

AGING SCIENCES – Anti-Aging Firewalls

*A weblog on the sciences and practices
of living healthily very long – perhaps
hundreds of years.*

What do we need to do to live longer, healthier lives? An editorial tale of cars and people

Posted on [30. July 2014](#) by [Vince Giuliano](#)

By Vince Giuliano

Can we expect to live longer and longer as the first part of this century rolls by? I think so, probably by a large amount. We about doubled our human lifespans in the course of the last 100 years. We can probably do this again, this time in as a little as 50 years for society as a whole, perhaps 30 years for those who systematically pursue this as an objective. This blog entry is about **how that process can be systematized and speeded up**, for individuals who wish to live very long healthy lives and for society as a whole. It is not about the many specific knowledge based interventions and changes that will lead to longer lives – matters that we have sought to cover in other entries in this blog.

Will this extension of human lives be because of basic new scientific breakthroughs? Yes, but only in part. Collectively, such breakthroughs are likely to be important. Curiously though, I don't think that any single such breakthrough will make an immense difference. What will matter is a *process issue*, and whether and how such breakthroughs are applied is only one consideration.

So, how then will it happen? I argue here that extended longevity is likely to happen via a number of *incremental steps*, probably small ones at that. Most will involve improvements in lifestyle and diet. Others will involve selective application of stresses and consumption of health-producing phytosubstances and selected dietary supplements.

Can you or I as individuals accelerate this process? [Translate](#) the answer is generally **yes**. To the extent that the steps are science and knowledge-based and can be systematically identified and socially pursued, the process will be accelerated.

How? I think you can move along the increasing longevity curve by pursuing a long string of incremental lifestyle and dietary modifications over time, each of which may seem to produce only modest results. Some steps may seem to be very tiny and insignificant, such as getting up from the computer and walking around a bit every hour.

Does the knowledge to do this exist now? Yes, again I think so. You can distill much of it from our blog entries. And more is constantly more being learned as time rolls on.

I don't get it. What exactly do I need to do?

Here is a story of amazing life extension that suggests the answer to this question.

A tale of five automobiles



1950 [Chevy Bel Air](#), like my grandmother's: actual lifespan 3.8 years RIP 1953. [Image source](#)

Let's start by talking about, my grandmother's 1950 Chevy Bel Air, purchased new. This Chevy was a neat looking and zippy little car. I learned to drive on it and loved it dearly. However, like other cars of that era it tended to rust out and develop progressively serious problems starting in about a year. Like the other cars I will be talking about, it was purchased new. If you were middle class and lived in Detroit you were expected to turn your car in every year for a new car, or at least every 2-3 years. Most cars did not survive the junk heap for more than 4-5 years. A three-year-old car was a seriously old car and you could expect to put less than 50,000 miles on it before it died. The Bel Air got 13 -17 miles to the gallon of gas. My wife had a five-year-old Chevy when I was in my 20s. We had to get rid of it because the floor of the backseat had rusted out to the point where a small child could fall through it down to the road.



1959 [Studebaker Lark](#), this picture like my first new car. Actual lifespan 3.4 years. RIP 1961 with 28,900 miles on it. Died of multiple complications in the engine, transmission and the frame coming apart. Back then, you junked a car when it was clearly not economical to repair it. [Image source](#). It was sure a neat looker.



[Triumph Herald Convertible](#) like the one I purchased new in 1968 – actual Lifespan: 4.2 years RIP 1972

The problem of quality and short lifespans was not one just of US made cars; it was worldwide and applied to most cars in every price range. My shiny

new Triumph Herald Convertible coupe – a sporty car made in England – purchased in 1968 was junk and had to be scrapped in 1972 with only 34,000 miles on it. It was built in a tradition of English craftsmanship and had a beautifully polished mahogany dashboard panel. Now a classic car, the Beatles had one. However, underneath the sporty exterior was a vintage mechanical system with design probably going back to the 1930s and 1940s. The engine was remarkably fussy and always going out of tune and the gears were traditional square cut which meant that you had to carefully push the clutch in twice every time you wished to shift gears.



The car in the picture is like our 2012 [Subaru Impreza](#) which we purchased new in 2011, an existing family car. We expect it to have a lifespan of 15-20 years. [Image source](#) We have had this car for almost three years now, but it is still a very young car. It will probably go a 3-4 more years before it develops any significant issues. We expect to be able to clock up between 250,000 and 300,000 miles on it. It gets 35 miles to the gallon on the highway, 28 city driving.



