For Immediate Release:

World-Leading Surgeons, Scientists and the Organ Preservation Alliance Applaud Defense Department Initiated First-Ever Government Grant Programs Targeting Organ Banking for Transplants

January 14, 2015, NASA Research Park, Moffett Field, CA – The Organ Preservation Alliance, a Silicon Valley nonprofit working to save millions of lives by catalyzing breakthroughs in the storage of organs, together with world-leading transplant surgeons and scientists on the Alliance’s medical and scientific advisory boards, jointly congratulate the U.S. Department of Defense (DoD) on its announcement of the first-ever multi-million dollar grant funding pools dedicated to research on organ and tissue banking technologies.

On January 15, 2015, the DoD will via its Tissue Injury and Regenerative Medicine (TIRM) program office open three separate, but complementary, organ cryopreservation grant programs. These programs could together fund research for 20 or more leading American research teams, with strong, individual teams potentially receiving $3-3.5 million across different phase 1 and 2 awards. These business innovation (SBIR) grants are aimed to support U.S. commercialization of science while achieving military as well as civilian health goals.

Sebastian Giwa, PhD, President and CEO of the Organ Preservation Alliance and also speaking for New Organ, said:

“This bold step by the DoD will enable the crucial breakthroughs needed to create a future in which we can stop biological time for human organs, in much the way that we have, for decades, been able to bank stem cells, human eggs, sperm and embryos.”

“35% of all deaths in the U.S. could be prevented or substantially delayed by organ transplantation, and this move by the DoD could be a true game changer.”

Need for Organs is Vast, DoD Funding Could Transform Transplantation and Save Millions of Lives

“The supply of tissues is one of the major constraints we face in transplantation medicine today, and organ banking technology would dramatically help resolve it. This is a major step forward in the field of transplantation,” said Harvard Medical School Professor Bohdan Pomahac.

“Currently, transplant organs cannot be stored for long at all, so a high percentage of viable transplant organs are discarded before matches can be found and helicopter and jet transportation can be arranged. Hearts, for instance, can currently only survive for 4-5 hours outside of a body,” said world-leading heart transplant surgeon, Professor Jacob Lavee. “If we could get longer preservation, so that just half of the wasted hearts and lungs could be used, the U.S. wait-list for these organs would be extinguished in a few years.”
Dr. Gerald Brandacher, Scientific Director of the Composite Tissue Allotransplantation Program at Johns Hopkins heralded this commitment: “People seem to underestimate what could be coming. This is a big step towards a future in which we routinely replace damaged organs and tissues to restore both form and function, in a way that only transplantation allows – replacing ‘like with like’.”

“The ability to build real organ and tissue banks could transform the entire field of transplantation. This commitment from the DoD is taking us one step closer to that reality.”

**The DoD’s Three Separate, but Complementary, Grant Programs are Designed to Catalyze Audacious Breakthroughs**

The three new DoD grant programs target different, but related, problems in the field. The first program aims to develop fundamental breakthroughs in the low temperature physics underlying the preservation of living tissues; the second program focuses on low toxicity cryoprotectants that prevent ice formation in cooled organs; and the third program targets effective and fast rewarming protocols to ‘out-warm’ the ice crystallization process and for restoring function to cooled organs.

“At first look, the challenge of reversible banking of human organs seems daunting, but it can be broken down into a set of tractable sub-problems, each with many potential solutions. The different topics that the DoD is asking scientists to work on to a large extent cover the set of different sub-challenges that need to be overcome,” said leading cryobiologist, Professor Boris Rubinsky at UC Berkeley.

The head of the DoD group that runs these programs, Kristy Pottol, project manager for the Tissue Injury and Regenerative Medicine Project Management Office at the U.S. Army Medical Materiel Development Activity said:

“In the context of the important investments the DoD is making in tissue engineering via the Armed Forces Institute of Regenerative Medicine (AFIRM), and the investments in the world’s largest hand and face transplant program, this investment in tissue banking should not only add value on its own by improving current transplantation practices, but could also help support, complement and accelerate tissue engineering breakthroughs.”

**Military as well as Civilian Needs Outside of Vital Organs are Immense**

“The DoD’s decision to support tissue cryopreservation research is critical to restoring the health and function of our brave service members,” said world-leading cryobiology scientist Mehmet Toner, Professor at Harvard, Mass General and MIT.

"Progress in cryobanking would be game-changing and would enable our ever-improving transplantation abilities to help maimed American servicemen, as well as firefighters, factory workers, or civilians and children around the world injured by landmines,” said Dr. W.P. Andrew Lee, who performed the nation’s first military double-arm transplants and is Director of the Department of Plastic & Reconstructive Surgery at Johns Hopkins.

