

Waking up from transhumanist dreams: reframing cancer in an evolving universe

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Abstract. Technological dystopias incarnate transhumanist dreams of a this-worldly blissful immortality gone awry. Underlying these worldviews is a globalized technocratic paradigm. One response to these transhumanist dreams is to remind ourselves of how Nature actually works—its origins, constraints, and future. Our relationship with Nature spills over into how we feel standing face-to-face with vulnerability and suffering. In this article I reframe cancer as a journey of maintaining harmony with Nature in an evolving universe instead of a war against death that we are destined to lose. I argue that understanding the natural world helps us come to peace with the reality of cancer, and find opportunities to love in and through vulnerability and suffering. In contrast to *transhumanist* dreams, being *human* presents an opportunity to welcome the reality of imperfection, to be liberated from our addiction to technological control, to draw together as a community, and to live the lessons of each stage of our finite life to their fullest. I hope this reflection, grounded in scientific literature and engaging with richly embodied medical humanities readings, can help us all reframe cancer, from books to bench to biotech to bedside.

Keywords: transhumanism; cancer; evolution; relationship to nature; quest for perfection; immortality; vulnerability and suffering.

Introduction

Transhumanism means different things to different audiences. In this article I critique a particular flavour, which I briefly outline now. Technological dystopias incarnate transhumanist dreams to live forever (Heinlein 1958), be free of suffering—at least for the rich and powerful (Ishiguro 2005)—or re-create intelligent life in a state of innocence (Atwood 2003). Underlying these worldviews is a globalized technocratic paradigm (Guardini 1996; Francis 2015, 105, 108, 115, 203, 219), the loss of an overarching cosmic world view (Bouyer 1988), rise in consumerism, a gnostic repudiation of the body, and a neo-pelagian aspiration to individualistic self-sufficiency (Congregation for the Doctrine of the Faith 2018, 2–4). Crowdfunding campaigns cater to these transhumanist dreams to secure stable funding for age related research like Alzheimer’s, heart disease, and cancer (Life Extension Advocacy Foundation 2017; Kurzgesagt 2017; CGP Grey. 2017). One imaginative short story embodies death as a mythical dragon that plagues humanity, who have become so blind to this apparent inevitability that they consider death good (Bostrom 2005), and has been made into a video leveraged for a transhumanist cause (CGP Grey 2018). There are big biotech players at work in these arenas. For example, The Methuselah Foundation is a biomedical nonprofit charity co-founded in 2001 by David Gobel and Dr. Aubrey de Grey, whose aim is to “make 90 the new 50 by 2030”, and who fund various projects (Methuselah Foundation 2019).

In this article I argue that by reflecting and listening to how Nature works we can wake up from transhumanist dreams—or nightmares—and reframe cancer in an evolving universe. I reframe cancer as a journey of maintaining harmony with Nature instead of a war against death that we are destined to lose. I argue that understanding the natural world helps us come to peace with the reality of cancer, and find opportunities to love in and through vulnerability and suffering. Instead of avoiding the inevitable at all costs, vulnerability and suffering have their own lessons. By being made aware of the systemic biases of transhumanist dreams, how we think and feel about cancer can change and lead to wiser health decisions. It is

my hope that a scientifically informed perspective, guided by the wisdom captured in medical humanities texts will wake us up from transhumanist dreams that influence some aspects of cancer, from books to bench to biotech to bedside. Reframing cancer in these contexts means changing how we conceptualize, investigate, intervene and experience cancer. My sources range recent biomedical research, all the way to medical humanities and biblical texts. In contrast to *transhumanist* dreams, being *human* presents an opportunity to welcome the reality of imperfection, to be liberated from our addiction to control and slavery to technology, to draw together as a community, and to live the lessons of each stage of our finite life to their full *human* potential.

1. Hallmarks of Nature

Nature is Harmony –
 Nature is what we know –
 Yet have no art to say –
 So impotent Our Wisdom is
 To her Simplicity – Emily Dickinson

Our view of Nature is intimately connected with our view of disease. Therefore before looking at the *Hallmarks of Cancer*, let us take a step back and consider the *Hallmarks of Nature*.¹ The view of Nature as a machine has persisted in popular culture and many scientific circles since the 17th century. A richer and more faithful description, in light of many empirical studies, has already been taken up into philosophy of nature and articulated in the recent book *Creative Nature* (Novo et al. 2018), John Brungardt and I have reviewed for *Scientia et Fides* (Woollard and Brungardt 2019). “To understand Nature as a great system of complex and dynamic systems, modern science no longer sees the Universe as a ‘machine’ moved solely

¹ This phrase is inspired by the various hallmark reviews on cancer (Hanahan and Weinberg 2000; Hanahan and Weinberg 2011), reviews on aging, pluripotency, and likely others.

by cold, deterministic interactions, but rather as an immense network of relations” (Novo et al. 2018, 182)².

Creative Nature connects physics with biology to see Nature, living and non-living beings, as a whole (Novo et al. 2018, 15–42). While life, change, limits, functions, creativity are all hallmarks of Nature, I think the most pertinent for this article are life, function and limits.

1.1. Life

What is life? What changes when something dies? The more we investigate living beings, their history and the cause of their dynamic activity, the more we distinguish the trees, vines, leaves and seeds in the forest of life, the more confused we may feel! Is a virus alive? A cell line? If I am alive and my cells are alive – what about the parts of my cells? How many ways are there to be alive?