The car in the picture is like our 2005 Subaru Impreza which we purchased in 2004. Expected lifespan: 15-20 years, perhaps 200,000 miles [Image source](#) This 10 year old car is still healthy, vigorous and a reliable family workhorse with no known problems at 100,000 miles. No sign of rust. If it were human it would be like a healthy 35-year-old.

The big breakthrough

What was the big scientific or technical breakthrough that made the difference in lifespan and performance between the earlier cars and our Subarus? Lifespan extension of a factor of at least four and MPG improvement by a factor of two? **None!** *In fact, it wasn't any single big scientific or engineering breakthrough.* The difference is because of *thousands of incremental improvements* made year after year in just about every component and system. Virtually everything has been improved to make cars more reliable, last longer and operate more economically. Different lighter more rustproof metals are used, and the fenders and bumpers are made of tough light plastic that can never rust. Exposed metal surfaces are treated with sophisticated chemicals to prevent rust. The metals in the engine are different as well as the electronic ignition and gas vaporization systems, and dimensional tolerances are much more precise in the newer cars. The gasoline and fluids used in the newer car are different, the automobiles are much safer on multiple dimensions. In 1950 and 1968 they did not have seatbelts, airbags, antilock brakes, reinforced chassis, let alone radar, GPS, computer-based engine, all-wheel drive, catalytic converter, safety monitoring systems, etc. And the maintenance requirements for the earlier cars were much greater than for our current cars. The newer cars do not require distributor or carburetor cleaning or adjustments because these no longer exist.

The health and longevity of the newer car **was the result of a breakthrough** in fact, but a breakthrough of a different kind. That breakthrough is known as [Total Quality Management](#) (TQM), a systematic approach to both design and manufacturing that seeks to achieve constant incremental improvements based on measurements, analysis and better integration of design and manufacturing processes. This approach was invented in the US but adapted early on by the Japanese automobile industry. What happened some six or more decades back is that Toyota Motors decided to break ranks with tradition and make better cars cheaper. This was the only way they could compete in the world market and in the US. By fifty years ago, Toyota motors was already heavily into quality control. It had adapted a TQM organizational lifestyle and had implemented a Creative Idea Suggestion System. It had a corporate philosophy of customer first and quality first. See [this article](#). US companies had the big advantages of cheap available raw materials and less shipping costs. The

Japanese companies had the advantage of being smarter and adapted TQM.

The US automobile industry centered in Detroit had a traditional philosophy of low-cost manufacturing, emphasis on style and marketing, and was happy with the idea that people had to trade in their cars after a year or two. Growing up in a middle-class family in Detroit, I knew from a very young age that trading in your car every year or two was absolutely the expected thing to do in the 40s through the 70s. In the US automobile industry, it was known for sure that quality could come only at greater cost. So, competitors could not create it and have longer-lasting cars without those cars costing significantly more. Not to worry. This turned out to be wrong. TQM was based on the idea that it is possible to redesign automotive components for both quality and easier manufacturing and that far better automobiles could be made with less cost. Of course you had to keep working on that year-after-year, and that is what the Japanese companies did. In the 1980s and through the 1990s the US automobile industry was losing more and more domestic market share to the Japanese, and the US cars were achieving the reputation of being relatively junky.

As time progressed, other Japanese auto companies and eventually the US automobile companies were forced to adopt more and more elements of TQM and its successor quality philosophies in order to remain competitive in the world market. So, our homegrown automobiles also last a lot longer now than they used to. In the process the US companies permanently lost a great deal of market share for autos and small trucks to Japanese, European and other Asian companies.

Quadrupling human lifespan, or just doubling it?

Some 62 years elapsed between 1950 and 2012. Now, suppose we seriously applied something like TQM to human health and longevity for the next 62 years. Do I think we could quadruple human healthspan and lifespan, like we did for automobiles? The idea seems completely preposterous. However, we might simply go for doubling our expected lifespans. Still preposterous? Perhaps not. And for a growing cohort of health-aware people. I would go for accomplishing this in 30 years, not 62.

I lay out how some basic TQM principles might be applied to health and longevity below. First, however, I would like to cast doubt on the idea that any single scientific breakthrough could by itself make a major difference in human healthspan or lifespan – much as I would personally love to see that happen.

Why individual scientific breakthroughs are unlikely by themselves to make major differences in human healthspans and lifespans.

I argue this point from two different systems perspectives.