Dr. Lee’s colleague, Dr. Pomahac at Harvard said: “In addition to scarce availability of vital organs like heart and kidneys, there is a tremendous lack of vascularized composite tissues for transplantation, trauma, reconstructive and regenerative medicine needs. Over 1,600 service members have suffered amputations from injuries in Iraq and Afghanistan and over 4,000 Service members have sustained severe craniomaxillofacial injuries. Being able to bank complex vascularized tissue would revolutionize the way we can restore these brave young women and men who serve our country.”

At the same time that the number of catastrophic combat injuries to limbs and face is unacceptably high, civilian need for solutions to amputations is even greater: “Two million people are living with limb loss in the U.S., with 185,000 amputations conducted each year. Approximately 100,000 of those amputations stem from vascular disease and/or diabetes, and roughly 83,000 are due to trauma, often in young individuals,” Dr. Lee added.
Decades of Cryobiology Research, as well as Valuable Understanding and Tools in Other - Often Radically Accelerating - Domains Have Set the Stage for the Needed Breakthroughs

“It is wonderful that the DoD has decided to target complex system cryopreservation at this moment in time. Cryobiologists have been able to preserve individual cells and a wide variety of organized tissues for decades, and even intestinal segments, whole uteri, and to some extent whole ovaries, by freezing. And exciting progress, including my group’s ability to cryopreserve and successfully transplant a rabbit kidney, with subsequent life support, by avoiding ice formation entirely, suggests that much more extensive successes may be possible in the future,” said Dr. Greg Fahy, Chief Science Officer at 21st Century Medicine.

“With all the possibilities cryopreservation research has opened up, there is now a lot of room for scientists in other fields to come in and apply their knowledge. As a result, we may be on the path to better cryoprotectants, better rewarming techniques, better tools in almost every respect,” said Dr. Erik Woods, President of the International Society of Cryobiology.

"Within its set of complementary cryopreservation grant topics the Department of Defense has wisely identified re-warming of tissue as a key scientific opportunity. Safely re-warming tissue is actually one of the largest barriers to cryopreservation. Ironically, dangerous ice formation happens more quickly when the tissue is warmed than when it is cooled." Said Dr. John Bischof, Director of Bioheat and Mass Transfer Lab and Professor at the University of Minnesota, and then added: "A number of leading edge technologies can now be brought to bear on the re-warming challenge. Using recent advances in nanotechnology combined with low-frequency radiowave transmission, we can deliver enormous amounts of heat rapidly, evenly, and safely."

Important Move by the DoD in to Ensure that the U.S. does Not Fall Behind China; Large Commercial Value

"China has been making progress lately in the field. The other day, I read a study about an experiment in which Chinese scientists cryopreserved rat legs and successfully transplanted them into recipient rants. It is a shame that China beat us to these important proof-of-concept results, when the U.S. has arguably the best scientists in the world when it comes to cryopreservation. The decision by the DoD to help support these scientists is a great step in the right direction,"said Harvard Medical School Professor Bohdan Pomahac.

"Even in the applications where cryopreservation is already clinically available — the banking of cells and simple tissues — progress in organ preservation will lead to better techniques. The market value of these areas is large, and progress in them will in turn lead to further cryopreservation investment. Because of this, targeting organ preservation pushes the overall field of regenerative medicine forward," said President and Chief Science Officer of Cell & Tissue Systems, Dr. Kelvin Brockbank.

Protecting Ovaries of Women with Cancer; Accelerating Drug Development With Less Animal Experiments

"One huge potential application for this technology will be in helping patients who have treatable cancer, but require strong doses of chemo or radiation therapy. In these cases, cryobanking could enable doctors to protect crucially important, but fragile, tissues by removing them, banking them and then transplanting them back into the patient after the gonadotoxic therapy is completed." says world leader in ovary cryopreservation and Professor Pasquale Patrizio, Director of the Yale University Fertility Center.

“Preserving human tissues for research on a broad range of diseases will facilitate and accelerate scientific advances and create impact at the clinic. It can also potentially reduce costs and decrease the need for animals in research. In a similar way, it will also aid drug screening and development reducing cost and time towards new therapies,” Professor Utkan Demirci, Director of Stanford University’s Bio-Acoustic MEMS in Medicine Labs.