Creative Nature contextualizes life and death in a cycle. Many of our approaches to understand living beings abstract them from time and community. However, a living being contains a story of its history and will make its own contribution, and then pass this on. To be alive means to be part of the great temporal story of life, to live in the molecular circle of life. Our metabolism is intertwined with other living beings and we speak the same molecular language.

As dynamical systems, a living being is not only maintaining homeostasis with its environment, but maturing and preparing for the future. As a new living being starts to “crawl” it takes its first “molecular steps” in a process of self-construction. The nested layers of information and structure constructed in self-directed development are taken up into a hierarchical complexity much more interesting than Russian Matryoshka dolls. The scientific community’s sky high view of the neighbourhood of the cell is resolving to a crisp image of molecular crowding. We can see transportation hubs, utility lines, and recycling factories that underpin cellular life. The lines between biology and physics are being blurred as cellular life comes into focus. We are challenged

² Translations from the Spanish are by John Brungardt and myself.

to find new analogies to explain the organization at various length and time scales where the parts contribute something for the sake of the whole.

1.2. Functions

What is function? We speak of functions of living beings, but not of volcanoes erupting, of tectonic plates shifting, or of the periodic climatic events of El Niño and La Niña years. For causal processes such as these, we speak of mechanism “because we do not consider those processes as part of a larger system. However, if we change our perspective and focus, for example, on global cycles that regulate the dynamics of the biosphere, then yes it would make sense to speak of the function of volcanoes erupting or of El Niño in this larger system” (Novo et al. 2018, 132).

The relationship between structure and function has been discussed in a scientific manner at least as far back as Aristotle.³ To understand the function of a certain biological structure, we must listen to its evolutionary story—the roles it has played in various contexts and how it has changed over time. Through the humorous example of a penguin’s flippers, the authors explain how evolutionary context goes hand-in-hand with function. “The crux of the matter is that wings in the abstract do not exist, only the wing of this or that concrete animal, an animal that is a *whole* in which this concrete part will have a specific function. But it is an evolving whole that uses the structures it possesses and modifies them according to the ecological context and thus maximizes its chances of survival” (Novo et al. 2018, 137).

These insights about whole organisms and body parts also sheds light on the structure–function relationships of the parts that make up a cell. To speak of function is to speak of a concrete living being, a concrete evolutionary context—the historical trajectory of a structure and the supporting

³ As Aristotle wrote without the wealth of empirical studies we now have, and was a pioneer in the intellectual tradition that international science is built on today, we might think we have exhausted his limited insights. For a well scholarly challenge to this stance, see the section *Aristotle’s Metaphysics of Nature* in O’Rourke 2004, 12–24, and his analysis of various Greek works (like τέλος) and what is different in biology versus other areas of inquiry.

information (Novo et al. 2018, 139). We cannot deeply understand living beings apart from their story; this includes the history of the selective pressures that shaped the function of their parts (Novo et al. 2018, 133; Lynch et al. 2014). Evolution provides a theoretical framework to answer Emily Dickinson's opening poem, however inevitably limited our knowledge of the evolutionary history is, we must listen to hear Nature's harmony and grow in the wisdom of her simplicity.

1.3. Limits

A living being inherits its past evolutionary solutions. New functions can evolve, but there is always a point of departure. The striking observation that common solutions appear independently (for example, the eye) reminds us that there is both surprise and consistency in our evolving universe.

Why is life the way it is? Life has survived amidst radical environmental changes, and this has yielded a molecular architecture that is robust and adaptable to unforeseen conditions. We will see in an upcoming section how this gives us insight into the atavistic understanding of cancer.

2. Brief History of Antagonistic Cancer Language

Definitions of a disease shift with our scientific knowledge which is digested, discussed, and shared in a cultural context. Our attitudes towards cancer depends on our definition of what it is, what is causing it, how responsible we are, and its impact on our future.

Charles Hayter, an expert on the history of cancer in Canada,⁴ gives a brief overview of attitudes towards cancer. The ancient Greeks coined the term after the crab-like appearance of veins around tumours,⁵ and 18th century anatomists and 19th century pathologists characterized the disease at the organ and cellular level (Hayter 2003, 253–255).

⁴ While his historical overview is focused primarily on Canada, this country's close academic ties with Britain and France (via Quebec), and geographic proximity to the United States provide a mosaic of North American and European perspectives.

⁵ "Crab," is *καρκίνος* in Greek and *cancer* in Latin.

Hayter, citing Susan Sontag, overviews the use of the language of warfare to describe cancer (Sontag 1977; Hayter 2003). The view of cancer as unregulated, lawless and unpredictable influenced the use of political analogies like anarchy and Bolshevism. Cancer was seen not only as a personal burden, but considered a public health issue and framed as a threat to society. Society had declared a War on Cancer and since 1923 the British Empire Cancer Campaign had been mounting a “cancer crusade” (Hayter 2003, 261).

Authors describing cancer pathogenesis employed the language of a colonial war: invasion, colonization, evasion of the body’s defenses. Treatment was a counterattack, which aimed to destroy and kill cancer cells while minimizing collateral damage to the patient. Arsphenamine (Salvarsan), the first modern chemotherapeutic agent, was developed to treat syphilis around 1910 and was described as a “magic bullet”. Other early drugs to treat cancer like cyclophosphamide (Cytosan) date back to military research and a tragic accident in World War II with nitrogen mustard gas (Sontag 1977, 63–67; Hayter 2003, 253–259; Hazell 2014).

