ALCOR LIFE EXTENSION FOUNDATION
A Non-Profit Organization

CRYONICS

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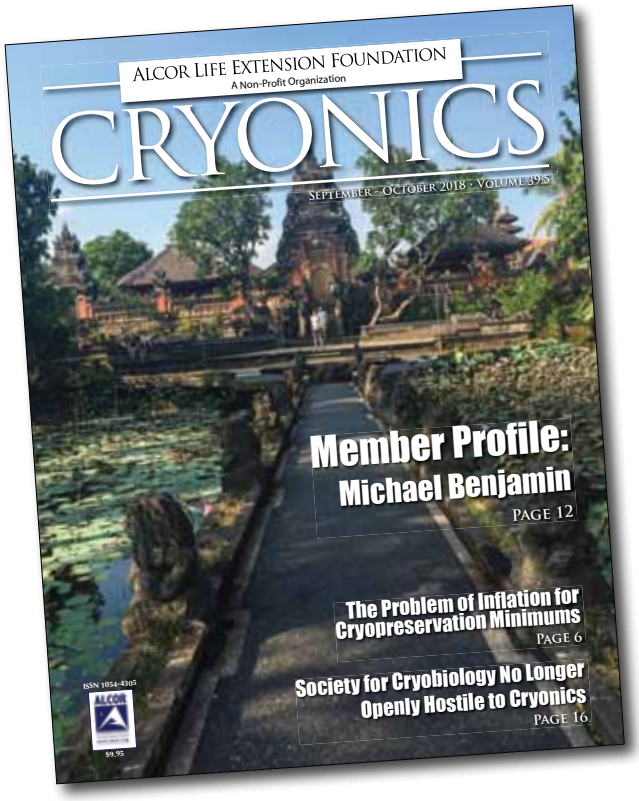
CRYONICS



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Member Profile: Michael Benjamin

Facing uncertainty in the modern world is a challenge. Living with a rare autoimmune disorder that causes progressive scarring of your skin and organs is a marathon, but one that Michael Benjamin is determined to win. Join us in New York, where he works to support scleroderma research and awareness, while finding peace and beauty in the unknown.

ON THE COVER: During Michael Benjamin's stay in Bali in 2015, he visited the Ubud Royal Palace, also known as Puri Saren Ubud.

Alcor Life Extension Foundation
A Non-Profit Organization
CRYONICS

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EDITORIAL

Photo: Cryo-Care Equipment Corporation at 2340 E. Washington St., Phoenix, AZ. Dr. Bedford's "home" about 1970.

HYBRID CRYONICS STANDBY INFRASTRUCTURE By Aschwin de Wolf

Cryonics has limited appeal but cryonics organizations have assumed global responsibility to cryopreserve their members timely and competently. A hybrid model in which local members and volunteers work together with medical staff members and contractors to deliver the best possible cryonics care is the best answer to this situation. Taking Alcor as an example, what does this model entail in terms of infrastructure and staffing?

The most important response mandate of a cryonics organization is to ensure competent local response capabilities through full-time employment of medical professionals and cryonics experts at the facility. Unlike remote response capabilities, Alcor's response to local cases should not be dependent on erratic, case-by-case, contracting with local medical professionals. While such professionals can supplement Alcor's own capabilities, Alcor should never find itself in a situation where it cannot deploy an effective standby due to a shortage of available staff members. This mandate requires that Alcor's staffing policy cannot be allowed to outcrowd its local response capabilities. In practice, this means having at least three staff members available for local case work with at least two of them being proficient (and preferably certified) in conducting medical procedures that are elemental to cryonics stabilization (placing IV lines, placing an endotracheal tube etc.).

A strong mandate to primarily deliver state-of-the-art care in the Scottsdale area may look rather meager in light of its global responsibilities, but considering the fact most Alcor members do not die suddenly, and are eligible for an attractive Alcor relocation-reimbursement, out-of-state cases may increasingly be seen as reflecting choices made by Alcor members, as opposed to inevitable events happening to them. The significantly higher costs, and potential logistical and legal complications, of out-of-state cases are a strong argument to further increase Alcor's relocation reimbursement amount.

The next layer is to coordinate a network of professional cryonics response providers (such as Suspended Animation and ICE) and local groups to respond effectively to out-of-state cases. Such companies can provide a valuable element to deliver rapid response provided that access to such services does not lead to allowing the atrophy of local groups and response capabilities. Professional standby companies usually deploy out of a single state (or two at most), which means that relying on local capabilities created by members remains an essential component for responding timely to time-sensitive cases. To ensure consistent and competent non-local response coverage, the coordination and monitoring of non-local response capabilities should be an important job responsibility of a full-time Alcor staff member.

To augment the services of cryonics standby organizations and the resources available to local members, regions with substantial numbers of Alcor members should be encouraged and supported in creating robust physical cryonics responsibilities. In such areas, maintenance of a full set of standby kits, a response vehicle, and even on-site field cryoprotection capabilities should be pursued. These non-Scottsdale cryonics "hubs" should be allowed some degree of autonomy, provided their efforts conform with Alcor's protocols and standards. Further enhancement of these cryonics hubs can be reaped if such efforts are supported by other cryonics-supporting activities such as research and public outreach. Examples of areas where such hubs would be feasible and desirable include New York City, Los Angeles, and San Francisco. The mandate for these areas should be to close the gap between Scottsdale-based cases and local cases.

International cases are a formidable challenge for Alcor and the cryonics hub idea will need to be extended to countries (or even a set of neighboring countries). Collaboration between members of different cryonics organizations is often a necessity in international cases. Transport times to the US necessitate the use of procedures such as field cryoprotection and shipping on dry ice. ■

The Problem of Inflation for Cryopreservation Minimums

By Max More

Disclaimer: *These are my own views and thoughts and do not necessarily represent the views of the board of directors or Alcor. The purpose of this piece is to advance discussion of inflation as it relates to cryonics funding, leading eventually to an official addition to the Member Funding section of Alcor's website.*

Alcor members (and prospective members) should read the entirety of this article. But here are the core points:

- Cryopreservation minimums are extremely likely to rise over time – at least in nominal terms.
- Most people are very poor at financial planning. Although undoubtedly more intelligent and educated than the general population, Alcor members are not exempt from this.
- Member ignorance (or avoidance of reality) along with insufficient (but far from absent) leadership communication led to a major underfunding crisis. This has been greatly reduced in recent years but could worsen again unless members better understand how to plan for cryonics inflation.
- Grandfathering old cryopreservation minimums has sometimes been a practice of Alcor but never an official policy. Grandfathering is a recipe for financial disaster.
- Alcor members must plan for future increases in the (nominal – and perhaps real) costs of cryopreservation.
- Several ways to make these plans already exist.

HISTORY OF CRYOPRESERVATION MINIMUMS

To understand the likely future, let's begin by looking at the past. At the time of writing, Alcor's required minimum funding for cryopreservation is $80,000 for neuro members (or $100,000 to get the waiver of the CMS fee), and $200,000 for whole bodies members ($220,000 with CMS waiver). Here are Alcor's CP minimums over time:

Neuropreservation Funding Minimums

1982 – $35,000
1991 – $41,000
1994 – $50,000
2005 – $80,000
2018 – $80,000

Whole Body Funding Minimums

1982 – $100,000
1991 – $120,000
2005 – $150,000
2010 – $200,000
2018 – $200,000

IN THE 37 YEARS FROM 1981 TO 2018

For Neuro: That's an annualized increase of 2.26%. That's a doubling time of about 31 years. Using Bureau of Labor Statistics (BLS) numbers, $35K in Jan 1982 = $93,378 in May 2018.

For WB: That's an annualized increase of 1.89%. That's a doubling time of about 37 years. $100K in Jan 1982 = $266,795 in May 2018.

IN THE 27 YEARS FROM 1991 TO 2018

For Neuro: That's an annualized increase of 2.51%. That's a doubling time of 28 years. $41,000 in 1991 = $76,635 in May 2018.

For WB: That's an annualized increase of 1.91%. That's a doubling time of 36.6 years. $120,000 in 1991 = $215,693 in May 2018.

In other words, over the last 37 years, we have raised both neuro and whole body minimums considerably LESS than general inflation. Over the last 27 years, we have raised neuro minimums slightly more than general inflation

These increases are lower than the century-long average inflation rate of 3.2% but very close to general inflation during those periods. Both the 27- and 37- periods (but especially the former) cover a time when Alcor transitioned from unpaid or highly underpaid staff (mostly lacking medical credentials) to market-based compensation and professional personnel -- a one-time transition. It is therefore remarkable that CP minimums have not risen at a considerably faster rate.

PROGRESS TACKLING THE UNDERFUNDING PROBLEM

Many members fund their cryopreservation just barely at the minimums of the time. Quite a few still do even though we urge them to fund as much over the *current* minimum as they can. As a result, many members who joined in the 1980s and 1990s and the early 2000s, became increasingly underfunded. For too long, management and the board avoided addressing this extremely difficult and yet critical issue. After more than a year of detailed deliberation and consideration of options, the Underfunding Plan was put in place. The following demonstrates how very bad the situation was at the time of the plan's inception:

Start of the Underfunding Plan {4/12/2012}	
Number of members underfunded:	581
Total under minimum funding:	**$28,691,837**

What that means is that if all members had to be cryopreserved at that time, Alcor would lose over $28,000,000. In other words, Alcor would cease to exist. This understates the problem since, without new measures being put in place, the under-funding amount would increase over time.

Here are the most recent numbers at the time of writing:

{6/30/2018}	
Number of members underfunded:	195
Total under minimum funding:	**$8,417,899**

From the start of the detailed analysis for the Underfunding Plan over six years ago, the number of underfunded members has gone down from 581 to 195 (66%). The total under-minimum funding has gone down from $28,691,837 to $8,417,899 – a reduction of $20,273,938, or a 71% improvement in a little over six years.

That's a huge improvement. But we are left with a weighty financial burden. In addition, if members don't raise their funding over time, the situation will worsen since many members are currently funding at or somewhat above current minimums and so will become underfunded. [A reminder: all new members who joined after the underfunding plan was adopted are not part of the plan.]

GRANDFATHERING: PRACTICE VS. POLICY AND WHY IT'S A TERRIBLE IDEA

In the past, Alcor has in practice grandfathered members at the pre-existing cryopreservation minimum (for an unspecified period). However, grandfathering has never been a formal policy. For more on this, see: https://www.alcor.org/blog/securing-your-optimum-cryopreservation-3/

If you read the above and the analyses provided in the sidebar, you will understand why ***grandfathering is not a feasible solution***. It would be guaranteed to destroy Alcor. The only way it could possibly work is if Alcor's growth rate accelerated massively – and if grandfathering were not offered to new members.

Cryonics is unusual, in that you are making arrangements for something that you don't expect to need for a long time and you don't know when you will need it. It could be days, months, years, or decades from now. Imagine going to a car dealership where your attention has been caught by an attractive vehicle, listed at $20,000. You say: "I want to buy a car much like this (but maybe much better in the future) for $20,000 in today's money. I might decide to drive it off the lot in a few months. But maybe not till 40 or 50 years from now."

The dealer looks at you with disbelief. "But if you don't take the car for 50 years, given the average rate of inflation, the car will then cost $96,606! And you want to be able to give us $20,000 in 2068 dollars! We would be taking a *huge* loss! Sorry, pal, but we have a business to run here."

The only way that grandfathering early customers in perpetuity – or over long periods of time – can work is if an organization grows extremely fast. (Or, say, some person or persons were generously willing to subsidize those whose funding is no longer adequate.) Alcor cannot depend on accelerating growth. It has not happened. (Subsidies have also been very limited.) In an exchange on this topic, one person claimed that "the standard business practice for any company hoping to retain members is to simply 'grandfather' existing rates for those who have signed previous contracts". This is incorrect. Companies that grandfather in prices for early customers do so only for a limited period of time. An example: Netflix Is About

MEMBERSHIP DUES

The focus of this article is cryopreservation minimums. The other cost of Alcor membership is, of course, membership dues. These have not only not gone up (even in nominal, not real terms), they have gone down over the last 7 years. I can't guarantee that will continue, but I think it fairly likely. (Plus long-term members received discounts on dues.) For a detailed discussion, see my March 2013 Cryonics magazine article, "Past, Present, and Future of Alcor Membership Dues", also found here: https://alcor.org/Library/html/dues.html

Note that dues have come down by $95 since that was written (from $620 down to $525). At the same time prices in general have risen by about 8% (05/01/13 to 05/18), so $800 would now be $864.66. Since the last raise in dues took effect on January 1, 2011, inflation has been 14.2% up to May 2018 (the latest available numbers), so inflation-adjusted dues would have gone up to $913.94 by now.

