Hello All,

CI continues to do well and exceed expectations on many fronts. We have 1,525 Members and 165 patients and are growing fast. We are quickly filling our current building and have begun expanding within the local CI area industrial park as well as making continued improvements at CI West. Interest and speculation on the location of CI West exceeded expectations and created some entertaining conversations and guesses among our members. However, the important takeaway message here is that CI has demonstrated the ability to adapt and grow on short notice, within budget as predicted by earlier business forecasts. As our membership and patient storage load grows, so does our financial base and resources to address this growth. Many people find it hard to believe that we can operate as efficiently as we do at CI for what we charge. The recipe for our success is simple. We do not spend more than we take in and we stick to our core mission: Providing the best chance to save as many lives as possible at the most affordable prices.

Recently CI fitted our Michigan facility with additional fixed insulated lines to transfer liquid nitrogen to all areas of the patient bay with efficiency and safety in mind. We will be fitting the 3rd and 4th rows of cryo-stats with a loading walkway as well. This should all be completed before the next AGM in September.

Outreach efforts and training our members about the benefits of standby continues. I am pleased to note that many members are becoming more proactive in setting up local standby with family and friends or local funeral directors. I continue to strongly believe there is no other area in cryonics that demands more focused attention than proper Standby. This is the lowest hanging fruit on the tree that can make the greatest difference in whether you get a good suspension or not. We have a great example of a well-planned and executed local standby effort in this very issue that really drives that point home. Please check out the story, and remember that your Standby planning efforts can make a world of difference. So keep up the good work, everyone!

I am often asked a simple question by the media and non-cryonicists alike. The question is “how do you predict that we will be able to revive people from suspension?”

That is a tough but fair question that many people both inside and outside of cryonics have been asking since this all started. However, since I don’t think anyone can really predict the future, myself included, I hesitate to answer. But at the same time it begs the question of what do I, as the President of the world’s largest cryonics organization, really believe?

Certainly I have some optimistic predictions, or at least high hopes, for the potential of achieving successful revival techniques in the future. When I first became interested in cryonics I had no idea how patients could be revived. I simply reasoned that cryonics had to be a better option than the self-destructive traditions of burial or cremation. I have always been optimistic...
about the future and see our technological advances as almost limitless and able to solve any problem if we really set our minds to it.

Death is probably mankind’s most eternal problem. If we put enough time and effort into studying and understanding the aging process, fatal diseases, and even death itself, Cryonics can buy us the time to find solutions to even the most seemingly insurmountable problems. It is medical time travel - our ambulance to a future hospital.

But what that hospital might be was always a giant question mark to me until years ago when I stumbled across Eric Drexler’s book “Engines of Creation.” For those of you who aren’t familiar with it, it’s a fascinating exploration of the concept of molecular nanotechnology. The fundamental message is how we might reverse-engineer living systems themselves to solve many of the world’s problems.

The reason we can’t do this today is simply because these systems are just too small to see and manipulate with our current technology. A wavelength of light is often several orders larger than the molecular machinery that builds the fascinating systems of life. However, that began to change in the 1980s with the advent of scanning tunneling microscopes that could see and manipulate matter on the nanoscale. The sheer complexity of these systems is almost mind-boggling, but through recent breakthroughs in AI and pattern recognition we are learning to hack what evolution has taken billions of years to figure out. We are learning to hack life itself.

It turns out that the difference between disease and health is basically just the particular arrangement of our molecules. Whether we are young or old, sick or healthy, suspended in liquid nitrogen or alive and talking has to do with how your atoms are arranged and the function of your molecular repair systems that move these atoms from one place to another.

All the excitement in Stem Cell tissue regeneration is really just a hack into the beginning processes of life. It turns out that your cells all have a complete blueprint for every other cell in your body. This master blueprint can be switched on to trick an older cell into becoming a brand new, healthy young stem cell. This has been proven and this is with today’s current technology!

In my estimation, this is probably how we will start to be able to repair and rejuvenate cryonics patients who are in suspension now. All we need is one cell out of a trillion to give up its blueprint for repair or replacement of all the rest of the cells in a body. This is how our body’s repair mechanisms work today, but unfortunately, they are insufficient to stave off aging. But there is also nothing in the laws of physics or biology that says we can’t turn up the speed and efficiency of these repair mechanisms or reverse engineer them to build even more powerful repair systems. Potentially, we could even create repair systems that can overcome aging and even death, which in these terms can be seen as an organism simply being damaged beyond its ability to repair itself. With a strong enough repair mechanism, wouldn’t an organism be capable of a greatly extended or even indefinite lifespan?

Cryonics to some people sounds too much like the mythical Fountain of Youth or a scam elixir. There seems to be no process in nature that lets animals live indefinitely. This is what many people, myself included, thought until I learned about germ line cells and stem cell generation where old cells generate brand new ones.

The proof of this is all around us every time someone has children - they are resetting the clock on a few cells whether those are sperm or eggs cells and creating brand new, infant cells from old ones. Mother Nature already has programming in our bodies to “reset the clock” and the proof is in the basic example of reproduction that all life follows in one way or another.
Now it’s up to us to figure out just how Mother Nature does what she does. This is no easy task and it is why we are not reviving people now or curing aging, but I don’t think anyone can plausibly argue it is impossible when it is literally happening every single day.

To me, the argument against this is as if a critic of Davinci were arguing against heavier-than-air flight while ignoring the heavier-than-air birds flying in the sky above them.

It would take some time and other inventions, but the Wright Brothers showed us that they could, in a crude way, duplicate what Mother Nature had already proven was possible and fly. Not naturally, as birds do, but through our remarkable ability to innovate and create tools and devices to mimic, and often surpass nature.

No bird flies at supersonic speeds or with sufficient velocity to travel into space. But in the span of a little over a century, mankind not only achieved flight, but flight capabilities far beyond those of our original inspiration from nature.

In this way cryonics revival has already been proven by nature. It is our monumental task, however, to figure out exactly how nature does what she does, replicate those processes ourselves and improve on them to the point where Cryonics Revival becomes a reality.

Decoding the unbelievably complex molecular and biological systems of nature is certainly a major challenge. But the encouraging news is that we have already developed systems and techniques that are capable of taking significant steps forward and those systems will only get better as time goes on.

I suspect we may need the help of advanced AI as well as molecular nanotechnology to unlock the secrets of hyper-advanced biological repair. Perhaps we will use some form of CRISPR cas 9 genetic engineering of a virus that repairs us from within. Maybe our future hospital will use very precise 3D bio printers to print up healthy new parts of our bodies using cloned stem cells.

I don’t claim to know any of this for certain, but I do know that for every process we would need to revive a cryonics patient there seems to be an existing process in nature that can do the same job. Moving beyond biology, we can even consider matter itself, atoms, molecules and the like, as well as energy, as proven natural processes that follow laws and behaviors we can discover, copy and ultimately improve upon to turn to our own ends.

Nature has already proven these processes exist and they are just waiting to be reverse-engineered.
Membership Benefits
Why join the Cryonics Institute?

1) A Second Chance at Life
Membership qualifies you to arrange and fund a vitrification (anti-crystallization) perfusion and cooling upon legal death, followed by long-term storage in liquid nitrogen. Instead of certain death, you and your loved ones could have a chance at rejuvenated, healthy physical revival through cryopreservation.

2) Affordable Cryopreservation
The Cryonics Institute (CI) offers full-body cryopreservation for as little as $28,000.

3) Affordable Membership
Become a Lifetime Member for a one-time payment of only $1,250, with no dues to pay. Or join as a Yearly Member with a $75 initiation fee and dues of just $120 per year, payable by check, credit card or PayPal.

4) Lower Prices for Spouses and Children
The cost of a Lifetime Membership for a spouse of a Lifetime Member is half-price and minor children of a Lifetime Member receive membership free of charge.

5) Quality of Treatment
CI employed a Ph.D level cryobiologist to develop CI-VM-1, CI’s vitrification mixture which can help prevent crystalline formation at cryogenic temperatures.

6) Standby Options and Assistance
CI’s use of Locally-Trained Funeral Directors means that our members can get knowledgeable, licensed care. Or members can arrange for professional cryonics standby and transport by subcontracting with Suspended Animation, Inc or International Cryomedicine Experts (I.C.E.) CI also offers Standby Training Materials and Kits for members who choose to perform Local Standby.

7) Affordable Funding Options
Cryopreservation with CI can be funded through life insurance policies issued in the USA or other countries. Prepayment and other options for funding are also available to CI members.

8) Cutting-Edge Cryonics Information
Members receive a free e-subscription to the Cryonics Institute Newsletter, as well as access to our Facebook page, Twitter feed, YouTube channel and an official members-only forum.

9) Helpful, Professional Support
CI’s professional staff is available to answer any questions and address any concerns you may have about CI, your membership or Cryopreservation.

10) Additional Preservation Services
CI offers a sampling kit, shipping and long-term liquid nitrogen storage of tissues and DNA from members, their families or pets for just $98.

11) Support Education and Research
Membership fees help CI to fund important cryonics research and public outreach, education and information programs to advance the science of cryonics.

12) Member Ownership and Control
CI Members are the ultimate authority in the organization and own all CI assets. They elect the Board of Directors, from whom are chosen our officers. CI members also can change the Bylaws of the organization (except for corporate purposes).

The choice is clear: Irreversible physical death, dissolution and decay, or the possibility of a vibrant and joyful renewed life. Don’t you want that chance for yourself, your spouse, parents and children?

To get started, contact us at:
(586) 791-5961 • email: cihq@aol.com
Visit us online at www.cryonics.org
New Liquid Nitrogen Lines Installed at CI Facility

CI recently fitted the facility with additional fixed insulated lines to transfer liquid nitrogen to all areas of the patient bay. The new lines provide greater efficiency and safety for our patients and facility staff.

We will also be fitting the 3rd and 4th rows of cryostats with a loading walkway. The new walkways are expected to be completed before September 2018.
CI experienced significant growth in patients over the last 6 months, receiving and processing eight new patients in that time. Five of those patients were received in the last three months, which is a record number. Kudos to Facility Manager Andy Zawacki and Perfusion Technician Hillary Martenson for their outstanding efforts in preparing and securing these patients in perpetual cryonic storage.

This brings our patient count to 165, which is the largest number of human cryopreservations in the world. Our last two patients were placed in Cryostat HSSV-6-23, which will be placed in the main storage area at the Michigan facility. Our two new cryostats are on standby and will be put into operation when #23 reaches capacity. HSSV-6-23 can hold four additional patients, so we are expecting the new units to be online very soon.

Future plans are to house an additional five cryostats at the current facility, for a total of seven available units with the capacity to accommodate 42 more patients at our Clinton Township Facility. Once those units reach capacity, new patients will be stored at our new CI West facility.

Danish TV station TV 2 News visited CI on Friday, March 16 to record a segment for their popular 7 pm nightly news program. Cryonics Institute Facility Manager Andy Zawacki was interviewed by TV 2 US Correspondent Jesper Steinmetz and Photographer Anders Albjerg, who also captured a number of shots of the facility. The story aired Friday, March 30, and also features an interview with Danish CI Member Morton Weid.

