reach the unreached and give them access to information and further education.

79. Where do you suggest Governments should implement LiFi?

There is an urgent need to secure the installation of LiFi in facilities where the precautionary principle should be applied first: Hospitals, schools and homes for the elderly, which is already happening in some cases. Hospitals in France have decided to cut the exposure of patients to radio frequencies and installed LiFi to bring the combination of all IoT together under the recommended limitations.

The Regional Hospital in Perpignan for example realized that each of the individual devices was well within the limits suggested, but the combination of all the WiFi empowered devices was a multiple above the recommended limit. Ever since the LiFi system has been installed, expecting mothers are singling out their maternity ward. The industrial suppliers of sanitation equipment to hospitals in Osaka (Japan) decided to place LiFi on and in between sanitation stations to monitor the application of disinfection protocols in hospitals. This technology is proving its value.

80. Are there applications where LiFi works and WiFi does not?

There are several applications where the needs of society cannot be met by the current wireless communication systems. The GPS for the visually impaired is insufficiently precise and is not reactive enough in confined spaces such as subways. The metro of Paris is committed to install LiFi, which will change the mobility of the visually impaired, an incredible social breakthrough. LiFi can also provide safety to underground miners, workers who are surrounded by massive metal structures, even underwater activities where radio communication does not function.

81. How should we deal with the detractors?

The detractors to the LiFi must be thanked for their resolve. While we can demonstrate that some are ill-intentioned, it is their right to voice their dogmas and ventilate their frustrations. I respect that. Still, I prefer not to engage in their debates, and have refrained from responding to their insistent attacks. They have made up their minds, while we are on a continuous search for better. With a preference for investing time and effort in making alternative grand opportunities known.

After all, anyone who has undergone this period of crisis, may vent their frustrations, then hopefully find the freedom and courage to dedicate time to imagining a better world. That is an individual choice. After decades of work in the field, I have learned that polarization does not lead to a strategy that improves livelihoods for all. Rather, it seeks at imposing one singular vision, blocking the energy to jointly endeavor innovations for the strengthening of the common good, and for the building up of resilience.

82. Can today's type of democracy warrant the success of "better"?

Apathy is increasing rapidly amongst our population. The game of modern democracy, where there is a need to garner 50% plus one vote to rule, and where no one enjoys a clear majority to impose a singular vision of society, forces coalitions to govern. Worse, this continuous instability and a lack of real long term focus has demonstrated its incapacity to improve livelihoods, at the risk of citizens embracing extremism.

The outlandish views promoted by extremists are not the result of the bright and ingenious proposals made by their politicians. They are rather the reactionary outcome of voter preferences caused by the incapacity to respond to the real needs of people. Today, more than ever before, this includes quality water, nutritious food, effective health care, and jobs, jobs, jobs while rebuilding communities, and a fast and safe internet .

PART 4

WHAT'S NEXT

83. How do you view the reactions from Policy Makers?

Politicians entered the space of the Coronavirus pandemic with a clear win or loose "game". If the pandemic kills many, and they would have done nothing, or their actions are perceived as insufficient, they are out of government in no time. These policy makers will enter in the history books as the ones that failed grossly. As a result, most Government leaders were prepared to act resolutely, imposing draconian measures even if this costs the collapse of the economy. And despite other dramas unfolding that have similar and even more devastating impacts annually.

If the political leadership undertakes tough actions and prolongs the lockdown, and the pandemic nevertheless progresses due to facts beyond their control, then the politicians can claim they did their best. They will at least have secured the support of their constituencies. The history books will not be too harsh.

However if politicians take limited and measured steps to control the situation, and the pandemic does not materialize in their country, i.e. there are fewer infections and even less fatalities, as is the case in Sweden and New Zealand (and quite a few other nations), then they will be regarded as role models, not just in their constituencies but around the world.