Some have said that Alcor has never warned members about rising prices. That's not true. Setting aside our urging that new members secure funding above today's minimums, see these articles:

Alcor Underfunding Plan
May 4, 2013
https://alcor.org/Library/pdfs/AlcorUnderfundingPlan.pdf

Cryonics Life Insurance with Inflation Considerations
By Rudi Hofmann
Cryonics March-April 2012
http://www.alcor.org/Library/html/CryonicsLifeInsuranceAndInflation.html

Cryopreservation Funding and Inflation: The Need for Action (A Discussion Article
by the Management and Board of Directors of Alcor)
September 30, 2011
https://alcor.org/Library/pdfs/CryopreservationFundingAndInflation.pdf

Long-Term Financial Stability in Cryonics
By Robert A. Freitas Jr.
http://www.alcor.org/magazine/2011/01/14/long-term-financial-stability-in-cryonics/

Funding Your Cryopreservation
By Ralph C. Merkle
Cryonics, 2nd Quarter 2010
http://www.alcor.org/cryonics/Cryonics2010-2.pdf

Securing Your Optimum Cryopreservation
By Jennifer Chapman, November 12, 2010
http://www.alcor.org/blog/securing-your-optimum-cryopreservation-3/

Scenario Analysis using a Simple Econometric Model of Alcor Finances

Version 2.6, 15 October 2010
http://www.alcor.org/Library/pdfs/EconometricModelOfAlcorFinances.pdf

Funding Your Suspension – Another Viewpoint
By Paul Wakfer
Cryonics, Volume 12(11), November 1991, Issue 136
http://www.alcor.org/cryonics/cryonics9111.txt

Funding Cryonic Suspension – A Critique
By Howard S. Katz
Cryonics, Volume 12(8), August, 1991, Issue 133, p.13
http://www.alcor.org/cryonics/cryonics9108.txt

A Plea for Inflation-Proof Cryonic Financing
By Ben Best
Cryonics, Volume 12(10), October, 1991, Issue 135, page 14ff
http://www.alcor.org/cryonics/cryonics9110.txt

to Raise Prices For Grandfathered Users, As Expected. <https://lifehacker.com/netflix-is-about-to-raise-prices-for-grandfathered-user-1754050403>

If companies use grandfathering at all, they typically restrict the grandfathered customers to increasingly unappealing options. (See mobile phone plans.) If they grandfathered customers over decades, they would go out of business. That's simply not an option in cryonics.

HOW TO PLAN FOR FUTURE INCREASES IN MINIMUMS

What will happen to cryonics costs in future? This is the difficult question that needs a better answer right in the membership costs section of the website.

We are working to reduce our storage costs, but it's difficult to reduce the cost of other parts of the procedure. There is no guarantee that cryopreservation costs will closely track overall inflation, but over the last 27 years that has been the case. For 1991 to 2018:

Overall inflation: **2.3% average**
Average annualized inflation for neuro: **2.51%**
Average annualized inflation for whole body: **1.91%**

The following chart uses $100,000 for neuro to reflect the current minimum of $80,000 plus $20,000 to cover the Comprehensive Membership Standby (CMS) Waiver. Similarly, for whole body members, I'm using $220,000 as the minimum to cover the CMS Waiver. This charts assumes an average annual inflation rate of 3.2%.

Now	$100,000.00	$220,000.00
5 Years	$117,057.00	$257,526.00
10 Years	$137,024.00	$301,453.00
20 Years	$187,756.00	$413,062.00
30 Years	$257,271.00	$565,996.00
40 Years	$352,523.00	$775,551.38
50 Years	$483,042.00	$1,062,692.00

Results for 1% or 5% inflation assumptions will diverge increasingly over time. Over 50 years, with 1% inflation, $100,000 becomes $164,463. At 5% it becomes $1,146,740. The power of exponential growth at work!

DON'T PANIC! You just have to keep your funding in pace with inflation.

Just for comparison and context: At the end of May 2018, the PCT and ACT together held $13,139,958. With an annual average (real) return of 3%, those funds would grow in 75 years to $120,610,698 (with no additions from new cases). (With 3.2% inflation, the nominal amount would be $1.2 billion.) After 100 years, the current funds would grow to $252,532,017. (With 3.2% inflation, the nominal amount would be $5.38 billion.)

Perhaps a more useful way to look at this is to see what would happen to the PCT/ACT allocations per patient. For whole body patients, this is currently set at $115,000. At a 3% real return, over 75 years we end up with $1,055,576. Over 100 years, each patient would have available $2,210,143 for repair, revival, and rehabilitation. (Remember: That's in 2018 dollars.) In 2093 dollars, it would be $10,472,168. In 2118 dollars, it would be $47,113,950.

WAYS TO BUILD FUNDING OVER TIME

At this point, I hope that everyone understands why fixing cryopreservation minimums that are in effect at the time of sign-up in perpetuity is unworkable, irresponsible, and guaranteed to destroy a cryonics organization. Even if real costs of cryopreservation do not rise (that is, they do not outpace general inflation), nominal costs will (unless we enter an unprecedented and prolonged period of deflation). So, what can you do to plan for that inevitability? Here are some options, each of which need far more detailed discussion than I can provide here:

1. Buy life insurance for an amount well above the current CP minimum. This is more likely to be affordable if you are young, in good health, and have a decent income. It is also easier for neuro members, since it doesn't seem to be much more costly to get $200,000 in coverage than $100,000.
2. Buy a life insurance policy that can reasonably be expected to increase in nominal value over time – hopefully enough to keep pace with inflation.
3. Periodically add to a pre-paid account. In the past, this wasn't very appealing because we parked those funds in a bank account which, in recent years, earned close to zero. I believe we are close to creating new prepaid accounts that will keep pace with inflation.
4. Trusts. Build up your investments and set up a trust. If your current funding fell below the minimum at some point, you could use a trust to cover the difference.
5. Alternative funding options. You may be able to make up for part of a shortfall in funding using the alternative funding options as discussed here:
   https://www.alcor.org/blog/alternative-funding-methods-introduced/
   https://alcor.org/BecomeMember/sdfunding.htm ■

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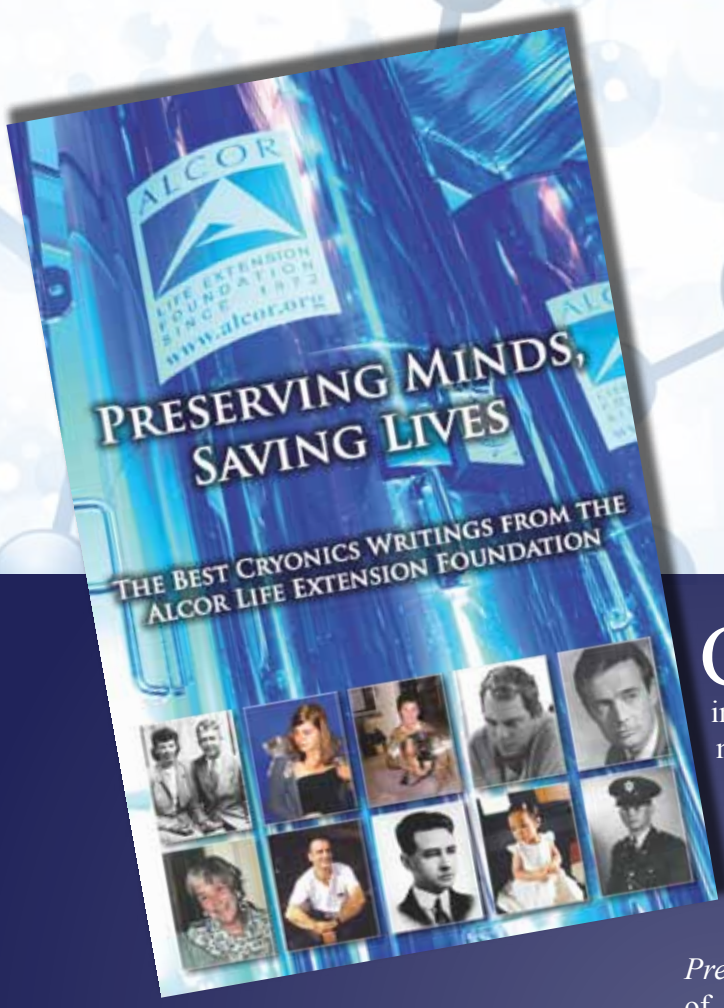
Preserving Minds, Saving Lives

The Best Cryonics Writings of The Alcor Life Extension Foundation



"Cryonics *magazine introduced me to Alcor and cryonics at its best back in 1983. The visions and technological breakthroughs that you will read about in this book continue to shape Alcor's mission to preserve life through science."*

– Max More, Ph.D.
President and CEO of Alcor

Cryonics is an experimental medical procedure that uses ultra-low temperatures to put critically ill people into a state of metabolic arrest to give them access to medical advances of the future. Since its inception in the early 1960s, the practice of cryonics has moved from a theoretical concept to an evidence-based practice that uses emergency medical procedures and modern vitrification technologies to eliminate ice formation.

Preserving Minds, Saving Lives offers an ambitious collection of articles about cryonics and the Alcor Life Extension Foundation. From its humble beginnings in 1972, and its first human cryonics patient in 1976, Alcor has grown to a professional organization with more than 1,000 members, more than 150 human patients, and more than 60 pets, all awaiting a chance to be restored to good health and continue their lives.

This book presents some of the best cryonics writings from *Cryonics* magazine from 1981 to 2012. There are clear expositions of the rationale behind cryonics, its scientific validation, and the evolution of Alcor procedures. Also covered are repair and resuscitation scenarios, philosophical issues associated with cryonics, and debates within the cryonics community itself.

Soft Cover Edition: $20 – Hard Cover Edition: $35
To order your copy, go to: www.alcor.org/book
or call 1-877-GO ALCOR (462-5267)

Bring in a NEW member and save a year of dues!

Membership growth has been slowly accelerating since bottoming out in 2013. But we would benefit from faster growth. Alcor is now at a point where we could enjoy considerable economies of scale: We could manage many more members with minimal or no increase in staffing costs. That would enable us to *reduce membership dues* while building up our resources. A modest acceleration in membership growth would move us into a virtuous circle where growth enables reductions in dues which further spurs membership growth. Growth will also make it easier to hire highly skilled people in medical and technical areas.

The most effective way to bring in new members has been through direct encouragement by existing members. Many of us realize this, but may not make it a priority to nudge our friends a little more to sign up and potentially save their lives. How can we spur more members to gently persuade those they care about to move ahead with making cryonics arrangements? Perhaps some financial incentive will help.

Anyone who is primarily responsible for getting a new member to sign up will, at their request, be given a one-year waiver of membership dues.

For an existing member to receive the dues waiver, they must (a) be credited by the person who has signed up; (b) ask for the waiver; (c) not be otherwise profiting from the signup; (d) wait until the new member has completed all essential cryopreservation paperwork and has paid at least six months of dues; and (e) the new member must not be a member of their family. If the member signs up two new members, they are eligible for a two-year waiver of dues. If the new member is a student, the existing member is eligible for a waiver of six months of dues.

Who do you know who could do with some encouragement to sign up? Please, give it some thought, then help yourself and help the organization by helping to stimulate membership growth. Bring in one new member per year, and you will never pay dues again!

ALCOR
ALCOR LIFE EXTENSION FOUNDATION
The World's Leader in Cryonics

Member Profile
Michael Benjamin

By Nicole Weinstock

A portrait in profile of Michael by a subway artist in NYC around 2002.

"A cat has nine lives. For three he plays, for three he strays and for the last three he stays." Or at least, so goes the ancient proverb describing the furry felines that now nibble their kibble in every third American household.

While the numbers in question are read arbitrarily, they do hint at the cat's proven ability to survive situations in which their canine or human companions would surely perish. It is a rather stunning fact that of the 132 cats that were admitted to Manhattan's 62nd Street Animal Medical Center in 1984 for falling between two and 32 stories, 107 survived.

Michael Benjamin, a native New Yorker and fellow cryonicist, does not own a cat and has yet to fall out his window. But in his lifetime, he has endured several life-threatening health issues and an incurable autoimmune disease. One cannot help but draw some parallels between Michael and these cats. Curiosity only seems to fuel his resilience, focus, and zeal for life.

WHERE BAGELS ARE JUST BETTER

It's no surprise when Michael laughs and says, "There was absolutely nothing typical about [my] family in any way, shape, or form." His parents grew up in communities known for industry, his mother from Detroit, and his father from Queens. They both met at Columbia University, pursuing Russian Studies and Mechanical Engineering, respectively.

Mr. Benjamin worked as a programmer, physicist, and mathematician for most of his life, while Mrs. Benjamin went from civil rights to residential apartment management and executive recruiting to politics – at one point she was Vice Chair of the Reform Party with Ross Perot. Michael, their eldest of two sons, is very much the child of his parents given his composite interests in STEM and the arts, as well as his unrelenting spirit of inquiry.

Michael and his daughter in the late 90s at their home on Staten Island, NY.

Michael had shown great interest in science as a youngster. He used to read *Odyssey*, a monthly astronomy magazine for middle-school aged kids and precocious 4th and 5th graders. But a change in geography may've dampened that passion ever so slightly. While he grew up in New York City, attending a private school in Staten Island through tenth grade, his family was one of many that moved west into perceived enemy territory: New Jersey.

Evidently, the age-old tension between the Garden State and the Big Apple was no less then than it is now. "My first class, the homeroom class, happened to be run by the physics teacher in the school. The first thing he did was the roster. Instead of me saying 'here,' pronouncing my r's, I say, 'heeyah,' like a New Yorker. And he went into this diatribe of anti-New York rhetoric. And that was my first day, my first hour, in high school in New Jersey. Unfortunately, it also was my first real academic experience with physics. Needless to say, that year of physics with this teacher not only turned me off to physics, but to science altogether for about 10 years."

Needless to say, New Jersey wasn't a long-term endeavor for Michael. Though his parents stayed, he moved back to Staten Island within a couple years of high school graduation. What did it feel like to be back in New York? "Home, right? That's pretty much what it is." And of course, Michael

Michael hunts for geodes in the Florida Mountains of southern New Mexico in 2006.

admits with a chuckle, "The bagels were better, and the pizza was better."