Weid discusses his reasons for joining the Cryonics Institute with journalist Celina Liv Danielsen, saying “I LOVE life. So, I think that this decision only requires a little bit of love for life and then a little bit of adventurous happiness.” When asked if death was not a natural thing people need to accept, Weid replied “Yes, that’s what some say, but when we get terminally sick we ask: Can I please get cured? Can I please have one more week? Suddenly we discover that we like to be alive and we are willing to fight for it. In fact, I’m just securing my life.”
CI Teams Up with Forever Labs to Offer New Stem Cell Preservation Service

CI Members wishing to preserve their stem cells can now receive an exclusive $500 discount on those services, courtesy of an arrangement between Forever Labs and the Cryonics Institute.

CI President Dennis Kowalski, who negotiated the new program on behalf of CI, said "We know that a lot of our members are interested in the potential of cloning and bio-printing as possible avenues to successful resurrection techniques in the future. We also recognize the exciting potential of today’s stem cell research toward those ends, as well as anti-aging and other possible applications.

With those things in mind, I am very happy to introduce this new service to our members. We believe this is a great addition to our current DNA and Tissue Sample Preservation services."

CI Members will receive a $500 discount on Stem Cell Preservation services by using the code CRYONICS. For more information, please see the Forever Labs advertisement on the following page, or email info@foreverlabs.com.
Why Store My Stem Cells?

The number and therapeutic quality of our stem cells diminishes with age.

Storing your stem cells today preserves them for future therapies that combat age-related disease, and perhaps aging itself.

- Anti-aging
- Healthier Life
- Fight Disease
- Quality Time

Like storing your newborn’s umbilical blood stem cells, you can preserve your own stem cells for future treatment of conditions like heart attack, stroke, autoimmune disease, dementia, arthritis, and more.

Forever Labs is also developing therapies with the aim to use your younger stem cells to rejuvenate your older self.

Use code CRYONICS for $500 off.
Get the world’s premier publication on prolonging youth & longevity for one year absolutely FREE!

Packed with the latest medical findings, research results, and innovative treatment protocols, Life Extension Magazine® is the ultimate resource on staying healthy and living longer. Call now and get a one year subscription (12 issues) absolutely FREE ... that’s a whopping $59.88 off the newsstand price! And it’s brought to you by the global leader in the field of preventing age-related disease for over 35 years.

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Life Extension® is the only supplement brand solely dedicated to helping you live a longer, healthier life. Our premium-quality products are based on the latest clinical studies — made with pure, potent ingredients at the same clinically validated dosages used in those studies. Your body deserves the best. Insist on Life Extension.

Don’t just guess what your body needs.
Our expert team of Wellness Specialists can answer your health-related questions every day of the year. And they’ll gladly create a regimen of nutritional supplements, diet, and exercise that’s customized for your needs.

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CI Members as of March 23, 2018

- Total Members: 1,525
- Associated Members: 192
- Patients: 165
- DNA/Tissue: 263
- Pets: 148
- SA: 235

New Members and Countries:
- New Members: 1,882
- New Countries:
  - United States: 1,052
  - Canada: 88
  - Argentina: 1
  - Chile: 1
  - Brazil: 2
  - Mexico: 2
  - Costa Rica: 2
  - Aruba: 2
  - Spain: 15
  - France: 17
  - Ireland: 3
  - British Isles: 2
  - Germany: 53
  - Portugal: 4
  - Belgium: 10
  - Netherlands: 14
  - Denmark: 3
  - Norway: 8
  - Switzerland: 2
  - Spain: 15
  - Italy: 11
  - Croatia: 2
  - Greece: 13
  - Russia: 2
  - Austria: 3
  - Hungary: 1
  - Romania: 3
  - Poland: 8
  - Czech Republic: 3
  - Liechtenstein: 1
  - Turkey: 1
  - Israel: 1
  - Japan: 4
  - Hong Kong: 2
  - Singapore: 3
  - Australia: 61
  - New Zealand: 1
  - Sweden: 10
  - Lithuania: 1
  - France: 17
  - Sweden: 10
  - Lithuania: 1
  - Portugal: 4
  - Spain: 15
  - Finland: 1
  - Nigeria: 1
  - Malaysia: 1
  - Thailand: 1
  - United Arab Emirates: 1

Global Presence:
- Argentina: 1 uni
- Aruba: 2
- Australia: 61
- Austria: 3
- Bahrain: 1
- Belgium: 10
- Brazil: 2
- British Isles: 2
- Canada: 88
- Chile: 1
- China: 3
- Costa Rica: 2
- Croatia: 2
- Czech Republic: 3
- Denmark: 3
- Egypt: 1
- France: 17
- Germany: 53
- Greece: 13
- Hungary: 1
- Ireland: 3
- Israel: 1
- Italy: 11
- Japan: 4
- Liechtenstein: 1
- Lithuania: 1
- Luxembourg: 0
- Malta: 1
- Mexico: 2
- Netherlands: 14
- New Zealand: 1
- Norway: 8
- Poland: 8
- Portugal: 5
- Putin: 3
- Scotland: 4
- Spain: 15
- Sweden: 10
- Switzerland: 2
- Turkey: 1
- UK: 100
- Ukraine: 1
- United States: 1,052
- Ukraine: 1
- United Arab Emirates: 1
- United Kingdom: 100
- United States: 1,052
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- United States: 1,052
- Vietnam: 1
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Scientists Have Made a Huge Breakthrough In Cryogenics

WRITTEN BY
AUTHOR: June Javelosa
EDITOR: Abby Norman

Cryopreservation is the process of freezing organs and tissues at very low temperatures in order to preserve them. While it sounds simple in theory, only a handful of cells and tissues have survived this method. This is because while science has successfully developed ways to cool organs to the very low temperatures required for preservation, thawing them out has proven far more difficult. As the specimen thaws, it forms ice crystals, which can damage the tissue and render organs unusable.

Right now, the process is only a viable option for small samples, such as sperm or embryos. Previous efforts using slow warming techniques have proven to be effective on samples of that size, but haven’t worked for larger tissue samples, like whole human organs. The inability to safely thaw the tissue has also precluded the theoretical concept of cryogenically preserving entire human bodies, with the intention of reanimating them later. The concept has roots in cryogenic technology, but is actually referred to as "cryonics", and the scientific community generally considers it to be more science fiction than science fact — at least for the time being.

A recent study has made a significant breakthrough which may well begin closing that gap even more. Using a new technique, scientists were able to cryopreserve human and pig samples, then successfully rewarm it without causing any damage to the tissue.

As lead researcher John Bischof from the University of Minnesota notes:

"This is the first time that anyone has been able to scale up to a larger biological system and demonstrate successful, fast, and uniform warming of hundreds of degrees Celsius per minute of preserved tissue without damaging the tissue."

By using nanoparticles to heat the tissues at an equal rate, scientists were able to prevent the formation of those destructive ice crystals. The researchers mixed silica-coated iron oxide nanoparticles in a solution and applied an external magnetic field to generate heat. The process was tested on several human and pig tissue samples, and it showed that nanowarming achieves the same speed of thawing as the use of traditional convection techniques.

PRESERVING ORGANS AND SAVING LIVES: The theoretical application for this discovery would be.....
Neuroscientists devise scheme for mind-uploading centuries in the future

But first, they have to kill you with embalming fluid, inject antifreeze, and keep your brain at -130 degrees C

In a scenario (almost) right out of the show Altered Carbon, two researchers — Robert McIntyre, an MIT graduate, and Gregory M. Fahy, PhD., 21st Century Medicine (21CM) Chief Scientific Officer, have developed a method for scanning a preserved brain’s connectome (the 150 trillion microscopic synaptic connections presumed to encode all of a person’s knowledge).

That data could possibly be used, centuries later, to reconstruct a whole-brain emulation — uploading your mind into a computer or Avatar-style robotic, virtual, or synthetic body, McIntyre and others suggest.

According to MIT Technology Review, McIntyre has formed a startup company called Nectome that has won a large NIH grant for creating “technologies to enable whole-brain nanoscale preservation and imaging.”

McIntyre is also collaborating with Edward Boyden, PhD., a top neuroscientist at MIT and inventor of a new “expansion microscopy” technique (to achieve super-resolution with ordinary confocal microscopes), as KurzweilAI recently reported. The technique also causes brain tissue to swell, making it more accessible.

Preserving brain information patterns, not biological function

Unlike cryonics (freezing people or heads for future revival), the researchers did not intend to revive a pig or pig brain (or human, in the future). Instead, the idea is to develop a bridge to future mind-uploading technology by preserving the information content of the brain, as encoded within the frozen connectome.

The first step in the ASC procedure is to perfuse the brain’s vascular system with the toxic fixative glutaraldehyde (typically used as an embalming fluid but also used by neuroscientists to prepare brain tissue for the highest resolution electron microscopic and immunofluorescent examination). That instantly halts metabolic processes by covalently crosslinking the brain’s proteins in place, leading to death (by contemporary standards). The brain is then quickly stored at -130 degrees C, stopping all further decay.

The method, tested on a pig’s brain, led to 21st Century Medicine (21CM), lead researcher McIntyre, and senior author Fahy winning the $80,000 Large Mammal Brain Preservation Prize offered by the Brain Preservation Foundation (BPF), announced March 13.

To accomplish this, McIntyre’s team scaled up the same procedure they used to previously preserve a rabbit brain, for which they won the BPF’s Small Mammal Prize in February 2016, as KurzweilAI has reported. That research was judged by neuroscientist Ken Hayworth, PhD., President of the Brain Preservation Foundation, and noted connectome researcher Prof. Sebastian Seung, PhD., Princeton Neuroscience Institute.

CAVEATS: However, BRF warns that this single prize-winning laboratory demonstration is.....
Revolutionary technology could radically change cryopreservation of cells and tissues

Everyone knows that freezing things is an imperfect process. Take frozen food, for example - most have experienced those frozen ice crystals that change the texture and taste of their favorite meal.

The medical field experiences a similar problem when freezing cells (stem cells) and tissues, except the result is cellular death and decreased quality.

Two GlycoNet researchers have founded a startup company, PanTHERA CryoSolutions, to commercialize a revolutionary product for the cryopreservation, or freezing, of cells and tissues, resulting in better cell quality for cellular therapies and superior products.

“Cryopreservation is a common strategy, but the technology that was developed to do it is 70 to 80 years old,” explains Dr. Robert Ben (University of Ottawa), who co-founded PanTHERA CryoSolutions with Dr. Jason Acker (University of Alberta & Canadian Blood Services). “With current technology, when you freeze something, you get a large amount of cell death that occurs, so you don’t recover all those cells. In addition, we’re actually adversely affecting the functional capacity of those cells.”

The process that causes the majority of this cellular damage and death is called ice recrystallization. PanTHERA CryoSolutions has discovered a small molecule inhibitor that prevents ice recrystallization - something that none of the current cryoprotectants available on the market can do - making it a unique technology.

“Our technology uses small molecular structures that have the ability to inhibit the ice recrystallization process,” explains Ben. “They actually prevent that damage from occurring, so when we thaw that product, it’s a superior product and it’s also functional.”