There were - as we can note - no politicians who refrained from taking any action, even if the numbers of infections in their constituencies were insignificant. India, a population with 1.3 billion locked down the nation even though the number of infections (13,000 and dropping on April 16, 2020)was with one ten thousands of a percent statistically insignificant. Colombia a nation of 50 million with only an infection rate at less than one thousands of a percent also took draconian measures extending the lock down destroying its

economy. Both countries have a thousand-fold more people dying from hunger, home violence and Dengue. Virologists have acquired the powers to force policy makers into action supported by a singular focus on Coronavirus by the media. Fear is a force to be reckoned with.

84. What comes after the lockdown?

The lockdown of the population is only the first round of the drama. The game that is being played by a few health advisors, has an important second part: How to revive the collapsed economy? Or, perhaps even more important, how to rebuild communities that are devastated, and rebuild confidence in the system. The politicians who took forceful action brought the economy to a standstill. The worldwide impact will see Gross Domestic Product drop by at least ten percent, most likely 20% and some countries even 30%. The lockdown causes the impact of a nuclear attack, except there's no military economy concentrating on producing what's needed to keep the war machinery rolling. Millions of companies will go bankrupt. Hundreds of millions will be unemployed. The pandemic is now replaced by depression and virologists will no longer be in charge. They caused a calculated closure of everything everywhere for as long as possible. Everyone in society, except medical staff, have been forced into nearly total inactivity.

85. How can a government revive the economy?

There is no need to debate at this moment the logic (or better the lack of logic) to destroy the economy. The same game plan of action will be presented along the similar logic as the first one: If you do nothing then the economy will be subjected to the drama of

collapse, whatever happens in the global economy. Every Government will announce the very traditional stimulus package: cash to spend. The challenge is, what are you stimulating? An old model of an economy that's been forced to its knees? Is the stimulus geared towards mega mergers and acquisitions with the promise of Governments not to apply any anti-trust regulations? Will the recovery be guaranteed through the creation of massive monopolies, like we witnessed after the economic collapse of 1929, that promised to be benevolent and serve the Common Good? I doubt it.

86. Which nations will be hit the hardest?

A few countries will be much harder hit than others. The first group are the nations that will suffer more than others have relied heavily on foreign visitors to sustain and grow their economy. The easy money of tourism where white beaches, unique musea, entertainment parks, excellent transport infrastructure, hotels and restaurants will be hit with few chances of recovering anytime soon. The developmental model of mass transportation and mass tourism will see their livelihood dwindle. Any country that counts more than 10 million visitors a year will need to undergo fundamental transformation. France (89 million), Spain (83 million), Italy (62 million), Turkey (45 million), Mexico (41 million) Thailand (38 million) will loose an estimated US$ 1.5 trillion in revenues[94]. This equals the total expense of healthcare in the European Union, thus triggering a wave of bankruptcies of its over-leveraged tourism sector. Unfortunately, maybe only ten percent of the Michelin-starred/rated restaurants can survive this evaporation of guests.

[94] UNWTO Tourism Highlights: 2019 Edition. World Tourism Organization"

87. What about the soft sectors like culture and the arts?

A few countries that have relied on cultural heritage, will come to a complete stop. Countries like Austria and Italy will be hard-hit. The top-down imposition of lockdowns for a very prolonged period, with all the associated uncertainties, including the cancellation of all major sports activities and music festivals will especially put the young and creative on the street. Some even wonder how musea, concerts, and music will ever recover from this? The service industries that are closely associated with travel like conferences and trade fairs will see their engines grind to a halt. Virtual events will not secure a fast pick-up of the pieces. Since there are no revenue models associated with virtual events there will be massive casualties.

88. What about Nature and Parks?

People will search for refuge, and seek a reconnection with Nature. Nature parks may be overwhelmed by demand, which could endanger their livelihood. The good news will be for any region that is underpopulated (and thus a clean and untouched environment). These communities in the periphery will have unparalleled demand. This will offer a chance to recover the economy from the periphery. This could ensure a trickle down effect that will take poverty and insulation from the old globalized economy into a new mainstream. This offers options for overpopulated centra of unemployment to channel the most eager towards the regions were until recently no one wanted to live. I forecast a large scale de-urbanisation. This provides a window to create a portfolio of thousands of small scale initiatives that, combined, will generate a multiplier effect. This will quickly increase the purchasing power amongst the communities where it is most needed. Land value will increase rapidly.