"The power of cryopreservation stems from the universality of breakthroughs in one complex tissue system to others. What we learn in preserving liver tissue will help us preserve limb and the knowledge gained from the limb will lead to the preservation of heart, which will ultimately lead to bio-banking of complex tissues and organs for a myriad of clinical applications relevant to the injured servicemen," says Mehmet Toner, cryobiologist and Professor at Harvard, Mass General and MIT.
Stopping Biological Time by Turning Tissue Into a Glassy, Non-Frozen, State

“The process of vitrification, turning the entire tissue directly into a glassy state avoiding freezing and ice damage, has opened up a lot of new possibilities. It's brought us closer to addressing some of the major barriers to large tissue cryopreservation.” Dr. Mike Taylor, world-leader in vitreous cryopreservation approaches of tissue systems and Adjunct Professor at Carnegie Mellon.

“While the ability to store living systems for a few years is probably all we need for organ banks to transform transplantation medicine, vitrification should actually enable storage of biological material for literally as long as anyone would ever want. Cryopreservation virtually stops biological time, indefinitely,” said Dr. Greg Fahy, Chief Science Officer at 21st Century Medicine.

ABOUT THE ORGAN PRESERVATION ALLIANCE AND NEW ORGAN

The Organ Preservation Alliance is a non-profit incubated at SU Labs at NASA Research Park in Silicon Valley, which is working to catalyze breakthroughs on the remaining obstacles towards the long-term storage of organs by building on recent advances in cryobiology and relevant fields.

These breakthroughs will save and enrich the lives of millions; they will also accelerate progress towards break-throughs in organ tissue engineering. Innovation in these technologies will enable cryobanked, tissue-engineered organs to be available off-the-shelf and on-demand, eventually revolutionizing human health.

The Organ Preservation Alliance is a Founding Partner of New Organ, a collective impact initiative working to address organ disease and injury by coordinating a shared roadmap, prize portfolio, and alliance to catalyze breakthroughs in organ banking, bioengineering, and regeneration.

Appendix 1: Contact info, titles, etc, for the world leading transplant surgeons and scientist on our medical and scientific advisory boards that provided quotes above

Appendix 2: Enabling Breakthroughs in Transplantation through Cryobanking – Summary Presentation
### Appendix 1 - Contact Info and Titles to World leading transplant surgeons and scientist

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Title</th>
<th>Contact info</th>
<th>Website</th>
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<tbody>
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</tr>
<tr>
<td>Dr. Bohdan Pomahac</td>
<td>World leading transplant surgeon; led the team that performed the first full face transplant in United States</td>
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<tr>
<td>Dr. W.P. Andrew Lee</td>
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<tr>
<td>Dr. Gerald Brandacher</td>
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<tr>
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<td>Dr. John Bischof</td>
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ENABLING BREAKTHROUGHS IN ORGAN TRANSPLANT MEDICINE
Millions of others are waiting for a new organ worldwide. Many will die before receiving one.

We want to change that with your help.
AN INTERDISCIPLINARY TEAM
OF DOCTORS, SCIENTISTS,
POLICY INFLUENCERS,
COMMUNICATORS &
ENTREPRENEURS

ENABLING BREAKTHROUGHS
IN THE LONG-TERM PRESER-
VATION OF ORGANS TO
SAVE MILLIONS
OF LIVES

NASA Research Park | Building 20, S. Akron Road | Moffett Field | CA 94035 | OrganPreservationAlliance.org
Eligible to receive tax deductible donations via 501(c)(3) fiscal sponsorship
IN PARTNERSHIP WITH

new organ

prizes & partnerships to advance the regeneration, preservation and engineering of organs

INCUBATED AT SU LABS AT NASA RESEARCH PARK IN SILICON VALLEY

using accelerating technologies to address humanity’s biggest challenges
ACCELERATING THE DEVELOPMENT OF REVERSIBLE LONG-TERM HUMAN ORGAN STORAGE

TO CATALYZE A VITAL NEW INDUSTRY THAT PERFECTS THE ORGAN PRESERVATION PROCESS, SAVING AND ENRICHING MILLIONS OF LIVES
“Kidney transplants seem so routine now. But the first one was like Lindbergh’s flight across the ocean.”

Dr. Joseph E. Murray, Nobel Prize recipient and surgeon for first successful kidney transplant.
ELLEN, AGE 38
is dying of organ failure; she may or may not receive an organ in time.
The Institute of Competition Sciences leads the development of the prize guidelines and team agreement. ICS has worked previously with X PRIZE and NASA's Centennial Challenges.

The growing shortage

The U.S. organ wait list has grown rapidly, while the number of organ donors has stagnated.