- **The systems nature of human biology. As a corollary, the nature of human homeostatic feedback systems.**

In the case of automobiles many different approaches across many systems had to be employed to extend their life spans. No single intervention could begin to do the trick and no single intervention made much of the amazing entire difference. And with every major shift in design and manufacturing process new problems and

new opportunities for further improvement surfaced. Biologically speaking, we are vastly more complex systems subject to many more constraints and system interdependencies. There is a large multiplicity of factors involved in maintaining health and aging. Some of these need to be addressed independently, some considering their interrelationships.

Homeostatic feedback systems in the human body constantly seek to restore a large number of working balances such as related to cell chemistry, electrolyte balance, protein expression, etc. I speculate, therefore, that *any intervention which would have a major life extending capability would activate one or more restorative feedback loops which would mitigate against the impact of that intervention being too great.* At least, this seems to be true historically. As far as we know, life-extending interventions which may more than triple lifespans of simple organisms like nematodes can add only 5% to 15% to lifespans of complex organisms like us. It has been said that if we could wipe out the three major disease killers of old people – heart diseases, cancer and dementias, that might add only 6 or 7 years to our expected lifespans. That is because of the multifactorial nature of aging.

In generating blog entries I have often pointed out that pursuing multiple small interventions may be more effective in generating health and longevity than seeking any single blockbuster approach. For example, in the 2011 blog entry [Age-related cognitive decline: focus on interventions](#) I said in summary “First, there is not one simple approach to promoting memory and mental acuity, neurogenesis and healthy nerve cell metabolism, nor is there even a small handful. To get the best results it is likely that a large number of approaches should be pursued synergistically.” I believe this applies across the board to the other issues of aging such as metabolic health, averting cancers, frailty, sarcopenia, DNA degradation, etc.

▪ **The systems nature of human societies. As a corollary social homeostatic feedback systems**

For the automobile, TQM involved evolution in automobile design, manufacturing, supplier enterprises, transportation systems, and customer expectations. Profound changes were required not only in systems and procedures but in every organization involved in the supply chain and especially in mindsets. These changes involved such factors as employee participation, effective use of human resources and the creation of many information feedback circuits. Our health and longevity is to a major extent driven by social systems, norms, expectations and habits. The most important contributions to public health and longevity historically have been societal ones, such as clean water, and sewage systems, cleaner air, cessation of smoking, inoculation and better sanitary habits. Gradual raising of awareness and implementing new initiatives tends to take a very long time – decades or even centuries. We may be able to speed this process up some when it comes to health, but we are likely still to be looking at decades

Moreover, any positive measure that threatens established patterns and vested interests will be fiercely resisted and slowed. We have seen this, for example, and the tobacco industries’ advertising and lobbying initiatives against the cessation of smoking – a battle that is still ongoing after more than 60 years. We see this kind of opposition to the idea of global warming and initiatives to switch to renewable energy sources. Similarly, the current public health initiatives to bring diets in the US into a better balance to limit the epidemic of diabetes and its metabolic cousins has been confronting fierce resistance from the corn sugar industrial lobby, fast food suppliers, and producers of industrial food products. The resistance is seen in our agricultural subsidy system, in our laws, in our legislatures, in our courts, in massive advertising campaigns, and in the minds of many influential people

Resistance to change is a characteristic of human cultures, no matter whether it comes from the Pharaoh, from the Pope, from the cigarette industry or from the corn sugar lobby. It makes no sense to bemoan that fact, but it can be helpful to recognize it. What I am suggesting is that if a perfect lifestyle and diet for longevity could be identified today (and I think we may be getting close to being able to do that), getting most people to buy into that lifestyle and diet might take another 50 to 100 years. So it may take a very long time for any given shift and health-related patterns to take hold in the general society. The good news, however, is that individuals can take health matters into their own hands and that multiple little improvements can piled on one another moving us right along the greater longevity curve..

The key point is that *although there is a remarkable difference in life expectancy between my grandmother's Chevy or my Triumph Herald and our current Subaru this came about through numerous small improvements over the years, each one of which could be dismissed as relatively unimportant. These all took place within a powerful context of relentless improvement which has been called TQM. We can create such a context for health and longevity.*

Some of the reasons why this process worked so well for automobiles are also relevant to how we can create constant improvements in our own health and longevity:

1. The knowledge and technology to make the necessary quality improvements to get where we are now with cars simply did not exist in 1950, or were unfamiliar to the industry and prohibitively expensive. For most people today, radically extending their health and lifespans looks that way
2. The automobile industry had an enormous investment in supply and manufacturing capabilities in 1950. They could not afford to scrap all these in one immense step, even if they knew how to make the necessary improvements which they did not. The same can be said for today's massive healthcare system.
3. The marketplace in 1950 expected automobiles to be cheap, to be shiny and fashionable when they were new and to wear out or deteriorate rapidly. Today, we venerate youth and still expect sickness and frailty to start at age 70 or earlier.
4. The cost of gasoline was so low that mileage of an automobile was not an important cost factor. We did not see the environmental costs of global warming. Today the cost of industrial-produced food is low and we mostly do not see the associated health and longevity cost.
5. What was all-important to transform the situation was to be on a path of constant improvement – TQM. The same can hold for personal health and longevity
6. The yearly improvements in the automobile industry were affordable, and dictated by a changing competitive environment. Many of us are already highly competitive when it comes to one health dimension – fitness. We might broaden the definition of that to go beyond exercise.
7. New technologies that contribute to product quality could be embodied in the auto manufacturing process as they became available. These included computer aided design, new metals and composite materials, computer-aided manufacturing, robotics, and innovations in management such as just in time production. In this blog, we report on a stream of important discoveries and innovations in health and longevity as they become available. We also strive to flag those which we believe can be embodied in a personal health and longevity regimen.

Is it possible to employ an approach like TQM to enhance human health and longevity?

At first look it could be argued that the answer is **no**, laudable though the objective may be. We can't do what the automobile industry did. That is we cannot redesign human beings component-by-component for health and longevity. And we can't redesign the human birth process that makes us. We have to accept ourselves as we are, the products of millions of years of evolution. Most of our genes are the ones we started out with when our condos were caves.

This is not to be the end of the story, however. While our genes are mostly fixed, our epigenome is not and can be affected heritably by our interventions. We can definitely affect the directions of our evolution and probably the rate of positive evolutionary changes by epigenetic interventions. It is now known that epigenetic interventions can serve to promote or inhibit gene mutations. Aging involves a lifelong pattern of changes in DNA methylation, culminating in hyper methylation of GPC island promoter sites, and otherwise global gene hypomethylation. But this methylation too can be profoundly affected by epigenetic interventions. In various blog entries we have discussed how this might take place through utilizing histone deacetylase and histone acetylase phyto and other substances. For example, check out our three-part series on the epigenetic's of cancer and aging and how those two deadly dragons can be seriously slowed *Slaying Two Dragons with One Stone – How to Prevent Cancer and Aging with the Same Strategy* – [PART 1](#), [PART 2](#), and [PART 3](#). And, as I write this my colleague Jim Watson and I are planning new blog entries on epigenomic interventions.

On the one hand, our basic human design might impose restraints on our longevity that we cannot remove. An example could be lifelong accumulation of DNA damage and non-functional or age-related dysfunctional modifications to our DNA like transpositions and ALU repeats and circular DNAs and proliferating dysfunctional RNA species. On the other hand, we have extensive biological machinery for the repair of DNA and control of our DNA. We are beginning to understand interventions that may keep this machinery powerfully activated as we reach advanced ages. Every week brings new discoveries.

In summary, we do not know if there are basic design constraints that ultimately limit our lifespans and, if so, the ages at which these constraints become active. And, we do not know whether there are constraints that we can't get around. Given that our average lifespans have multiplied by a factor of four from early prehistorical periods to today we may be able to keep living longer and longer lives for some time to come. We will probably only know our real lifespan barriers as we come to them.

A TQM approach to health and longevity

I am suggesting that individuals can pursue a philosophy similar to TQM for enhancing their personal health and longevity. TQM is basically an organizational strategy but it embodies critical elements that also can be adapted by an individual. These include:

1. **A deep contextual commitment to relentless improvement in health and longevity.** Such intentionality to support quality did not really exist in the automobile industry prior to TQM. Most people today either have no such intentionality today with regard to health or would know how to implement it if they did.
 - There have been multiple initiatives to integrate TQM into the processes of healthcare organizations and institutions ([ref](#))([ref](#)). These include public health organizations([ref](#)), laboratories([ref](#)), HMOs([ref](#)) and hospitals([ref](#)).
 - However, my focus in this blog entry is on a relatively new concept – how an **individual** in the context

of his or her own family and network associations can apply the principles of TMQ to his or her own personal health and longevity.