89. What are people looking for?

While these reflections are not aimed at declaring the definite winners and losers, it is obvious that countries associated with high standards of hygiene, quality of life with low infection rates (Japan, Singapore, New Zealand, Austria, Scandinavia) will be winners. Their economy will have it easier to bounce back. The downside may well be an excess of demand for immigration.

Then I see a future for countries that strongly rely on their capacity to produce food. Any region or nation capable of rapidly deploying local farming, building on their innate capacity to satisfy the basic needs of all strata of the population, will turn into an economic trampoline. The world is craving healthy vital food. Many countries and regions will have great difficulty extracting themselves from the global supply chain dominated by genetics and chemistry, high volumes and thin margins for farmers.

Any nation that is dependent for more than 30% of its food security will be at high risk. On the contrary, any nation capable of feeding the world will be the masters of the world. And, feeding people depends on fertile land and water, endemic produce resilient to changing climates. Biodiversity will turn into a critical asset. Nations like France, Italy, Turkey, Argentina, Brazil, Ukraine, Kazakhstan, and even Zimbabwe that have water and fertile soil while be part of the gluten free bread basket for the world. This is why decades of fieldwork by organizations like Slow Food, based in Italy and so effectively managed by Carlo Petrini, will deliver as fast as plants and mushrooms flourish.

The leading nations of the new world will have quickly substituted efficiency with resiliency. They will be the winners.

90. Does this imply the end of globalization?

The world will remain highly connected and communications will continue like never before. However, governments capable of responding to the basic needs of water, food, health, housing, energy and creating jobs, thanks to generating sustainable value with local resources, will be the ones that set new trends for economic development. Governments must focus on generating jobs and putting people back to production, moving from a lockdown to a mobilization.

91. Does pumping billions in cash help?

There is the risk that Governments in power will reserve trillions to pump cash into the economy. This will massively increase central debt and mortgage future generations. Money is quickly needed to secure loans to meet the payroll of small companies, for mortgages of families and for debts to pay for stock must be extended in order to continue operating. The Swiss Government's decision to have a no-nonsense approach allocated CHF 500,000 per small company to bridge immediate cash requirements over one year has been followed by other Governments. The money is disbursed within a few days after the application is filed. This immediately pulls the core economic activities in line with the need to ensure purchasing power … for local products.

92. What is required to guarantee this works?

Unfortunately, this will only have a tangible effect if and when there are enough projects on the ground to stimulate activity. Without the design, initiation and mobilization of thousands of initiatives per region, perhaps millions of initiatives per nation to

respond to the basic needs, this cash injection in the economy will engender massive inflation. This means that citizens will pay for the over-printing money.

The abundance of money after the lockdown will have the same effect as the quantitative easing that central banks applied to the financial crisis over a decade ago: It makes the rich very rich, and it alienates the middle class who will sink quickly into a state of relative poverty. A new classification of nations will emerge: the Under Developing Nations!

93. Is there a portfolio of opportunities that makes sense now?

For the past 25 years our network of scientists (Think Tank), entrepreneurs for the common good (Do Tank), combined with the legacy investors (Money Tank) have undertaken hundreds of initiatives worldwide. Our coffee waste to mushrooms is one example, already demonstrated at the Slow Food Festival in Turin over 20 years ago by the Politecnico di Torino with the support of the Lavazza Family[95]. Implemented 5,000 times since! The center of entrepreneur training Ekofungi[96] is located in Belgrade, headed by Ivanka Milenkovic, recognized as the Entrepreneur of Serbia. More than 500 entrepreneurs went though her pragmatic approach on how to turn a local resource in a local business.