The chair of a American Society for the Control of Cancer meeting in 1926 at Lake Mohonk, New York declared that “civilization must wage a relentless war against cancer” (Hayter 2003, 260). Many of the early pioneers in the cancer scene were familiar with bacteriological terminology because of the amazing strides being made against tuberculosis. For instance, the chair of the 1926 cancer meeting was George Soper, a sanitation engineer, who had discovered Typhoid Mary (New York Times 1948).

We have inherited a rhetoric about cancer that is historically confounded with the language of 20th century wars and infectious diseases. Perhaps there is always a necessary element of struggle: against unproductive negative thoughts, against our longing for inordinate security and certainty, against unrealistic expectations about treatment, against crippling social isolation. Struggle can mean resiliency when treatment is done and we want to forge a post-cancer life. Some language of struggle will have its time and place in cancer care. Yet every analogy has its limits and we should take care not to overemphasize antagonistic language in discourse about cancer. Com-

pared to the early/mid 20th century, the scientific community has a deeper understanding of cancer. Going forward, this can help update our cancer vocabulary and analogies. So what language should we use?

3. Hallmarks of Cancer

What is cancer? Cancer is not an organism or an infectious microbial agent. Our own cells become cancerous. As we saw in *Hallmarks of Nature*, living beings are a process of self-construction of nested hierarchical levels of information and structure. If we open up the Russian Matryoshka dolls, which ones contain cancer?

For many decades now there has been a sustained effort to understand smaller scale interactions inside of cancer cells and the ways they communicate with the tumor microenvironment. Hanahan and Weinberg frame cancer research “as an increasingly logical science, in which myriad phenotypic complexities are manifestations of a small set of underlying organizing principles” (Hanahan and Weinberg 2011, 669), in their two seminal “Hallmarks of Cancer” reviews that span the first decade of the 2000s (Hanahan and Weinberg 2000).^{6,7}

Cancer is more complex than a monocrop of cancer cells overrunning a field. Tumors are complex tissues with different cell types and cancer cells unbalance the communication patterns. When cancer cells become pathologically independent, what serves them contrasts with the good of the whole organism. These hallmarks frame cancer as a story of a loss of harmony between the functional units of life—cells—and the whole environment. Let us look at some hallmarks in more detail.

⁶ There are six original hallmarks of cancer: sustaining proliferative signalling, evading growth suppressors, activating invasion and metastasis, enabling replicative immortality, inducing angiogenesis; and two additional emerging (tentative) hallmarks: deregulating cellular energetics, avoiding immune destruction; and two enabling characteristics: genome instability and mutation, tumor-promoting inflammation.

⁷ The following sections follow the language extremely closely, including sentence fragments of technical phrases. For readability I have avoided direct quotations and citations to other supporting studies which can be found in their two hallmark reviews.

Sustaining Proliferative Signalling & Evading Growth Suppressors

While normal cells walk the knife's edge between uncontrolled growth and static death, cancer cells communicate and grow in a way that upsets the harmony of the whole organism. For example, cancer cells acquire the ability to stimulate themselves in a positive feedback loop and evade anti-growth signals.

Resisting Cell Death

Cell death is often framed as happening in two contrasting manners: controlled or uncontrolled. In programmed cell-death (apoptosis) cells go through regulated steps and gradually wind down and recycle and digest their parts. Apoptosis is a common natural process. For instance, apoptosis causes the absorption of the webbing between our fingers and digits that typically occurs in the first stages of pregnancy, when nascent life is 6–8 weeks old. In cancer, apoptosis happens when conditions inside the cell are imbalanced (DNA damage, oncogenic signalling, low oxygen). Cancer cells can avoid apoptosis in a myriad of ways and stay alive past their due date. Hence, triggering apoptosis is a strategy for cancer therapeutics.

The way that cells die is important to tumour progression. In catastrophic uncontrolled (necrotic) change—through infection, toxins, or trauma—cells burst like balloons and release inflammatory signals to the surrounding tissue microenvironment, thereby recruiting immune cells that enhance tumorigenesis through promoting growth of supporting vasculature, cancer cell growth, and invasiveness.

Enabling Replicative Immortality

Cells do not divide forever, but tend to either die or stop dividing (senescence) after 60–70 doublings. How then have we managed to create immortalized cell lines in laboratories? Disabling just a few genes can keep cells dividing until they enter a stressed out “crisis” state: large scale cell death, end-to-end DNA chromosome fusions, and a one in ten million chance of survival. But the cells that do survive have acquired replicative immortality.

Activating Invasion and Metastasis & Inducing Angiogenesis

Some cancers appear decades after a primary tumour has been surgically removed or chemically destroyed. This is because it can take a long time for disseminated cancer cells in dormant micrometastases to navigate the multicellular environment of the body. Cancer cells enter nearby blood or lymphatic vessels, transit through these two different body-wide circulatory systems, escape from the vessels into the functional tissue of an organ, grow into small nodules, and finally grow into a macroscopic tumors by encouraging the growth of the supporting vasculature (angiogenesis). At each of these steps cancer cells have to adapt to a new context.

Tumor-Promoting Inflammation

Immune cells live in and around cancerous lesions. They swarm like a school of fish, or they hide like a needle in a haystack. The anti-tumoral activity of the immune system protects us from ourselves by pruning away cancer cells like it does infectious microbial organisms.

