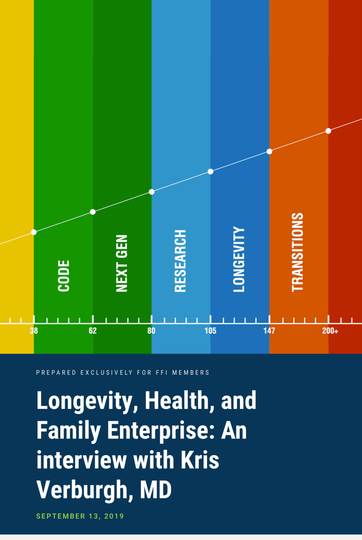

PREPARED EXCLUSIVELY FOR FFI MEMBERS

Longevity, Health, and Family Enterprise: An interview with Kris Verburgh, MD

SEPTEMBER 13, 2019

We are extremely pleased to feature an exclusive interview with Dr. Kris Verburgh, who will be leading a master class in London on September 24 and giving the opening keynote presentation at the Miami conference on October 23. The topics discussed here and at these two educational events are on the forefront of science, business, philanthropy, scholarly research, and much more. We hope you enjoy this unique FFI member benefit.

FFI: CAN YOU SUMMARIZE THE MAIN ELEMENTS OF YOUR BOOK *THE LONGEVITY CODE*? WHAT'S NEW ABOUT IT?

Kris Verburgh: *The Longevity Code* is about what we can do to live longer, now and in the future. Currently, the best technology we have to live longer is nutrition, followed by exercise, sleep, and positive psychology. However, in the near future, new biotechnologies will emerge that cannot just slow down aging, but also partially reverse it. Recent studies show that it is possible to reverse aging in animals. In such studies, old organisms are made younger again. Old mice that have a gray fur with bald spots, an osteoporotic arched back, and cognitive decline receive a treatment making their fur shiny black again, making them much more active, while their bones, muscles, and organs can regenerate much better compared to untreated animals of the same age. Scientists achieved this partial reversal of aging by epigenetic reprogramming for example, or by removing senescent cells. I recently visited Harvard University, where they could regenerate the optic nerve in mice using similar approaches. We will probably see the first treatments to address aging in the next 8 to 15 years.

FFI: FOR FAMILY ENTERPRISE MEMBERS, THEIR ADVISORS, AND THOSE WHO RESEARCH MULTI-GENERATIONAL COMPANIES, HOW DO YOU THINK THE PROJECTIONS ON LIFE EXPECTANCY WORLDWIDE WILL IMPACT COMPANY OWNERSHIP AND GOVERNANCE TRANSITIONS?

KV: A child born today has a more than 50 percent chance of becoming 105 years old. However, this prediction is likely an underestimation because it doesn't take into account new, revolutionary biotech developments that are happening, like gene editing, immune therapy, transcriptomic drugs, novel stem cell therapies, or bioprinting. Even more importantly, this prediction does not take into account new biotechnologies that will considerably slow down and even reverse aging. So, it is very likely there will be a future in which our descendants look with pity at our paltry lifespans of 80 years. We will eventually go to a future where people will live for 150 years, perhaps even centuries. Some researchers speak of the multistage portfolio life, in which a 200-year long life will be organized in a different way compared to our current life.

At the present time, most people have a 3-stage life: they get an education, then work for a couple of decades, and then retire. When lifespans will be 200 years, people will do a study, then have a job, followed by a micro-retirement for a few years, and after that they will do a different education, do a totally new kind of job for a few years or decades, followed by another micro-retirement, and so on.

It is also important to keep in mind that people will not only live much longer, but they will also look much younger, and still be very productive and active. So, the goal of current longevity research is to reprogram, or reverse, aging, so that people would eventually become 150 years old, but still look like 35 years or so.