The solution is simple: Ground coffee beans are drenched in hot water and steam. The soluble part which is only a minute fraction ends up in the cup, and the solids are wasted. However, these solids are rich in fibers and have been sterilized in the process. When these

[95] For more details: https://www.theblueeconomy.org/uploads/7/1/4/9/71490689/case_106_clustering_coffee_mushrooms_animal_feed_final.pdf

[96] For information go to http://www.ekofungischool.com

leftovers are mixed with mushroom spores, within weeks fresh edible mushrooms pop-out, provided they have been guarded under the right conditions. Such an initiative can be secured over a million times with expediency, provided there is a dedicated effort to inspire people to pass embark on action and service.

94. Is there an overarching framework that ensures performance?

The key question to ask is “what do you want to achieve?” The absolute priority immediately after the easing of the lockdown is food and jobs, generate value with what is locally available and respond to people’s needs - NOW! If we agree the priority is people and their communities, and the goal is health and jobs, we can collaborate globally. Sharing “open source” and proving it is possible. At this point, we do not respond to questions with answers, we prefer to encourage people to explore, investigate, and learn for themselves. This approach will increase the purchasing power of the local population and if this is matched with local production then there is a rapid pick-up of the economy without the risk of inflation.

95. Are there quick wins?

The best response is to ensure initiatives at the local level, village per village, community per community, city by city. The need is to ensure there are dozens of initiatives that secure quick wins. Farming a mushroom on coffee offers the first harvest in 3 weeks. Producing hand cleaners with antibacterial properties from the skin of citrus fruits takes only 2 weeks. Blending seeds from fruits into bread increases nutritional value, which only depends on the harvest of the seeds. Convert spent grain from breweries to healthy bread, which can be started at a small scale with microbreweries in a week.

Actually we have a rich experience in converting opportunities that are relevant for a city, a region, or a village to pass immediately into action. We (the ZERI Network) only imagine what would work based on what we have previously achieved.

96. Are there cases demonstrating that people act and react?

After an offer via a Tweet to visit France to share with communities how to get started with relaunching their local and regional economy, based on what the urgent needs are by creating value with readily available local resources, over 20 committees were created within 48 hours! The actual trip is planned the moment the President permits public meetings once again. We reached out to the youth, the powerful, politicians, entrepreneurs and financiers who all share a willingness to move on and do better than ever imagined. The Tour de France is a trip throughout the Nation to liberate people from apathetic inaction.

97. What is missing to get started?

First we need to overcome ignorance. As long as people do not know what is possible (and on offer) then it won't be possible. Secondly we need to inspire and be inspired by something and someone. It must make sense, speak to heart and convince the mind. Third, the only way to build up confidence is to deliver! And delivery in adverse times where no one can claim to know exactly how to proceed with confidence requires the deployment of human-beings greatest asset: Creativity. If this is combined with perseverance and the commitment to succeed, then I have no doubt we can regain the dynamics of society, possibly even exceed it.

98. Can you point to communities where your strategy has worked?

After working forty years on the ground we are blessed with so many cases where this approach has worked. As two examples in Europe, we can point to the island of El Hierro of the Canary Peninsula (Spain), and the Rumpan Village in the North of Sweden. These cases demonstrate it is possible to create abundance where many saw only scarcity. We can build an economy using local resources that evolve to full employment. In projects like Las Gaviotas in the Vichada of Colombia or Songhai in Benin, the vast emptiness of a Latin American savanna, and the poverty stricken peri-urban belt of Africa, were converted into thriving communities. There we have succeeded against all odds[97].

99. Can this be done independent of money and power?

Independence is key. Few people have been able to maintain a high degree of freedom to think and act without the influence of money. However, it is a wish, even a dream of many. Since I never worked for anyone as an employee, and have never had a paid position in government anywhere in the world, I have been able to navigate the world of science, without being a scientist, and operate in the world of business, as an entrepreneur with an interest in the common good. I am not out to convince nor represent any special interests. There is no proposal to win, nor insurance to minimize loss.

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[97] On Las Gaviotas https://medium.com/@adam_sulkowski/colombia-at-a-crossroads-climate-solutions-poised-for-spread-a7aa2aef5bb6

On Songhai Center http://www.songhai.org/index.php/en/home-en

On El Hierro https://english.elpais.com/elpais/2018/03/28/inenglish/1522239815_193089.html

On Rumpan https://larsling.org/2018/08/01/100-eco-cycle-village-rumpan/

There is only a wish that we will succeed in overcoming narrow minds and interests to discover an abundance of opportunities that are also enjoyable, with a chance to serve and inspire.