Source: OPTN/SRTR 2012 Annual Report and website data
TRUE NEED COULD BE 10X LARGER THAN OFFICIAL WAITING LIST SUGGESTS

Annual transplants: 28,000
Total waiting list: 120,000
Annual deaths preventable by transplantation: 900,000

AN ESTIMATED 35% OF ALL U.S. DEATHS COULD BE PREVENTED OR SIGNIFICANTLY DELAYED BY ORGAN TRANSPLANTATION

The Institute of Competition Sciences leads the development of the prize guidelines and team agreement. ICS has worked previously with X PRIZE and NASA’s Centennial Challenges.

EVEN FOR THOSE FORTUNATE ENOUGH TO RECEIVE COMPATIBLE ORGAN TRANSPLANTS IN TIME, SERIOUS CHALLENGES REMAIN

VITALITY

Immunosuppressants that keep your body from rejecting an organ can harm your immune system, raising the odds of severe illness.

LONGEVITY

Transplanted organs often don’t last long. You need a new one every 5-15 years, forcing you to endure the waiting list each time.

COST

Immunosuppression treatment, which must be administered for the duration of patients lifetime, can cost hundreds of thousands of dollars for a single person.

Due to logistical challenges, no attempt will be made to find an organ for Semu. In other parts of the world, the life-saving transplant operation he needs is done routinely.
GLOBALLY
THE PROBLEM IS EVEN MORE SEVERE THAN IN THE US

According to the World Health Organization, organ transplants are currently meeting less than 10% of the global need.

Source: World Health Organization and Global Observatory on Donation and Transplantation (http://www.transplant-observatory.org/)
SONIA, AGE 15, UK
has cancer that is curable, but her ovaries will be damaged by the required chemotherapy. She will never have children and will suffer health issues related to hormone imbalances.

MARK, AGE 32, US
lost both his arms while on duty for the military and would like nothing more than to receive successful arm transplants.
A COMMON NEED
THE REVERSIBLE AND EFFICIENT BANKING OF LARGE TISSUE SYSTEMS WOULD SAVE MILLIONS OF LIVES AND RADICALLY IMPROVE MILLIONS OF OTHERS
A Powerful Solution

What if organs could be reliably preserved, for when they are needed?

1. Long-term organ preservation would provide time to train a recipient’s immune system - leading to both organ rejection and the need for immunosuppressants potentially falling to zero as the promising work on immunologic tolerance induction is perfected.
2. Ability to bank organs will enable use of more organs and based on the better matches and fewer rejections lead to less loss of organs. In time, limbs and appendages can probably be preserved by similar methods used for vital organs.
3. Treatment for kidney disease costs $43 billion a year in the US and the aggregate cost has been estimated at more than $1 trillion during a decade (kidney.niddk.nih.gov and Lanza, West, Atala, et al., “Generation of Histocompatible Tissues Using Nuclear Transplantation”, Nature Biotechnol).
4. Banked organs could make it possible to save policemen, fire-fighters and civilians in accidents who urgently need an organ within hours to save their life; long-term preservation would also allow for an inventory of limbs and organs for use in war-related injuries.
5. Concept has been demonstrated using ovarian tissue in humans and full ovaries in other mammals.
Many More Organs

% of Unharvested Organs from Deceased Donors

If half of the wasted hearts and lungs could be used, the U.S. waitlist for these organs would be extinguished in about 2-3 years.

Procurement Costs Alone of Those Organs Would Contribute a Multi-Bilion Dollar Market

Source: Based on 2012 numbers from US Dept. of Health and Human Services.
Imagine a future in which tissue engineering of organs is routine

Sheila, 68, would be able to maintain “backup copies” of each of her organs, prolonging her health and potentially saving her life.
COMBINING ORGAN MANUFACTURING & BANKING

THE ABILITY TO REPLACE VITAL ORGANS ON DEMAND IS ESTIMATED TO SIGNIFICANTLY DECREASE HUMAN MORTALITY

COMBINED, TISSUE ENGINEERING AND ORGAN BANKING CAN POTENTIALLY:

• DELAY MORE THAN 30% OF DEATHS

• INCREASE THE LIKELIHOOD OF LIVING TO 80 BY 2 TIMES

• INCREASE LIKELIHOOD OF LIVING TO 90 BY 10-20 TIMES

THE ABILITY TO BANK ORGANS WOULD ACCELERATE THE DEVELOPMENT OF TISSUE ENGINEERING TECHNOLOGIES

Efficient ways to store and manage backup organs would likely increase demand for tissue engineered organs by several orders of magnitude.