Evading Immune Destruction

Immune cells monitor cell health and eliminate tumors. Immune cells talk to each other and have a molecular conversation with cancer cells. Cancer cells can reprogram immune cells to suppress the immune system, thereby evading it. Paradoxically inflammation can enable hallmark capabilities by secreting bioactive molecules that put the gas pedal on each hallmark.

4. What is Cancer, Really?

Hanahan and Weinberg's hallmarks are the *how* of cancer: how cancer cells relate to their neighbours in a multicellular context. In the year 2000 these were conceptual advances because they did not abstract cells out of their physiological context. In their first paper they confidently proposed the analogy of rewired circuits to understand cellular communication. They forecasted that the cell could be modeled as an integrated circuit, "where transistors are replaced by proteins (e.g., kinases and phosphatases) and

the electrons by phosphates and lipids” (Hanahan and Weinberg 2000, 59). They thought a mere two decades would be sufficient to “be able to apply the tools of mathematical modeling to explain how specific genetic lesions serve to reprogram this integrated circuit in each of the constituent cell types so as to manifest cancer” (Hanahan and Weinberg 2000, 67). Unfortunately, their perspective abstracted cells from their evolutionary history.

In their second paper, written a decade into their bold prediction, they acknowledged nuances in the integrated circuit analogy (Hanahan and Weinberg 2011, 656–6). This analogy starts to breakdown when we forget that in living beings the function of structures depends on their context, particularly their evolutionary context (section *Hallmarks of Nature: Function*). The story of cells, and hence cancer, started long before humans were on the scene and shaping functions through the selective pressure appropriate to them.

What is cancer from an evolutionary perspective? Some authors speculate that cancer cells are reverting to a primitive state and losing their recently evolved functions that allowed them to harmonize in a multicellular context (Lineweaver et al. 2014). From this *atavistic model* proceeds a target-the-weakness strategy that plays to the strengths of the recently evolved functions that are still intact in normal cells in harmony with the body, such as immunity, metabolism, and membrane transporters.

This hypothesis has therapeutic implications and testable hypotheses. For example, if a certain hallmark of cancer is its strength, then we should avoid approaching it head on.⁸ Therapeutic interventions require under-

⁸ [A]fter ~4 billion years of evolution (the first ~3 billion of which were characterized by the largely unregulated proliferation of unicellular organisms) cellular proliferation is probably the most protected, least vulnerable, most redundant and most entrenched capability that any cell has. (Lineweaver et al. 2014, 827) [I]f cancer is the dysregulation and degeneration of recently evolved genes and the complementary up-regulation of ancient genes – then a potentially useful therapy is to apply a specific stress to the organism that is relatively easily dealt with by healthy cells using recently evolved capabilities, but is not easily dealt with by the older capabilities available to cancer cells. [...] Viewed in the context of the atavism model, cancer’s niche creation can be thought of as the re-creation within the host organism of ancient environments in which ancestral physiologies are more comfortable. [...] In bridge one plays to the strengths of one’s partner (which are the weaknesses of one’s opponent). Here we play to the strengths of the more recent genes in

standing causal mechanisms enough to predict behaviour in novel contexts. If we want to understand how cells can behave in different contexts at a deep level, we must look to the evolutionary story of the parts and the whole.

So what is cancer, really? While there is some consensus, a deeper understanding would be able to unite our study of cellular structures (how does the cell do that?) and their evolutionary trajectory (how did diverse cellular structures and pathways arise?) (National Science Foundation 2012). We must humbly acknowledge that our understanding of what evolution is has matured substantially since its articulation by Darwin a bit over 150 years ago, and it will continue to be refined. Evolution is an important perspective for reframing our relationship with cancer, because, to quote the geneticist and evolutionary biologist Theodosius Dobzhansky, “Nothing in biology makes sense except in the light of evolution” (Dobzhansky 1973).

5. Being Human: Harmonizing our Thinking and our Feelings about Cancer

Our conception of evolution spills over to how we experience cancer, because our knowledge and beliefs about evolution shapes our relationship with the natural world. Do we consider our home a welcoming place—even with cancer? As we digest scientific conclusions we naturally make sense of our limitations and constraints, and weave a relationship with the natural world and with ourselves—including diseases like cancer. For example, the scientific illustrator David Goodsell vividly explains how he conceptualizes the cell communicating information, “as an old jury-rigged automobile, barely held together with bailing wire and duct tape. I can just imagine generation after generation of changes, randomly adding a new kinase here or a backup phosphatase there, slowly tuning the flow of information” (Goodsell 2016, 104).

Science searches for the truth. Truth purifies unrealistic and unhealthy attitudes. Scientific truth gives us agency to harmonize what we know and

normal cells (which are the weaknesses of cancer cells). (Lineweaver et al. 2014, 829)

how we feel (Archer 2000, 225). This involves our relationship with the natural world, including our own self. Understanding the *why* of cancer enables us to reframe our personal experience of it—the “inner conversations” we have with ourselves (Archer 2000).

Technology sings a siren song that she alone will solve all our problems. *Techne* eclipses *sapientia*, and we are tempted to pursue it alone. While evolutionary cell biology studies perfection at a cellular level (Lynch et al. 2014, 16990) it does not guide us to a perfect human life. Transhumanists dream of living forever, not culturing immortalized cancer cell lines! The dream is to reach a type of immortality that dominates our vulnerability to suffering. Perhaps this is possible. But perhaps not. And perhaps, if we reflect deeply enough, we would no longer want to transcend being human.