“The results have clearly indicated that this ice recrystallization inhibitor technology really works and makes a superior product where we get faster engraftment and increased incidence of engraftment, which is exactly what you want in a clinical setting,” Ben says.

PanTHERA CryoSolutions aims to have a product commercially available in 2018 for a specific therapy, but Ben sees the potential to apply this technology to many areas, including cellular therapies, regenerative medicine, and 3-D bioprinting applications.

“A technology like this can radically change.....
Researchers uncover framework for how stem cells determine where to form replacement structures

by Lisa Girard, Massachusetts Institute of Technology

Researchers at Whitehead Institute have uncovered a framework for regeneration that may explain and predict how stem cells in adult, regenerating tissue determine where to form replacement structures.

In a paper that appeared online March 15 in the journal Science, the researchers describe a model for planarian (flatworm) eye regeneration that is governed by three principles acting in concert, which inform how progenitor cells behave in regeneration. The model invokes positional cues that create a scalable map; self-organization that attracts progenitors to existing structures; and progenitor cells that originate in a diffuse spatial zone, rather than a precise location, allowing flexibility in their path. These principles appear to dictate how progenitor cells decide where to go during regeneration to recreate form and function, and they bring us closer to a systems-level understanding of the process.

From previous work, the researchers knew that stem cells are likely reading out instructions from neighboring tissues to guide their path, and it became clear that the process faces some serious challenges in regeneration. “We realized that positional information has to move; it needs to change during regeneration in order to specify the new missing parts to be regenerated. This revised information can then guide progenitor cells that are choosing to make new structures to differentiate into the correct anatomy at the correct locations,” says the paper’s senior author Peter Reddien, a Whitehead Institute researcher, an MIT professor of biology, and a Howard Hughes Medical Institute (HHMI) investigator. “There is a puzzle that emerges, however. Since positional information shifts after injury during regeneration, there is a mismatch between the positional information pattern and the remaining anatomy pattern. Realizing this mismatch exists was a trigger for our study. We wanted to understand how stem cells making particular tissues decide where to go and differentiate. Is it based on anatomy, or is it based on positional information? And when those two things are not aligned, how do they decide?”

Reddien and his lab have spent over a decade unraveling the mysteries of regeneration using a small flatworm, called the planarian. If a planarian’s head is amputated, or its side is removed, each piece will regenerate an entire animal. In order to understand how progenitors decide where to go in the noisy environment of animal regeneration, the researchers used the planarian eye, a visible organ that is small enough to be removed without serious injury and has the added advantage of having defined progenitor cell molecular markers.

The researchers devised a simple experiment to resolve the question of....
Research Update:
Perfusion Strategies to Reduce Toxicity During Organ Cryopreservation

With support from the Cryonics Institute, cryobiologist Adam Higgins and his research team have been investigating the potential for manipulating the organ perfusion process to reduce toxicity during addition and removal of cryoprotectants (CPAs). This work builds on previous research from the Higgins laboratory demonstrating the potential to reduce toxicity during cryopreservation of cultured endothelial cells by mathematically optimizing the CPA addition and removal process.1 While the research is ongoing, results have been promising and suggest that the toxicity minimization approaches developed for isolated cells can be adapted to organs.

Background and Motivation

Currently human organs used for transplantation are stored on ice, which enables a shelf life of 5 hours for heart and lung to about 24 hours for kidney. The ability to extend shelf life by cryopreservation would simplify the logistics of organ transplantation and improve outcomes for patients by enabling more rigorous disease testing, better immunological matching and by providing time to use new methods for inducing immunological tolerance.2 Promising research over the last two decades suggests that organ cryopreservation is feasible, and in one instance a cryopreserved rabbit kidney was shown to sustain life for over a month after transplantation, indicating that the kidney remained viable and functional.3

While these results are promising, it remains challenging to reproduce success after kidney cryopreservation, and less is known about the potential for cryopreserving other vital organs. Damage during organ cryopreservation can be divided into 3 major categories: ice damage, osmotic damage and chemical toxicity. Ice damage can be avoided by vitrifying the sample using high concentrations of CPAs to suppress ice formation. Osmotic damage is typically avoided by introducing and removing CPA slowly. Avoiding CPA toxicity is more challenging. The main strategy is to use the lowest CPA concentration that prevents ice damage. The required CPA concentration is dependent on how fast the sample can be cooled and warmed. For small samples (e.g., oocytes, embryos) very fast cooling and warming is possible and ice damage can be avoided using a relatively low CPA concentration. Outcomes for these small samples have been relatively good. In contrast, organs are much larger, resulting in slower heat transfer rates and necessitating higher CPA concentrations to prevent ice damage. Achieving these relatively high CPA concentrations without excessive toxicity is the major challenge facing cryopreservation of organs.

Recent work in the Higgins laboratory has focused on reducing toxicity during CPA addition and removal. In preliminary studies, cultured endothelial cells were used as a model system to demonstrate the potential for dramatically reducing toxicity using methods designed using a new mathematical optimization approach based on quantitative prediction of CPA toxicity kinetics. The most unique feature of these methods is the use of a hypotonic buffer for preparing CPA solutions, which results in cell swelling during CPA loading.1 This is advantageous because it accelerates CPA loading and enables more CPA to be delivered using a lower concentration. The research team is now working to extend this promising approach to organs.
Results

Initial efforts to extend the toxicity reduction approach to organs have focused on characterizing the response of organs to perfusion with CPA solutions. In particular, two different CPA solutions were compared: a conventional CPA solution prepared in isotonic buffer, and a CPA solution prepared in hypotonic buffer similar to what was used to reduce toxicity in previous studies with endothelial cells. In both cases ethylene glycol was used as the CPA at a concentration of 10% w/v. Pig kidneys were perfused using these CPA solutions and the resulting changes in kidney mass and perfusion resistance were quantified. As shown in Fig. 1A, the use of hypotonic buffer resulted in faster CPA loading, and the whole kidney swelled, increasing in mass by about 5%. This is qualitatively similar to the response observed for isolated cells, suggesting that the toxicity minimization strategies developed recently for isolated cells can be extended to organs. Interestingly, vascular resistance increased dramatically after about two minutes of perfusion with CPA in hypotonic buffer, suggesting that swelling may have impinged blood vessels.

To characterize CPA distribution within the organ the research team partnered with a medical imaging specialist in the College of Veterinary Medicine at Oregon State University to acquire CT images during kidney perfusion. For these experiments, dimethyl sulfoxide (DMSO) was used as the CPA as it has previously been shown to be visible using CT imaging. Initial studies using a range of DMSO concentrations confirmed a linear relationship between CT signal and DMSO concentration. As shown in Fig. 1B, the kidney becomes progressively brighter after perfusion with 15% DMSO in hypotonic buffer, indicating delivery of CPA to both the cortex and medulla. Steady state is achieved at about two minutes and there is no evidence that impingement of blood vessels impairs CPA delivery, despite the substantial increase in vascular resistance. This preliminary result is quite promising, but additional experiments are required to confirm that loading of CPA in hypotonic buffer does not impair delivery of CPA to all regions of the organ.

\[ \text{Fig 1. (A) Change in mass and flow resistance after perfusion of pig kidneys with 10% CPA in either isotonic or hypotonic buffer (n = 3). (B) CT images of a kidney perfused with 15% CPA in hypotonic buffer, and average pixel intensity for the indicated regions of interest in the cortex and medulla.} \]

While the use of hypotonic buffer for CPA loading does not appear to impair delivery of CPA into the organ, there is potential...
for damage to cells as a result of excessive swelling. Damage to isolated cells caused by osmotic swelling has been well studied for various cell types, but less is known about the susceptibility of cells within organs to osmotic damage. The research team has taken some initial steps to investigate osmotic damage during kidney perfusion with hypotonic buffer. For these experiments, the same isotonic and hypotonic buffer solutions were used as above (Fig. 1), but in the absence of CPA. To assess cell damage, the release of lactate dehydrogenase (LDH) into the kidney effluent was quantified using a commercially available LDH assay kit. LDH is an intracellular enzyme that is released when the cell membrane ruptures. Preliminary results suggest that perfusion of kidneys with hypotonic buffer causes no more LDH to be released into the effluent than the isotonic perfusion control. While this result is promising, these experiments must be repeated before any definitive conclusions can be drawn.

**Future Directions**

The results to date indicate that organs and cells exhibit qualitatively similar responses to CPA exposure, highlighting the potential to adapt toxicity minimization strategies that were developed for isolated cells\(^1\) to organs. A key feature of the toxicity-minimized methods developed for isolated cells is to induce cell swelling and faster CPA uptake by using a hypotonic concentration of nonpermeating solute in the CPA loading solution. Perfusion of such a solution through kidneys also results in faster CPA uptake and an overall increase in the mass of the kidney, suggesting that this approach will also help to reduce toxicity for organs. However, perfusion with CPA in hypotonic solution increases vascular resistance, which could lead to non-uniform delivery of CPA into the organ, and the resulting cell swelling could be damaging.

To address these questions, recent experiments have focused on characterizing the uniformity CPA delivery using CT imaging, and examining cell damage due to swelling by quantifying release of LDH into the perfusion effluent. The research team plans to continue this line of research. Additional CT experiments will be performed to enable direct statistical comparison of CPA delivery into different regions of the kidney during perfusion with CPA solutions prepared using either isotonic or hypotonic buffers. Additional replicates of the LDH release experiments will also be performed to allow statistical comparison of LDH release after perfusion with isotonic and hypotonic buffers. Completion of this work will be an important step toward extending the recently published toxicity minimization strategies\(^1\) from cells to organs.

**References**

CI patient #165 was a 59 year old female from Maryland. The patient was a CI member at the time of her death.

The patient died at home, under hospice care, and was pronounced at 1:45 am on March 14, 2018. After pronouncement took place, her son and husband transferred her into a body bag and began the cool down with ice. They were well prepared with the basic standby kit and Zeigler case that they purchased from CI. An EMT assisted them in carrying her to the Ziegler case, which also serves as a portable ice bath, where they administered Heparin and Maalox, performed chest compressions, and covered her entire body with ice. The funeral home chosen by the family came prepared with extra ice to compensate for ice used up during the initial cool down. They then transferred her to the funeral home and worked quickly to obtain the paperwork needed for her transportation.

The patient arrived at the CI facility at 10:30 pm, approximately 21 hours after death. The patient was in the Ziegler case with a generous amount of ice and the Ziegler case was well insulated with both polystyrene insulation and fiberglass wool insulation. The nasal temperature upon her arrival was -1.2c, though there were no signs of surface freezing.

Hillary Martenson performed the perfusion. The perfusion was completed at 12:20 am. During the perfusion there were 3 liters of 10% Eg solution and 6 liters of 30% Eg solution used, and 25 liters of 70% VM1 solutions used. The final refractive index of the effluents exiting the right jugular vein was 1.4216. The final refractive index of the effluents exiting the left jugular vein was 1.4216. The average perfusion pressure was held at 115 mm and metal cannulas were used. Flow rate started at 1.69 liters per minute and was reduced to 1.46 liters per minute by the end of the perfusion. The nasal temperature was -9c at the end of the perfusion.