COMING FULL CIRCLE

After a brief stint of college in business administration, Michael decided to strike out on his own. For some young adults, *staying* the course is a challenge. But for Michael, it was *defining* the course. "I was clueless from the beginning of high school until my late twenties, as far as what I wanted to do. I did all kinds of things. I tried recruiting, I drove a truck for a few years for a medical supply company. I did all these different jobs until I went back to school at 27. I finally went back to what I knew I was interested in when I was nine. Physics!"

Michael started by taking classes at the College of Staten Island (CSI). While he had finally narrowed his academic-professional path, he experienced his first major health setback in the form of listeria, a rare but serious case of food poisoning. He was hospitalized for three days. "I literally almost bled to death. When I walked into the doctor's office, the whole place got quiet and they called an ambulance immediately...When I returned to the office four days later, they all came up to me so happy." As can only be said by someone who's seen much worse, he laughingly adds, "I guess they thought I was gonna die on the spot."

The upside of the food poisoning was that it kicked Michael into a lasting healthier lifestyle. "I lost 100 pounds in two months, because I couldn't eat. And I basically spent a year only able to eat chicken, rice, and shrimp; no roughage." Now years later, he's still kept that weight off.

After recovering from the listeria and redirecting his attention back to school, Michael decided CSI's physics program wasn't as strong as he needed. He transferred to Hunter College in Manhattan where his instinct was well-rewarded; he was able to participate in experiments out at Brookhaven National Labs in Long Island as well as intern with NASA.

Michael left a strong impression in his next role at NASA as an undergrad research assistant. So much so, that his NASA mentor offered to fund part of a PhD program, pending his acceptance. Michael applied to and was accepted at Catholic University in Washington DC, and was already three weeks into his new home when he learned that NASA Headquarters had made funding cuts that impacted his education.

Disheartened by this unexpected turn of events, he returned to New York to pursue graduate school at his alma mater, Hunter College. A year in, he got a fateful phone call from home. "My father worked for Lockheed Martin at the time, and he called me one day, and said they were having a job fair at 7am the next morning, 'So come down.' So I did. I had a 10-minute interview and they hired me."

Michael commuted from Manhattan and Brooklyn to South Jersey – a two-hour commute each way, with the occasional night at his parents' (who still lived in Jersey) – for one and a half years. But after some reflection, and what was surely a serious case of drivers' fatigue, he decided that he wanted to return to the area of his real passion, space. He was eventually offered a job in a division of Lockheed Martin in New Mexico, which he gladly accepted.

WHEN AN APPLE A DAY FALLS SHORT

"I get to the hotel at night. I wake up in the morning. I open my shades, and there's these gigantic mountains in front of my window. It was awesome, frankly, to see that for the first time," says Michael. Though he did manage to break a foot on his first New Mexico hike, he lived and worked in the Land of Enchantment for two years until he was diagnosed with cancer during a training trip in Washington, DC. Concerned about the quality of care in the southwest, Michael decided to transfer back east for work and better treatment options.

Within the year after his cancer diagnosis, Michael started noticing changes in his hand dexterity, a nagging stiffness. "I went to my GP in DC and he immediately said I needed to see a rheumatologist. One of the top scleroderma doctors in the world happened to be at Georgetown." This was but a silver lining to his imminent diagnosis of scleroderma.

A rare but chronic connective tissue disease, scleroderma is the progressive fibrosis, or scarring, of the body's skin and organs. The finger stiffening that Michael initially experienced is a common symptom of its earliest stages. He continued to work but experienced some serious deterioration in his heart. "I go to one of my normal doctor visits in April 2012, and the nurse

Inevitably cold weather calls for beanies and heavy jackets during Michael's visit to the Flumserberg Ski Resort in the Swiss Alps in 2005.

A sense of accomplishment lights Michael's face during this Hawaiian fishing trip in July 2012.

that's taking my vitals said, 'Why is your heart rate 130?' I didn't even notice. So they immediately called the ambulance to bring me to the main hospital."

After a barrage of tests, they found out that there were pockets of fibrosis in his heart, stiffening the muscle and causing electrical problems. "At that point, I probably felt worse after the hospital than before," says Michael.

This initial discovery was followed by a cardiac ablation, but not before Michael took a good old-fashioned vacation to see if some relaxation would improve things. Unfortunately, the beach-driven week with friends in Hawaii was not quite as healing as he'd hoped. "I couldn't sit down by myself and get up by myself. It had gotten really bad, and so I said, 'Vacation's not working, so I need to take medical leave.'" His leave began in August 2012.

Michael's painting, "Quilt," an oil on canvas from 1998.

ON LEAVE, BUT EVER PRESENT

Scleroderma is a known autoimmune disease, but it is still quite rare; only an estimated 2.5 million people have been diagnosed with it worldwide. And while medical leave is often perceived to be a time of greater latency, Michael used his curiosity, intelligence, and powers of observation to transform his leave into a vehicle for medical advancement. He founded the Global Scleroderma Initiative (GSI) to explore different technologies that might improve daily living for scleroderma patients and maybe eventually find a cure.

Additionally, he began to serve as a source of information for his own team of doctors. "I sit down and read all the medically related research papers I can find, and I go back to my doctors and say, 'What about this? What about this?' Sometimes I tell the doctors about things they don't know about." He even plays show-and-tell now and again for the medical students of his rheumatologist, a professor at Weill Cornell Medical College.

Michael's value in providing unique insights to the field became particularly evident during his 2-month stay in Bali. The six-month Bali plan was upset by breathing issues just a couple months in. He headed to Bangkok for better medical care, but the doctors simply couldn't pinpoint the cause, so Michael took to his own research for answers. "Two weeks later, Google and I figured out what I had." And sure enough, when he returned to the doctor with a desired list of tests and cash payment, Michael and the almighty Google were right. He had indeed suffered from pulmonary embolisms, FOUR OF THEM! "I don't know how I'm still standing here," Michael reflects. "It's unbelievable all the medical stuff I've had."

Those five years of medical leave also formed a diving board for Michael's pursuit of other subsets of technology and futurism. Michael started *The Science Mic*, an online science news aggregator, discovered transhumanism, and unsurprisingly, cryonics soon thereafter. He began his membership with Alcor in 2015. "Death is not a requirement for new ideas to flourish. There can be an injection of new ideas and change for the future without death."

ON MORTALITY AND COPING

Close encounters of the mortal kind have shaped more than one cryonicist in past, and Michael acknowledges its influence in his membership initiation as well. "I don't have any religious beliefs, and I'm 48 now, so it's not time to go as far as I'm concerned." He still has plans. Michael is embarking on a Masters degree in Pure Mathematics at Hunter College and afterwards, a PhD in Theoretical Physics. "The disease is going to progress," he admits. "There's really not much I can do to slow that down. It's unpredictable. But, in the meantime, wouldn't it be cool to wake up in 500 years and hop a shuttle to Mars?"

The level of uncertainty inherent to scleroderma is unnerving for most, but Michael's character lends him strength in pursuing life goals regardless. "I was already ... a non-conformist. I don't fit in any particular category. That personality makes it easier to do things that you feel like you need to do where people might look at you funny. You just don't give a shit."

In addition to his independence, Michael called upon some literary and philosophical resources for support. He began reading up on Buddhist philosophy and meditation. "It had an impact on how I thought about my place in the world, what really matters, what's important, what's really not that important." When it comes down to it, Michael says, "Some people want to spend their lives travelling the world. Some people

"Splash," Michael's oil on canvas painting from 2010.

Michael's painting, "Le Fleur," an oil on canvas from 2010.

Michael captured a quick close-up of a pin from his participation in the March for Science in NYC on April 22, 2017. He was accompanied by others from the NY Academy of Sciences.

In Times Square NYC, Michael and his daughter share a meal at Junior's Restaurant, made famous for its cheesecake, in June 2017

want to do physics." (He's actually done both.)

INSPIRATION FOR THE FUTURE

Michael has begun a trial period of returning to work this year. He is putting his technological know-how to use, developing applications on an AI platform. While life is busier, he still finds time to enjoy family and hobbies. His 23-year old daughter and 9-month old grandson live just a short trip away on nearby Staten Island. And, being in New York, he has no shortage of resources to fill his love of both the arts and the sciences.

"You had all these great physicists at the beginning of the 20th century – Einstein, Max Planck, etc. And at that time, the humanities was a big part of education along with the STEM education. It was a 'liberal arts science education,' if that's what you want to call it. As technology has advanced, STEM education has become more specialized and we've lost the humanities part of science education. The way I think about it, if you don't have a wide breadth of perspectives, you lose the ability to look at things in different ways, which is essential to solving problems and pushing science forward."

Michael and his grandson Grayson pose cheek to cheek in the Staten Island Mall in March 2018.

That's one reason, apart from pure enjoyment, that Michael pursues oil painting and classical music appreciation in his free time. When it comes to the brush, he is a studied fan of the Cubist and Impressionist movements, with a distinct preference for Braque over Picasso, and Manet over Monet. His music taste showcases Mozart, Beethoven, Chopin, Mendelssohn, Dvorak and Arcangelo Corelli, to name a few.

Perhaps the bridge that unites his self-titled "liberal arts science education" is his reading list. The nooks and crannies of his apartment have the constant companionship of his many books in process, ranging from the Dalai Lama's *The Universe in a Single Atom*, to Carlo Rovelli's *The Order of Time*, to Ray Kurzweil's *The Singularity Is Near: When Humans Transcend Biology*, to Yuval Noah Harari's *Sapiens: A Brief History of Humankind* and *Homo Deus: A Brief History of Tomorrow*.

His collection genuinely reinforces the future that he strives to create through his own example: "I would like to see a global altruistic society that focuses on the betterment and happiness of every human being, where illness is no more and suffering has been minimized as much as possible." ■

Society for Cryobiology No Longer Openly Hostile to Cryonics

By R. Michael Perry

On 15 September, 1982, the Society for Cryobiology adopted revised bylaws, which explicitly singled out cryonicists as targets for denial of, or expulsion from, membership in the Society.[1] Quoting from Section 2.04, "Denial of Membership and Discipline of Members":

> "Upon a two-thirds vote of the Governors in office, the Board of Governors may refuse membership to applicants, or suspend or expel members (including both individual and institutional members), whose conduct is deemed detrimental to the Society, including applicants or members engaged in or who promote any practice or application which the Board of Governors deems incompatible with the ethical and scientific standards of the Society or as misrepresenting the science of cryobiology, including any practice or application of freezing deceased persons in the anticipation of their reanimation. …"[2]

This provision remained in the bylaws for many years, but finally has been modified to remove the explicit, anti-cryonics content. In the latest version of the bylaws, whose adoption was announced 17 January 2018,[3] the amended passage (now Section 3.04) reads:

> "Upon a two-thirds vote of the Governors in office, the Board of Governors may refuse membership to applicants, or suspend or expel members (including individual, institutional, corporate, or student members), whose conduct is deemed detrimental to the Society, including applicants or members engaged in or who promote any practice or application which the Board of Governors deems incompatible with the ethical and scientific standards of the Society or as misrepresenting the science of cryobiology. …"[4]

Bravo!

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TWO FOR THE FUTURE:
CONTRASTING VIEWS OF FUTURE PROSPECTS BY TWO CRYONICIST AUTHORS

By R. Michael Perry

INTRODUCTION

As cryonicists we are more or less in general agreement that we seek a longer life than the present "natural" span of years. (It is, however, "natural" that we should do so, and if we succeed, well, that would surely come to be seen as a "natural" outcome also, why not?) On one hand, cryonicists focus on sustaining and conserving what is here already – themselves in particular, and others they care about. On the other, there is the anticipation of future benefits, a world with possibilities beyond those of today. In this article we consider some works by two authors who are both cryonicists and had signed up with Alcor. Each offers their own reasons for choosing the cryonics arrangements they made and what led up to this choice. (Disclaimer: current cryonics arrangements in either case may differ.) Though united by the perspective of having chosen cryonics, the two authors in fact hold rather different views of what should be possible in the future and how that affects their lives and perspectives today. These views can be seen as an outgrowth of a similar division in more general society, particularly in Western thinking over the past several centuries.

Cryonics is an attempt to address the problem of death, but it is far from the first such attempt. Primitive humans sought to understand the world they lived in and their place in terms of life and death issues. The world and all that was in it could be divided into two types of things, things without consciousness, which could include living as well as nonliving things, and things with consciousness: living, sentient beings. Such beings were self-moved and able to act based on an internal constitution or "will." Sentient beings included earthly humans and animals, and also, some thought, celestial objects such as stars and planets since these too seemed to be moving of their own accord, and not just in response to applied external forces. (Modern physics, of course, teaches the contrary.)

More generally, many believed, there were sentient agents or a single agent whose powers were beyond the human level and which exerted profound effects on our world and might also be appealed to for assistance in confronting the difficult problems of life, including death. Regarding the latter, many had hopes of an afterlife based on interactions in this life with such an agent or agents.