2. **A commitment to seeking and applying knowledge and the best available technologies** to achieve steps of improvement. This knowledge spans the range from the latest scientific understandings relating to biology and health on the one hand to specific information about an individual's health conditions on the other hand. The commitment extends also to going ahead and experimentally doing things that might enhance health, and seeing if they work. The process has inherent uncertainty and risk. Personally, I find it very exciting.
3. **Use of strategy, data, and effective communications to integrate the quality discipline into the culture and activities** of the individual or organization concerned.
 - For an individual concerned with personal longevity this involves developing a **strategy** which might include learning about specific personal disease processes, instituting changes in lifestyle and dietary patterns, learning more about longevity interventions, etc. It can include steps to obtain ongoing **data** as to how well that individual is doing given his strategic path. This could involve use of medical tests such as inflammatory indices, and data related to daily exercise such as can be provided by a FitBit. It can involve increasing use of cellphone health and fitness apps. An individual needs to **communicate** with members of his or her family and other supporting people and institutions like healthcare personnel to assure that his or her intentions and activities are understood and supported.
4. A focus on the **customers' needs and wants**, rather than those of a supplier or sponsor.
 - For an individual seeking a longer healthier life, the customer and the major supplier are the same. Any conflict between supplier and customer needs can and must be resolved on a personal basis. Being a busy person, as a supplier I like the idea of eating fast and easy-to-grab meals. As a customer, I want to consistently take care of my health. As a supplier for a family birthday party, I am expected to provide a rich cake and ice cream. As a customer, I see it important for me and my family members not to eat these and instead eat more fresh fruits and vegetables.
 - For supplier institutions there may be conflicts between focusing on their own wants and needs and those of their customers or other intermediaries. Pharmaceutical companies need to maximize their profits, and this happens best when there are drugs that are not disease cures but are required lifelong for maintenance of health in the continuing presence of the disease. Seriously preventing any age-related disease like diabetes would hit the bottom lines of some pharma companies horribly. As mentioned, companies that make or serve unhealthy food can be expected to defend the status quo vigorously by lobbying, legal actions and advertising. Similarly to what the US automobile industry did in the 1950s and 1960s, and what the tobacco industry did for many decades, they can be expected to rely on massive advertising to maintain their marketing positions and obfuscate health considerations. As pointed out above, it may take many decades to resolve such conflicts in the customer's interests.

5. **Process-centered.**

A fundamental part of TQM is a focus on process thinking. A process is a series of steps that take inputs from suppliers (internal or external) and transforms them into outputs that are delivered to customers (again, either internal or external). The steps required to carry out the process are defined, and performance measures are continuously monitored in order to detect unexpected variation.

- For an individual, being processed centered implies focusing on every activity and habitual pattern that relates to health and seeing if it can be improved. In my personal case it is useful that my office is on the upper floor of the house is requiring me to climb on the average of a dozen flights of stairs every day. Everything related to movement, posture, patterns of activity, eating and social relationships is up to for grabs. That is, I ask myself if there is a variant of that activity that I know from science may be better for me. For example, does my pattern of research and writing on a computer support me getting up and moving around every hour? Does my daily rhythm allow for at least 45 minutes of vigorous exercise every day combined with other physical challenges throughout the day? Would I be better off shifting my treadmill exercise from the early evening to the morning? I may make a half-dozen shifts every week and see how they work for me, making some permanent and dropping others. And I think about others, e.g. running up the hill every day to get the mail, something I've been leaving for my wife to do. It could be doing a few stretching exercises every morning. And there are a huge number of process steps connected with shopping for foods and eating. A recent shift was from using regular milk to almond milk and from consuming sugar-rich raisin bran cereal to consuming oatmeal. Also I have become increasingly aware of stresses or absences of the same, recognizing the importance of experiencing stresses for health and vitality. I may deliberately choose to be rather uncomfortably cold or hot as part of my daily rhythm for this purpose.

Just like there was a myth that increasing quality in an automobile could only happen at greater cost, there is a myth that paying conscious attention to health can come at a cost of quality of life. I have found this to be completely untrue. While I thoroughly enjoyed breakfasting on cold milk and crispy raisin bran, I enjoy the warm oatmeal and almond milk with blueberries and walnuts even more.