There were no blood clots noted during the perfusion and there was good flow from both of the jugular veins. The entire body was perfused and dehydration along with bronzing of the skin was visible through the trunk, as well as in
the arms and legs. Significant dehydration of the head and face was noted along with a bronzing of the skin. No edema was noted in the patient’s body or head, nor was any edema noted in the brain when observed through the burr hole in the patient’s skull. The perfusion of both the head and body was very successful. It was evident that the knowledge and effort put into the standby and stabilization done by the son and husband played a big role in the success of the perfusion.

The patient was then transferred to the computer controlled cooling chamber to cool to liquid nitrogen temperature. The human vitrification program was selected and the time needed to cool the patient to liquid nitrogen temperature was five days and 11 hours. The patient was then placed in a cryostat for long-term cryonic storage.

The following is the detailed standby report received from the patient’s son, Matthew Deutsch:

**Standby Report**

*In 2006 my mother, Linda Deutsch, was treated for breast cancer. Ten years later, the cancer remerged and metastasized into the spine. At first it was responsive to radiation, however, in January of this year it became cerebrospinal-fluid-mobile and metastasized into her brain ventricles and liver. She was given months to live.*

Seven years earlier, I was signing my dogs up with the Cryonics Institute. Upon my advice my mother purchased a yearly CI membership. We never thought it would actually be used, and for years I had paid no mind to the notarized years-lapsed contract that they had on file. Because my father is a secular man and wishes the best for his wife and family, and because my sister has my mother’s grandchild on the way which she would not live to see, he agreed to fund her cryopreservation out-of-pocket with stipulations on standby, stabilization, and transportation expense.

In the final weeks, I scrambled to put her standby protocol, supplies, and funeral home transportation in place. My good buddy Nicholas Reef Van Der Mullen and his wife, Nicole Rodriguez, made arrangements to fly here the night of the 15th of March, a few days before my mother’s projected expiration, however, she took futile chemotherapy pills out of tenacity which ended up robbing her of those few days. I had been exercising a loose personal standby leading up to Nick and Nicole’s arrival with the assistance of two under-mattress SIDS alarms, which detect breathing through minute vibrations.

Early in the day on the 13th, hospice had delivered a special adjustable hospital bed with an electric pneumatic mattress that uses a continuous pump to adjust firmness. Immediately, I identified the problem of false positives on the SIDS alarms. I arranged a next-day replacement with a regular mattress. Fortunately, I bought a third clip-on SIDS alarm as an additional precaution and this is the only one she had for the night.

That night, at 1:20am, I was in the room with my mother who was sitting upright and drinking Pedialyte to recover from severe bile reflux. Her oximetry was erratic and blood pressure low, so hydration and initiation of supportive oxygen seemed prudent. After seeming to stabilize, she suddenly fell sideways onto the bed and coughed up a large mouthful of bile with her eyes rolling back. I called the nurse and four minutes later, I hear a beep coming from her waistband. It was the 15-second respiratory failure alarm. Within 15 seconds of the alarm going off, I confirmed cardiac arrest, got her on the floor, and began chest compressions. My father ran me the kit so I could switch to the ResQ Assist for compressions.

I tried to ventilate with the bag valve mask, but the mask piece wasn’t in reach, so I had my father give a single breath from his mouth, removed the tongue depressor, looked at the oximeter to see it at 94%, and decided compressions were more important. All ventilation after this point was incidental of just chest compressions.

Twenty minutes into compressions, we had our pronounce-ment. I moved my mother into the body bag and placed ten pounds of ice over and around the head and neck. I performed a few more compressions to reset ischemia,
then a paramedic assisted my father and I in carrying her downstairs, into the garage, and into the Zeigler case. While my father continued compressions, I quickly moved the remaining 80 pounds of ice into the body bag in the Zeigler. It was originally going to stock another forty pounds later that day per the original plan. I took over compressions to closely control initial cooldown and ice position over key vascular points such as face, neck, armpits, and groin. After a few degrees below normothermic according to the nasopharynx thermocouple, I had my father take over compressions while I attempted to place the cardiac needle. I hit the sternum three times. I shelved it and went for the interosseous drill, which I had ordered from CI individually by request in addition to sodium citrate as a backup nonthrombolytic anticoagulant. I had only studied placement of the drill just a few hours prior; two fingers proximal to the tibial protuberance. I placed my fingers so, positioned the drill at the targeted concavity, and gave it my best smooth firm perpendicular push and twist. It was in, it was level with the skin. I unscrewed the initial puncture needle from the center and what was left was a perfect port exactly like in the YouTube EMT training videos or eXisenZ. Because the reservoir being accessed is much smaller than a heart atrium, I took the precautions of not priming through and using a J-Loop and not injecting without circulation. Fortunately I was able to skip the filter since there are many protective lymphs between the injection site and the brain, unlike the heart.

One by one, I set up the syringes and purged the air pockets, then got back to compressions. My father smoothly depressed the plungers as I compressed, and this repeated until she received, in order, 40,000u of sodium heparin, 20mL of sodium citrate solution, and a saline flush. I removed the IO port, leaving a perfect clean target-shaped indentation. After more circulation, I inserted a gastrointestinal tube through the nose and it slid down to the stomach with no resistance. I pushed 12mL of Maalox and removed the tube.

I continued compressions until I got tired, then took breaks which I used to take temperature readings and prepare shipping ice for when the initial cooldown depletes what was purchased, going back immediately on new wind. I inflated the shampoo basin and placed it on the legs. With all of the ice packs from garage and kitchen freezers, there was enough to fully pack the head, torso, and abdomen without risk of shifting. Fortunately, the funeral home who I had just gone to for help earlier in the day and was supposed to meet with that morning prepared for the worst and had the needed tens of pounds of extra shipping ice on-hand and I was able to remove the ice packs and shampoo basin.

I continued compressions and saved the last of my strength to perform a few minutes immediately before pickup to reset ischemia at 17C°. I emailed my mother's brain imaging data to CI three to four hours prior in case a perfusion issue comes up related to cancer-induced vascular changes. The following morning, I receive an update saying that perfusion was not only successful, but outstanding in quality. My mother's connectome was safe, she survived information theoretic death against all odds, and my job was done. My arms hurt a lot but it was all worth the effort and planning.

The perfusion was very successful in both the head and body. Andy and I are were very pleased with the results. It was evident that the standby and stabilization done by Matthew Deutsch and his father played a major role in the success of the perfusion. It was also very helpful that the funeral home worked so quickly to get her paperwork for transportation. They were contacted ahead of time and were provided with CI's Funeral Director Guidelines, so they knew exactly what to do. This case was a perfect example of how critical it is to prepare in advance. Matthew purchased a basic standby kit and insulated Ziegler from us and worked very hard to find a cooperating funeral home. It was a great team effort and we hope Matthew can find some comfort in knowing what a great job he did to care for his mother.

Just one day before we received Matthew's mother, we received a local patient whose family was also very involved and well prepared with standby items from CI. That perfusion also went very well in both the head and body. Hopefully these excellent results will encourage other members to be proactive because these cases are the proof that preparation pays off.

-Hillary Martenson - CI Perfusion Technician
RAADfest 2018: Sept 20-23rd | San Diego, CA

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Dr. Neil Riordan
MediStem Panama, CEO

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- Student (no meals): $397
- Young Adult (13-18): $200
- Children (5-12): $100

Register Now!
The German Society for Applied Biostasis (DGAB)

Germany, Austria, Switzerland

by Dirk Nemitz - DGAB Board Chairman

Introduction

The German Society for applied Biostasis (in German: Deutsche Gesellschaft für angewandte Biostase or short DGAB) was founded in 2006 in Kassel, Germany. At that point, the founders were hesitant to use the term “cryonics” or in German “Kryonik” in the name of the organization. It was perceived as more respectable and reputable to use a term with stronger connotations to the scientific biomedical field, and so the term “applied biostasis” was used as a description of cryonics. While almost all of our efforts so far have focused on cryonics, to some degree this term is broader and would also allow us to include other preservation methods in our focus areas as they arise in practical ways, e.g. chemical preservation or medium-temperature storage. We also cover new findings in other related areas, which may have an impact on the practical application of cryonics, e.g. gerontology, biotechnology, nanotechnology or cryobiology.

The DGAB is registered in Germany as a not-for-profit organization with special tax-exempt status. It is also allowed to receive donations and to issue corresponding tax-deductible donation receipts. The German fiscal authorities grant this tax-exempt status to non-profits under special requirements, including regular audits of earnings and expendi-
tures, and whether all spending is made within the framework of our organization’s constitution. The DGAB board consists of four members, which are elected by the membership for two years. At the end of 2017 the DGAB had 118 members, including a number of members from Austria, Switzerland and other countries. In the following article, we briefly describe the range of activities which kept us busy over the past nearly twelve years.

Support the development of field cryopreservation

At this point, there is no long-term cryonics storage facility in Germany, or in any neighboring country. Thus, the third crucial pillar of our work is therefore to provide a platform for cryonicists who have contracts with a cryonics storage provider in the United States or other countries, and allow them to organize all the additional steps that would be required for a successful and high-quality cryopreservation. The DGAB also directly supports related activities which lead to a higher quality of cryopreservation. The DGAB is dedicated to make cryonics work for as many people as possible, regardless of the cryonics storage provider selected. Since this is a critical field, and since we have worked out quite a sophisticated system, a separate article will be provided on this matter in a future issue of this magazine.

Promoting research and science related to cryonics

There are many ways to approach a field like cryonics, which shakes some of our deepest hold core beliefs (e.g. that taxes and death are the only certain things in life). The DGAB decided to build very closely on a scientific approach, emphasizing the direction of science and technology while avoiding overly emotional public relations or dubious exaggerations. We have also undertaken a number of activities to promote cryonics research.

Most importantly, the DGAB has organized two scientific conferences on the topic of cryonics: The first took place in Goslar in 2010 on the topic of “Applied Cryobiology”, the second in Dresden in 2014. The conference language was English, which allowed to have great presentations from a number of world-class experts in the field of cryonics, including Ben Best, Aubrey de Grey, Max More and Aschwin de Wolf. Most of the talks of the 2nd symposium as well as some of the talks of the 1st symposium remain available on our Youtube channel. Conference proceedings for the first symposium have already been published under the title “Applied Cryobiology - Human Biostasis” (available for example on Amazon). Conference proceedings for the second symposium are currently undergoing final polishing before publication.

The DGAB also further promotes scientific research in the field of cryonics, within our limited possibilities. One example is a financial contribution we made for research on the mechanisms of cryoprotectant toxicity, undertaken by Dr. João Pedro de Magalhaes from the University of Liverpool. On invitation, we have also provided a lecture to students of the University of Bonn, Germany, within a series of special lectures on death-related ethics, during which also Germany’s Federal Minister of Health gave a talk. Finally, we have supported a number of students and researchers in their endeavors to find out more about cryonics. This is a matter which is very dear to our hearts, as we think that regular honest and critical exchange with the scientific community will help to improve cryonics procedures, and also improve the public perception and reputation of cryonics.
Informing the public about cryonics

The DGAB does a lot more on informing the public about cryonics, which is another part of our long-term strategy. In our view, it remains critically important and also ethically required to inform the public about the possibilities which cryonics offers. To this end, first and foremost, we maintain web presences with regular updates, including our own website and blog, a Facebook page, Youtube channel and Twitter account. Last year we added another page to our portfolio, which summarizes in simple and easily understandable terms the key concepts of cryonics: http://www.kryonik.de.

