

SENS Foundation

human regenerative engineering

An Open Letter from Michael Kope, Chief Executive Officer

El Granada,
California.

I am delighted to have this opportunity to introduce you to the SENS Foundation. Our mission is simply stated: SENS Foundation will work to develop, promote and ensure widespread access to regenerative medicine solutions to the disabilities and diseases of aging. We shall be focusing on the Strategies for Engineered Negligible Senescence (SENS) identified by our Chief Science Officer, Dr Aubrey de Grey, and combining direct research efforts with education, affiliation and outreach programs.

Our work will incorporate and build upon the important research program initiated by Dr de Grey in his work for the Methuselah Foundation. We have agreed with the Methuselah Foundation that the time is ripe for transferring that work into a new entity, one designed to provide mature operational and financial management, and capable of developing the networks necessary to build on existing contributions. From day one, we shall be supporting key research through our own institute and through a variety of affiliated universities and research organizations.

The challenge is not small. We are proposing nothing less than a transformation of medicine; away from the increasingly burdensome and unprofitable chase to treat pathologies, and towards a functional – and, for society as a whole, more cost-effective – approach to maintaining and extending individual health.

Yet, we shall not be alone in our mission. Our own research – introduced in this prospectus – will be governed by a strategic agenda to demonstrate the feasibility of SENS and regenerative medicine approaches, and therefore drive broader involvement. We are already assembling a world class team of advisors; we shall continue to build on the successful biennial Aging (US) and SENS (UK) Conferences; we are expanding affiliations to include non-profits with complementary missions, research organizations, government support, and technology transfer with mainstream biotechnology companies; and we shall be working hard to raise awareness and interest in the general community.

Over the coming months and years, I hope that you will seek to collaborate with us and support us in meeting the challenges which we have set for ourselves. Help us to make this audacious idea into a reality: Let's stop aging.



Mike Kope

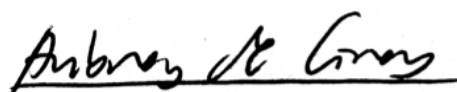
An Open Letter from Dr Aubrey de Grey, Chief Science Officer

Cambridge,
England.

It is now two years since I completed the first edition of my book, *Ending Aging*, in which I set out the *Strategies for Engineered Negligible Senescence* which underpin SENS Foundation's work. SENS concentrates on therapies which clean up the damaging side-effects of human metabolism, allowing us to sidestep science's still-considerable ignorance of the underlying workings of that metabolism itself. Building on the research successes of the Methuselah Foundation, it is my pleasure to address you now as Chief Science Officer of SENS Foundation, to reflect on where we stand today, and what the future holds.

I want to give you a feel for what we are achieving by summarising just two of the many recent elements of SENS-related scientific progress. One shining example is the discovery of enzymes that can destroy A2E, a by-product of the chemistry of sight, which is thought to be the primary cause of age-related macular degeneration (in turn, a major cause of blindness in the elderly). Kent Kemmish, a scientist working for the Methuselah Foundation's research group in Phoenix, leveraged knowledge built up in disparate fields over many years to have an inspired insight as to what type of enzyme might perform this task, and he was rapidly able to confirm this in the laboratory. The other example, this time relating to mitochondrial mutations (the strand of SENS that was my own first interest), is the breakthrough by Marisol Corral-Debrinski's Methuselah-funded group in Paris in cracking the problem of hydrophobicity of the proteins encoded by mitochondrial DNA. This obstacle, which had for over a decade completely stalled progress in the 20-year-old idea of making mitochondrial DNA redundant by duplicating it in the nucleus, is now largely solved, and there is great hope that this strand of SENS can be brought to complete fruition within only a few more years.

I have no doubt that SENS Foundation is the right organization to take the next evolutionary steps in the engineering of comprehensive regenerative therapies. As Chief Science Officer, I am excited by the challenges ahead, and confident in our ability to construct the teams and resources necessary to meet those challenges. It promises to be a remarkable journey, and I look forward to your continued interest, support and collaboration as we increase our pace and set our sights ever closer to the horizon.



