

Examples of Potentially Age Reversing Technologies

MaxLife will help develop products and technologies such as:

- Tissue engineering
- Genetic engineering
- Stem cell therapy
- Whole genome engineering
- Nanomedicine
- General/Strong Artificial Intelligence
- Breakthrough nutraceuticals

Here are some examples of potentially extreme life-extending technologies. Many were designed years ago, but remain unfunded because venture capital firms are skittish of “life-extension.” So instead of curing diseases and saving lives, these technologies sit on the shelf.

They include but are not limited to:

Genomics Company

This researcher and his colleagues are capitalizing on a scientific breakthrough and proven scientific and drug discovery techniques to develop therapeutics and diagnostics that will extend life and improve quality of life. Their strategy is based on over 20 years of research.

The head scientist is the pioneer of evolutionary research on aging, and remains the foremost experimenter in this field. He has a long track record of experimental research on aging, dating back to 1976.

He was the *first person in the world* to deliberately and significantly postpone aging in experimental organisms which live approximately three times that of normal. Although other experimental organisms have lived longer, his are the only ones that have both increased quality and quantity of life. They are more active for a longer period of time, are more resistant to stress, have more sex, and are generally more healthy and vital.

Funding will allow this group to compare genes in long-lived animals to normal animals and identify the genes that are different. Studies suggest they will find a few hundred aging-related genes.

The animals’ genes related to aging will then be correlated to their human gene counterparts. They expect to find that about 73% of these genes will have closely related genes in humans.

They can then develop diagnostic tests, especially on drugs already marketed (and thus FDA approved) that act on the pathways harboring these genes. Those screened drugs can thus be identified that might have anti-aging properties. FDA approval is streamlined, and diagnostic tests can be utilized to generate a revenue stream early in the life of the corporation.

They will then plan to develop new nutraceuticals and drugs.

Nanomedicine

The chief scientist of this project is the world's recognized authority on medical applications and implications of molecular nanotechnology.

He will launch a company aimed at developing provable nanomedical life-extending technology – leading ultimately to medical nanorobotics. Medical nanorobotics may be the only technology which by its very nature can definitively cure aging and reverse its effects. Unlike the uncertain abilities of biotech, nanomedicine should be up to the task.

The company will work toward all the capabilities to build medical nanorobots. They've put together a preliminary R&D roadmap and have already achieved some of their objectives. An example of the sort of IP that might be generated is an application for the first mechanosynthesis patent ever filed. The company would patent many more such "firsts" that could eventually have licensing value.

They would give small contracts or grants to third parties who would develop parts of the roadmap. They have already put together six currently active collaborations.

Upon achieving the first experimental demonstration of controlled diamond mechanosynthesis, they believe more funding will flow into this field.

The technology should have commercially useful early applications, but the company would license these out. They plan to provide side income streams while not becoming distracted from their central goal... developing lifesaving technology as fast as humanly possible. Early revenue will be reinvested in R&D until the goals are reached. The company will then own a must-have product - indefinite life extension and aging reversal. Meanwhile, the company will build shareholder value through its IP.

The ideal funding level for the first few years would be \$500K-\$1M/year. It would increase from there. They believe they could achieve the first demonstration of diamond mechanosynthesis in 3-5 years, the first diamond nanopart manufacture in 5-7 years, and so forth, achieving the first medical nanorobot sometime in the 2020s. Larger investment levels would accelerate the process.

Artificial General Intelligence

One part of the MaxLife plan to accelerate extreme life extension capabilities is to facilitate developing Artificial General Intelligence (AGI).

The goal of AGI research is to create broad human-like intelligence, rather than narrowly "smart" systems that can operate only as tools for human operators in well-defined domains.

Imagine having machine intelligence with the ability to think and learn on its own as well as humans. That capability appears to be in our near future. If, for example, the AGI gets an education equivalent to a biotech researcher, it could do the research on a relentless 24/7 basis.

However, it could get its “PhD” in a fraction of the time, maybe in two years or less. It would never need to rest. It would have total recall. It would be able to download all the data it needs from the Internet almost instantaneously. It could collaborate with humans and other AGI.

And then, it could be quickly copied as many times as necessary. In other words, we could copy it a hundred... or a million times. Imagine putting a million researchers on every aspect of the aging puzzle... who would tirelessly work around the clock. Imagine how much faster we would develop real anti-aging therapies.

MaxLife is looking at two companies who plan on delivering these capabilities in less than 15 years.

Company A

Company A was formed in December 2001 to develop and commercialize an effective artificial general intelligence (AGI) software engine.

Late in 2004 they completed their internal proof-of-concept prototype research, and initiated a development plan for a fully functional, commercializable AGI. They expect this to be completed during 2008.

A half-dozen full time members have made, in a relatively short time and operating on a shoestring budget, significant headway towards their goal.

The founder is an entrepreneur with a background in electronics, computer systems, software, and management. His research interest in cognitive science and the inter-relationship between philosophy, psychology, ethics and computer science culminated in the development of a breakthrough model of AGI.

Company B

Company B is an AI software company aimed at creating a powerful AGI software system, and then leveraging this system to create software applications in the areas of text-mining, Natural Language Processing, biological data analysis and robot cognition.

Their natural language processing technology was initially developed under contract to U.S. Army Intelligence and Security Command (INSCOM). Their bioinformatics data analysis software has already been licensed to the NIH and CDC. The company's ongoing research focus is to bring its AI Engine closer each month to radically powerful AGI.

They expect to be profitable within three years with applications in the virtual reality and game industries.

The President has been involved in AI research and application development since the late 1980's. From 1989-1997 he held several university faculty positions in mathematics, computer science, and psychology. He authored numerous research papers and journalistic articles and five scholarly books dealing with topics in the cognitive sciences.