We also try to cooperate with high-quality multipliers. For example, in cooperation with a university professor we have recently published an article about the hope that cryonics can give. The article has been published in a medical magazine on palliative care. We also drafted and published another article together with an embalmer in an important publication for funeral directors. Of course, we also regularly give interviews to journalists from mainstream media and support their writing about cryonics, in order to have information on cryonics delivered to the public as accurately as possible. On average we get at least 1-2 requests per month. We have also found that some creativity and flexibility helps a lot to make certain arrangements possible, e.g. we once gave a Skype interview for a children’s TV show, which turned out really well.

Finally, of course, we also have an open ear for all questions that potential cryonicists may have. We receive such questions via email, Facebook and our public forum on a daily basis, and respond to all of them as good as we can.

Connecting and networking

The DGAB provides a great place to find new friends that are interested in cryonics, which is a rare thing. Local groups are developing, while social interaction and discussions continue in our internal members-only forums and mailing lists. Last but not least, we would like to extend an open invitation to the readers to get in touch. In case you are in the area and looking for new contacts, we’d be happy to welcome you as a new member. Otherwise, we’re also always open and interested in professional exchange about local challenges and solutions with other cryonics support groups.

Connecting the Cryonics Community

CI profiles the various cryonics groups listed in our Worldwide Cryonics Groups list every issue. Our goal is to provide a networking resource and offer an ongoing source of ideas and practical examples of how others organize and run their groups.

If you have a group and are interested in being profiled for one of our upcoming features, please contact dg@cryonics.org.

* Please note, listings in CI Magazine’s Groups list does not constitute an endorsement by CI.
Winston (Kreisman Brakke) Benaderet
a Tribute by Michelle Benaderet

The first time I saw Winston he ran and jumped into my arms. We were supposed to be together!
Almost always in my arms he never left my side for 16 years
Medical Service Dog
Extraordinary Best Friend
Great Love of my life
He never looked at you but rather into you
... and connected with your soul
Intuitive and intelligent, he could find a way to communicate
He was devoted, tolerant, patient, compassionate, sweet, happy and incredibly loving! He never wanted food or treats but love and “kissies” instead.

Winston Saved My Life
Winston could recognize when I was in distress. He would try to keep me alert and focused, and would try to revive me.
Winston was able to alert family members, retrieve my medical bag and my telephone.
He helped me get back into the world after being mostly home-bound for almost 10 years.
He came with me everywhere.
Winston also became a therapy dog helping others.
He touched everyone’s heart in a very special way!

Everyone who met him knew he was Very Special.
He made us laugh and smile! He filled our hearts with Love and Joy, especially his “Dad” Adam and “Grams” Liliane.
Our years all together were our best and happiest.
I truly believe that for anything good that I have ever done in my life Winston was my reward.
We love him dearly! He will forever be in our hearts!
No measure of time with him will ever be enough!

Michelle Benaderet and Winston
I was Never interested in Cryonics.

Shortly before Winston passed away unexpectedly, Joseph Kowalsky, CI board member and one of Winston’s favorite people, talked to me about cryonics being “an ambulance to the Future,” a “hope” and a “chance” that would otherwise never be possible.

I knew this was the only right choice.

Joseph, Andy Zawacki and Hillary Martenson rushed to help us! They made sure that Winston was taken care of -- with great care and concern for his well-being.

Cryonics Now became a potential life-giving procedure.

Immediately there is Comfort and Hope!

Medicine and science are advancing at unprecedented rates. What is not possible today may be possible tomorrow.

And although there was already Death, Now there is a Hope and a Chance for Life.

Michelle Benaderet
Adam Brakke
Liliane Kreisman Benaderet

CI Patient Tributes

Family Members of CI Patients* are invited to submit tributes to their loved ones for publication in the CI Newsletter. Please note, our newsletter is published online and read by both members and non-members alike around the world. If you are concerned with privacy, a semi-public option is to contribute photographs for our Tribute Room which will only be seen by visitors to the Michigan Facility. Written Tributes intended for the magazine may be also edited for length. Interested parties can contact CIHQ@aol.com or dg@cryonics.org to submit Tribute Materials or for more information.

* Persons submitting Tribute Materials must possess the legal authority to release private patient details to the public.
Worst mistakes in Cryonics

#2: Not providing proof of funding

You have signed up for Cryopreservation, have all of your contracts in place and funding secured through a Life Insurance policy naming CI as the beneficiary. Everything should go like clockwork when the time comes for your suspension.

But it doesn’t.

There is a significant delay - potentially weeks - that may very well jeopardize your chances for the successful suspension you’ve put significant time and money toward achieving.

What happened?

Unfortunately, you have failed to provide your Annual Proof of Funding Statement to CI. Now, although your funding is, in fact, in place, CI still cannot proceed with your suspension until that funding has been confirmed! As stated earlier, this process can take several days or even weeks to work through.

CI requires our funded members to provide proof of funding annually. We do this in order to ensure your eventual cryostasis can be performed without any delays or issues. Problems with proof of funding can delay cryopreservation by days or even weeks, so it is critical we have your up-to-date records on file here at CI.

There are three strategies to how you set up your funding.

1. PREPAY: If you have sufficient funds and can pay your preservation fee in full up front, you obviously don’t need to provide annual proof of funding.

2. CO-OWNER LIFE INSURANCE: If you are using an insurance policy, and you add CI as a co-owner to your policy, the insurance company will send us the same proof-of-funding statements you receive annually. We recommend this option to members as the easiest and most convenient way to ensure CI receives your required annual proof of funding.

3. SINGLE OWNER LIFE INSURANCE: Finally, if you are using life insurance but prefer to remain the sole owner of the policy, you will be required to mail or fax a copy of your annual statement to CI to prove that your policy is paid up, in force and up-to-date.

We schedule your annual Proof-of-Funding update to coincide with your signed contract date, so if you signed your CI Contract in May, we would expect your proof of funding to be submitted annually each May. However, if you prefer to set a different date, or even want to send it in today that is perfectly fine. The important thing is to be sure you provide us this important information every year.
Who will be there for YOU?

Don’t wait to make your plans. Your life may depend on it.

Suspended Animation fields teams of specially trained cardio-thoracic surgeons, cardiac perfusionists and other medical professionals with state-of-the-art equipment to provide stabilization care for Cryonics Institute members in the continental U.S.

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Speak to a nurse today about how to sign up.

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or email tabitha@suspendedanimationinc.com
AUSTRALIA: The Cryonics Association of Australasia offers support and information for Australia & nearby countries. caalist@prix.pricom.com.au. Their Public Relations Officer is Philip Rhoades. phil@pricom.com.au GPO Box 3411, Sydney, NSW 2001 Australia. Phone: +6128001 6204 (office) or +61 2 99226979 (home.)

BELGIUM: Cryonics Belgium is an organisation that exists to inform interested parties and, if desired, can assist with handling the paperwork for a cryonic suspension. The website can be found at www.cryonicsbelgium.com. To get in touch, please send an email to info@cryonicsbelgium.com.

BHUTAN: Can help Cryonics Institute Members who need help for the transport & hospital explanation about the cryonics procedure to the Dr and authorities in Thimphou & Paro. Contacts: Jamyang Palden & Tenzin Rabgay / Emails: palde002@umn.edu or jamgarnett@hotmail.co Phones: Jamyang / 975-2-32-66-50 & Tenzin / 975-2-77-21-01-87

CANADA: This is a very active group that participated in Toronto’s first cryopreservation. President, Christine Gaspar; Vice President, Gary Tripp. Visit them at: http://www.cryocdn.org/. There is a subgroup called the Toronto Local Group. Meeting dates and other conversations are held via the Yahoo group. This is a closed group. To join write: csc4@cryocdn.org

CHILE: Community oriented to provide reliable information on human cryopreservation, as far as technical scientific as well as other practical aspects. Dissemination, awareness and education on issues related to the extension of life in general and cryonics in particular. Contact José Luis Galdames via galdamesjoseluis@gmail.com or via facebook at Cryonics Chile

QUEBEC: Contact: Stephan Beauregard, C.I. Director & Official Administrator of the Cryonics Institute Facebook Page. Information about Cryonics & perfusion services in Montreal for all cryonicists. Services available in French & English: stephan@cryonics.org

FINLAND: The Finnish Cryonics Society, (KRYOFIN) is a new organization that will be working closely with KrioRus. They would like to hear from fellow cryonicists. Contact them at: kryoniikka.fi Their President is Antti Peltonen.

FRANCE: SOCIETE CRYONICS DE FRANCE is a non profit French organization working closely with European cryonics groups. For more information: J.Roland Missionnier; phone: 33 (0) 6 64 90 98 41 or email: cryonicsnews.inpi@yahoo.fr

GERMANY: DGAB There are a number of Cryonicists in Germany. Their Organization is called “Deutsche Gesellschaft für Angewandte Biostase e.V.”, or short “DGAB”. More information on their homepage at www.biostase.de. If there are further questions, contact their Board at vorstand@biostase.de

GERMANY: CRYONICS-GERMANY is an active group providing cryonics support, including a special 8-member Standby Response Team. Members from Germany or Internationally are welcome to join. at http://cryonics-germany.org. Direct inquiries to contact@cryonics-germany.org.

INDIA: Can help Cryonics Institute Members who need help for the transport & hospital explication about the cryonics procedure to the Dr and authority in Bangalore & Vellore Area. Contacts: Br Sankeerth & Bioster Vignesh / Email: vicky23101994@gmail.com Phones: Bioster / 918148049058 & Br Sankeerth / 917795115939

Worldwide Cryonics Groups
ITALY: The Italian Cryonics Group (inside the Life Extension Research Group (LIFEXT Research Group)) [www.lifext.org](http://www.lifext.org) and relative forum: [forum.lifext.org](http://forum.lifext.org). The Founder is Bruno Lenzi, contact him at brunolenzi88@gmail.com or Giovanni Ranzo at giovanni1410@gmail.com.

JAPAN: Hikaru Midorikawa is President Japan Cryonics Association. Formed in 1998, our goals are to disseminate cryonics information in Japan, to provide cryonics services in Japan, and eventually, to allow cryonics to take root in the Japanese society. Contact mid_hikaru@yahoo.co.jp or [http://www.cryonics.jp/](http://www.cryonics.jp/).

NEPAL: Can help Cryonics Institute Members who need help for the transport & hospital explanation about the cryonics procedure to the Dr and authorities in Kathmandu. Contact : Suresh K. Shrestha / Email : toursuresh@gmail.com Phone : 977-985-1071364 / PO Box 14480 Kathmandu.

THE NETHERLANDS: Dutch Cryonics Organization is the local support group since 2002 and able to provide advice, standby, perfusion and shipment 24/7, in case of need. We are an active group utilizing the latest equipment. New members from The Netherlands welcome.