Increased future demand and greater impact should generate increased interest and funding, thereby accelerating the pace of tissue engineering breakthroughs.

The ability to generate backup organs would save more lives if coupled with the commensurate ability to store them so they are on demand in times of urgent need.

1 The demand for tissue-engineered organs could then increase dramatically as the reliable banking of organs becomes possible. At the extreme, once these technologies are readily available in the US, every American could have a unique, compatible set of backup organs based on his or her unique DNA. The demand for tissue-engineered organs could increase from around 30-50,000 a year to as much as 1.8 bn initially (300 mn * 6 organs) and 18 mn a year after that (3 mn newborns annually * 6 organs). And that’s just the US. 2 Organs banks will increase the survival rate dramatically for individuals requiring a transplant urgently — whether within a few weeks with just hours. This could help any of us, and is particularly important for the policemen, firemen and soldiers who serve us, as well as those with pre-existing medical conditions.

INCREASED DEMAND

GREATER IMPACT

INCREASED FUNDING
AND YET...

OVER THE LAST 30 YEARS VERY LIMITED FUNDING AND RESEARCH HAVE GONE TOWARD SOLVING THE LONG-TERM ORGAN PRESERVATION PROBLEM
LONG-TERM ORGAN BANKING IS ACHIEVABLE

Stem cells, sperm, eggs, and embryos have been routinely cryopreserved for long-term banking in a reversible fashion for decades.

Breakthroughs in ice blockers, cryoprotectants and vitrification have made it possible to preserve arteries, veins, heart valves, tracheas, cartilage, corneas, organ slices and more in recent years.

Feasibility demonstrated by progress with rat hearts, pig and rodent livers, sheep ovaries and pig uteri, for instance, as well as in the groundbreaking cryopreservation and successful transplantation of a rabbit kidney.

A TALE OF TWO KIDNEYS

-140°C

STRAIGHT FROZEN  VITRIFIED
GROUND-BREAKING, SUCCESSFUL TRANSPLANT OF CRYOPRESERVED RABBIT KIDNEY published by Dr Gregory M Fahy, Dr Brian Wowk, et al, at 21st Century Medicine in 2009
Starting from a low base, understanding of cryopreservation has improved significantly.
Scientists with relevant cryobiology expertise exist around the world.

**Academic Institutions**

Examples: Berkley, Carnegie Mellon, Harvard, University of Tennessee, MIT, University of Minnesota, Villanova University, Arizona State University, US Department of Agriculture’s ARS Laboratory and St. Luke’s Hospital (St Louis)

**Private Sector Labs**

Examples: Cell & Tissue Systems, 21st Century Medicine, Cook General BioTechnology and Innovative Biological Preservation Technologies Corporation

**International**

Examples: University of Liverpool, University College London, Fertilesafe (Core Dynamics) - Advanced Cryopreservation Technologies, University of Seville, University of Groningen, and the UNESCO Chair in Cryobiology
THE CHALLENGE CAN BE BROKEN DOWN INTO A FEW SOLVABLE “ENGINEERING PROBLEMS”

1. EXCESSIVE ICE FORMATION
   A. TOO MUCH ICE NUCLEATION
   B. TOO RAPID ICE GROWTH/CRYSTALLIZATION (DURING COOL-DOWN, BUT PRIMARILY DURING REWARMING)

2. ABOVE THRESHOLD LEVEL OF CRYOPROTECTANT TOXICITY

3. TOO EXTREME MECHANICAL / THERMO DYNAMIC STRESS

4. POTENTIAL FOR TOO MUCH CHILLING INJURY

5. UNACCEPTABLE LEVEL OF ISCHEMIC INJURY

6. ACCEPTABLE REVIVAL PROTOCOL
TOOLS AND UNDERSTANDING FROM OTHER RAPIDLY ACCELERATING DOMAINS COULD HELP CREATE NEEDED BREAKTHROUGHS

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**Metabolomics, Proteomics and Genomics**
- to better understand and find ways to intervene with chilling injury, osmotic shock and toxic reactions to cryoprotectants

**High throughput screening and computational and conceptual chemistry**
- and methods to discover more effective cryoprotectant cocktails

**Powerful computer simulations**
- to better understand and address ice nucleation, ice growth, vitrification and de-vitrification processes

**Gas persufflation**
- to accelerate cooling, warming and avoid fracturing

**Oscillating radio frequency / micro waves / electromagnetism and / or magnetic nano-particles**
- to accelerate rewarming protocols and avoid de-vitrification processes