Stem Cell Company

A new stem cell company recently filed for a patent on a stem cell signaling factor technology.

Rather than using stem cells for therapeutics, they capture the signals (lipids and proteins for example) that stem cells give off to activate surrounding cells to a more youthful state.

They have had promising success in developing a skin cream using signaling factors derived from young adult skin stem cells. They are now in human trials with a hair restoration product. The active ingredient is signaling factors from young adult robust hair follicle stem cells.

Management will establish a new company, using the same technology for therapeutics to treat various injuries and diseases including aging.

The holy grail of stem cell research could be systemic rejuvenation.

They have another technology that isolates the best stem cells in a human body and replaces the least viable stem cells with millions of copies of the most viable ones. That means weakened immune systems would be strengthened, damaged hearts and other organs would have better internal repair mechanisms, and bodies could be made more resistant to cancer and other diseases.

Extensions of this technology would enhance elderly stem cells beyond the capabilities of young adult or even infant stem cells.

Biotech Company

This biotechnology company owns two worldwide exclusive licenses to breakthrough technology from the University of California at San Diego (UCSD) and the Howard Hughes Medical Institute (HHMI) for the delivery of large biomolecules into living cells, both *in vitro* (primary and cell cultures) and *in vivo* (living animals and humans).

They use complex macromolecules in their natural state (DNA, RNA and proteins) to treat and prevent disease at the cellular level.

The first applications they will pursue are Anti-Aging Therapy, Cancer Therapy, Vaccines, and Therapeutics for Infectious Diseases.

Anti-Aging Therapy

Most body cells gradually decline in function with each cell generation (cellular aging). Reproductive cells and stem cells produce a protein enzyme called Telomerase Reverse Transcriptase (TRT), which reverses this functional decline and thereby reverses cellular aging (completely in reproductive cells; partially in stem cells). Medical research has shown that human cells can be made biologically youthful in terms of regenerative capacity, self repair and function, when TRT is delivered into cells in culture (*in vitro*). They plan to use its macromolecular delivery technology to be the first to deliver TRT *in*

vivo for human therapeutics for restoration of regenerative (self-healing) capabilities of tissues for the treatment of a wide range of the many diseases of aging.

They are also developing a topical skin treatment delivering TRT to aged skin cells to restore regenerative (self-healing) capacity for youthful function and appearance of skin tissue... as well as anti-obesity and BioFitness products.

The Chairman and Chief Executive Officer, is an experienced technology entrepreneur who founded two biotech companies and co-founded a venture capital company specializing in technology start-ups.

Bio/Nanotech Company

This company develops nanotechnologies that regenerate human tissues. Their primary product focus is on delivering agents that therapeutically lengthen and repair chromosomal telomeres in living animals. Successful therapies based on this tactic may offset, and potentially reverse many presently incurable age-related diseases and possibly reverse the processes of human aging.

The Company is lead by a group of financiers and public biotech corporations who maintain expert scientists in the field of anti-aging. The company's executives took three companies public in 2005 and collectively operate major biotechnology corporations or are heads of investment banks.

The Company is developing products that elongate chromosomal telomeres *in vivo* by delivering a variant of the enzyme hTert or synthetic DNA nanocircles with a special formulation of PLGA biodegradable nanoparticles capable of delivering extra-large molecules.

PLGA is the only FDA approved gene therapy in the U.S. marketplace and is capable of comprehensively delivering molecules that are too large and complex to deliver with other known vectors. Telomeres cap the ends of chromosomal DNA and consist of repeated sequences of the chemicals Thymine, Adenine, and Guanine. They are longest at conception and become shorter each time a cell divides. This shortening eventually becomes critical and leads to cell death. In general, aging cells become progressively less able to form and maintain tissue. This dysfunction plays a key role in a variety of presently incurable age-associated diseases. It can also be seen in symptoms we often label as human aging, such as wrinkled and deteriorating skin and the decline of vital organs. The company believes that human tissues can be regenerated *in vivo*. The non-immortalizing delivery of enzyme is considered a "safe" practice and has not been shown to correlate with cancer.

They are working closely with a strategic partner to combine telomere therapy with advances in stem cell therapy.

Genome Engineering

This company has technology to modify genomes in any living organism. The ultimate goal is to reengineer the human genome in order to make it resistant to disease and aging. There could be at least 20 applications of this basic technology in many unrelated industries.

For example, they can prove their concept with a working prototype that will “manufacture” ethanol in solar ponds seeded with engineered bacteria within one year for less than \$3 million. Minimum results will result in valuable patents. The ethanol would cost a fraction of today’s cost.

Flex fuel is the first logical commercial product. Vinod Khosla, the Silicone Valley billionaire pointed out that oil companies control the pumps and don't want to jeopardize the value of their reserves. E15 ethanol mixed with gasoline will reduce emissions. The reverse ratio, or E85 does no better. Thus oil companies would still sell almost as much gasoline as they sell today, and the company believes it can work in cooperation with them.

Today, the U.S. Government is subsidizing farmers \$20 billion per year (including disincentives to grow no crops at all). Many farms could be easily converted to growing ethanol profitably. Ethanol plants take 2-3 years to build. Small solar ponds can be built in days. Not only could this save taxpayers \$20 Billion per year in subsidies, but would significantly reduce our dependence on foreign oil.

This technology could be expanded to produce any number of things including nutritious, inexpensive food products.

The researcher believes it would take only about 2000 man-years to modify human genomes for longevity to solve 90% of the aging problem and only 10's of thousands of man-years to reengineer the whole human genome. It would take 1-2 years to train biotech undergrads or grad students anywhere in the world to do this. Thus, 500 researchers trained for two years and working for four more years could potentially solve an estimated 90% of the aging problems.