E-mail: info@cryonisme.nl website: [http://www.cryonisme.nl](http://www.cryonisme.nl)

SWEDEN: [www.kryonik.se](http://www.kryonik.se) or Facebook: Svenska Kryonikföreningen. Initially, the society will focus on providing information and assistance to those who wish to sign up for cryonics. Eventually, we also hope to provide practical assistance in cases, possibly in collaboration with other European groups.

SWITZERLAND: [www.cryosuisse.ch](http://www.cryosuisse.ch)

CRYOSUISSE The Swiss Society for Cryonics. To join, email info@cryosuisse.ch.

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Do our brains use the same kind of deep-learning algorithms used in AI?

_Bridging the gap between neuroscience and AI_

Deep-learning researchers have found that certain neurons in the brain have shape and electrical properties that appear to be well-suited for “deep learning” — the kind of machine-intelligence used in beating humans at Go and Chess.

Canadian Institute For Advanced Research (CIFAR) Fellow Blake Richards and his colleagues — Jordan Guerguiev at the University of Toronto, Scarborough, and Timothy Lillicrap at Google DeepMind — developed an algorithm that simulates how a deep-learning network could work in our brains. It represents a biologically realistic way by which real brains could do deep learning.*

The finding is detailed in a study published December 5th in the open-access journal eLife. (The paper is highly technical; Adam Shai of Stanford University and Matthew E. Larkum of Humboldt University, Germany wrote a more accessible paper summarizing the ideas, published in the same eLife issue.)

READ THE FULL STORY AT KURZWEILAI.NET

The Dark Secret at the Heart of AI

_No one really knows how the most advanced algorithms do what they do. That could be a problem._

Last year, a strange self-driving car was released onto the quiet roads of Monmouth County, New Jersey. The experimental vehicle, developed by researchers at the chip maker Nvidia, didn’t look different from other autonomous cars, but it was unlike anything demonstrated by Google, Tesla, or General Motors, and it showed the rising power of artificial intelligence. The car didn’t follow a single instruction provided by an engineer or programmer. Instead, it relied entirely on an algorithm that had taught itself to drive by watching a human do it.

Getting a car to drive this way was an impressive feat. But it’s also a bit unsettling, since it isn’t completely clear how the car makes its decisions. Information from the vehicle’s sensors goes straight into a huge network of artificial neurons that process the data and then deliver the commands required to operate the steering wheel, the brakes, and other systems. The result seems to match the responses you’d expect from a human driver. But what if one day it did something unexpected—crashed into a tree, or sat at a green light? As things stand now, it might be difficult to find out why. The system is so complicated that even the engineers who designed it may struggle to isolate the reason for any single action. And you can’t ask it: there is no obvious way to design such a system so that it could always explain why it did what it did.

READ THE FULL STORY AT MIT TECHNOLOGY REVIEW
Cancer-fighting nanorobots programmed to seek and destroy tumors

In a major advancement in nanomedicine, Arizona State University (ASU) scientists, in collaboration with researchers from the National Center for Nanoscience and Technology (NCNST), of the Chinese Academy of Sciences, have successfully programmed nanorobots to shrink tumors by cutting off their blood supply.

“We have developed the first fully autonomous, DNA robotic system for a very precise drug design and targeted cancer therapy,” said Hao Yan, director of the ASU Biodesign Institute’s Center for Molecular Design and Biomimetics and the Milton Glick Professor in the School of Molecular Sciences.

Moreover, this technology is a strategy that can be used for many types of cancer, since all solid tumor-feeding blood vessels are essentially the same,” said Yan.

The successful demonstration of the technology, the first-of-its-kind study in mammals utilizing breast cancer, melanoma, ovarian and lung cancer mouse models, was published in the journal Nature Biotechnology.

READ THE FULL STORY AT PHYS.ORG

CRISPR genetic editing takes another big step forward, targeting RNA

Most people have heard of the CRISPR/Cas9 gene-editing technology, which acts as targeted molecular scissors to cut and replace disease-causing genes with healthy ones. But DNA is only part of the story; many genetic diseases are caused by problems with RNA, a working copy of DNA that is translated into proteins.

Now, Salk Institute scientists have created a new tool that targets not DNA, but RNA, and used it to correct a protein imbalance in cells from a dementia patient, restoring them to healthy levels. The new Salk tool, called CasRx, opens up the vast potential of RNA and proteins to genetic engineering, giving researchers a powerful way to develop new gene therapies as well as investigate fundamental biological functions. The work appeared in Cell on March 15, 2018.

“Bioengineers are like nature’s detectives, searching for clues in patterns of DNA to help solve the mysteries of genetic diseases,” says Patrick Hsu, a Helmsley-Salk Fellow and senior author of the new paper. “CRISPR has revolutionized genome engineering, and we wanted to expand the toolbox from DNA to RNA.”

CRISPRs are bacterial immune systems that contain many defense enzymes such as the Cas9 “molecular scissors,” which scientists including Hsu have engineered as a powerful DNA-targeting gene-editing tool.

READ THE FULL STORY AT PHYS.ORG
How to build a human brain

Some steps for growing mini versions of human organs are easier than others

In a white lab coat and blue latex gloves, Neda Vishlaghi peers through a light microscope at six milky-white blobs. Each is about the size of a couscous grain, bathed in the pale orange broth of a petri dish. With tweezers in one hand and surgical scissors in the other, she deftly snips one tiny clump in half.

When growing human brains, sometimes you need to do some pruning.

The blobs are 8-week-old bits of brainlike tissue. While they wouldn’t be mistaken for Lilliputian-sized brains, some of their fine-grained features bear a remarkable resemblance to the human cerebral cortex, home to our memories, decision making and other high-level cognitive powers.

Vishlaghi created these “minibrains” at the Eli and Edythe Broad Center of Regenerative Medicine and Stem Cell Research at UCLA, where she’s a research assistant. First she immersed batches of human pluripotent stem cells — which can morph into any cell type in the body — in a special mix of chemicals.

New 3-D printed materials harness the power of bacteria

Items made with ‘living ink’ could make medical supplies or clean contaminated water

A new type of 3-D printing ink has a special ingredient: live bacteria.

Materials made with this “living ink” could help clean up environmental pollution, harvest energy via photosynthesis or help make medical supplies, researchers report online December 1 in Science Advances.

This study “shows for the first time that 3-D printed bacteria can make useful materials,” says Anne Meyer, a biologist at Delft University of Technology in the Netherlands who wasn’t involved in the work.

The newly concocted printing ink is a polymer mix called a hydrogel that is blended with bacteria and a broth of nutrients that helps bacterial cells grow and reproduce. Eventually, the bacteria use up all of this built-in sustenance, says study coauthor Manuel Schaffner, a material scientist at ETH Zurich. But the ink is porous, so dipping a 3-D printed structure in more broth can reload it with nutrients, he says.

Schaffner and colleagues printed a grid embedded with a breed of bacteria called Pseudomonas putida, which eats the hazardous chemical phenol. When the researchers placed this lattice in phenol-contaminated water, the bacteria completely purified the water in just a few days.
Member Readiness Checklist
You’ve signed up for cryonics - what are the next steps?

Welcome Aboard! You have taken the first critical step in preparing for the future and possibly ensuring your own survival. Now what should you do? People often ask “What can I do to make sure I have an optimal suspension?” Here’s a checklist of important steps to consider.

- Become a fully funded member through life insurance or easy pre-payments

Some members use term life and invest or pay off the difference at regular intervals. Some use whole life or just prepay the costs outright. You have to decide what is best for you, but it is best to act sooner rather than later as insurance prices tend to rise as you get older and some people become uninsurable because of unforeseen health issues. You may even consider making CI the owner of your life insurance policy.

- Keep CI informed on a regular basis about your health status or address changes. Make sure your CI paperwork and funding are always up to date. CI cannot help you if we do not know you need help.

- Keep your family and friends up to date on your wishes to be cryopreserved. Being reclusive about cryonics can be costly and cause catastrophic results.

- Keep your doctor, lawyer, and funeral director up to date on your wishes to be cryopreserved. The right approach to the right professionals can be an asset.

- Prepare and execute a Living Will and Power of Attorney for Health Care that reflects your cryonics-related wishes. Make sure that CI is updated at regular intervals as well.

- Consider joining or forming a local standby group to support your cryonics wishes. This may be one of the most important decisions you can make after you are fully funded. As they say-“Failing to plan is planning to fail”.

- Always wear your cryonics bracelet or necklace identifying your wishes should you become incapacitated. Keep a wallet card as well. If you aren’t around people who support your wishes and you can’t speak for yourself a medical bracelet can help save you.

- Get involved! If you can, donate time and money. Cryonics is not a turnkey operation. Pay attention and look for further tips and advice to make both your personal arrangements and cryonics as a whole a success.

- Keep up to date! Read CI Magazine and follow the simple “STANDBY NOTEBOOK” exercise in each issue.
Show the world you support cryonics with CI gear from our Cafe Press store.

CI Standby Kits

CI offers pre-made Standby Kits complete with all required equipment and detailed instructions. These kits are perfect for an individual or a group planning local standby support. Basic and Intermediate kits are available for sale now. To purchase a kit, please contact us at: cihq@aol.com

FREE Memberships?!!

Did you know the Cryonics Institute offers FREE LIFETIME Memberships for minor children of paid Lifetime Members? Any minor children (under the age of 18) of fully-paid Lifetime Members are eligible for a permanent Lifetime Membership of their own. If you’d like to give your children the priceless gift of a second chance of life with you in the future, please contact us at 1 (586) 791-5961 and ask about Lifetime Membership Benefits.

Writers Wanted

Got something to say?
The CI Newsletter is looking for submissions from our readers!
If you’ve got a great idea for a story, please forward it to: dg@cryonics.org
PART ONE

www.cryonics.org

robert c. w. ettinger

the prospect of

immortality
Robert Ettinger’s “The Prospect for Immortality”

**Preface**

*by Gerald J. Gruman, M.D., Ph.D. Lake Erie College*

While reading this book, I was reminded of the Belgian businessman who in the early days of World War II heard rumors about the possibility of atomic fission. He ordered a large supply of uranium from the Congo and sent it to warehouses near New York just in time for the atomic bomb project. (On Edgar Sengier, winner of the U.S. Medal of Merit and former president of the Union Miniere du Haut Katanga, see *The New York Times*, 7-30-63:29) I must confess that were I interested in business speculation, I should be busily stockpiling equipment needed for Mr. Ettinger’s project.

Unlike the creation of the atomic bomb, Mr. Ettinger’s proposals are completely benevolent and humanitarian in their intent, so much so that readers may wonder why scientists and physicians are not already applying low-temperature techniques (“cryobiology”) to extend human life. To this it must be said that too often there has occurred an unfortunate lag between the scientists’ findings in the laboratory and the application of those findings for human welfare. In 1928, for example, Sir Alexander Fleming discovered that penicillin was remarkably effective in killing germs, but he lacked the capital to prepare sizable quantities of the substance, and nothing was achieved until the massive casualties of World War II stimulated a cooperative search by government and business in Britain and America. By 1944 the drug was performing medical miracles; but what about the lag between 1928 and 1944? No one can calculate the cost of those fifteen years in human suffering. It has been the same with other much-needed innovations: the first anesthetics were suggested in the early 1800’s but forty more years of anguish passed before surgical operations became painless, and an even longer struggle was necessary before this benefit was extended to women in childbirth.