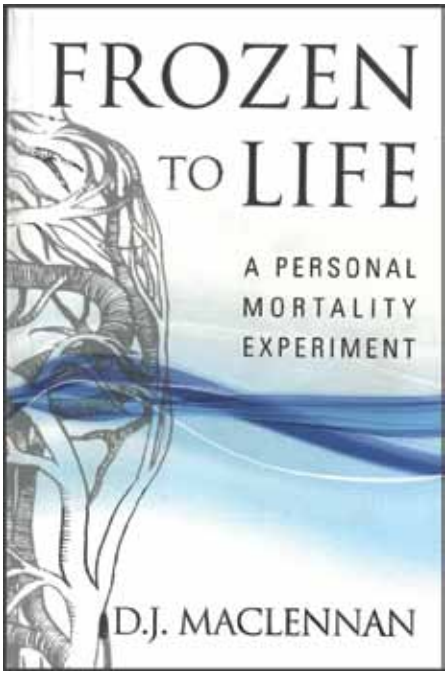
Alongside these views were those of such schools as Epicureanism which held that, essentially, the world is a place where superhuman sentient agents, if they exist, are not worthy targets of appeal in times of crisis. In practical terms, the world was what our senses told us it was, and our death was inevitable and final, and we had to come to terms with it on those premises.

For many centuries the first, essentially religious view prevailed in thinking circles in the West as well as among the common people (and elsewhere too). But with the Enlightenment and subsequent events the second, secular point of view gained a wider following, bolstered by scientific discoveries and theories, and today many endorse it. Many cryonicists, including the two authors considered here, also have a secular outlook, but cryonics itself introduces what amounts to a third, revolutionary alternative: a possibility, at least, of surviving clinical death and living on indefinitely through technology to be developed during the period of "dormancy" when one is safely cryopreserved.

Such an alternative in turn gives rise to its own, somewhat diverging patterns of thought, as exemplified in the works considered here. First is what I would call a more conservative attitude, shown in Donald John "DJ" MacLennan's book, *Frozen to Life: A Personal Mortality Experiment*.[1] MacLennan eyes the world through lenses a modern, mainstream physicist would be comfortable with. There does not appear to be anything like a "soul" that survives your death. But cryonics does provide a possibility that you could come back in the future, assuming you are well-preserved and stay that way, and it's a chance worth taking. (I've also used additional materials by MacLennan.) Tripper McCarthy, in his book, *The Path of the Eternal Song*, offers a far more radical and optimistic point of view, that essentially everyone is resurrectable regardless of their state of preservation after death, based on elaborated, informational, not mystical, considerations. With such a prospect, could cryonics make any difference? Tripper argues that it could, and explains why this is his preferred alternative despite the hopes

of others coming back by other means as necessary.

In addition to a pro-cryonics philosophical outlook each of the books offers its own life story, of a struggle against adversity that involves others and a whole culture. It's the human drama that makes their stories especially appealing, and maybe more acceptable to those on the outside who find cryonics problematic.



D.J. MacLennan

Near the beginning of his book MacLennan makes clear his rather unusual (to the mainstream) intentions regarding the treatment of his remains after clinical death: "I have chosen to be cryonically preserved after my death – to be 'vitrified', head only, at liquid-nitrogen temperature, in a compartment of a huge stainless-steel container called a *dewar*. People sometimes ask me about this. Generally, they ask in a clipped, detached way that indicates to me that they want me to keep the explanation short, painless, clean, and death-free. …"[2] A little later he clarifies his views on the issue of mortality:

> "I find your death horrifying. Not just that you *will* die but what they will do with your precious configuration afterwards. They will burn you up, as if in dreadful mockery of the fires of the stars that created your constituent elements. Or they will put you in a box, down in the ground-rock and decayed vegetable matter that swathes parts of this beautiful planet. They will allow you to dissipate. This is what happens. These are the conventions. This is respect.
>
> "But what else could they have done? They could have paused you. They could have waited."[3]

Further on, near the end of the book, there is a brief recounting of scientific advances that give hope that cryopreservation may prove reversible as its advocates think it will. There is encouraging progress in nanotechnology in particular, which seems able to lead to advanced medical nanorobots or "medichines." Still, the author is cautious:

> "Despite all of this progress, I accept that there is a strong likelihood that there will be some unforeseen problem with the 'plans' (whatever form they happen to take), and that as a result, scientists (even ones with medichines) will not be able to reconstruct me. I do not accept that, because of this likelihood, I should abandon a hypothesis that if true will save me and many others from otherwise certain dissolution.
>
> "What is so special about *my* pattern that it should be saved? I would be entitled to ask in response to such a question, what is so *un*special about yours that it should not?"[4]

MacLennan tells us that he was about four years old when he first really understood something about death. He was bouncing along in the back seat of the family auto with some siblings, happy and carefree, when his mom who was driving said something about an animal dying, and he asked if she would die too. Laughing, she replied, yes of course, everybody died eventually, but it wouldn't happen for a long time. The remark was intended to be lighthearted, but the young boy wouldn't see it that way, and cried inconsolably.

In general, death became a worry beyond what it was to those around him. He recalls, for example, being afraid to go on fishing expeditions with his father and brothers because of the sudden squalls that would blow up around the Scottish island where they lived. Sometimes the motor-boat's engine would sputter and stop just when needed to escape the coming storm, and getting through this danger was not the great thrill to him that the others found it.

In school he had a teacher who liked science fiction, and showed him an intriguing story about a severely injured man whose death is averted by transplanting his brain into a donor body. Later MacLennan began to think about a scientific approach more generally to the problem of death. Religious traditions, on the other hand, he found forbidding and alienating, particularly regarding what was done, in a ritualized practice, after someone died. The body, previously vibrant with life, now still and cold, was lowered into the ground, to be spoken of no more, in a service which reminded the listeners that they are sinners and must pass through a "narrow gate" to have any hope of a bearable hereafter themselves. "[I]t always sounded wrong to me, even when I was a small child. It rang with suffering, with hopelessness, and with blank resignation. It rang, like a cracked but still-sonorous bell, with evil."[5]

This alienation (supported by his atheist-leaning mother who dampened his father's half-hearted efforts to involve the family in church attendance) did not preclude a study of the effects of religious traditions and ideas about the soul and afterlife. One notable observation was how traditional views tended to clash with ideas of modern life-extensionists who were focused on the individual's life versus the more communal perspective of the traditionalists:

> "It may not be possible to draw useful conclusions about the emergence of ideas of 'immortality' or 'the soul' from

the historical record, because our ideas are so coloured by modern, individualistic materialistic interpretations of what 'survival' means. We have, perhaps, lost sight of an active, integrated contributor who had been raised to that status at great cost to the group. In that context, transmission of the stories, deeds, and *role* of that lost contributor to other group members may have carried a significance that was 'alive' to them in ways that we simply cannot grasp."[6]

MacLennan, then, is not much inspired by past religious traditions, even if one ignores the appeal to a superhuman agency and focuses only on the end result, a life beyond death. Instead, though, he grew up with great appreciation and fascination for science and its possibilities for understanding and also shaping our reality. Cryonics, when he finally heard about it, seemed a logical choice, as recounted in an online interview:

"I think I'm a very sort of practical, pragmatic person, and when I first heard about cryonics, it didn't come as a shock to me in the same way as it does to other people. I think I first heard about cryonics about 2003 in a newspaper article, and to me it just seemed like a sensible, pragmatic thing to do, I guess because I don't have any spiritual beliefs. There was no blockage there to considering the idea, so I just thought it was an interesting and practical idea. It was only later on that I actually decided to pursue it for myself. But I didn't think there was anything odd about somebody choosing to be cryopreserved after their death."[7]

In the same interview MacLennan delves into why he decided to write his book:

"Well, I think it's partly to do with family. I have a large family. I've got four brothers and a sister. Fortunately, both my parents are still alive, and they're all intelligent people and they had different questions, and they kept asking me about this. But I still had this nagging feeling, no matter how many conversations we had, we weren't really getting to the nub of this thing, and I felt that I really needed to get the science thing properly, to explain it to them. But also, because we're all individuals, although we grew up together, you don't see directly inside somebody else's head. I don't think they understood the extent to which I was a fearful child, and [that] this thing about death was building up in me for a long, long time, and that I wanted to try and do something practical about it. Because, as I say, I'm practical and pragmatic, but I'm also emotional and very much in love with life, and I wanted to kind of try and marry those two elements together – the emotion of my feeling about my life and my wife and my family, but also that kind of pragmatic aspect. How can we make this persist? How can we keep this wonderful thing that we have going for longer, without seeing it all wither away and die?" [8]

Tripper McCarthy, in his book, The Path of the Eternal Song***, offers a far more radical and optimistic point of view, that essentially everyone is resurrectable regardless of their state of preservation after death, based on elaborated, informational, not mystical, considerations.***

As for the possibility of life after death, in his book MacLennan summarizes two opposing viewpoints:

"(a) You think that there is some element of what 'you' are that is separate from your physical brain and body. You may or may not think of this 'separate element' as a 'soul' or other *religious* concept, but you *do*, at least, believe that there is *something* more than 'just' your physical brain and body that constitutes *you*. You think that this element is *more* than or other than *consciousness* brought about by your physical brain and body. You may think 'soul' is a good word for describing this other thing, and you may believe that this other thing will survive your death.

"(b) You *do not* think that there is some element of what 'you' are that is separate from your physical brain and body. As a result of this, you do not think that 'you' will continue in any 'spiritual' way after your death. You may or may not find the term 'soul' useful shorthand for describing otherwise tricky concepts such as *consciousness*."[9]

It should not seem surprising that the "practical and pragmatic" MacLennan believes that, of the two viewpoints, (b) is correct, because (quite simply) "everything is made of atoms." Though not having any "spiritual beliefs," MacLennan became attracted to Buddhism, which in its older, Theravada form ("Buddhism without beliefs") can be considered a moral philosophy rather than a religion. Buddhism teaches "the impermanence of all things" (*anicca*), "the nonexistence of the soul" (*anatta*), and the prevalence of *dukkha*, or suffering. On the face of it, this seems rather to fly in the face of thoughts of the importance of the individual, the possibility and desirability of radical life extension, and the likelihood of a future where aging, diseases, and so much else which causes suffering are eliminated. If these motivating elements have dismal prospects, as Buddhism seems to imply, and one finds Buddhism appealing, how then would the choice of cryonics also seem justifiable and desirable? MacLennan offers these thoughts in an essay:

"We want to live. We want to provide for ourselves and our loved ones. We want to learn, to grow, to change, to 'better' ourselves; are these not ways of 'becoming'? Buddhism is not blind to the exigencies of the life of the layman. The early texts make clear that only those

seeking the ascetic life for the purposes of learning the teachings in detail then passing them on to others are expected to live as monks. The more mundane texts provide simple guidance for all on how to live a modest, careful, mindful, *joyful*, moral life. Profligacy, recklessness, and excess are discouraged; health of mind, body, relationship, and community are encouraged. All should seek to alleviate suffering.

"Is cryonic preservation a profligate, reckless, or excessive choice? Will it increase our suffering, and/or will it cause suffering to others? The answers to these questions seem to depend upon the spirit in which we approach it. Cryonicists could reasonably claim that it is the *opposite* of reckless, and that those who do *not* make careful preparations for their further futures are the ones behaving recklessly. It is possible that dwelling on our death and subsequent cryopreservation will increase our suffering, and it is also possible that our choice will cause anguish to those closest to us. We do not know the 'karmic' repercussions of our choice, but it is difficult to see how it could cause harm to future persons.

"From a Buddhist perspective, it must be at least incumbent upon cryonicists to take a carefully considered approach to their future suspension. Everything possible should be done to minimize any negative impacts of that choice. And once the decision is made, we should not obsess about it, otherwise we may lose our joy in the life we already have. The 'prospect of immortality' may free us from the fear of death, but we should not defile it with *attaching* behavior that locks us into a waiting, grasping, expectant mindset."[10]

As for immortality itself, it appears that MacLennan is doubtful at best. With his Buddhist leanings he is committed to viewing life as comprising an "anattasphere" in which individuals, properly speaking, don't exist though elements we normally think of as making up individuals might. When "someone dies" (as we usually understand it) traces of them remain in memories and records over a protracted, "liminal" period, until finally being entirely lost:

> "Because we do not exist as individuals in the anattasphere, we are not summarily deleted from it when our brain and body die. Some traces of our network of actions remain imprinted on the system for a time, after our death. These traces gradually fade out as the system forgets our actions. Some individual traces remain strongly imprinted, perhaps for hundreds of years, but these eventually fade as the ripples from those actions weaken to irrelevance. Call this 'stage' a type of liminality if you must; it is certainly no immortality. …"[11]

Presumably, then, cryonics could be a stepping-stone to a longer life, possibly much longer, but the life of any one of us (as usually and reasonably understood) must eventually end, never to be resumed. In the meantime we can find reasons to be hopeful and joyful about living, and can rightly seek to extend our lives as far as possible, even by such means as cryonics.

Dare we hope for anything more? That will be subject of what follows, where we consider the viewpoint and arguments of Tripper McCarthy. A preliminary "intermezzo" will help clarify issues and introduce possibilities of revival that are often overlooked.

INTERMEZZO: IS DEATH IN A PERMANENT SENSE REALLY POSSIBLE?

Reality as a whole is vast. It includes the visible universe, estimated to be about 14 billion years old and 93 billion light years (8.8×10^{26} meters) in diameter.[12] (Space has inflated during the 14 billion years of the universe's existence so the diameter of the universe is greater than the distance light could have traveled in this amount of time, with unexpanding space.) Intuition suggests that, as big as this (finite) volume of spacetime is, it isn't everything – why should it be? Instead, it's plausible that there is more outside this "Hubble volume" we call our home and it may go on forever. Max Tegmark is one noted cosmologist who thinks so, based on some simple conjectures that seem to be borne out by astronomical evidence, or at least for which no strong contrary evidence has been found. His observations and speculations are found in his book, *Our Mathematical Universe*. There he draws some startling conclusions that (though he doesn't say so) have a bearing on whether it is possible to die, if "to die" is appropriately understood.