Aubrey de Grey

The Year Ahead

SENS Foundation has already identified an interim Board, under which it will incorporate and obtain 501(c)(3) status, and is currently working to secure its permanent governance. Its long-term goals and operational development are firmly directed towards its core mission, but, in addition, it also faces a range of more immediate opportunities and challenges.

The SENS research element of the Methuselah Foundation will be handed over to SENS Foundation from the date of its formation, covering projects with a variety of research groups across several strands of the SENS program. Whilst some of these projects are internal, several are being funded at facilities elsewhere in the USA: details can be found in the following section. SENS Foundation itself has strong global networks, arising from the members of its core team, with particularly strong links to the UK: the SENS4 conference will be held in Cambridge during September, 2009.

The Methuselah Foundation's Institute of Biomedical Gerontology will be immediately expanded, transferred to a larger facility, and launched as an integrated component of SENS Foundation. Through it, we will conduct 'in-house' research, collaborate with companies and research groups, and host academic meetings and colloquiums. Development planning is underway to continue the expansion of this SENS Foundation Institute and create a permanent location for it in the San Francisco Bay Area.

Some initial funding for SENS Foundation is available as part of the hand-over from the Methuselah Foundation, and this will be supplemented by the transfer of existing monthly donations, where those donations relate to SENS research. However, projected commitments will require the swift implementation of development strategies, including: cementing relationships with major donors; revisiting existing prospective donors; and exploring options for IP-sharing relationships in keeping with 501(c)(3) status.

The immediate public relations and education strategy requires that SENS Foundation and the Methuselah Foundation be clearly differentiated. Dr de Grey's new role as Chief Science Officer will be his only officially-held position, and he will act as a representative of SENS Foundation in his public and scientific roles. A preliminary website will be created, which will quickly be extended into a comprehensive resource for those interested in our work. The wider public relations strategy will address multiple audiences, from the general public, through commercial organizations, to specialized elements of the scientific community. It will dovetail with collaborative and 'in-house' research activities. In addition, recent changes in the American political landscape have the potential to shift regulatory frameworks in a manner which suggests the value of increasing SENS Foundation's influence amongst policy makers.

Initial Research Portfolio

The following SENS research projects are currently being funded by the Methuselah Foundation. They will be transferred to SENS Foundation on its inception.

LysoSENS - 7KC Degradar: to develop medical bioremediation for the removal of long-term accumulations of oxidised cholesterol derivatives, particularly the highly toxic compound 7-ketocholesterol, from cells in the artery wall, using catabolic enzymes derived from environmental microorganisms. Principal Investigators: Dr Bruce Rittmann, Professor, Civil and Environmental Engineering, Arizona State University; Dr Pedro Alvarez, Professor and Chair, Engineering, Rice University, Texas

LysoSENS - A2E Degradar: to discover new and superior family members of enzymes identified as degrading A2E, which is thought to cause Stargardt's and age-related macular degeneration. Principal Investigator: Dr Bruce Rittmann, Professor, Civil and Environmental Engineering, Arizona State University, Bio Design Lab

MitoSENS - Allotopic Expression: to address diseases due to mutations in mitochondrial DNA. Allotopic expression for the mitochondrial genes ATP6, ND1 and ND4 has now been optimized, with complete and long-lasting rescue of mitochondrial dysfunction in human fibroblasts in which these genes were mutated. Biosafety and benefit to mitochondrial function is now being validated in animal models, prior to clinical applications. Principal Investigator: Dr Marisol Corral-Debrinski, Institut de la Vision, INSERM, Paris

OncoSENS - Cerebral Epimutation: to test the hypotheses that (i) neuronal cells in the mouse brain are subject to stochastic changes in the transcriptome, epigenome and genome, and (ii) such changes can have functional consequences. Stochastic changes in the somatic genome could contribute to aging by dysregulating gene expression. Principal Investigator: Dr Jan Vijg, Professor and Chair, Department of Genetics, Albert Einstein College of Medicine, New York