Many more illustrations could be given indicating what I think is the most outstanding virtue of Professor Ettinger’s book: he is trying to bridge a gap between the world of the research laboratory and that of everyday practice, because he has come upon something which holds great promise for mankind. He has spent years searching the technical literature in a careful and responsible way in order to prepare himself for a vital role: the arousing of general public demand for a new service which science can offer, and the stirring of the conscience of physicians, lawyers, businessmen and government officials so that the demand will be met. Mr. Ettinger feels that what he is calling for may happen anyway someday (to some degree, it already is happening), but what he wants to be sure of is that it will happen as soon as possible and in the best possible way. That is why he has adopted a stirring, optimistic writing style, and, in my opinion, he is justified in doing so, because he has a solid grasp of the physical, chemical and biological processes he discusses and a hard-headed appreciation of contemporary technical, economic and social realities.

What is this revolutionary development in science? In brief, it is this: if a man dies today it no longer is appropriate to bury or cremate the body. For there is hope that by keeping it at very low temperatures, physicians of the future may be able to revive him and cure him. And if someone has an “incurable” disease, it is not good practice any more to let him succumb; it is preferable to put the patient into low-temperature storage until better medical facilities become available, or until a cure is discovered. In regard to the scientific and medical bases of this concept, we are fortunate in having the excellent preface by Dr. Rostand who is world-renowned both for his laboratory research and for his understanding of the social and philosophical aspects of science. As Mr. Ettinger states, Dr. Rostand in 1946 was the first to report the protective action of glycerol in the freezing of animal cells. It also is noteworthy that the English scientist Dr. A. S. Parkes in whose laboratory the glycerol phenomenon independently was rediscovered in 1948 also has spoken favorably about the possibility of

Mr. Ettinger represents the latest spokesman for a worthy American tradition going back as far as Benjamin Franklin. That eminently practical inventor, philosopher-scientist, and statesman predicted in 1780 that scientific progress would bring about means to lengthen the life span beyond a thousand years. Franklin was delighted with the advances of his time; the lightning rod (his own invention), inoculation for smallpox, the steam engine, flying (manned balloons), etc., and he yearned to see the developments of the future. In a letter to a French scientist, he expressed the wish that he might be awakened in a hundred years to observe America's evolution; the great English surgeon, John Hunter, had a similar idea, hoping to arrange thawing for one year out of every hundred. Franklin also was keenly interested in experiments in resuscitating persons apparently “dead” from drowning or electrocution; in fact, the eighteenth century was fascinated by such activities.

The main pioneers in reviving the “dead” were the Humane Societies set up in Europe and the United States after 1767. (On the Humane Societies, see the article by E. H. Thomson: Bulletin of the History of Medicine, 37:43-51 (1963).) They had to overcome some scorn and ridicule, because, among ignorant and superstitious people, attempts to rescue drowning victims or trapped coal miners were considered utterly foolhardy. But many a conscientious doctor threw himself into the cause, and there were enlightened clergymen to hack them up; the Quakers of Philadelphia aided these reforms, and also the great Methodist John Wesley was called into the campaign. An Episcopalian minister concluded in a sermon in 1789 that the Humane Societies deserved his blessing, “Their sole reward is in the holy joy of doing good.” As we congratulate ourselves today over the Red Cross and medical successes in artificial respiration, cardiac massage, blood hanks and other methods to revive the “dead,” we should recognize that Mr Ettinger is performing the same kind of service and merits our wholehearted support.

Bringing up the question of the nature of death is a major contribution of this hook, and it is one reason why physicians should read it carefully. We tend to accept uncritically as absolute such concepts as “irrevocable damage,” “biological death,” etc., and we overlook the insidious nature of this “hardening of the categories,” (A phrase coined by Dr. Esther Menaker to describe a common “intellectual disease” of professionals and experts) an intellectual flaw as prevalent and as hampering as hardening of the arteries. This is one of the most useful things about Mr Ettinger’s text; he challenges with admirable tenacity many of these fixed ideas, and every physician will benefit from reading his ingenious attacks on hypotheses we too often take for granted. By serving this function, Mr. Ettinger helps to open original lines of thought and to prevent any lag in the utilization of recent findings in cryobiology, both in practice and in further research.

Of course there are a few points (all peripheral) on which I might not completely agree with Mr. Ettinger; but this has not obscured for me the undeniable logic of his train of thought and the real value of his insight into some of the most difficult problems of modern man. I believe that reviewers and readers in general will find that the core of the book once grasped will never be forgotten and not only will lead to further thought but also to action. We have heard a great deal recently (to our shame) about the costly and childishly sentimental funeral practices referred to as the “American way of death.” (Jessica Mitford: The American Way of Death, N.Y., 1963.) Here we have a book which proposes an American way of living on, a demand that our superb (and underemployed) technological facilities be used to implement in a realistic and mature way our avowed belief in the beauty and value of life and health and the immeasurable worth of the individual.

In conclusion, I am reminded of the story about Benjamin Franklin who on one occasion was marvelously rescued from a shipwreck. Having expressed feelings of gratefulness and thanksgiving, he was asked if he intended to build a chapel to memorialize his escape. “No, indeed not,” he re-
Robert Ettinger’s “The Prospect for Immortality”

plied, “I’m going to build a lighthouse!” It is my considered opinion that Mr. Ettinger too has “built a lighthouse,” one which throws a powerful light into the years ahead. In the first sudden brightness some persons will be startled, others will ponder curiously the strange, unexpected ways that old perspectives and landmarks have been altered. But those who have faced the pain and the loss and the maddening “absurdity” of human death, whether on a wartime battlefield or in dingy hospital wards - those persons will feel this illumination as a welcome glow of hope in a world which has been waiting so very long.

Preface

By Jean Rostand de l’Academie francaise

About a century ago, Edmond About, a fine French writer and one of the precursors of “science fiction,” published a short novel called The Man with the Broken Ear. In this diverting tale, he tells about a professor of biology who dries out a living man and then, after a “suspension of life” lasting several decades, successfully resuscitates him.

What was, in 1861, only an amusing fantasy has in our time taken on a rather prophetic air; for, in the light of recent scientific developments, a similar method of preserving a human being no longer seems so impossible.

We have learned, from the experiments of Hahn de Becquerel and others, that some animals of the lower orders (Rotifera, Tardigrada, Anguilla), some vegetable seeds and some microbes can have all internal activity interrupted for a long time by being reduced in temperature to close to absolute zero - and then, upon being thawed, resume all normal functions again. But more than this, researchers report having observed “resurrections” of this sort even among higher order animals; though the entire animal may not have been involved, it is definitely the case that a significant amount of tissue - and even whole organs - were thus frozen and revived. In the same way, the sperm of certain mammals, when impregnated with proper preservatives, has been able to endure the temperature of liquid nitrogen for some months without losing the ability to regain normal mobility and the capacity to reproduce. Likewise, the heart of a chicken, after undergoing a similar super cooling, was able to heat again after being rewarmed.

So it is not out of the question to anticipate future successes of greater and greater complexity; indeed, we are at last even forced to concede the real possibility that the means for freezing and resuscitating human beings will one day be perfected, at however distant a time this may be. This certainly is the opinion of M. Louis Hey, one of the most competent contemporary biologists in the field. He writes:

“There are some very convincing reasons to think that, thanks to future research, one will be able to bridge the gap that now separates the superior organisms from the Tardigrada and Rotifera; the solution will then be found to the problem of suspending the vital life force perhaps indefinitely.” (Conservatism de la vie par le froid. Hermann, 1959.)

In The Man with the Broken Ear, Edmond About envisioned, with a certain amount of humor, some of the consequences for human society which could result from the preservation of human beings.

“The sick people who were declared incurable by the ignorant scientists of the nineteenth century need no longer bother their heads about it; they were dried up to wait peacefully in the bottom of a box until the doctors had found remedies for their ills.”

R. C. W. Ettinger, the author of The Prospect of
Immortality, has gone a crucial step beyond the French writer: It is not only the incurables he proposes to preserve, but the dead themselves. Indeed, as Mr. Ettinger suggests, should not the dead be considered to be only “temporary incurables” that a better informed science might one day resuscitate by repairing the ills to which they had succumbed - whether their difficulty be sickness, accident or old age? The preservation he advocates would be through refrigeration (a liquid helium or nitrogen bath); this is a method of freezing that is not harmless now, but undoubtedly the science of tomorrow will have ways of repairing freezing damage too.

So we don't have long to wait before we shall know how to freeze the human organism without injuring it. When that happens, we shall have to replace cemeteries by dormitories, so that each of us may have the chance for immortality that the present state of knowledge seems to promise. At the moment, all of this may seem like a remote chance, and no one is more aware of this than Mr. Ettinger. But he has the insight to realize that we have nothing to lose and, possibly, everything to gain by pressing the search. It is, in a sense, a Pascal's wager based on a faith in science. Certainly, a decision to let all corpses remain corpses is, in the face of Mr. Ettinger's alternative, the highest folly.

What is important to realize is that Mr. Ettinger is, in the strictly biological section of the book, carrying to its logical conclusion an argument for which he has unimpeachable premises. It is not the role of the prefacer to pronounce on the immediate practicality of the program. Indeed, Mr. Ettinger himself fully understands that the whole job cannot be done overnight. What he is telling us is that we must begin; the job will be done some day, and for every day that we put it off untold thousands are going to an unnecessary grave.

In any case, Mr. Ettinger's book is a captivating, stimulating tonic crammed with original views especially on the problem of the personal identity of the individual. It deserves to be read and thought about.

Translated by Sandra Danenberg
Chapter 1

Frozen Dead, Frozen Sleep, and Some Consequences

Most of us now living have a chance for personal, physical immortality.

This remarkable proposition - which may soon become a pivot of personal and national life - is easily understood by joining one established fact to one reasonable assumption.

The fact: At very low temperatures it is possible, right now, to preserve dead people with essentially no deterioration, indefinitely. (Details and references will be supplied.)

The assumption: If civilization endures, medical science should eventually be able to repair almost any damage to the human body, including freezing damage and senile debility or other cause of death. (Definite reasons for such optimism will be given.)

Hence we need only arrange to have our bodies, after we die, stored in suitable freezers against the time when science may be able to help us. No matter what kills us, whether old age or disease, and even if freezing techniques are still crude when we die, sooner or later our friends of the future should be equal to the task of reviving and curing us. This is the essence of the main argument.

The arrangements will no doubt be handled at first by individuals, then by private companies, and perhaps later by the Social Security system.

By preserving our bodies in as nearly life-like a condition as possible, it is clear that you and I, right now, have a chance to avoid permanent death. But is it a substantial chance, or only a remote one? I believe the odds are excitingly favorable, and it is the purpose of this hook to make this belief plausible. If it is made plausible, the necessary efforts will be encouraged further to improve the odds.