If individuals can always recover from what would otherwise be death, and become ever-developing continuers, the possibility is opened that they could be truly immortal."

We must consider just what it means to die. Death we might define as the irreversible loss of consciousness in an individual, from whatever cause. (Granted, this is a simplistic definition but it should serve our purposes here.) If, on the other hand, full consciousness with memories, dispositions and so on can be restored, something close to the "same" individual is now conscious again. How close is close enough? When can individuals which are "essentially" identical be considered "really" the same? If you are asleep and a copy of you could be made and awakened, while your original body is destroyed, would you be dead or would you, the "real" you, "live on" in the copy? Many at least would accept that you would indeed live on in the copy, and more generally, that death only occurs with the permanent loss of information that encodes important features of your identity, again, memories, dispositions, and so on. This is "information-theoretic death." With sufficient information, it should be possible in the more technologically advanced future to create a functioning copy of you, so you would survive even if your physical remains had perished. (A version of this scenario is to imagine the personality information is uploaded to an advanced future computer so that a suitable equivalent of you "wakes

up" and resumes life in a virtual reality setting with suitable ties to the outside world. But the "upload" might also be to a biological body and brain similar to or incorporating part of the original.)

Opponents of this viewpoint are often bothered by the "copy problem": The reconstructed individual might be "just a copy" not the "original." Defenders might respond that one does not remain "the same" over time anyway, with the many exchanges of matter that take place with normal metabolism, along with normal aging and psychological changes. Thus one is always, at best, no more than a "copy" of one's former self. Indeed, one's future self is not expected to be "the same" as one's present or past selves, but only a *continuer* of these, someone for which once-ongoing experiences have been reduced to memories, and who is currently having new experiences to add to the total, and carrying out new activities. Here we shall adopt a viewpoint favorable to the information-theoretic criterion. A person, then, is best viewed as an evolving *pattern*, informational in essence, and not a material object.

Another problem the anti-copy people bring up is to ask, if multiple copies of you were created, and you do in fact survive in a copy, which of these copies would you be? A short answer that I find acceptable is, that, in effect, your identity is distributed over all identical (or sufficiently close) copies of yourself, so that no one of these instantiations is individually, exclusively "you" but instead all collectively participate on a more-or-less equal footing. If changes happen so that some of these once-close-enough copies differ significantly from others, then the original set of copies is partitioned into subsets in such a way that the one individual fissions into more than one. Again, I find no inconsistency or incoherence in this way of thinking (with some appeal to quantum graininess to insure that the subset boundaries in this case are sharp).

In this case, for you to "die" means for you to perish in such a way that in all of reality, nothing that can be considered a proper continuer of you will ever exist. A "proper continuer" is a being that has your memories, dispositions, et cetera, thinks it is you, and has also had some additional experience or experiences to add to the total. Your death would, of course, require the destruction of a sufficient amount of your identity-critical information that no reasonable reconstruction of the person you were is possible. Once the information is lost, it is seemingly lost forever. Persons who have died already, and whose remains have perished, are seemingly barred from ever living again – there is no life after clinical death, unless such a means as cryonics is employed, and succeeds. But must we accept this dismal conclusion? Some are hopeful of recovering information that appears to be lost through some advanced process of the future that is currently unknown. In this way, perhaps it will be possible to completely recover the identity-critical information or pattern of past individuals so that they (in the usual copy form) can be resurrected. I am not optimistic about this prospect, and discount it here. Instead, I ask if, given that the information is not recoverable in the usual sense, is it still possible (and inevitable) that for every vanished person a proper continuer will (or does) exist. It seems that if reality as a whole is "big enough" such a prospect is inevitable, so in this sense, death, a permanent loss of consciousness that precludes the emergence anywhere of a proper continuer of oneself, is impossible.

So how big can we be confident that reality is? At least as big as the visible universe, yes, but would that be enough to guarantee such possibilities as we have been discussing, including the overwhelming likelihood of continuers of arbitrary, perishing individuals coming into existence to dispel the possibility of someone dying? On good authority (see below) it can be accepted that the answer is *no*, a spacetime volume like ours, big though it is in everyday terms, would be much, much too small, and we must look beyond it for what we are seeking.

The word *multiverse* is often used to refer to a hypothetical extension of reality beyond the visible universe, our Hubble volume (named after the early-20th-century astronomer Edwin Hubble).[13] It could involve other entire Hubble volumes like ours but all part of one, connected whole, all with the same physical laws, or perhaps separate universes that are not connected, have different physical laws, and do not substantially interact. For our speculative purposes here it doesn't matter exactly what form reality as a whole may take, just that the amount of happenings or "eventing" be unlimited and cover all possibilities for which there is a nonzero probability. If we had such a multiverse, then, for example, there would be another individual just like you in all essential respects, having the same thoughts, memories and so on. Your (finite) pattern would repeat. (This situation would be expected to hold only for the briefest additional moment before this person-instantiation became different from you, but for "this moment more" the similarity would hold and "you" would be distributed over this copy, as well as other copies expected to be scattered around the multiverse.) Tegmark even estimates how far away the nearest such copy of you would be expected to be, (very roughly) around $10^{10^{29}}$ meters. (This, of course, is very much more than the approximately 10^{27}-meter diameter of the visible universe, noted above.) There would be other copies too, in infinite profusion, even if very infrequent. Similarly, "out there somewhere" would be another whole Hubble Volume or observable universe exactly like ours, and others and others, in all, an infinite number. In this case the nearest, according to Tegmark, would be around $10^{10^{118}}$ meters away.[14] That two finite volumes of spacetime could be "exactly" alike (or similar enough, at any rate, for all necessary purposes here) follows, in essence, from quantum graininess.

With such a profusion of happenings overall, a perishing individual at any place could expect the creation, not of an exact copy (though this would be allowed too) but of a continuer at some location, and of course infinitely many more, under various circumstances. Some circumstances would be "more likely" than others, and also more favorable and/or pleasant, and would, perhaps, involve the intelligent, benevolent efforts of advanced civilizations, including our own at a future date.

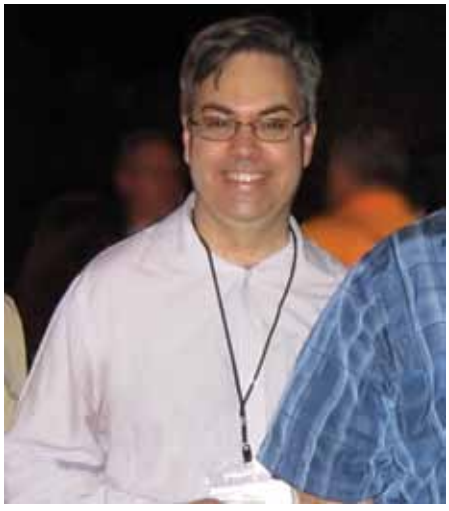
A scenario of the latter sort, in which resurrections of the dead would be carried out by our future civilization, has been developed by the author. (It derives, in spirit, from the work of the 19th Century Russian philosopher Nikolai Fedorov.) It would start from an imperfect historical record with gaps filled by educated guesswork, and yield a "timeline cohort" of past individuals, with parallel efforts in other branches of reality so "no child is left behind" but every possible person in

a large class is resurrected somewhere.[15] Along these lines, a belief known as Universal Immortalism holds that all the dead can be resurrected by technology that could be developed using known physics. It has inspired a small, cryonics-friendly movement to further the eventual goal of resurrection by whatever means might be feasible. Good and bad alike would be brought back, the bad to have their evil natures remedied, so all can enjoy an eternity of love, joy, and peace.[16]

We thus have reason to call in question some of the assumptions and conclusions reached by MacLennan. To paraphrase his point (b), he does not think there is some element of what "you" are that is separate from your physical brain and body. As a result, he does not think that "you" will continue in any "spiritual" way after your death. But with the patternist view we have considered here, there *is* something separate, informational in nature, that your physical body and brain instantiate but do not comprise, since other instantiations are also possible (and inevitable). And "you" could indeed continue, in an informational sense, and in fact must continue somewhere, and in many places, even after the physical destruction of a given instantiation of you, implying information-theoretic death. So we can uphold his point (a), the contrary of (b), in a non-mystical way. Whether you call this a "spiritual" way of continuing your life, it does appear that "you" could live on.

With these thoughts in mind, I see bold prospects beyond MacLennan's "anattasphere." If individuals can always recover from what would otherwise be death, and become ever-developing continuers, the possibility is opened that they could be truly immortal. (We imagine that some no doubt quite challenging cosmological issues will have to be addressed in the course of things, but we should have quite a lot of time, material resources, and intellectual firepower to devote to the task.) We don't have to face the dismal prospect that our personal traces become increasingly tenuous after a while and finally vanish forever, but instead these vital features, if lost, are eventually restored and our essence returned to functionality in any of many possible ways.

We are now ready to consider Tripper McCarthy's book.



Tripper McCarthy at the 2015 Alcor conference.

Like MacLennan, McCarthy was strongly affected by death. The death of his father especially, when he was home from college on a Thanksgiving break, caused him to think deeply about life and its meaning, and what, if anything, could be done about the problem of mortality. The result, after much time and attention given to the problem, included the book we examine here. It will be an inspiration to some, at least, that McCarthy starts off the Introduction in a manner worthy of an old-time evangelist:

> "Welcome my fellow traveler to your eternal future! Either after a long exhaustive search, or by mere fortuitous chance, you have found your way to this book and the Path of the Eternal Song. All of us have questions concerning the fundamental truths of the universe, and you have found your way to some answers. Like an oasis in a vast desert of confusion, the waters of the Eternal Song will quench your thirst for meaning and purpose. They will refresh you with answers to some of the most vexing questions to ever face the human race. Who am I? What am I? Where am I going? All of these questions will be answered by the Eternal Song. And while the answers will seem simple and quite obvious upon reflection, the answers will still amaze you. You will see the world through a new light, and what you see will be bright indeed! You are guaranteed an immortal future in an incredible world far beyond anything you can possibly comprehend. This is the promise of the Eternal Song."[17]

So what is this, a new religion? Well, why not?:

> "The Eternal Song is a new religion for a new age. Unlike the major religions that exist today, it is not founded on the notion that there is some divine entity that serves as the basis for reality. Instead the Eternal Song is built upon the foundation of the natural laws of reality itself. This does not mean though that its conclusions are any less incredible than those of other religions. The Eternal Song teaches that we have a soul, that there is a meaning to life, and that at the most fundamental level we are all immortal. It stands as tall and glorious as any other religion invented by humankind. But the Eternal Song is not an invention of the creative mind. It is a fundamental truth which exists whether or not anyone believes it. The truth is always the truth regardless of whether there is anyone around to see it as such. But the time has arrived for the Eternal Song, and the true answers to life's most pressing questions, to finally come forth,

so we can begin a new chapter in the story of the human race."[18]

Paul Tillich, the 20th-century Protestant theologian, defined religion as "the state of being grasped by an ultimate concern, a concern which qualifies all other concerns as preliminary, and which itself contains the answer to the question of the meaning of our life."[19] McCarthy's Eternal Song is quite plausibly a "religion" in this sense, and he proclaims "it stands as tall and glorious as any other religion …" It is, of course, also "true," as religions generally proclaim themselves to be, but, unlike the general run of them, it does not claim to be based on divine revelation or contain mystical elements. (It will be noted that Tillich's definition does not require such features; a "religion without God" should be possible, for one so disposed.) Still, there are many who will find the term *religion* off-putting, since they assume it must incorporate some sort of supernatural or mystical element. For them a better term in our present case might be *life stance*, though it is, if understood in a strong and serious sense, essentially Tillich's concept of religion under another name.[20]

In any case, we now must ask, what is the reason for all the jubilation and wonder expressed in these introductory paragraphs? Why does the author (1) think we are all immortal, and also, (2) refer to his religion/life stance as the Eternal Song? And (3) what is this "soul" he refers to? We start by quoting again from his Introduction:

> "First and foremost, the Eternal Song is a metaphor for who and what we are. By studying the Eternal Song we will discover the true nature of the human soul. We will learn what it is and how it operates. From this new perspective we will come to see that our souls are akin to vastly complex songs. The Eternal Song is a metaphor for what our souls are and its illustrative power is immense.
>
> "The Eternal Song is also an example of what the ideal life should be. It shows us what the true meaning behind all our lives is and how best we should pursue that meaning. Every choice or situation you are ever faced with in your life can be viewed through the lenses of the Eternal Song. And with the new perspective that the Path of the Eternal Song provides, you will have a better understanding about what choices and actions to take. In the end the Eternal Song is a way of life which leads to happiness for all who follow it.
>
> "Finally, the Eternal Song is a symbol of what we want to become. Life need not have an end, and under the teachings of the Eternal Song we will see that in fact it should not have an end. To fully realize the potential of the Eternal Song we must transcend current limitations and ascend to the mantle of immortality. As you will soon learn, we are already immortal. You will live forever. The Eternal Song is the symbol of what we must become to fully take advantage of this fact. It is our guiding light into the vast stretches of our immortal future."[21]

MacLennan is more conservative and does not hold strong hopes that anybody will escape death forever. Cryonics should make possible a longer life, however, in a future more advanced than ours, and that is valuable.