100. What's the first step we will all take - every day from now?

Every day we will take at least 3 minutes to tell an inspiring story to child. We have to inspire the next generation with the positive, the surprising and the amazing that is happening around us. We will discover the marvels that surround us. We will not impose our views, we will expose the extraordinary that surrounds us; we will not teach but reach out. Whenever there is a question we cannot answer, then we ask another question until we all are discovering the web of life.

PART 5

Background, Organization and Philosophy

What is ZERI?

The Zero Emissions Research and Initiatives (ZERI) was created in 1994 by the author of this book, at the United Nations University (UNU) via an invitation and funding from the Japanese Government. This initiative operated as an independent think tank. The author proposed that the Climate Change Summit held in Kyoto in 1997, embraces the concept of zero waste and zero emissions as a new standard for business. Prof. Dr. Carl-Göran Hedén, Member of the Swedish Royal Academy of Sciences and a panel of scientists from China, Colombia, Brazil and Tanzania had reached the conclusion in their feasibility study ordered by the UNU that "zero was not only feasible, it was indispensable to reverse climate change".

While the concept was widely adopted by the private sector and the Government of Japan, it was dismissed by the European Union and the United States of America. Instead, the Kyoto Protocol agreed on a certification and trading of carbon emissions. The United Nations Development Programme, the World Business Council for Sustainable Development and the Canton of Geneva (Switzerland) decided to support the author in the design and implementation of "zero emissions and zero waste" initiatives around the world. To date more than 200 projects have been implemented based on the philosophy of ZERI (for more information <www.zeri.org>).

Until 2000, ZERI maintained a central organization in Geneva, with offices in Japan, Namibia, Brazil, and Colombia. Later it was decided to decentralize all operations and have offices where projects and educational initiatives emerge. ZERI Japan has been consistently recognized by the University of Pennsylvania (USA) as one of the ten most creative think tanks in the world[98].

[98] McGann James, 2019 Think Tank Index Report, https://repository.upenn.edu/think_tanks/

What is the Blue Economy?

Blue Economy, a framework of the business model designed by the author operating in tandem with the philosophy of ZERI. The model responds to the basic needs of all with what is locally available. All is understood as all life, not just human life. Everything that is locally available can be upsized to create sustainable value. This includes all renewable and mineral resources, waste, weeds, and matter. ***The first goal is to create resilience instead of focusing on efficiency***, in order to strengthen the Commons. The approach is pragmatic and based on creative initiatives, identifying and delivering portfolios of opportunities that inspire the next generation to build community and an economic tissue that permits each to develop and contribute according to their innate capabilities.

The methodology underpinning the fast track and hands-on implementation of these initiatives is known as "System Dynamics". This dynamic mathematical modeling permits the project teams to foresee not just the impact of one initiative, but also how multiple projects generate multiple revenues and benefits thanks to the dynamic interplay of feedback loops and multiplier effects. This mapping of interactions permits envisioning the transformation of a city, a region, a village or an island. The mathematical models originally developed by Prof. Jay Forrester at the Massachusetts Institute of Technology (USA) offer a toolbox for policy makers[99].

The Blue Economy projects have mobilized financial resources for the realization of these initiatives mainly from private sources. Each of the projects is independently funded, pays no royalties and works with local resources.

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[99] Forrester, J.(n.d.) *System Dynamics Self Study*. Massachusetts Institute of Technology: MITOpenCourseWare. https://ocw.mit.edu/courses/sloan-school-of-management/15-988-system-dynamics-self-study-fall-1998-spring-1999/index.htm#

What are Gunter's Fables?