It is my hope that the cumulative weight of the discussion will convince the reader that his own life is at stake, and those of his family, and that his personal efforts are urgently needed in this mighty undertaking. (The pun should be forgivable; it is impossible consistently to accord the subject the awesome dignity it deserves.)

Suspended Life and Suspended Death

It must be made very clear that our basic program is not one of “suspended animation,” and does not depend on any special timetable of scientific progress, but can be instituted immediately. To make sure of our orientation, let us review the meaning of suspended animation and of the several kinds of death.

Suspended animation refers to a standstill in the life processes of the body. It is a stasis that can be imposed and removed at will, and the subject is regarded as alive at all times. In some simple life forms suspended animation can be produced simply by drying, and reanimation by moistening them again; in fact, certain bacteria found embedded in salt have been reported revived after hundreds of millions of years. For humans, the only likely way to induce suspended animation is by freezing, but full recovery after complete freezing has not yet been achieved with any mammal.

The subtle distinction between life and death is evident in the case of the dried bacteria, which were regarded as alive merely because they were potentially capable of displaying life processes. In fact, we recognize at least five kinds of death, which must be kept firmly in mind.

“Clinical death” is the kind we most frequently have in mind, its criteria being cessation of heart-
Partial text: "Biological death" has been defined by Dr. A. Parkes as the state from which resuscitation of the body as a whole is impossible by currently known means. This is very logical, but also very odd: a frozen body might lie around for years in a “dead” condition, then all at once come alive, without any physical change whatever, as soon as someone found a means of resuscitation.

“Cellular death” refers to irreversible degeneration of the individual tiny cells of our bodies.

The questions of legal death and religious death will be left for later chapters.

The important point is that a man does not go like the one-horse shay, but dies little by little usually, in imperceptible gradations, and the question of reversibility at any stage depends on the state of medical art. Clinical death is often reversible; the criteria of biological death are constantly changing; and even cellular death is a matter of degree, since it is possible for an individual cell to be made nonfunctional by minor and eventually reparable damage.

Suspended death, then, will refer to the condition of a biologically dead body which has been frozen and stored at a very low temperature, so that degeneration is arrested and not progressive. The body can be thought of as dead, but not very dead; it cannot be revived by present methods, but the condition of most of the cells may not differ too greatly from that in life.

There is also an interesting intermediate condition between suspended life and suspended death, which will be mentioned in a later chapter.

**Future and Present Options**

When full-fledged suspended animation becomes practicable, a wide range of options will be available. For example, the feeble aged and the incurably ill may choose to suspend life and await a day when cures are known. On the other hand, many people may still choose to be frozen only after natural death - but the techniques of suspended animation, applied after clinical death but before biological death, should ensure that their condition is still one of suspended life. (It is not self-evident that techniques applicable to a living person are also suitable for one clinically dead, but reasons for thinking so will be produced later.)

The chief value of research on suspended animation, then, is that it will develop new freezing techniques, ways to avoid freezing damage. When this is achieved, we will be able to preserve our freshly dead bodies with only the damage of old age or disease, and without the additional insult of damage by crude freezing methods, and thus our chances of early resuscitation will be vastly improved.

(How strange that the many popular articles on suspended animation have mentioned chiefly its possible use by astronauts on long interstellar voyages! This aspect is trivial. Its importance lies not in travel to the stars, for the few, but in travel to the future, for the many. It will open a veritable “door into summer” for all of us.)

Research in freezing techniques is proceeding actively, although so far on a relatively small scale, at a number of laboratories and hospitals in the United States, France, Britain, Russia, and elsewhere. Some small animals, and some types of human tissue, have been deep-frozen and successfully restored to life. Actual full-body freezing and suspended animation of a human being is anticipated fairly soon by some workers. Dr. James F. Connell, Jr. (St. Vincent’s Hospital, New York) is reported in 1962 to have said, “If all the medical personnel involved with this problem make a concerted effort, we will do it in less than five years.”

Research work will be multiplied and accelerated if sufficient demand appears for freezer programs. Should this happen, most of us now living will have the benefit of freezing by advanced techniques, so that our bodies will be preserved in much better condition than is now possible.

If feasible, therefore, one should contrive to stay alive for the next few years, since the odds will im-
prove rapidly during this time.

For the present, we must rely on the basic program of suspended death. It is simply proposed that, after one dies a natural death, his body be frozen and preserved at a very low temperature - perhaps near absolute zero, the lowest possible temperature - which will prevent further deterioration for an indefinite period. The body will be damaged by disease or old age which is the cause of death, and will be further damaged (although in some cases probably not much, as we shall see) by our current freezing methods. But it will not decay or suffer any more changes, and one assumes that at some date scientists will be able to restore life, health, and vigor - and these, in fact, in greater measure than was ever enjoyed in the first life. (This is a tall order, of course, and one of the chief aims of this book is to make it seem reasonable.)

### After a Moment of Sleep

The tired old man, then, will close his eyes, and he can think of his impending temporary death as another period under anesthesia in the hospital. Centuries may pass, but to him there will be only a moment of sleep without dreams.

After awakening, he may already be again young and virile, having been rejuvenated while unconscious; or he may be gradually renovated through treatment after awakening. In any case, he will have the physique of a Charles Atlas if he wants it, and his weary and faded wife, if she chooses, may rival Miss Universe. Much more important, they will be gradually improved in mentality and personality. They will not find themselves idiot strangers in a lonely and baffling world, but will be made fully educable and integrated.

If civilization endures, if the Golden Age materializes, the future will reveal a wonderful world indeed, a vista to excite the mind and thrill the heart. It will be bigger and better than the present - but not only that. It will not be just the present, king-sized and chocolate covered; it will be different. The key difference will be in people; we will remodel, nearer to the heart’s desire, not just the world, but ourselves as well. And “ourselves” refers to people, not just posterity. You and I, the frozen, the resuscitated, will be not merely revived and cured, but enlarged and improved, made fit to work, play, and perhaps fight, on a grand scale and in a grand style. Specific reasons for such expectations will be presented.

Clearly, the freezer is more attractive than the grave, even if one has doubts about the future capabilities of science. With bad luck, the frozen people will simply remain dead, as they would have in the grave. But with good luck, the manifest destiny of science will be realized, and the resuscitated will drink the wine of centuries unborn. The likely prize is so enormous that even slender odds would be worth embracing.

### Problems and Side Effects

In order to remove the prospect of immortality from the realm of thin, hazy speculation or daydreams and secure it in the domain of emotional conviction and work-a-day policy, it is essential that the discussion assume some scope and provide some background detail. The gist of the main argument has already been given, but it needs to be filled out and buttressed. Many obvious objections must be met, a host of troublesome questions answered.

How much progress in freezing techniques has actually been made? How much is known about freezing damage? How severe is the damage produced by current methods of freezing, and what reasons, other than vague optimism, are there for thinking the damage may be reversible? Can frostbite be cured?

Since the brain usually begins to deteriorate within a few minutes after breathing stops, how will it be possible to freeze the body soon enough? Considering the varied circumstances of death, how can one cope with the diverse practical problems that will be faced by the pioneers in treating and storing bodies?

Do you have a legal right to freeze a relative? Will failure-to freeze be considered murder or negligent homicide? Will there be an increase in mercy kil-
ings and suicides? Can a corpse have legal rights and obligations? Can a corpse vote?

Can families be kept together? Will widowers and widows be allowed to marry again in the first life? What will happen to the resuscitated person confronted with two or more ex-husbands or wives? Is there a conflict between the freezer program and religion, or should the freezers be considered merely the latest in a long series of medical efforts to save and prolong life? If a Christian refuses a chance at extended life through freezing, does this amount to suicide?

Will the cost of dying become so high that we cannot afford it? If we freeze every American, the current population alone will produce something like fifteen million tons of bodies; where’s all the money come from, and where can we stack them all?

What about the population problem? When the frozen are revived, where will the throngs of ancestors find lebensraum? Do we have a right to impose ourselves on our descendants, like a mob of poor relations come to dinner? Who needs us? Will it be only the selfish and cowardly who are frozen?

Even if the future welcomes us and makes room for us, will we like it? Even if we like it at first, will we not become bored? How can a mere human endure, let alone enjoy, thousands of years of life? And if we cease being human and become superhuman, will we still be ourselves? How much can a man change without losing his essence?

In fact, some of the most profound questions of philosophy are forced to the level of practical affairs. What is a man? What is death? What is the purpose of life?

How will the answers to these questions affect existing problems? Will a freezer program cause sharper competition or more cooperation among individuals and nations? Will a nuclear war become more likely or less? Will a man looking forward to thousands of years be less inclined to rock the boat and more inclined to practice the Golden Rule?

An attempt will be made to throw some light into all these dark corners.

**NEXT ISSUE:**

*Chapter II: The Effects of Freezing and Cooling*
Greetings to **ALL Young Cryonicists**,  
You are receiving this invitation because you are the future of cryonics,

**Who is Eligible?**  
Fully-Signed Up young cryonicists from all cryonics organizations in their late teens through age thirty (18-30) as of May 8, 2018 - may apply to attend.  

**Younger Cryonicists With Parent(s):**  
Thirteen through seventeen year olds may attended when accompanied by their parent(s) or guardian(s).  

Parents/guardians of attendees aged 18-19 are also encouraged to accompany their child. All attending parents will be put in touch with each other should they choose to have their own “get together” during the “young cryonicists” gathering.

**Program**  
Some individuals are social butterflies. This is not for everyone. And we want everyone to meet everyone. Therefore, I have designed a diverse range of “getting to know you” activities.  

**SCHOLARSHIPS**  
Life Extension Foundation, through a generous education grant, is offering 40 scholarships that pay for ALL of the following:

- **US Airfare** to/from Fort Lauderdale, FL (up to $1,000 for origin outside the U.S.)
- **HOTEL** accommodations for Friday & Saturday nights - plus Thursday & Sunday nights (specifically) for scholarship attendees who room together.
- **MEALS** and beverages on Friday night, all day Saturday & Sunday breakfast & lunch.
- **REGISTRATION** fee - $350 - also covered

**Please click HERE for a full packet with all details and application forms.**

**Forever,**  
*Cairn Erfreuliche Idun*  
Founder/Director: T2

**PS: Come Early. Stay Late.**  
* Some attendees to T2 enjoy spending extra time in Florida - especially since their flight is already paid for via their scholarship.

**This is at their own expense for additional lodging and food**

I look forward to getting to know you!
Visiting Hours For Family Members of CI Patients

Monday  2:00 pm – 4:00 pm
Tuesday  2:00 pm – 4:00 pm
Wednesday  2:00 pm – 4:00 pm
Thursday  2:00 pm – 4:00 pm

We ask that visitors kindly give us at least **one month advance notice** to ensure there are no scheduling conflicts. We cannot guarantee that the facility will be accessible to visitors who have not scheduled their visit in advance.

** These visiting hours are subject to change without notice due to patient or pet emergencies. **

These requirements have been established for multiple reasons, but most importantly for protecting our patients, members, and facility.

Questions regarding visitation can be directed to Andy or Hillary at CIHQ@aol.com or 1-586-791-5961

Thank you!