6. Persistent confrontation and overcoming of barriers

- As mentioned above, social, personal, and organizational feedback mechanisms operate powerfully in the background to maintain the status quo. In the two decades or more that efforts have been made to implement TMQ in healthcare organizations, for example, multiple barriers are still being encountered and have to be overcome. See the 1991 publication [Organizational barriers to quality improvement in medical and health care organizations](#). “The barriers are categorized as technical, structural, psychosocial, managerial, and goals and values. Following a mapping of the barriers, education, training, and research and development needs to support quality improvement are identified.” Much has been written since 1965 about improving the quality of healthcare delivery and overcoming the multiple existing barriers – though there is still a very long way to go. See [this list](#).
- As to barriers to radical life extension, you might enjoy reading a story that I invented in the blog entry [Getting the world ready for radical life extension](#). *The Story of the X-Pill starts out: “A team of distinguished university researchers uses molecular engineering to create a substance X that appears to activate an evolutionary genetic pathway affecting the expression of hundreds of aging-related genes. When tested, the substance doubles the life of laboratory mice and rats. Based on solid theoretical considerations, it appears that X could be the basis for making an anti-aging pill for humans. Extrapolating up from the mice and rats, it appears in theory that people who start taking the X pill on a daily basis in their 40s will double their average life spans. They will, the reasoning goes, continue to age but at a much slower rate. They will still get the diseases and problems of old age but, on the average, much later. At age 110 they should be about as healthy as people are today at 55. — So, the researchers raised venture capital to start up a biotech company to manufacture X pills and sell them to*

the public.” What happened in the story? In short, proponents of the X pill confronted so many barriers and challenged so many vested interests that eventually the situation for them and their company was disastrous. The public never got to reap the benefits of the X pill or to see if it actually extended lives. Read the story for the details.

- For an individual intending to extend his or her personal healthspan and lifespan, barriers can include 1. Lack of support of family members, and others and social isolation, 2. Opposition to what they are doing by officially sanctioned healthcare providers, 3, Lifelong personal habits and patterns that remain unexamined, 4. Confusion or uncertainty as to what steps could or could not personally be helpful, often made worse by conflicting advice of experts, 5. A perceived lack of time to do the necessary things such as exercise, 6. Lack of the infrastructure support, such as available paths or sidewalks for walking or lack of convenient suppliers of fresh fruits and vegetables, 7. Skepticism and ridicule by others, 8. Lack of a sufficient knowledge base about human biology, 8. Absence of easy to interpret measurements of health indicators, such as inflammatory state, overall REDOX state, degree of activation of certain critical proteins such as NF-kappaB, IGF-1, NRF2, etc. (It is interesting that much current efforts is being addressed to overcoming this barrier, including Moonshot, a Google initiative that is searching for a reliable set of biomarkers for general health and aging([ref](#)).) And 9. absence of knowledgeable and supportive people the individual can communicate with. Part of the reason why creating health is an incremental process is that such barriers have to be confronted one at a time, and may re-arise in different contexts.

7. Integrated system

- For organizations: “Although an organization may consist of many different functional specialties often organized into vertically structured departments, it is the horizontal processes interconnecting these functions that are the focus of TQM. Micro-processes add up to larger processes, and all processes aggregate into the business processes required for defining and implementing strategy([ref](#)).”
- Related to the biology of health and aging: as we have often pointed out there is no center to biological organisms or to aging. All systems are interconnected and considering any health intervention requires taking into account the impact of that intervention on all systems. In some cases there can be unforeseen and unwanted impacts and therefore systematic monitoring and evaluation of any introduced changes is necessary.
- Regarding individuals seeking to improve their health and longevity, it is important that individual recognizes that here she is a participation in integrated social structures that can either aid or serve to resist moving forward with such improvements.

8. Empowerment

For organizations, it has been learned that empowerment of all employees to maximally contribute to the organization’s objectives is very important for successfully achieving TQM. Employees and all other individuals participating in the organization must be viewed not as cogs in a predefined machine, but rather as contributing components of a dynamic constantly self-adjusting organism. This requires empowering individuals to contribute to the maximum extent they can.

- For an individual seeking to improve his or her health and longevity, the same applies to all important members of his human network, be they family members, close friends or colleagues, professional associates or healthcare providers. This means a requirement for sharing of personal health and longevity

goals and objectives, and getting critical people in a personal support network to buy into supporting them. To be effective, the empowerment must be mutual.

9. Supply chain management

- An important aspect of TQM in manufacturing organizations is paying careful attention to the supply chain – providers of raw materials and components, shipping organizations, wholesalers and retailers, etc. It is important to make sure there is alignment in plans and strategies and well articulated communications to support that alignment. An innovation in this regard has been *just in time manufacturing*, a process by which components used in manufacturing, say automobile fenders, arrive at an assembly plant just in time for them to be used, rather than stockpiled before hand. This facilitates major cost reduction connected with inventory control, more flexible manufacturing, and reduced headaches associated with inventory storage and management. Even better, using the computer communications it can be possible to assure that the fenders that arrive at an assembly plant on a given day match the models and colors of automobiles that will be assembled that day.
- A biological analogue of this situation applies to eating and health. A major cause of obesity is the stockpiling of calories which are converted into fat as a result of eating which is not synchronized with actual metabolism. Obesity can thus be regarded as a problem of dietary inventory control – lack of dietary supply chain synchronization with the metabolic operation of the body. The healthiest situation involves careful articulation of dietary input, both with respect to the specific components consumed and the amounts, to match actual daily metabolic expenditures.