When we are confronted with cancer, do we not look further afield than the life sciences for sources of meaning? Attitudes towards cancer are shaped by our attitudes towards perfection, control, our own bodies and the natural world; how we experience the passage of time, ageing, and new generational identities (youth, young adult, middle age, golden years, elder); our nostalgia for living and instinct to survive; our fear of the unknown and bewilderment by suffering.⁹

In my experience with cancer patients, they reach out for wisdom and meaning from richly embodied medical humanities, philosophy and theology/religion texts. These sources of wisdom strengthen the heart and soothe the soul. Although the gap between books, bench, biotech and bedside can be quite daunting, I nevertheless attempt to harmonize our thinking and feelings about cancer in order to care for the whole person.

⁹ I have drawn from the medical humanities excerpts and commentary by the United States President’s Council of Bioethics (2001-2009) because of their comprehensiveness, thematic organization, and sapiential flavour. The *Being Human* bioethics reader includes short stories, novels, poems, plays organized by themes: The Search for Perfection; Scientific Aspirations; To Heal Sometimes, To Comfort Always; Are We Our Bodies?; Many Stages, One Life; Among the Generations; Why Not Immortality?; Vulnerability and Suffering; Living Immediately; Human Dignity. (United States President’s Council of Bioethics 2003)

5.1. The Search for Perfection

Nathaniel Hawthorne's *The Birth-Mark* (1843) is a tragedy of perfection (United States President's Council of Bioethics 2003, 5–20). In this fictional story a brilliant scientist is cursed with the obsession to perfect the physical appearance of his wife at all costs. The charming birth-mark that glances her cheek becomes a shocking blemish that mars her face. She once beheld it as a beauty spot, but now begs him to rid her of it “at any risk” because “you cannot love what shocks you”. In the end his wife perishes. This tragedy seems inevitable since for him “each instant required something that was beyond the scope of the instant before”. This cautionary tale viscerally paints a picture of his wasted life because of his obsession with “the spectral Hand that wrote mortality where he would fain have worshipped”. Hawthorne warns us that an overly-zealous search for perfection alienates us from our own ever-perfectable humanity.

5.2. Why Not Immortality?

Many transhumanists dream of an immortality achieved through technology. This dream has been present in our stories and myths and is recorded in writing at least as far back at the third century BC in the Epic of Gilgamesh (United States President's Council of Bioethics 2003, 392–394) and diverse cultural references to the tree of life (Wikipedia 2019). Gilgamesh boasts and threatens the immortal winemaker, Siduri, “I will break in your door and burst in your gate, for I am Gilgamesh who seized killed the Bull of Heaven, I killed the watchman of the cedar forest” (United States President's Council of Bioethics 2003, 393). Gilgamesh's striving is mirrored in the globalized technocratic paradigm in so far as it disregards the divinely created structure of reality. The immortals' caution Gilgamesh that “You will never find that life for which you are looking. When the gods created man they allotted him to death, but life they retained in their own keeping” (United States President's Council of Bioethics 2003, 393).

Our mortal allotment is not extrinsically imposed by the whim of the gods and overcome by a hero's strength, but rather the ballad of being

human is a *magnum opus* whose opening notes go back billions of years. The harmonious communication that unites our parts into the whole is a story long in the telling. A harmony of relationships is woven in the biochemical dance of our most microscopic molecular parts. In the section *Hallmarks of Nature* we saw that the structure and function of the biochemical circle of life come hand in hand with limits. In the section *Hallmarks of Cancer* we saw the fragility and uniqueness of our multicellular being.

Philosopher Hans Jonas reflects on what this means for human mortality, which he proposes is both a burden and a blessing (Jonas 1992).¹⁰ Jonas contrasts the living and non-living and explains how life “carries death within itself” (Jonas 1992, 35). Life arose out of the potentiality of non-living creation by Nature’s creativity, by her natural creative causes. Yet from life’s humble origins, it has inherited limits and constraints.

life must depend on conditions over which it has no control and which may deny themselves at any time. Thus dependent on the favor or disfavor of outer reality, life is exposed to the world from which it has set itself off and by means of which it must yet maintain itself. [...] Emancipated from the identity with matter, life is yet in need of it; free, yet under the whip of necessity; separate, yet in indispensable contact; seeking contact, yet in danger of being destroyed by it [... T]hus does the living form carry on its separatist existence in matter—paradoxical, unstable, precarious, finite, and in intimate company with death. (Jonas 1992, 36)

Jonas looks for a purpose in death, why death evolved, and first voices the collective good, “dying of the old makes place for the young” (Jonas 1992, 39). Perhaps this perspective leaves something to be desired for us, especially we who are saturated in an overly-individualistic perspective where everyone is optimizing their personal trajectory in life. The real question is, why is immortality not good *for me*, a concrete individual?

In *Gulliver’s Travels* (1726), Jonathan Swift addresses this question. He vividly describes the eternal hell of living forever in Gulliver’s encounter with an immortal people—a special type of immortality where only the rare

¹⁰ Also in United States President’s Council of Bioethics 2003, 413-425.

individual is born with a curse of living forever (United States President's Council of Bioethics 2003, 395–402). It is a curse of gradual decay, not the dream of being forever renewed by the fruit of the tree of life.