As projects went from ideas to pilots, some turned into major initiatives that were widely recognized as game changers. Soon demand emerged to accompany the drive towards implementation into a pedagogy that covers all ages. The Latin American ZERI Center, based in Bogota, trained academia from over 80 universities, while rural schools (*Hogares Juveniles Campesinos*) and the City of Curitiba (recognized as one of the foremost environmental cities in the world) initiated programs for elementary and middle school children. The pedagogy emerged around science, emotional intelligence, the arts, interconnected systems and the capacity to implement. While Jean Piaget considered each child "a little scientist", the author recognizes each child as a little entrepreneur. The goal is to wake up the entrepreneur in all of us, an entrepreneur for the Common Good.

The Chinese Government offered to undertake learning trials in the City of Wuxi. The encouraging results led to an invitation to widely apply the methodology to all 5,000 Green Schools of China. The annual publication of a new series of 36 fables with a detailed pedagogy received widespread appreciation. After three years the program was expanded to all elementary and middle schools of China. The author has addressed hundreds of thousands of students and teachers as part of a ten year program. By 2023, a total of 365 fables will have been published in China. At the time of the publication of this book on "100 Questions on 100 Pages" 336 fables have already been written, indicating that the ambitious goal is within reach[100].

The revenues generated through these publications provide a high degree of independency.

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[100] For further information <www.zerilearning.org> and <www.TheFableShop.com>

Next Book Series: 100 Solutions

At the completion of the 365 Fables, the author plans to undertake, in partnership with journalist Jurriaan Kamp and international allies, to publish 100 books in the next 10 years. These publications will present solutions that transform consumption that destroys and degrades environments into consumption that supports and restores natural habitats and the communities with resilience.

This Solutions Series presents books dedicated to the coffee and tea we drink, the pepper we eat, and the diapers or razors we use. Each book shows how our consumption is linked to the web of life. Next time you sprinkle pepper on your dish, you realize that you are supporting tigers and elephants in Asia. Or, you learn that the diapers of your baby can be the beginning of fruit trees in your favorite park in the city supplying fresh fruits forever. Or, you discover that using a different razor can restore degraded lands that have laid barren for centuries.

By the Fall of 2020, the first batch of 6 books will be ready to set the stage covering topics as diverse as Plastics, Cosmetics, Coffee, Diapers, Light and Paper. The Solutions Series will outline the challenges in each sector, the ramifications for society and the planet, and the breakthrough solutions that have been tested and are ready to be rolled out. Our goal is to cover nearly every product we daily use and demonstrate how it can transform into an engine of sustainability provided we wake up the entrepreneur in us.

Government and Corporate Coaching

The network of scientists, entrepreneurs and financiers operating within the realm of ZERI and the Blue Economy are often solicited by Governments and industry to assist in the transformation of their economic, social and environmental development models. Our approach is positive with a sense of responsibility to deliver results - the sooner the better. We reject more analyses of the problems, considering that sufficient research has been undertaken. We focus on identifying portfolios of opportunities, agree on the most relevant ones, and from then on focus on implementation.

Only when there is a real commitment from leadership at the top will partnerships evolve and be successful. The culture is always to discover the resources and the trends that will lead to results that go beyond the mere financial and economic performance.

The modus operandi adheres to the logic that we not only use and transform what is locally available, but that we surf the waves meaning that work with what has remained unnoticed. Once we engage, then we build a long term relationship that may last for decades.

The project teams composed of scientists and entrepreneurs, representing a generation of people committed to action are accompanied by legacy investors who provide the financial resources in order to speed up the transformation of society where its citizens are happier and healthier.

Books by the Same Author

"**The Economy of Happiness: An Exploration of the Principles that could Guide an Economy to Health and Happiness**" published in English, French, Spanish and Italian (2020).

"**The Plastic Solutions: the business models that work for the Oceans**", with Marco Simeoni, published in English, Spanish, Portuguese, French, Japanese and Chinese, (2020).

"**The Moroccan Model: Transforming the Economy for the Common Good**", published in French, English and Arabic (2020).

"**LiFi - Internet at the Speed of Light and the Advent of the Internet of People**" published in English by JJK Books (2018), in French by L'Observatoire (2018).