As for (1), why we are immortal, the short answer is that he subscribes, more or less, to the point of view outlined above, that people are informational in nature, reality as a whole is big, and the profusion of ways of continuing one's existence is overwhelming. You just can't be out of it forever; in the words of an old movie song, "there's got to be a morning after."[22]

As for (2) and (3), the "Eternal Song," as the quotation indicates, covers a wide spectrum of meanings ranging from who and what we are and want to become, to what life in general ought to be. At the personal level, a song, or a musical composition more generally, is like a person, or more specifically, the "soul" or essence of the person. We might imagine this being especially true for a ballad in which the singer is relating his life experience or some portion of it. In this case, while the song is playing we identify with the singer and think of someone living his life, which we are privileged in this case to experience in real time, as the events are sung about. This music could be recorded on a CD or some other medium, or be a live performance. Behind the different forms we might imagine there is a written score with lyrics. This written material is, in effect, the "real" song but, on the other hand, the song is not to be identified with any particular copy of the score either. Instead we have to think of the song as a body of information which persists in inert form so long as it remains expressed only as a score but "comes to life" during a performance. The song can be performed at different times and places using different media, yet it is the same song. Indeed, if the same sounds were made using a space alien's equipment somewhere far from our solar system, it would even then be the same song, whether the words happened to be understood by the alien or not. It would also be the same song if the score and all recordings were lost and a random or purpose-driven process somewhere created the same material (same information), and, using it, played the song once again. We also would usually grant that the same song can be performed with relatively minor variations, like a change in key, though here, finally, we are getting into a gray area.

In a similar way, though, a person is informational in nature, and is also like a song in some other ways. The identity-critical information makes up the "score." When the person is active, their body is "playing" them much as a CD player or instrumental-vocal ensemble plays (performs) the song. Again, the "song" that is the person could be "played" under different circumstances, including a different physical body if the original is lost, yet still remain the "same" person. It is especially like the ballad in our analogy, only with new parts added over time to correspond to new life experiences and create a continuer of what went before. The song can be seen as "eternal" in two different ways. (1) The same portion of it could be "played" or performed in multiple

locations and, with an infinite reality, it seems likely it will be so performed, over and over without end. (2) Arbitrarily long segments corresponding to continuers of what went before, will be played, in this case, also over and over, so the individual in question will, over time, have an unlimited amount of personal experiences, thus be truly immortal. (A given song or segment of music might also be continued in numerous, different ways, corresponding to a person hypothetically splitting into more than one continuer.)

Early on the author's ideas are eloquently expressed in a short poem, with different portions used later to introduce different sections:

The Eternal Song[23]

You have a soul that is a song
Your notes are forever pure and strong
Your body may fade and disappear
But your music will always ring loud and clear

From your body your song will play
For each and every single day
Encoded are you within the sound
Your one true nature you have found

I am a song, my faith is strong,
I will be sung forever

To the Eternal Song, I belong
We will be as one forever

The meaning of life is to be happy
Knowing this truth will set you free
All happiness is not the same
Good Happiness is our aim

Sacrifice must often be made
Good Happiness will be delayed
But in the end it will be ours to keep
Eternal Good Happiness we will reap

I am a song, my faith is strong,
I will be sung forever

In keeping with the "song" metaphor, after the Introduction the book is organized into four sections or "verses": "The Song" (Chapters 1-2), "The Melody" (Chapters 3-4), "The Eternal Song" (Chapters 5-7), and "The Chorus" (Chapter 8). The "Song" section is devoted to establishing what is the essence or soul of a person, and developing the metaphor of the song to make the arguments that follow about the soul more intelligible. As for the soul, it is, of course, nothing mystical. Instead: "Our soul always remains composed of our memories, thought processes, and the way we interact with the environment. This composition never changes."[24] (Here it is the threefold composition that is unchanging, though individual memories, thought processes and such may change over time.)

The "Melody" section is concerned with what we are striving for and how we should live our life. What we are striving for, the author tells us, is happiness but not just any old "happiness." Instead it must be "Good Happiness," something far beyond the simple recipe of "if it feels good, do it." Instead it must be "happiness which does not negatively affect either other people's pursuit of happiness or our own future acquisition of happiness."[25] Someone who uses hard drugs, for example, may experience states of pleasure at first but then find that severe complications set in, so that the end result is highly undesirable – this is not Good Happiness. The same can be said about someone who delights in inflicting harm on others – that person's happiness also is Bad not Good Happiness, in this case, because others are hurt. Even when such issues as harm to oneself or others are not at stake, the seeking of Good Happiness can be complicated. The choice of a career, for example, may seem about to lead to Good Happiness, but may still be the wrong choice.

The author relates how he did well in law school, after college, and was about to become an attorney and go on to a political career. It might have been a good choice, providing financial security for himself as well as materially benefiting society. But he realized that he really didn't like the study or practice of law, and, finding he was attracted much more to computers, became a software engineer instead. This was a choice made in the direction of Good Happiness, and it seems to have been a good choice. Of course, Good Happiness is not guaranteed, even when a choice is made that seems unquestionably the right one at the time. But trying for it at least is worthwhile.

Good Happiness (like Bad Happiness) covers a spectrum of effects. At the top is Ultimate Good Happiness, in which one is enjoined to proactively contribute to others' happiness and not merely not to interfere with it. How might we achieve Ultimate Good Happiness? This topic is taken up in the next section, "The Eternal Song." Reference is made to Universal Immortalism. Future technology should eventually be able to resurrect the dead, and this goal is what we must strive for:

> "To truly follow the Path of the Eternal Song we must strive to make our universe one in which Universal Immortalism comes to pass. Our efforts must be focused on ensuring that everyone, past, present, and future, is able to pursue Good Happiness eternally. That is the end goal of the Eternal Song: eternal Good Happiness for everyone. Only by bringing back to life those souls that have been lost to the ravages of time can we accomplish this goal. We are all patterns of information and because of this we are immortal. Vast periods of time may pass in which we do not exist, but there will always come a time and place where we will be brought back to life. Coupled with immortal bodies not subject to the limitations of the past, we will live forever. Be it in this universe or another, it will come to pass. The Eternal Song will be realized and we will all enjoy Good Happiness forever. It is our destiny."[26]

Meanwhile, the author tells us, there is something we can do to further the cause: choose cryonics. On the face of it, this may seem superfluous at best. If everybody will be resurrected anyway, why bother with it? The author offers several reasons. To start with, there is a more general issue. We are enjoined at all times to pursue Good Happiness: to follow the Path of the Eternal Song. As far as possible, we should strive to make our universe one in which Universal Immortalism is realized. Working toward this goal will further Good Happiness; passivity or working against it is pursuit of Bad Happiness at best. But, you may ask, if everyone is to be resurrected to an ultimately happy state, then why worry about this at all? Instead, whatever conduct you have in this life, won't it all come to the same end of ultimate reward? Well, *in the end*, yes, says the author, but before that happens, it is expected that we will be held accountable for our shortcomings, and

there could be severe penalties for major lapses.

Not choosing cryonics certainly does not seem like as major a lapse as some of the bad things people have done. But given that one's best efforts should go toward promoting Good Happiness, and Ultimate Good Happiness in particular, advantages can be seen in this approach to combating death. Cryonics, assuming it works as planned, should lead to a much swifter return to consciousness and functioning, with much less expenditure of resources than would happen in the general resurrection. Arguably, you would be less burden on society overall, rather than selfishly demanding the enormous efforts and drain on resources that could well be required to get you back, at a distant day, if you are not cryopreserved. You would also have the advantage of seeing much of what will happen that otherwise you would only learn from history books (or whatever records are ultimately extant). Your swifter return would also provide more opportunities to pursue Good Happiness, the Ultimate variety in particular, that is, to just do good in this world. Doing good in this manner, benefiting others in particular, should produce reciprocal rewards that otherwise would be absent. In all, it is better to be a benefactor than merely a benefiter from the efforts of others, further down the line, an echo of the old saying of Jesus: "It is more blessed to give than to receive."[27]

The last section, "The Chorus," considers some issues that come up in everyday life, and makes the point that the Eternal Song doesn't try to teach you what to think, but how to think. So, it's inevitable that there will be disagreements about some difficult issues, even with the best of intentions to pursue Good Happiness (abortion is considered). Still, an effort to do one's best will reap rewards of hope and encouragement along with hoped-for, long-term benefit:

> "Even though the Path of the Eternal Song does not tell you what to think, you can still turn to it for guidance when faced with problems in your own life. Whenever a tough choice faces you, stop and consider your alternatives in the light of Good Happiness. Which choice brings you more Good Happiness and minimizes Bad Happiness? The answer may not always be simple, and you might have to weigh the alternatives carefully. Try finding out the opinions of others, such as your close family and friends. You can also reach out to other followers of the Eternal Song and see what they might have to add. Remember that we are all here to help each other pursue Good Happiness. You may not always agree with the advice you receive, but it can help you see the problem more clearly. And always remember that in the end the responsibility for making the choice lies on your shoulders. It is your primary responsibility to pursue Good Happiness. You ultimately are in the driver's seat. Let the Eternal Song be your map to get to your final destination, but remember that you are the one who plots the exact course to take."[28]

How much confidence, really, should we place in the Path of the Eternal Song? The author concedes that a leap of faith is required, but this is certainly true in other matters in life (cryonics itself being a case in point). Faith has been denigrated as "belief without reason" but that's really too harsh a judgment. The world is full of uncertainties; indeed, an uncertainty principle governs all events at a basic level. Thus, "it is impossible to ever have complete knowledge about anything." We need faith to reasonably conduct our affairs:

> "Faith allows us to have certainty in a world that is fundamentally uncertain. It gives us the strength to act and hold certain things to be true. Without faith we would suffer the same fate as the person who cowers in her living room all day long because she must be certain about an outcome before taking action. The concept of faith is such an integral part of how we all live our lives that without it all social activity would screech to a halt. It is because we choose to believe that certain things are true, even though we do not know for sure, that allows us to overcome the paralysis of indecision. We simply do not have the time to make a cost-benefit analysis of everything we do or hold to be true. Instead we switch in our faith and are able to go on living our lives."[29]

Faith of course can be misplaced, as the author concedes. But choosing any course of action, for whatever reasons, has its risks. For those making the leap of faith to choose cryonics the author offers an additional leap of faith to work toward a future of highest happiness and benefit for all. Such labor cannot happen in a vacuum. The author announces a "Chorus" consisting of like-minded people who are also pursuing the Eternal Song and working toward the common goal of Good Happiness. It is clear that this "organization" is very nascent at best – if you are part of it, agree with the author about the principal themes of the book and the need for hard work to bring about the principal aims, and are working toward these aims, you will know who you are. Much further labor will be needed to create a real, substantial organization able to lead and assist the would-be faithful to the goal of the higher, meaningful life that technology and right thinking can hopefully provide.

BRIEF CONCLUDING REMARKS

We have considered two forward-thinking writers, both cryonicists, boldly challenging contemporary attitudes and practices about death. MacLennan is more conservative and does not hold strong hopes that anybody will escape death forever. Cryonics should make possible a longer life, however, in a future more advanced than ours, and that is valuable. He also sees no prospects of revival after clinical death without some form of special preservation (cryonics being the most promising). McCarthy, though also endorsing cryonics, has hopes that all the dead will eventually be raised. Cryonics is seen as offering a better path to a future life, though not the only possible path, and all are to ultimately benefit as immortal, godlike beings. McCarthy, in fact, offers an outlook that competes with traditional religious viewpoints in its optimistic hopes for the future. Much less may "get us through" to a time when radical life extension is possible. Yet it can be argued that what we really want is to become immortal, to undo as well as to avoid or merely postpone the sentence of death. We thus must find a way to make the McCarthy scenario, or something very like it, a reality. ■

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Sarah MacLennan.

Tripper McCarthy: author's personal collection.

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29. MC, 226.

Robert Nelson
Is Cryopreserved at CI

By Dennis Kowalski

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Recently a very public figure in the cryonics movement, Robert Nelson, passed away and is now CI patient number 170. Nelson helped to found the Cryonics Society of California which was the first organization to actually suspend a person (James Bedford) using the concepts of cryonics created by CI's Robert Ettinger. Bedford was frozen by Nelson on Jan. 12, 1967, breaking new ground and taking the concept of cryonics from an intellectual dream to a physical reality. In this regard Nelson was a pioneer who paved the way for the rest of us to follow.

Nelson's life was a wild roller coaster of raw enthusiasm and initiative as well as controversy and, yes, failure. Despite his early successes and efforts, the Cryonics Society of California was eventually dissolved which led to the infamous Chatsworth disaster in which nine suspended people ended up buried or cremated. Sadly, the fallout from this led to lawsuits and a whole lot of bad PR for the nascent cryonics community as well as the tragic loss of potential life.

Many people in the media and even some within the cryonics community vilified Nelson as a scam artist for letting the disaster occur. Others like CI's Robert Ettinger were kinder in their assessment of Nelson. They saw him as a simple do-it-yourself guy who got in way over his head. I myself spoke with Robert Nelson and believe the latter as Robert Ettinger did. I believe Nelson had good intentions but perhaps wasn't the best planner or businessman. He was impulsive right till the end and was a bit of a leap-before-you-look person – which, unfortunately, we still see sometimes in cryonics today.