In contrast to *Gulliver's Travels*, in the children's novel *Tuck Everlasting* (1975) a family accidentally drinks from a spring that contains the water of life, and unexpectedly imbibes ageless immortality. When Winnie, an innocent young girl, accidentally discovers the spring and their secret, they kidnap her and try to convince her not to betray the secret, especially not to the "man in the yellow suit" who tries to capitalize on the enchanted water in a business venture. While we might dream of remaining suspended in the prime of life, one of the immortals explains to the girl the curse of falling off the wheel of time.

[D]ying's part of the wheel, right there next to being born. You can't pick out the pieces that you like and leave the rest. Being part of the whole thing, that's the blessing. But it's passing us by, us Tucks. Living's heavy work, but off to one side, the way we are, it's useless, too. It don't make sense. If I knowed how to climb back on the wheel, I'd do it in a minute. You can't have living without dying. So you can't call it living, what we got. We just *are*, we just *be*, like rocks beside the road. [...] I want to grow again, [...] and change. And if that means I got to move on at the end of it, then I want that, too. Listen, Winnie, it's something you don't find out how you feel until afterwards. (United States President's Council of Bioethics 2003, 405–406)

Stories like this allow us to imagine what might happen if transhumanist dreams come true, and rouse ourselves from what might degenerate into a nightmare, before it is too late. Instead of water from a magical spring, perhaps only the steady drip of basic research into longevity is needed to extend life a few-fold, from four-score to multiple centuries. I think it is important to consider not just individual perspectives, but the communal dynamic, so much a part of our mammalian evolutionary origins.^{11,12} Jonas'

¹¹ See these recent seminars from the Science, Reason and Faith Group at the University of Navarra (Rodríguez Valls 2018; Turbón 2013).

¹² See the work of archaeologist Steven Mithen at the University of Reading, especially his general academic books and his recent talk (Mithen 2019).

last paragraphs offers food for thought about the communal perspective of being human, and the alienation we would experience as nothing but “rocks beside the road.”

It would leave us stranded in the world we no longer understand even as spectators, walking anachronisms who have outlived themselves. It is a changing world because of the newcomers who keep arriving and who leave us behind. Trying to keep pace with them is doomed to inglorious failure, especially as the pace has quickened so much. Growing older, we get our warnings, no matter in what physical shape we are. (Jonas 1992, 40)

Jonas mentions the loss of artistic consolations, and we can substitute our preferred music and literature, familiar places, faces, and language. The philosopher William E. Stempsey, largely defends Jonas’ perspective and explains how the burden of death carries within it the blessing of death, “the blessing of knowing that our earthly travails are not eternal and of inspiring us to put the time we do have to good use” (Stempsey 2015, 47).

We all share the same life cycle with our fellow wayfarers and are bound together by temporal solidarity. It is part of how we evolved and the structure of reality. In contrast to endless technological striving and the looming curse of endless competition, death frees us to give without expecting anything immediately, in a spirit of gratuity. And this inspires others to continue the giving cycle. Freed from the prison of a this-worldly immortality we can share advice with those who are a few steps behind us and we can honour those who have gone before us and reach out to their helping hands.

These arguments may not ease the natural dread of death. Gilgamesh too was afraid of death, as we all likely are. Like Gilgamesh, when we see the end of a loved one, perhaps we too “stray through the wilderness and cannot rest” (United States President’s Council of Bioethics 2003, 394). But let us listen to the wisdom of the immortal winemaker,

As for you, Gilgamesh, fill your belly with good things; day and night, night and day, dance and be merry, feast and rejoice. Let your clothes be fresh, bathe yourself in water, cherish the little child that holds your hand, and make your wife happy in your embrace; for this too is the lot of man. (United States President’s Council of Bioethics 2003, 394)

As I read it, the winemaker's advice is more than *carpe diem*, but a reminder to discover community and intergenerational solidarity and live in the present moment. This lesson can remind us that possessively grasping the tree of life and weaponizing its fruit is not the eternal life we seek, but a perpetual alienation from the cosmos. We can drink the wide of Siduri—and other founts of wisdom—and find contentment, no matter our generational stage of life. We can learn from our elders, pass on our wisdom to the next generation, and live our lives in loving service to others.

5.3. Vulnerability and Suffering

Suffering and death are a part of life, and we will all have to live these stages. Paradoxically, framing death as great enemy to be conquered through technology may end up aggravating the assault that life-threatening illnesses have on the whole person. A 2006 qualitative research study used a framework of semi-structured interviews to study the lived experience of a cohort of patients suffering from life-threatening illnesses, mainly cancer.¹³ They identified common themes of suffering/anguish¹⁴ and integrity/wholeness¹⁵. Considering it a “failure” to escape death dooms us to a nightmare of existential anguish because we get stuck in the frame of victimization, control, and alienation from the present moment. One patient explicitly states that “People encouraged me to do these visualizations you know, where you see [your immune cells] going through the blood and eating

¹³ The authors are from McGill University (Montreal, Canada) and the University of British Columbia (Vancouver, Canada). The patients that comprised their sample “involved Caucasian, Judeo-Christian persons who were aware that they had life-threatening illness; the majority was female” (Mount et al. 2007, 383).