**Mechanical engineering and material science**
- to better re-understand and avoid fracturing

**Civilian and military trauma and resuscitation medicine and hypothermic surgery**
- to minimize ischemic injury and optimize revival

**Stem cell science, regenerative medicine**
- and expertise in key metabolites, enzymes and certain amino acids to prepare and harden cells ahead of potential damage and optimize healing of any that occurs

**Graft preconditioning**
- to enhance organ cryoprotectant tolerance, cryopreservation and thawing performance

**Hyperbaric pressure**
- to accelerate cooling and re-warming protocols

And many other domains such as

**Biochemistry, Molecular Biology, Electron Microscopy and Scanning Sciences, Automation and General Engineering and Surgeon Skill**
In 2013, cutting-edge research on “RADIOFREQUENCY HEATING OF MAGNETIC NANOPARTICLE CRYOPROTECTANT SOLUTIONS” led Dr Michael L Etheridge (then PhD candidate) to win the J.K. Critser Award at the 50th anniversary meeting of the Society for Cryobiology.

The work was an American-Chinese collaboration that included Prof John C Bischof and Drs Yi Xu and Jeunghwan Choi.
**THE HOW**

**THE POTENTIAL TO SAVE MILLIONS OF LIVES PROVIDES THE INSPIRATION AROUND WHICH TO RALLY SUPPORTERS**

**GRAND CHALLENGES SUMMIT**
Annually bringing the world’s leading cryobiologists together with experts from other fields to discuss challenges, share information and insights, debate solutions, and provide input for a research roadmap.

**GLOBAL ALLIANCE**
Channelling the interest and power of the world’s leading transplant and research organisations to accelerate support and subsequent breakthroughs in organ banking, engineering and generation.

**THE POWER OF PRIZES**
Prizes attract new resources, talent, and approaches. They generate significant public interest. Well structured prizes have often led to significant breakthroughs and the birth of new industries.

**MOTIVATED ECOSYSTEM OF SUPPORT**
A network of philanthropists, foundations, angel investors, venture capitalists, incubators and government backers with an interest in supporting research and teams.

Tremendous global market potential provides strong incentives which, once unleashed, should give rise to a vital new industry that perfects long-term organ preservation.
GRAND CHALLENGES SUMMIT

CROSS BETWEEN A MINI APOLLO PROGRAM, GORDON CONFERENCE AND VISIONEERING SUMMIT

WORLD’S LEADING CRYOBIOLIGISTS

TOP EXPERTS FROM OTHER DOMAINS - E.G. ACROSS INDUSTRY, BIOTECH, TECH, MEDICINE, ACADEMIA AND STAKEHOLDERS

ESSAY REQUESTS FROM TARGETED CRYOBIOLIGIST-OTHER DOMAIN EXPERT DUOS (+ ESSAYS ON THE NEED AND MARKET POTENTIAL)

YOUNG INVESTIGATOR IDEATION COMPETITION AND HACKATHON

JOURNAL PUBLICATION OF ABSTRACTS

BOOK PUBLICATION OF PROCEEDINGS, SYNTHESIS OF THE VISIONEERING AND RESEARCH ROADMAP IDEAS

PROMISE TO FUND TOP HIGH IMPACT RESEARCH PROPOSALS

STAKEHOLDER SPEECHES (THINK AMERICAN HEART ASSOCIATION, GERMAN CANCER SOCIETY, ETC)
Incentive prizes are phenomenal at raising the global visibility and prestige of an undervalued problem and the teams tackling it.

**VALUE OF AN INCENTIVE PRIZE**

**LEVERAGE**

Prizes drive new capital to a field. When well structured, they stimulate 5 - 20X their worth from funders backing teams.

**ATTRACTION**

Prizes attract new talent with novel ideas, multidisciplinary solutions, and significantly greater public interest.

**EFFICIENCY**

You only pay for a win. This provides unparalleled efficiency for funders – more so than research centers or grants.
In 1795, Napoleon offered a prize for a practical method of preserving food for his troops. In response, Appert developed glass jar preservation. We suffered famine, malnutrition, and disease for 6,000 years before this technique was developed.

The $25K Orteig Prize catalyzed Charles Lindbergh’s first flight from New York to Paris in 1927. This was the birth of the global aviation industry that has facilitated globalization and so much more for our current way of living.