However, we really did learn a lot from Nelson both positive and negative. Nelson was correct that waiting for perfect circumstances to get started would probably have cost the cryonics movement many years and many lives. Even Ettinger was surprised at the delay in action after his famous book was published. There are even some who argue that we shouldn't be freezing people right now. They argue that the idea is still premature and the technology isn't perfected. I say "tell that to the people who can't wait that long." How many people die of terminal illness waiting to get an experimental drug because of pencil pushers who don't want to take chances or assume any risk?

We also discovered that expecting ongoing cryonics maintenance payments from a preserved person's family on a handshake deal was a very bad business decision. One of Nelson's chief problems was caused by skeptical surviving family members simply stopping their payments. Today, responsible cryonics organizations require full payment or proof of funding up front.

Ultimately, I think Nelson was a good person with real flaws and rather than focus on the negatives I want to celebrate what we learned from him. Say what you will about Nelson, but he was a pioneer and those who came after him learned and benefited from everything he did in one way or another.

Ironically, before he died Nelson made one more mistake that we can learn from. Upon review of his case report you might notice that he was not perfused, and frankly, was almost not suspended at all. He put off funding verification with CI, even after repeated warnings. I am not sure why he did this but it reveals to me that Nelson himself was not immune from his own flaws. I don't think he was a bad person. He simply had very human faults and weaknesses. For good or bad it was who he was. ■

The case report on Robert Nelson (CI Patient no. 170) will be found at http://www.cryonics.org/case-reports/the-cryonics-institutes-170th-patient, accessed 8 Jul. 2018.

Bob Nelson in the backyard of his Oceanside home (Charlie Neuman) http://www.sandiegouniontribune.com/lifestyle/people/sdut-cryonics-pioneer-bob-nelson-2014mar15-story.html

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MKAQAV180301

A Visit to Oregon Cryonics

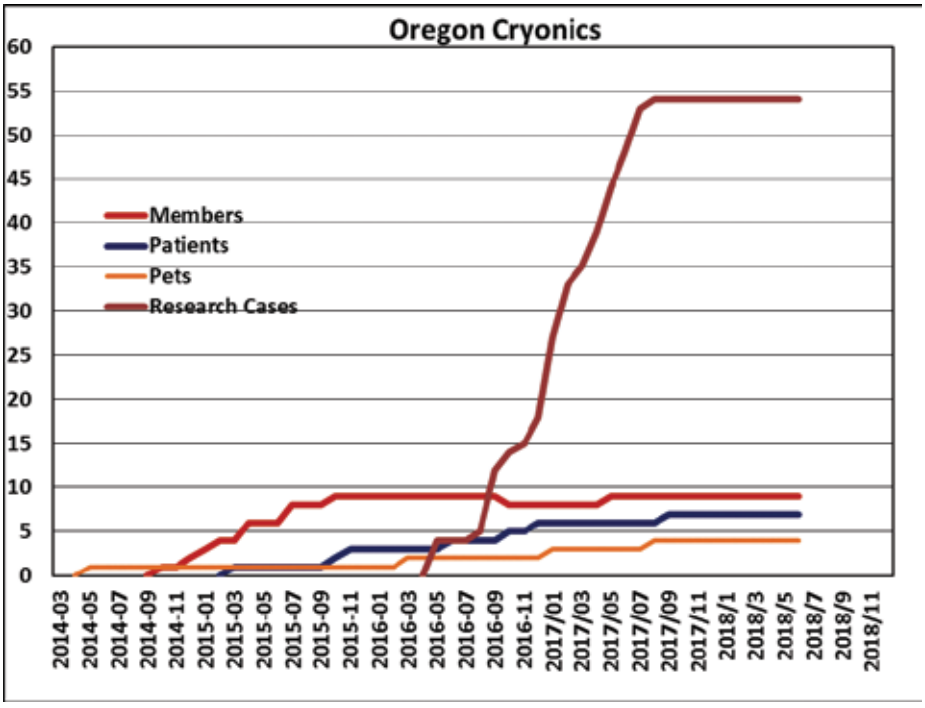
By R. Michael Perry

OVERVIEW

On Sunday afternoon, May 20, 2018, I was privileged to tour the Oregon Cryonics (OC) facility in Salem, Oregon as part of this year's OSSLAP meeting (Options for Safe, Secure, and Legal Asset Preservation for post-resuscitation access) held in nearby Portland. (Each year about fifteen OSSLAP members meet at a chosen location and consider ways that cryonicists can "take it with them" and be revived with wealth and possessions intact, along with the one asset that counts most, their own identity contained mainly in the brain.) OC is the brainchild of Jordan Sparks, who presently heads the organization and also has a family-owned business, Open Dental Software, Inc., which sells dental software systems nationwide and whose profits support his cryonics operation. The thus-far abundant funding has produced impressive results in terms of building construction, equipment acquisition, and research into methods of preparation for biostatic storage and low-cost storage options.

Our tour guide, Operations Manager Mathew Sullivan, was both courteous and well informed, and showed us around a well-equipped, expanding facility. Presently there are actually three sites associated with the facility. The original, modest quarters (Site 1) is still in use for much of OC's normal business, receiving research cadavers and extracting and experimenting with brains, for example. A much larger, roomier building (Site 2) is now used for long-term patient storage and a site for their rescue vehicle (modified ambulance for fast patient stabilization and transport following arrest). It too however is scheduled for eventual replacement. The projected future home of the organization (Site 3), is on 20 acres of land and includes a house now used as a temporary administrative headquarters, until the new building on the site is complete. Accommodations for patient storage and laboratory work are in various stages of construction, and Open Dental's main offices will also be there.

Presently Oregon Cryonics is accepting members on a limited basis only, mainly in next-of-kin situations.[1] A "Member Portal" to facilitate a larger volume of signups has been put on hold for a few years, "so that we can focus on some critical cryonics research."[2] The operation now has half a dozen true patients, all isolated brains.[3] All but one are chemically rather than cryogenically preserved. Chemical preservation is viewed as an interim step so that funding can be arranged for cryopreservation, though possibly also a permanent solution in extremely compromised cases. Rates for indefinite storage under chemical preservation start at $1,000 and advance payment is not required. Research at OC using cadavers has established methods of storage such as brain-in-braincase in which extra tissue is removed from the head to



Oregon Cryonics cases and members since 2014 CREDIT: Mathew Sullivan

reduce the cost of long-term storage. When research is completed (with efforts made to limit unnecessary damage) cadaver brains are not discarded but stored indefinitely and may be used in later experiments. Currently there are about 60 brains in all at OC, some fixed at room temperature, others in refrigeration, and a few in cryogenic storage.

MORE ABOUT OPERATIONS

From the start, Oregon Cryonics has been concerned with reducing the high cost of biostatic storage-for-eventual-revival while achieving high quality storage for the one part of the body that really matters: the brain. Accordingly, Oregon Cryonics presently will only do neuropreservation, including whole head, brain-in-braincase and isolated brains. Quoting from their website:[4]

> "There are two well-known techniques that scientists use to preserve tissue structure: aldehyde fixation and cryopreservation. We use both of these powerful techniques together in order to maximize preservation quality. In a lab setting, good preservation quality has been achieved. We have Electron Micrographs demonstrating that some information can be preserved. Nevertheless, the specific protocols used on human patients under real-world conditions are poorly validated. One of our primary goals is to validate the human protocols."

Presently their preservation protocol is as follows, with cryopreservation steps omitted in case only chemical preservation is desired:

- Death is pronounced.
- External cooling is initiated to slow metabolic damage.
- Tubes are inserted into the carotid arteries.
- Blood is washed out to prevent clotting.
- Aldehyde chemicals are pumped in to stabilize molecules.
- Cryoprotective Agent (CPA) is pumped in to prevent ice crystals.
- CT scan is performed to validate CPA concentration.
- Placed in permanent storage in liquid nitrogen at -196 °C.

CereTom CT scanner, one of two now used at OC (Site 1).
CREDIT: http://www.oregoncryo.com/manual/ctScanning.html, accessed 3 Jul. 2018.

Temperature testing with thermocouple probes CREDIT: Mathew Sullivan

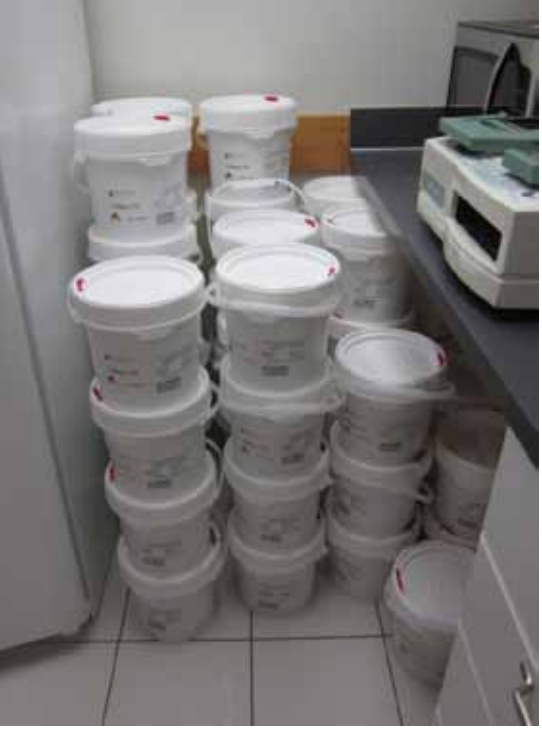
Another important focus of Oregon Cryonics is the possibility of choosing the time of one's own cryopreservation. Oregon has a "Death with Dignity Act" which, under certain conditions, would allow the patient to self-medicate to clinical death, after which cryopreservation might occur.[5] This is being investigated, along with other, similar options. In anticipation of positive results, a "Patient Room" is now available:[6]

> "The [P]atient [R]oom is in our main Facility across the hall from the operating room. It can be used by a terminal patient for the last few hours prior to a cryopreservation. It's not adequate for extended living because the bathroom is down the hall and the building doesn't have a sprinkler system for safety. The new building will have a patient room that could be used for longer stays."

Some further details are given about the anticipated use:

> "Oregon Cryonics cannot provide any medical care or assisted living services. We are not licensed or set up to provide food, bathing assistance, or other similar services. The patient should be on hospice and tended by friends and family. We would move the patient into our facility during their last few hours or days, but timing can be very hard to get right.
>
> "We support any End-of-Life choices that the patient may make, and our Patient Room is available to help facilitate those choices."

To keep things in perspective, Oregon Cryonics is not presently using their Patient Room nor are they very active in any sort of patient preservation for the general public, as noted. They appear to be progressing rapidly, however, and may soon offer services on a competitive scale.



Brains in storage at room temperature (Site 1).

Patient Care Vault (Site 2)
CREDIT: http://www.oregoncryo.com/facility.html, accessed 5 Jul. 2018.

Site 1 exterior.
CREDIT: http://www.oregoncryo.com/facility.html, accessed 5 Jul. 2018.

Tour guide Mathew Sullivan explains a point.

IMPRESSIONS OF THE TOUR

Mathew Sullivan gave us a walk-through tour of the facility, starting at Site 1, where we saw rooms for surgery and other steps of preparation, along with the Patient Room noted above. Among other things, there was coverage of research in gauging the effectiveness of procedures to chemically preserve brains. Picture taking was allowed, except where donors might be identified.

Some tough questions from knowledgeable OSSLAP members were fielded with confidence and skill. At one point, a question came up about immersion fixation of brains. Ideally, if the brain is going to be preserved with fixative (including the possibility of also cryopreserving it) perfusion through the vascular system should be used for maximum penetration of the fixative through the tissues in the shortest possible time. If that is not possible, immersion fixation, submerging the brain in fixative with no attempt at perfusion (so only slower diffusion will deliver fixative into the brain), can still be attempted, and is easy to do. Mathew noted that, with 5 gallons of fixative, significant preservation of a human brain is obtained after 24 hours of immersion fixation, though the fixation is still not complete. The use of this larger volume of fixative appears to substantially accelerate the penetration rate.

The tour continued to Site 2, which is in part of a large building also partly occupied by Open Dental. The portion devoted to OC includes its Patient Care Vault, with its very high ceiling. The rescue vehicle parked outside was opened so the group could inspect its roomy interior.

Rescue vehicle (Site 2)

The tour concluded on the 20-acre Site 3, a beautiful location "out in the country" where an impressive facility is taking shape. Construction should be completed within a few years and Oregon Cryonics could be a very strong competitor in the cryonics field.

SOME FINAL THOUGHTS

Overall I am very encouraged by the approach being taken by Oregon Cryonics. They emphasize preserving the brain, and that's where the emphasis should be. They also recognize that other preservative approaches than cryo could be viable or at

Rescue vehicle, rear view showing interior. From left: Neal Vanderee, Doug Baldwin, Jim Yount taking picture.

Construction at Site 3 CREDIT: Mathew Sullivan

least serve as a useful preliminary to cryo. I often have the thought that, if cryonics had started off in the 1960s more like this, then the major disasters might have been avoided and many more today might be safely stored in biostasis, awaiting revival. The emphasis on low-cost alternatives to presently expensive preservation procedures I find especially appealing. (One of OC's chemically preserved patients is a personal friend who had very little funding but could now be promoted to cryopreservation when funding is available.) One question that has been raised about Oregon Cryonics concerns its own funding, which, as noted, comes from essentially a single source. Presently the source is holding up well, by reports, but diversification of funding sources would be desirable, or some other provision for long-term financial sustenance. ■

Special Thanks

The author thanks Mathew Sullivan for reviewing and correcting this article and supplying images.