¹⁴ 1. Sense of disconnection from self, others, phenomenal world, ultimate meaning. 2. Crisis of meaning; an existential vacuum; inability to find solace of peace. 3. Preoccupation with future or past. 4. Sense of victimization. 5. A need to be in control. (Mount et al. 2007, 381, Table 5)

¹⁵ 1. Sense of connection to Self, others, phenomenal world, ultimate meaning. 2. Sense of meaning in context of suffering. 3. Capacity to find peace in the present moment. 4. Experience of a sympathetic, non-adversarial connection the disease process. 5. Ability to choose attitude to adversity; open to potential in the moment greater than need for control. (Mount et al. 2007, 383, Table 6)

those bad cells—and I... I couldn't really connect with cancer as the enemy, because it's part of me" (Mount et al. 2007, 382–3).

They discuss their findings through the perspective of Viktor Frankl's logotherapy (c. post WWII 1946) and Martin Buber's I-Thou relationships (c. 1923), among others. They observed that "Meaning-based coping was associated with the capacity to form bonds of connection, which we came to called *healing connections* in response to the evident revitalization, sense of security, and equanimity that accompanied them" (Mount et al. 2007, 376). The published interview snippets support their conclusion that "meaning was not an end in itself, but a by-product of a related experience, a sense of connectedness. It was not meaning, per se, that brought the person alive but the underlying experience of being part of something greater and more enduring than the self" (Mount et al. 2007, 383).

It is one thing to spend time with an ailing elderly as they close their eyes for the last time. It is another to take care of a child stricken with cancer. The novelist Flannery O'Connor tells the true story of the life of a dying child in the *Introduction to A Memoir of Mary Ann* (1961). Mary Ann was admitted at three years old to Our Lady of Perpetual Help Free Cancer Home in Atlanta, operated by the Hawthorne Dominican Sisters.¹⁶ Succored by the Sister's for nine years, Mary Ann lived to the tender age of twelve.

Of those nine years, much is to be told. Patients, visitors, Sisters, all were influenced in some way by this afflicted child. Yet one never thought of her as afflicted. True, she had been born with a tumor on the side of her face; one eye had been removed, but the other eye sparkled, twinkled, danced mischievously, and after one meeting one never was conscious of her physical defect but recognized only the beautiful brave spirit and felt the joy of such contact. (United States President's Council of Bioethics 2013, 513)

O'Connor revisits Hawthorne's *The Birth-Mark*, and reminds us that, unlike the scientist's wife, "The defect on Mary Ann's cheek could not have been mistaken for a charm. It was plainly grotesque. She belonged to fact and

¹⁶ The name is not a coincidence because Nathaniel Hawthorne's daughter founded it in 1900. A quick internet search shows that they are still going strong.

not to fancy” (United States President’s Council of Bioethics 2003, 515). Normal life has its own way of teaching lessons if we are ready to live them. The reality of suffering provides an opportunity to love and educate our emotions to care and comfort, and affirm the dignity of the human person. O’Connor is challenged by the photograph of Mary as a sweet little girl in her first Communion dress and veil. “Her small face was straight and bright on one side, the other side was protuberant, the eye was bandaged, and the nose and mouth crowded slightly out of place. The child looked out at her observer with an obvious happiness and composure. I continued to gaze at the picture long after I had thought to be finished with it” (United States President’s Council of Bioethics 2003, 514).

Quoting another of Hawthorne’s works, *Our Old Home* (1863), O’Connor shows our vital need for more than technological solutions, as a sick and factory-overworked child reaches out to a stranger for the warmth of touch. This poor creature is “A wretched and rhumy child, so awful looking that he could not decide what sex it was” (United States President’s Council of Bioethics 2003, 515).

Nevertheless, it could be no easy thing for him to do, he being a person burdened with more than an Englishman’s customary reserve, shy of actual contact with human beings, afflicted with the peculiar distaste for whatever was ugly, and, furthermore, accustomed to that habit of observation from an insulated standpoint which is said (but I hope not erroneously) to have the tendency of putting ice into the blood.

So I watched the struggle in his mind with a good deal of interest, and am seriously of the opinion that he did a heroic act and affected more than he dreamed of towards his final salvation when he took up the loathsome child and caressed it as tenderly as if he had been its father. (United States President’s Council of Bioethics 2003, 515)¹⁷

Perhaps Mary Ann would have lived more years if she was treated with today’s technological solutions. But would she have been loved and cherished more dearly? The best possible health decisions also include love. Our love

¹⁷ O’Connor claims that Hawthorne himself was the gentleman in the story.

is embodied, and recent empirical studies on the neurobiology of human emotions show us the connection between what we can measure and what we experience in the first person: the comfort of a hug, the tenderness of a caress (captured so poetically by Hawthorne), the deep sense of communion in a spousal embrace, the release of crying, the relief of laughter, the thrill of play, and the joy of a smile.

The technocratic paradigm can preoccupy us excessively to the point that we miss many opportunities to love, and work against the reason to care through our use of technology, which underlies the reason to intervene in the first place. This paradigm is the same tragedy as the obsessive search for perfection in *The Birth-Mark*. From the bottom of my heart I hope that reframing our attitude toward cancer cures us of an excessive search for perfection and the mirrage of a more-of-the-same immortality. I hope that a wise reflection of our origins, constraints, and future can guide us to the common good of the human community—of each person and of the whole person.