"PLAN A - Economic Development Strategy for Argentina" published in English by JJK Books and in Spanish by the Argentinian Ministry of Environment and Sustainable Development (2018)

"Let's Be As Intelligent as Nature" also named in the USA **"The Third Dimension: 3D and 11 other unstoppable trends that are revolutionizing the production of food and fuel, regenerating nature, and rebuilding communities",** published in English by JJK Books, in Spanish by Tusquets, in Italian by Edizione Ambiente, in French by L'Observatoire (2017), in Dutch by Nieuw Amsterdam (2019).

"The Blue Economy 3.0" published in English by XLibris in Australia (2017)

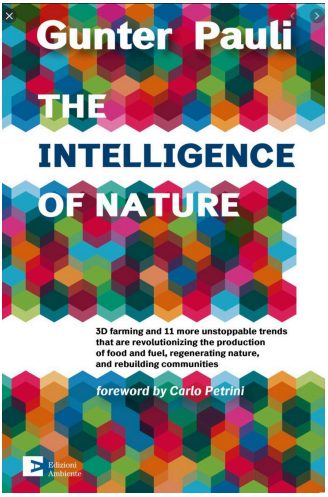
"The Blue Economy 2.0" published in English by Academic Press in India (2015)

"The Blue Economy: 100 innovations, 10 years, 100 million jobs" in English by Paradigm Publishers in the USA (2010).

"Steering Business Towards Sustainability" edited with Fritjof Capra, published by the United Nations University Press is the first book ever presented over broadband internet video on April 7,1995.

A series of 252 published fables bringing science, emotions, arts, logic and entrepreneurship to children. All fables are illustrated by Katherina Bach.

www.TheFableShop.com



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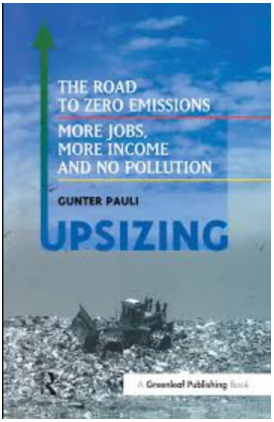

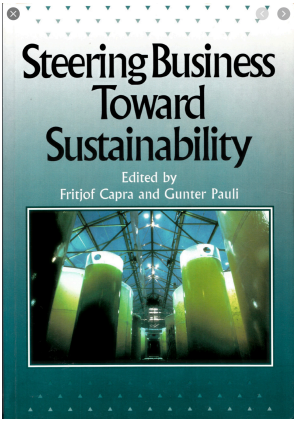

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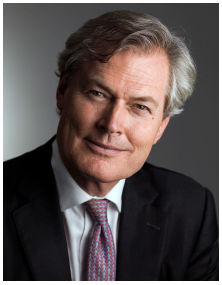
ABOUT THE AUTHOR



Gunter Pauli (1956) is an entrepreneur, pedagogue and author. He pioneers innovations and creates new (disruptive) business models. Gunter accompanied over 200 projects over the past quarter of a century, translating ideas with solid science into a vision implemented through entrepreneurship. These initiatives have evolved in three unicorns and dozens of demonstrations on how to transform society. Gunter adheres to a philosophy summarized in his book “The Blue Economy” (2010) translated in nearly 50 languages. He proposes to avoid dividing opinions centered around “for or against”. Rather he continuously focuses on finding better solutions, much better indeed! He embraces radical change, shifting from the obsession to ever higher levels of efficiency, globalization and ever lower prices, to resilience and the capacity to better respond to the basic needs of all, by generating value with what is locally available. He dedicates half of his time to inspire children with fables that empowers them to create a “SuperWorld” their parents could never have imagined. His latest book “The Economy of Happiness” is based on the successful implementation of game changing businesses, and outlines underlying principles that establish the successful pursuit of health and happiness.

<www.gunterpauli.com>

Othmane Mechatte, born in Morocco, is an explorer at heart. This manifests in his continual search for novelty. He worked in several positions ranging from paramedic, policy analyst to mine worker and photographer. He currently resides in Canada, and assisted with dedication, a critical mindset and joy in the rapid turnaround of this string of questions into a book.