We have seen in animal studies that it's possible to reverse aging. In fact, it seems that the information encoding a young state is still stored in the biochemistry of the body, only the cells cannot access it anymore in a proper way, so they need a nudge in the right direction to rejuvenate themselves. In short, family enterprises and companies should take into account that people will live much longer and stay healthy and active for a much longer time than ever before in human history.

FFI: AS A DOCTOR, HOW DO YOU VIEW THE INTERFACE BETWEEN LAW AND MEDICINE, GIVEN ADVANCES IN GENOMICS AND POTENTIALLY ELIMINATING SOME WIDESPREAD DISEASES AS WELL AS "ORPHAN" OR RARE DISEASES? IS THE LEGAL COMMUNITY KEEPING UP?

KV: The new developments are happening at such a fast pace that most governments and regulatory bodies are lagging behind. Many legal and moral dilemmas will arise from the biotechnological revolution that is currently unfolding. For example, because editing of genes has become very cheap and much faster and more accurate than ever before, it's possible to not just cure diseases, but also to upgrade the body.

Biohackers are already using new gene editing technologies to reprogram their body, for example to get more muscle mass or fight HIV. There are companies that use AI to calculate polygenic risk scores to screen for pre-implantation embryos which have the least risk of getting heart disease or diabetes later in life. It's a small step from here to use this technology to screen for embryos which will be the smartest, or the tallest. Also, how accurate are these predictions? What are the shortcomings of applying AI to predict traits and disease risk based only on the genome? And what about privacy? AI algorithms are being developed that analyze your voice to predict your risk of heart disease or cognitive decline. So next time you call your health insurance company for a general question, they could analyze your voice to assess your future health.

Or take precision medicine and new curative cancer therapies, which can be very effective, but which are almost prohibitively expensive. Not to mention the first treatments that will reverse aging. There is the risk that for the first time in human history, economical inequality can be translated into biological inequality, leading perhaps to a biological aristocracy with access to the best health and rejuvenation therapies, while others are excluded. We must make sure new biotechnologies will benefit everyone and not just a few.

FFI: TWO DISEASES OFTEN ENCOUNTERED BY FAMILIES AND THEIR ADVISORS ARE ALZHEIMER'S AND PARKINSON'S. IT DOESN'T APPEAR THAT MEDICINE HAS MADE MANY IN-ROADS INTO UNDERSTANDING AND TREATING THESE DISEASES. ALZHEIMER'S, IN PARTICULAR, HAS BEEN WIDELY DISCUSSED IN THE FAMILY ENTERPRISE WORLD. WHERE DO YOU THINK RESEARCH ON THESE DISEASES IS GOING?

KV: Many pharmaceutical companies have failed to develop successful drugs against Alzheimer's disease, and an important reason for this is that they didn't focus on the root cause of the disease, which is aging itself. If we get old enough, everyone eventually gets a form of dementia; it's an inherent consequence of aging itself. Conversely, if you slow down aging you substantially reduce the risk of Alzheimer's disease. Some people get the disease earlier, because they have specific mutations that accelerate the course of the disease, but in essence, you have to address aging itself to have the biggest impact on the disease.

However, instead, many pharmaceutical companies focused on small downstream aspects of Alzheimer's disease, like tweaking a protein that is involved in the breakdown of one of the several proteins that accumulate during the disease. It's like trying to tinker with one very small little cogwheel in the huge complex machinery of Alzheimer's disease, which in the end is caused by the wearing out of the metal itself as time passes. Some promising avenues to address Alzheimer's are therapies that act on aging itself, like reprogramming the epigenome of brain cells, rejuvenating the mitochondria, upgrading the lysosomes so that they can break down the proteins and other junk that accumulate in the aging brain cells, and so on.

Other companies focus on AI to chart the pathways involved in Alzheimer's, or to map out the Parkinson's, which are all the different mechanisms involved in the origin of Parkinson's disease, ranging from dysfunctional lysosomes and mitochondria in brain cells to the gut microbiome and systemic blood vessel stiffness.