10. Innovation and pragmatic responsiveness

- There is no such thing as a general agenda for improvement according to TQM. Every organization exists in its own ecology of other organizations and the steps to forward its TQM objectives at any given time will be unique to it. Changes in environment, customer expectations, or the availabilities of new technologies will pragmatically trigger steps of improvement. So, innovation in processes is the rule rather than the exception and is customized to the particular internal and external situation of a particular organization at a particular time.
- Pretty much the same holds for individuals seeking to further their health and longevity. There is no general rule as to sequence of steps which need to be pursued but rather what is important is the ability of the individual to discern what the problems and opportunities of a particular moment are and how to move forward in the next possibly quite small steps. Again, this requires awareness: awareness of the particular health situation, disease susceptibilities, and vulnerabilities of the individual at that particular moment, what is happening in science and opportunities for new interventions that may be opening up, possibilities for modifying daily routines or simple processes such as related to movement or what to eat when. What can be very helpful is mobilizing a strong supporting external network of people to assist in this process.

Where do other scientists stand in the kinds of views expressed here?

I think there is widespread agreement to many of the central points made here. See for example the recent science news story [Strategy proposed for preventing diseases of aging/](#) “Researchers argue that medicine focuses too much on fighting diseases individually instead of concentrating on interventions that prevent

multiple chronic diseases and extend healthy lifespan. They call for moving forward with strategies that have been shown to delay aging in animals. In addition to promoting a healthy diet and regular exercise, these strategies include manipulating molecular pathways that slow aging and promote healthy longevity. — “Heart failure doesn’t happen all at once,” Fontana said. “It takes 30 or 40 years of an unhealthy lifestyle and activation of aging-related pathways from metabolic abnormalities such as high blood pressure, high cholesterol and type 2 diabetes to give a person heart failure in his 60s. So we propose using lifestyle interventions — such as a personalized healthy diet and exercise program — to down-regulate aging pathways so the patient avoids heart failure in the first place. — Fontana and his colleagues write that most clinicians don’t realize how much already is understood about the molecular mechanisms of aging and their link to chronic diseases. — But challenges abound. The most important change, they argue, is in mindset. ”

Wrapping it up

I have outlined a general process philosophy for creating personal health and longevity which happens to be the one I have been seeking to pursue for a number of years now. I outlined the similarity of this philosophy to that of TMQ, an industrial philosophy which over a 60 year interval has allowed us to effectively quadruple the lifespan of automobiles. I speculate on how through applying TMQ-like principles we might go as far as doubling our expected human lifespans in as little as 30 years. If I were asked “How strongly do you feel about this incremental approach, Vince?” my answer is “I have been betting my life on it.”



About Vince Giuliano

Being a follower, connoisseur, and interpreter of longevity research is my latest career. I have been at this part-time for well over a decade, and in 2007 this became my mainline activity. In earlier incarnations of my career. I was founding dean of a graduate school and a university professor at the State University of New York, a senior consultant working in a variety of fields at Arthur D. Little, Inc., Chief Scientist and CoO of Mirror Systems, a software company, and an international Internet consultant. I got off the ground with one of the earliest PhD's from Harvard in a field later to become known as computer science. Because there was no academic field of computer science at the time, to get through I had to qualify myself in hard sciences, so my studies focused heavily on quantum physics. In various ways I contributed to the Computer Revolution starting in the 1950s and the Internet Revolution starting in the late 1980s. I am now engaged in doing the same for The Longevity Revolution. I have published something like 200 books and papers as well as over 430 substantive entries in this blog, and have enjoyed various periods of notoriety. If you do a Google search on Vincent E. Giuliano, most if not all of the entries on the first few pages that come up will be ones relating to me. I have a general writings site at www.vincegiuliano.com and an extensive site of my art at www.giulianoart.com. Please note that I have recently changed my mailbox to vegiuliano@agingsciences.com.

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4 Responses to *What do we need to do to live longer, healthier lives? An editorial tale of cars and people*



[Vince Giuliano](#) says:

1. August 2014 at 14:56

My next incremental health step.