The $10M Ansari XPRIZE motivated SpaceShipOne to develop the first re-usable manned spacecraft. NASA now relies on such private craft to send astronauts to space and for launching satellites and other private sector initiatives are flourishing.
A MULTI-MILLION DOLLAR, GLOBAL PRIZE FOR DEMONSTRATING THE LONG-TERM STORAGE OF A VITAL ORGAN AND SUBSEQUENT TRANSPLANTATION INTO A HUMAN OR HUMAN-SIZED MAMMAL, WITH POST-TRANSPLANT FUNCTION AND SURVIVAL

Note: Preliminary definition. Precise prize rules and definitions to be decided after further discussion with scientific advisors, other stakeholders and broader public.
WHY A PRIZE WOULD BE POWERFUL IN THIS INSTANCE

WHY THE PRIZE CHALLENGE BREAKTHROUGH LIKELY WILL BE ACHIEVED

- It is possible and enough people believe so
- Few people are focused on problem, but many people have relevant knowhow and could
- Forgotten field, with few resources ever deployed to it
- Interdisciplinary approaches seem promising, but very little such collaboration has ever occurred
- Breakthrough would solve a huge public need
- Challenge makes for an interesting media story

WHY A SUCCESSFUL PRIZE SHOULD GIVE BIRTH TO A NEW VITAL INDUSTRY THAT PERFECTS THE PROCESSES

- Global market potential is significant
- New breakthroughs would totally dominate and disrupt current approaches
- Strong stakeholder support and customer demand
- Regulatory barriers are manageable
- More teams/researchers in the field will exist and have experience in the field than otherwise
- Healthy balance between competition and collaboration as different teams/researchers focus on different organs and multiple approaches
The Institute of Competition Sciences is co-leading the prize development process. The partner working with us has previous experience from XPRIZE and NASA’s Centennial Challenges.
MOTIVATED ECOSYSTEM
OF INTERESTED PARTIES

INDUSTRY & BIOTECH

VENTURE CAPITALISTS

ANGEL INVESTORS

GOVERNMENT AGENCIES

FOUNDATIONS

INCUBATORS

PHILANTROPISTS
AN INTERDISCIPLINARY TEAM THAT MET AT SINGULARITY U AT NASA

SEBASTIAN (MBA, PhD)
PRESIDENT AND CEO
Seb works at the world leading hedge fund and has previous experience from Bain and Goldman Sachs. He has a PhD in Economics (conducted at SSE, Harvard and MIT) and an MBA from Harvard where he was named a Baker Scholar. He served two terms as President of the National Youth Council of Sweden e.g. directly lobbying the Prime-Minister and UN Secretary General.

ALEXANDER (BSc, MD cand.)
CO-CHIEF MEDICAL OFFICER
Sebastian is co-founder of Revolution Labs and was the founder of Gruppi. He was named one of the ‘Top 25 Web Entrepreneurs’ by Internetworld and nominated ‘Young Entrepreneur of the Year’ by the Founder’s Alliance. Seb has a Masters in Engineering Physics from Royal Institute of Technology and studied at SSE and Singularity University.

ZAK (MD)
CHIEF OPERATING OFFICER
Zak is a physician, entrepreneur and accomplished pianist. He has experience from the World Health Organization, the United Nations and the UNESCO. His MD degree is from the University of Oran and he completed medical rotations in Cardiac surgery and Interventional neuroradiology at Harvard Medical School and Oxford University respectively.

JESSE (AB)
Boris is currently a last year medical intern at the leading University Clinic of Munich, Germany. His research focuses on human stem cells and their capacity for musculoskeletal regeneration. He is also involved with IPOKRaTes, a non-profit organization that strives to provide the best possible education in the field of biomedical sciences in the form of seminars, which are held by most distinguished experts in their field.

ELI (MSC)
Eli is the CEO of Walkmore, a big data analytics startup at the intersection of the health care and consumer finance sectors. Previously, Eli helped build regional management consulting firm Sense Consulting. Eli often serves as a subject matter expert in the field of innovation for the European Commission.

VALENTINA (BSc, MSc)
In conjunction to working as an executive at consulting company PwC, Valentina was a business developer of a biomedical startup. She previously worked with the nanomedicine team of the Methodist Hospital Research Institute in Houston, focusing on technology transfer & VC funding activities. She’s authored a peer-reviewed scientific paper and was mentioned as a young woman entrepreneur in national newspapers.

ANDREW (BSc, MD cand.)
CO-CHIEF MEDICAL OFFICER
Andrew is a co-founder of medical device startup AugMI Labs, an M.D. candidate at Harvard Medical School, and a medical informatics researcher at Mass. Gen. Hospital. He studied mechanical engineering at MIT, where he researched robotic prostheses and played varsity soccer.