Currently, the best ways to reduce our risk of getting Alzheimer's is to pay attention to our diet, exercise, supplements, sleep patterns, and stress levels. Maintaining a healthy lifestyle is very important for your brain. One reason for this is that the brain is metabolically very active, so it is very dependent on many micronutrients to function properly, such as vitamins, minerals and omega-3 fatty acids. Also, the brain processes sugars differently compared to other tissues, so it's very sensitive to unhealthy food, especially too much sugar. It's no surprise that some scientists call Alzheimer's disease "type 3 diabetes."

FFI: CAN YOU TELL US MORE ABOUT THE LONGEVITY VISION FUND AND HOW YOU WORK WITH THIS $100 MILLION DOLLAR FUND THAT INVESTS IN TECHNOLOGIES THAT EXTEND HUMAN LIFESPAN WHILE ADDRESSING THE AGING PROCESS AT ITS ROOT CAUSE.

KV: The fund invests in companies that want to slow down aging in one way or another. These companies fall into mainly three categories: 1) companies that target aging at its root causes, for example by epigenetically reprogramming cells into a younger state, or by upregulating autophagy so that cells can better clear the waste that accumulates during aging, or by improving mitochondrial health; 2) We also look into companies that want to repair or mitigate the damage and consequences of aging, for example companies that can grow organs or tissues which can replace the old and worn out versions. One example we invested in is developing methods to grow lower or pancreatic beta cells in the lymph nodes. Another company uses new types of stem cells that won't be rejected upon implantation to address metabolic diseases; 3) Another type of companies that we invest in use AI to study aging. Their algorithms analyze huge amounts of data to unravel specific aging mechanisms and harness these insights to develop new drugs to slow down aging.

FFI: WE LOOK FORWARD TO SEEING YOU IN LONDON ON SEPTEMBER 24 AND IN MIAMI ON OCTOBER 23. WHAT ARE SOME QUESTIONS THAT YOU WISH THE FFI MEMBERS AND FRIENDS WOULD COME PREPARED TO ASK YOU?

KV: Some questions that often pop up relate to the ethics revolving around all these new biotech developments, and the privacy issues that will arise in this new era of genomics, wearables, invisibles, and AI-powered health prediction. Other questions are similarly interesting, like how much dark chocolate we should eat per day. I enjoy giving talks, but I enjoy even more the discussions and questions afterwards, so I look forward to it.

Kris Verburgh is a medical doctor, researcher and author. He studies new developments in medicine, biotechnology, and longevity. He is a researcher at the Free University Brussels and faculty member of Singularity University Benelux, an institute that studies new trends and developments in technology. Verburgh is a venture partner at the Longevity Vision Fund, which invests in technologies to slow down aging and improve health. He wrote his first book at the age of 16. His latest book is The Longevity Code: Secrets to living well for longer from the front lines of science.

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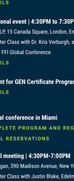

By now we hope you've registered for the FFI annual global conference in Miami, October 23-25, but if you haven't, or even if you have, here are some of the options available in addition to the formal program.

READ MORE

DATES TO REMEMBER

SEP 15

Last day to submit proposals for the 4th Review Issue of *Family Business Review (FBR)*

VIEW DETAILS

SEP 24

London Regional event | 4:30PM to 7:30PM

Host: KPMG LLP, 15 Canada Square, London, England

Program: Master Class with Dr. Kris Verburgh, author of *The Longevity Code* and keynote speaker at the FFI Global Conference

VIEW DETAILS

OCT 1

Q4 Enrollment for GEN Certificate Program opens

VIEW DETAILS

OCT 23-25

Annual Global conference in Miami

VIEW COMPLETE PROGRAM AND REGISTER

VIEW HOTEL RESERVATIONS

NOV 14

NYC regional meeting | 4:30PM-7:00PM

Host: J.P. Morgan, 390 Madison Avenue, New York City

Program: Master Class with Justin Blake, Edelman, "Implications on Trust for Family Businesses"