ApoptoSENS/RepleniSENS - Immuno Rejuvenation: to test whether removal of accumulated age- and virus-related T-cell clonal expansions and/or T-cell repertoire rebalancing can (i) restore functionality of T-cell compartment in an aged organism; (ii) improve immune defence against new infection. Principal Investigator: Dr Janko Nikolich-Zugich, Professor and Chair, Department of Immunobiology, University of Arizona

Policy Research Initiative - SENS Demographic Consequences: to take SENS predictions of biotechnological progress and create models for global and regional population demographics over the coming century. Principal Investigators: Dr Leonid Gavrilov and Dr Natalia Gavrilova, Center on Aging, NORC/University of Chicago

SENS Foundation : Senior Management

Michael Kope, Co-Founder : Chief Executive Officer



Mike specializes in business development consulting. He currently serves as CEO of Genomic Systems, a company developing an anti-metastatic antibody for a wide range of cancers, and as officer and advisor for companies involved in genomic analysis, anti-aging research, vaccines and delivery technologies, research management systems, and genetic sequencing. Previously, Mike was Director of Corporate Development for MedImmune, Inc., serving the MedImmune Vaccines unit formerly known as Aviron. He came to Aviron a few years after having licensed the company its core FluMist™ technology from the University of Michigan, where he served as the University's Intellectual Property Counsel through the Nineties. Mike has negotiated a broad range of business acquisition and partnership agreements, designed strategies for technology protection and promotion in many fields of research, and facilitated a number of successful start-ups. He received his JD from the University of Michigan in 1990.

Dr Aubrey de Grey, Co-Founder : Chief Science Officer

Aubrey is a biomedical gerontologist based in Cambridge, UK, and has most recently served as Chairman and Chief Science Officer of the Methuselah Foundation, a 501(c)(3) non-profit charity dedicated to combating the aging process. He is also the Editor-in-Chief of *Rejuvenation Research*, the world's only peer-reviewed journal focused on intervention in aging. His research interests focus on the accumulating, and eventually pathogenic, molecular and cellular side-effects of metabolism ("damage"). This "damage" constitutes mammalian aging and Aubrey's work seeks to design the interventions necessary for its repair and/or obviation. He has developed a potentially comprehensive plan for such repair, termed Strategies for Engineered Negligible Senescence (SENS), which breaks the aging problem down into seven major classes of damage and identifies detailed approaches to addressing each one. A key aspect of SENS is its potential to extend healthy lifespan without limit, even with repair processes which remain imperfect, as the repair only needs to approach perfection rapidly enough to keep the overall level of damage below pathogenic levels. Aubrey has termed this required rate of improvement of repair therapies, "longevity escape velocity". In 2007 Aubrey published his book, *Ending Aging*, bringing his ideas to a wider audience.



Jeff Hall, Co-Founder : VP Research Operations



Jeff gained his Bachelor's Degree in Electrical Engineering from the University of Michigan, and has over twenty years of engineering and management experience. Over the past sixteen years he has been involved in entrepreneurial ventures, including three years in Silicon Valley, developing a web portal business and working with venture capitalists. His engineering qualification has been supplemented by two years of philosophy studies with an emphasis on AI research, again at the University of Michigan, in addition to more recent, in-depth involvement with molecular biology and biogerontology. Jeff is the founder and Chief Engineer of Muse Technologies, an engineering consulting and systems integration company based in Ann Arbor, MI, which is currently engaged in an NIH-funded research project with the University of Michigan. He is the Chief Engineer of Halcyon Molecular, and has also worked as a research engineer, supporting the ATLAS upgrade to the CERN Accelerator, and as Program Manager for Virtio, a startup company developing simulation software for embedded systems. Since 2005 Jeff has been working with the Methuselah Foundation, most recently as Executive Director of SENS.