JESSE (AB)
Jesse is on the investment team for Columbia University’s Endowment, and came to Columbia from Bridgewater Associates. He left from Harvard Law School to Bridgewater, and graduated magna cum laude from Columbia College. Jesse is active in the Columbia community, serving on the board of its umbrella service organization, Community Impact, and is also active with his local Community Board.

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APPENDIX I:
ORGAN PRESERVATION INSTITUTE
Annualy bringing the world’s leading cryobiologists together with experts from other fields to discuss challenges, share information and insights, debate solutions, and provide input for a research roadmap. On a bi-annual basis, gathering leading cryobiologists and other domain experts, for focused workshops on specific challenges and solutions (see a few slides above for examples of promising domains).

Requesting research proposals and funding high-impact projects (even more speculative ones) that can help further understanding, or develop new methods. Primary aim of leading to radical breakthroughs. Using our team and network to conduct outreach and educate key grant-making institutions; Providing support and leverage to grant applicants (statistics, arguments, scientific feedback, etc).

...towards the reversible long-term preservation of complex tissue systems within the next 5-8 years.
APPENDIX II:
MORE ON NEW ORGAN AND
THE METHUSELAH FOUNDATION
Prizes and partnerships advancing the regeneration, preservation, and engineering of our vital organs to address organ disease and the global organ shortage, starting with the liver.

New Organ is an initiative of the Methuselah Foundation, a charity dedicated to advancing and celebrating regenerative technologies.

- Over $4 million in funding for rejuvenation biotech research
- Critical early-stage funding for Organovo (NYSE: ONVO)
- The Mouse Prize, the first large prize for rejuvenation research
- Funding that enabled Silverstone to do kidney matching online
APPENDIX III: ORGAN TRANSPLANTATION HAS COME A LONG WAY
Organ transplantation has come a long way.

A long time ago, Ancient Chinese and Romans dreamt of transplants and attempted them, but with little success.

1901 First serious attempts to transplant kidneys in dogs, pigs, goats, and calves. Failed due to lack of understanding.

1912 Nobel Prize to Carrel for work on vascular suture and the transplantation of blood vessels and organs.

1933 First real attempt to transplant a human kidney. Failed.

1954 First successful major organ transplant in human (a kidney from twin; no adverse immune response).

1960 Nobel Prize to Sir Macfarlane Burnet and Medawar for discovery that body’s rejection of foreign tissue was an immune response.

1962 Tissue typing and immunosuppression with drugs used for the first time in a human kidney transplant.

1966 First successful pancreas transplant.

1967 First successful liver transplant.

1968/69 Breakthroughs by Belzer and Collins in short-term organ preservation allow organs to be transported short distances.

1970s “Fearless surgeons and physicians along with brave patients began to experiment with organ transplantation and immunosuppression.”*

- Our understanding of immunosuppression was poor, post-transplant mortality rates were high, and the regular transplantation of complex organs took place at only four hospitals in the world.*

1984 The FDA approves a drug based on an immunosuppressive fungal metabolite allowing pioneers of transplantation to rapidly move forward. The survival rates for kidney and heart grafts sky-rocketed.

mid-60s “Fearless surgeons and physicians along with brave patients began to experiment with organ transplantation and immunosuppression.”*

- 1966: First successful pancreas transplant
- 1967: First successful liver transplant

1970s “Heart transplantation, which had started with a worldwide flurry... quickly slowed as the patients succumbed. By the late 1970s, few were attempting to do the operation.”*

1986 First successful double-lung transplant.

1988 First successful hand transplant.

1990 Organ Transplantation “accepted as mainstream medicine”; Nobel Prize to Murray and Thomas for organ transplantation in treatment of human disease.

2005 First successful ovarian transplant.

2008 First successful complete full double arm transplant.

20?? Routine, on demand availability of banked replacement organs that are tissue-engineered.

First successful hand transplant.

First successful ovarian transplant.

First successful pancreas transplant.

Public aware of potential of organ transplantation after first successful human heart transplant.

1968/69: Breakthroughs by Belzer and Collins in short-term organ preservation allow organs to be transported short distances.

mid-80s “Transplant surgeons were seen as daredevils working at the fringe of science.”*

* = from Articles from Proceedings at Baylor University Medical Center. 2004, Other Sources, Organdonor.gov; National Health Service of UK (http://www.nhs.uk/Tools/Pages/transplant.aspx)
FOR THE MILLIONS IN NEED
FOR A REAL SOLUTION

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