Since I published this less than two days ago, I have been wondering what will be my next incremental health step that could contribute to my longevity. Today the answer came in a new research publication. In the course of my 45-minute daily walks and treadmill exercises, I will spend at least 5 minutes of that time running at a modest rate instead of fast walking.

The new publication published in the Journal of the American College of Cardiology is entitled Leisure-Time Running Reduces All-cause and Cardiovascular and Mortality Risk, at <http://content.onlinejacc.org/article.aspx?articleID=1891600>. The publication reports on a population study that indicates that people who ran at least 5-minutes a day lived on the average three years longer than people who didn't. "The study involved more than 55,000 adults aged 18 to 100, who were followed during a 15-year period to determine whether there is a relationship between running and longevity. About one quarter of this group were runners. — Participants were asked to complete a questionnaire about their running habits, and researchers kept track of those who died during the study period. — The researchers discovered that people who didn't run had a life expectancy three years less than that of runners. Running was linked to a 30 percent lower risk of death from any cause and a 45 percent lower risk of death from heart disease or stroke, compared to no running. — Even less-avid runners received significant benefits. Running a minimum 30 minutes to 59 minutes each week — which equates to just 5 to 10 minutes a day — was associated with a 28 percent lower overall risk of death and a 58 percent reduced risk of death from heart disease, compared with no running.(from a story on the study at <http://www.webmd.com/fitness-exercise/news/20140728/running-could-add-3-years-to-your-lifespan>).

I don't regularly run, but because I do exercise every day, I doubt that starting to run 5 minutes a day would add three years to my expected lifespan. But suppose it adds only a month. Hardly worthwhile? Well, if I can identify three interventions that might do that every month, this would mean that in the course of a year I would possibly add three years to my expected lifespan.

Vince

[Log in to Reply](#)



Vince Giuliano says:

3. August 2014 at 12:48

Another example of a small possibly longevity-enhancing habit.

For a while I will continue to report on small personal science-based interventions that have the potential to enhance lifespans and that I have been pursuing or consider pursuing. The spirit is giving concrete examples of the principle of constant improvement to increase probability of living longer – the main theme of the blog entry. The specific example of concern here is the regular consumption of capsaicin, the active ingredient in hot peppers and hot pepper sauces. Long-time readers of this blog know that I love to pepper and slather foods with it at every opportunity. See the blog entry Red wine, hot peppers and my uncle Gigi at <http://www.anti-agingfirewalls.com/2009/05/08/red-wine-hot-peppers-and-my-uncle-gigi/>.

New research was just reported August 1, 2014 in a paper with the formidable title "Ion channel TRPV1-dependent activation of PTP1B suppresses EGFR-associated intestinal tumorigenesis." It is at <http://www.jci.org/articles/view/72340>. The key matter reported here is explained in the Science Daily story "Chili peppers for a healthy gut: Spicy chemical may inhibit gut tumors" at <http://www.sciencedaily.com/releases/2014/08/140801213339.htm>. "The researchers fed capsaicin to mice genetically prone to developing multiple tumors in the gastrointestinal tract. The treatment resulted in a reduced tumor burden and extended the lifespans of the mice by more than 30 percent." Again, I don't think eating the hot spicy stuff will increase my expected lifespan by 30% because the study was on cancer-prone genetically modified mice. Further, I am not a mouse. But suppose it increases my expected lifespan by only 3%, a pure conjecture based on this and a history of other research. Since I started the pepper-consuming habit very young that would amount to about two and a half years of lifespan.

Of course, eating hot peppers is just one of a large number of small but possibly life-expanding interventions I have been pursuing. I don't know how much each of my tiny interventions actually contributes to affect my lifespan probability and how they combine. I hope to live long enough that I will be able to start measuring and assessing their actual impacts.

Vince

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Adrian Crisan says:

6. August 2014 at 19:28

Vince – very nice blog. I have a suggestion: can you organize your blog as a mind map? That will allow for a continuously evolution (by connecting meaningful parts) of the knowledge published here and will accelerate our quest for slow/stop/reverse aging. Thanks for your thorough research.

[Log in to Reply](#)



Vince Giuliano says:

15. August 2014 at 11:39

Adrian

A great suggestion. Let me think about it, since a lot of work could be involved. I would have to go back over close to 500 entries and would want to comment briefly on each one. And it would be nice to have a good graphical representation. For now, you can use the Google-like search function available to registered users. Even simpler, you can do an ordinary Google web search combining the term anti-agingfirewalls with any others terms you are interested in. It works quite well though Google sneaks in a few paid advertiser entries on the top of the list..

Vince

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