Dr Sarah Marr, Co-Founder : VP Development and Communications

Sarah was most recently acting Director of the UK charity, the BioGerontology Research Foundation. She was previously employed as COO of the UK political think-tank, Demos, with responsibilities including financial management and accounting, HR, business infrastructure, and strategic development. She also co-authored a global survey of design practices in public sector service delivery, working with a team from PriceWaterhouseCoopers. In the 1990s she spent several years as a business and IT consultant with Andersen Consulting (now Accenture), working on a variety of projects from systems analysis to the streamlining of the new business acquisition procedures for the company's EMEA operations. She has a Bachelor's Degree in Law, from the University of Oxford, and another in Theoretical Physics, from Imperial College London, where she also built a prototype web portal for the European grid computing network of the Large Hadron Collider. Her postgraduate studies include a Master's Degree in Social Anthropology from the University of Manchester, specializing in the nature of cultural misappropriation in Western subcultures, and a PhD in Theoretical Physics from Imperial College London, covering the quantum and relativistic properties of black holes in discrete spacetimes.



SENS Foundation : Interim Board

Barbara J. Logan : Chair

Barbara is the CEO of the LifeStar Institute, formed to catalyze a global collaboration to prevent age-related diseases within a radically compressed timeframe. In the mid-1980s, she was President and COO of ComputerLand Corporation, then the world's largest retailer of personal computers, with over 800 stores in 26 countries. An entrepreneur, she and her husband have been producers of children's audio recordings, as well as proprietors of a popular restaurant in Boise, Idaho. She is currently co-owner of Calypso Building Logistics, Inc., a Florida-based builder.



Kevin Dewalt : Board Member



Kevin has over 15 years experience driving technology innovation in start-ups, large companies and the federal government. He has held leadership roles in all aspects of entrepreneurship including fundraising, product development, software engineering, business development/sales, and strategic marketing/brand development. He is founder and CEO of ManyWheels, a start-up in the automotive logistics space funded by the National Science Foundation. At the investing arm of the Central Intelligence Agency, Kevin helped make over \$20m of venture investments into 25 technology start-ups, and worked with their CEOs and management teams to deploy their products to the federal market. Kevin founded Soapbox.com, a start-up subsidiary company he incubated in The Motley Fool, building the consumer online marketplace from the ground-up after securing \$2m in funding. At NASD, Kevin developed the business plans to commercialize the company's regulatory applications and lead a 35-person, worldwide engineering team that regulates the NASDAQ Stock Market. He began his career as an engineer and project manager with the US Coast Guard and DMW Worldwide, a start-up telecom software company. Kevin has a BS in Electrical Engineering from the US Coast Guard Academy, where he was the top graduate in his class, and an MS in EE from Stanford University. He is also a former board member of the New Media Society, and panel reviewer for investments by the National Science Foundation.

Kevin Perrott, Co-Founder : Board Member

Kevin is the owner of Riverside Honda, the largest Honda recreational vehicle dealership in Canada. After twenty years of management he became a cancer survivor and shifted the direction of his efforts from retail business to academics. He graduated near the top of the class of 2006 with a double major in Biology and Chemistry, specializing in Biochemistry. He then entered the PhD program at the University of Alberta completing two years in the study of mitochondria and the process of aging, with a GPA of 4.0. In 2008 he shifted focus to the use of nanocrystalline silver in wound healing and regenerative medicine. Kevin is a



founding member of, and consultant for, the Biomedical Engineering Research and Results Initiative (BERRI) at the University of Alberta. In 2005 he became COO and a Board Member of the Methuselah Foundation, and Executive Director of the Methuselah Mouse Prize. He is also the founder and President of Aging Research Network, a Canadian charity sponsoring research to reverse the diseases of aging, with an associated public education remit. In the fall of 2008, Kevin stepped down from his official capacities with the Methuselah Foundation and became a founder and Board Member of the LifeStar Project, an organization dedicated to highlighting the economic imperatives for the development of therapies for age-related disease.

SENS Foundation is a California nonprofit organization. SENS Foundation is in the process of applying for recognition of exemption from taxation under section 501(c)(3) of the Internal Revenue Code. The organization expects to receive tax-exempt status effective its date of incorporation. Donations to organizations exempt under section 501(c)(3) are deductible from federal income tax.