6. The Tree of Life

Yet we rebel against the inevitability of death, and seek to slay it like a dragon! The words of the child in the *The Fable of the Dragon-Tyrant* who misses his late Grandmother haunt us, “The dragon is bad and it eats people... I want my Granny back!” (Bostrom 2005). Many of us have the same insight of the child; death is somehow not the way things should be. But what exactly do we mean by death? Our attitudes to death are not merely about what we have observed in our journey so far, but about what we believe will come after. Confronting the possibility of death can break open the hearts of people indifferent, unsympathetic, or even hostile, to religious perspectives.¹⁸ *Being Human* includes the culminating passages of the Bible as one of fourteen texts on immortality.

¹⁸ See Lorrie Moore’s short story *People Like that are the Only People Here: Canonical Babbling in Peed Onk* (1997). A family copes with the unsettling news that their baby has a Wilms’ tumor. (United States President’s Council of Bioethics 2003, 483-511)

Then I saw a new Heaven and a new Earth; for the first Heaven and the first Earth had passed away, and the sea was no more. And I saw the holy city, new Jerusalem, coming down out of heaven from God, prepared as a bride adorned for her husband; and I heard a great voice from the throne saying, "Behold, the dwelling of God is with men. He will dwell with them, and they shall be his people, and God himself will be with him; he will wipe away every tear from their eyes, and death shall be no more, neither shall there be mourning nor crying nor pain anymore, for the former things have passed away." (Rev 21.3–4)

Then he showed me the river of the water of life, bright as crystal, flowing from the throne of God and of the Lamb through the middle of the street of the city; also, on either side of the river, the tree of life with its twelve kinds of fruit, yielding its fruit each month; and the leaves of the tree were for the healing of the nations. (Rev 22.1–2)

These passages have strong parallels in the prophet Isaiah (chapters 60–62), and their language and imagery of the New Jerusalem is taken up and interpreted in light of the encounter with Jesus present in New Testament writings. This biblical imagery is full of life, growth, and personal communion. The tree of life is received as a gift and shared by all without competition. The citizens of the New Jerusalem are not absorbed into an esoteric blob, do not merely live on in the memory of future generations, and do not repeat another cycle in the eternal treadmill of existence. The closing book of the Christian sacred scriptures presents death as a doorway to eternal life where we personally communicate with God face-to-face.^{19,20,21}

This biblical vision has inspired poets like Dante (cf. the last canto of *Paradiso*) and literary figures like C.S. Lewis (cf. Alsan's land in the *Chronicles of Narnia*)²² and J.R.R. Tolkien (cf. *The Silmarillion*)²³ to imagine death

¹⁹ The last enemy to be destroyed is death (1 Cor 15:26).

²⁰ To him who conquers I will give some of the hidden manna, and I will give him a white stone, with a new name written on the stone which no one knows except him who receives it. (Rev 2.17).

²¹ They shall see his face, and his name shall be on their foreheads (Rev 22.4).

²² See the last chapter of *The Voyage of the Dawn Treader* (1952), "The Very End of the World".

²³ In particular see the Halls of Mandos, the hidden eschatological destiny for Men (as opposed to Elves, etc.), and references to the end of time.

as a doorway to eternal life. For these authors, and many others, death is a homecoming to being definitively healed.

Obviously, in the space available to me, I cannot argue definitively for an exhaustive Christian worldview. The gift of faith grounds our existence, and gives us what we cannot give ourselves. I would like to settle for one important point. The ideals of our lives are an anchor for how we attempt to live them out, through our day-to-day free choices and long term strategizing. Our belief of what death is—final cessation of our personal being, or the doorway to the tree of life—is the point of departure for the response of our life, and our response to cancer. There is no definitive consensus among humanity’s cultures and sages as to what death actually is. How critical it is to keep this in mind when dialoguing about cancer! Finding common ground among the many diverse perspectives in pluralist societies can help us all reframe how we relate to cancer, how we allocate research funding, and how we care for the sick. I hope what I have written will encourage the reader to engage the sources of wisdom available to us all, and enable us to change our lived experience of cancer, from books to bench to biotech to bedside, for the better.

Conclusion

Patiently studying how Nature works—its origins, constrains, and future—grounds us in the truth. Certainly many transhumanists are quite grounded, but I have observed a bandwagon of credulous followers and I worry that they could be taken advantage of, especially financially. In this sense I would like to wake up impressionable slumberers from transhumanist dreams. There are seasons to dream dreams, but there are also constraints and limitations in Nature that may be technologically un-transcendable. I have shown in what ways life is constrained, and how biological function is intertwined with evolutionary history. Even though we are used to a certain lifestyle, and have desires to dramatically shape our relationship with the natural world, certain things have happened in our evolutionary past and influence our identity as embodied human beings. Learning to live in harmony with cancer,

to prevent it and manage it, involves listening to the grammar of Nature and carefully and patiently discovering the causal networks at work in us.

I hope this reflection, grounded in scientific literature and engaging with richly embodied medical humanities readings, can help us all reframe cancer in an evolving universe. I hope we can wake up from unrealistic transhumanist dreams and engage with the challenge of cancer, “go even beyond the attempt to unravel the structures and processes hidden in Nature” (Novo et al. 2018, 183) and consider how we can “put into practice our effort, our creativity, our enthusiasm and our cooperation to thereby feed the hope that this seemingly broken physical world will one day be healed and make sense” (Novo et al. 2018, 183). Perhaps I am a dreamer, but if so I will enjoy a good night’s sleep, because my dream is profoundly human.

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