Site 3, temporary administrative headquarters; Aschwin de Wolf (left), Jim Yount.

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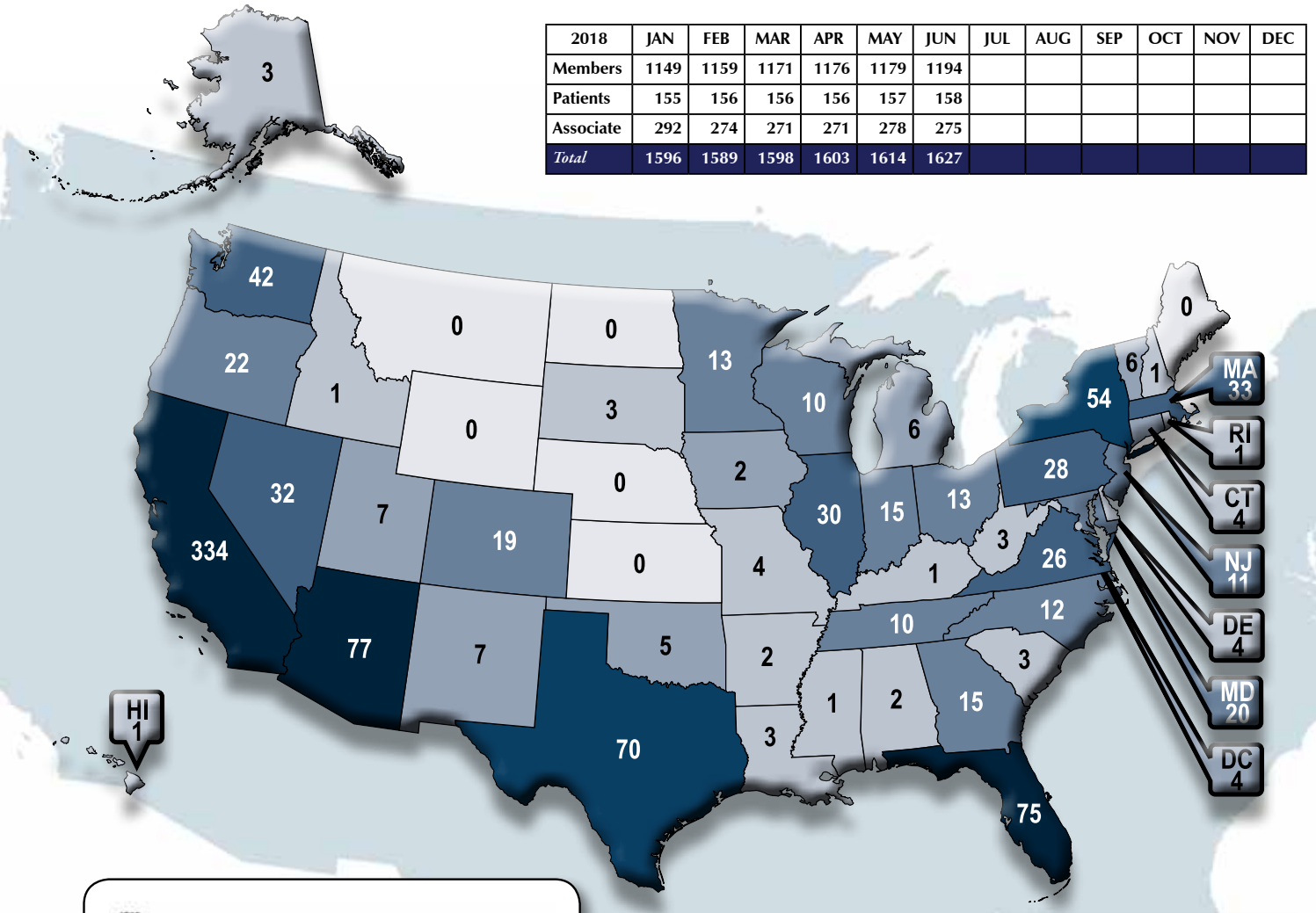
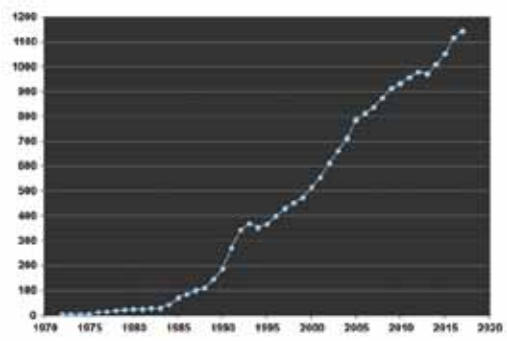
3. (Patient data) http://www.oregoncryo.com/caseReports.html, accessed 4 Jul. 2018.
4. (Overview and procedures) http://www.oregoncryo.com/index.html, accessed 4 Jul. 2018.
5. (Oregon Death with Dignity Act) https://en.wikipedia.org/wiki/Oregon_Ballot_Measure_16_(1994), accessed 4 Jul. 2018.
6. (Patient Room) http://www.oregoncryo.com/patientRoom.html, accessed 5 Jul. 2018.

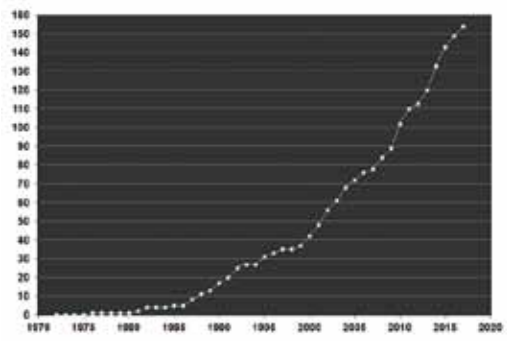
Membership Statistics

2018	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Members	1149	1159	1171	1176	1179	1194						
Patients	155	156	156	156	157	158						
Associate	292	274	271	271	278	275						
Total	1596	1589	1598	1603	1614	1627						





Number of Alcor members



Number of Alcor patients

- 0 Members
- 1–4 Members
- 5–9 Members
- 10–24 Members
- 25–49 Members
- 50–74 Members
- 75+ Members

International Members & Patients

Country	Members	Patients
Australia	13	3
Austria	1	0
Brazil	1	0
Canada	54	3
China	0	1
France	0	1
Germany	18	0
Hong Kong	2	0
Israel	1	1
Italy	3	0
Japan	5	0
Luxembourg	1	0
Mexico	4	0
Monaco	1	0
Netherlands	1	0
Norway	1	0
Portugal	5	0
Singapore	1	0
South Korea	1	0
Spain	5	1
Taiwan	1	0
Thailand	5	1
United Kingdom	35	3
TOTAL	156	14

Hidden Secret of 'Immortality' Enzyme Telomerase Unveiled

Understanding the regulation and limitation of the telomerase enzyme holds the promise of reversing telomere shortening and cellular aging with the potential to extend human lifespan and improve the health and wellness of elderly individuals. Research from the laboratory of Julian Chen at Arizona State University recently uncovered a crucial step in the telomerase catalytic cycle that limits the ability of telomerase to synthesize telomeric DNA repeats onto chromosome ends. "Telomerase has a built-in braking system to ensure precise synthesis of correct telomeric DNA repeats. This safe-guarding brake, however, also limits the overall activity of the telomerase enzyme," said Professor Chen. "Finding a way to properly release the brakes on the telomerase enzyme has the potential to restore the lost telomere length of adult stem cells and to even reverse cellular aging itself." This intrinsic brake of telomerase refers to a pause signal, encoded within the RNA template of telomerase itself, for the enzyme to stop DNA synthesis at the end of the sequence 'GGTTAG'. …

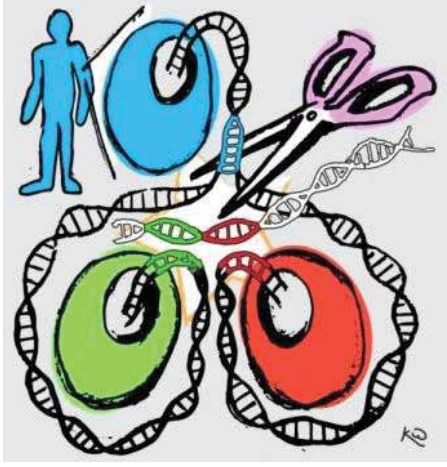
ScienceDaily / Arizona State University
27 Feb. 2018
https://www.sciencedaily.com/releases/2018/02/180227142114.htm

Slowing Biological Time to Extend the Golden Hour for Lifesaving Treatment

DARPA's Biostasis program aims to prevent death following traumatic injury by slowing biochemical reactions inside cells, thus extending the "golden hour" for medical intervention. The desired interventions would be effective for only limited durations before the process reverts and biological processes resume at normal speeds. "At the molecular level, life is a set of continuous biochemical reactions, and a defining characteristic of these reactions is that they need a catalyst to occur at all," said Tristan McClure-Begley, the Biostasis program manager. "Within a cell, these catalysts come in the form of proteins and large molecular machines that transform chemical and kinetic energy into biological processes. Our goal with Biostasis is to control those molecular machines and get them to all slow their roll at about the same rate so that we can slow down the entire system gracefully and avoid adverse consequences when the intervention is reversed or wears off." The program will pursue various approaches to slowing down biochemical processes in living cells.

Defense Advanced Research Projects Agency, News and Events
1 Mar. 2018
https://www.darpa.mil/news-events/2018-03-01

Gene Editing Method with Absolute Precision



Stem cells with shared genetic information aid in the study of human disease. Credit: Kyoto University / Knut Woltjen

Researchers led by Dr. Knut Woltjen of Kyoto University, Japan, report a new gene editing method that can modify a single DNA base in the human genome with absolute precision. The technique, called MhAX, or Microhomology-Assisted eXcision, is unique in that it guides the cell's own repair mechanisms by design, providing pairs of genetically matched cells for studying disease-related mutations. Single mutations in DNA, known as single nucleotide polymorphisms – or SNPs for short – are the most common type of variation in the human genome. More than 10 million SNPs are known, many of which are associated with ailments such as Alzheimer's, heart disease, and diabetes. In order to understand the role of SNPs in hereditary disease, scientists at Kyoto University's Center for iPS cell Research and Application (CiRA) create induced pluripotent stem cells from patient donors. In this way, cells from tissues such as the brain, heart, or pancreas can be created and observed in the laboratory, enabling safe testing for new disease treatments before starting clinical trials. …

ScienceDaily / Kyoto University
5 Mar. 2018
https://www.sciencedaily.com/releases/2018/03/180305093015.htm

Lens-Free Fluorescent Microscope

Lenses are no longer necessary for some microscopes, according to Rice University engineers developing FlatScope, a thin fluorescent microscope whose abilities promise to surpass those of old-school devices. A paper in *Science Advances* by Rice engineers Ashok Veeraraghavan, Jacob Robinson, Richard Baraniuk and their labs describes a wide-field microscope thinner than a credit card, small enough to sit on a fingertip and capable of micrometer resolution over a volume of several cubic millimeters. FlatScope eliminates the tradeoff that hinders traditional microscopes in which arrays of lenses can either gather less light from a large field of view or gather more light from a smaller field. The Rice team began developing

the device as part of a federal initiative by the Defense Advanced Research Projects Agency as an implantable, high-resolution neural interface. But the device's potential is much greater. The researchers claim FlatScope, an advance on the labs' earlier FlatCam, could be used as an implantable endoscope, a large-area imager or a flexible microscope.

Mike Williams / Rice University News & Media
5 Mar. 2018
http://news.rice.edu/2018/03/05/rice-team-designs-lens-free-fluorescent-microscope/

The 'Architecture of Life' Described by Computer Modeling

While most of biology and medicine focus on the key roles genes and chemicals play in the formation and control of living systems, the spatial arrangement of the components that make up those systems and the physical forces they experience are being increasingly recognized as equally important. Donald Ingber, M.D., Ph.D., Founding Director of the Wyss Institute at Harvard University, started investigating this "architecture of life" over 35 years ago, and discovered that Nature uses an architectural principle known as "tensegrity" (short for "tensional integrity") to stabilize the shapes of living cells and to determine how they respond to mechanical forces. Using a newly developed, multi-scale computer modeling method, Ingber and Wyss Staff Scientist Charles Reilly have now successfully demonstrated that tensegrity principles are used across various levels of size and structural complexity within living cells. Their work also revealed how tensegrity-based changes in molecular shape can drive the motion of cellular parts. The research is reported in *Extreme Mechanics Letters* …

Lindsay Brownell / Wyss Institute, Harvard University
8 Mar. 2018
https://wyss.harvard.edu/the-architecture-of-life-described-by-computer-modeling/

Google Thinks It's Close to "Quantum Supremacy"

Seventy-two may not be a large number, but in quantum computing terms, it's massive. This week Google unveiled Bristlecone, a new quantum computing chip with 72 quantum bits, or qubits – the fundamental units of computation in a quantum machine. The previous record holder is a mere 50-qubit processor announced by IBM last year. John Martinis, who heads Google's effort, says his team still needs to do more testing, but he thinks it's "pretty likely" that this year, perhaps even in just a few months, the new chip can achieve "quantum supremacy." That's the point at which a quantum computer can do calculations beyond the reach of today's fastest supercomputers. When Google or another team finally declares success, expect a flood of headlines about the dawn of a new and exciting era. Quantum computers are supposed to help us discover new pharmaceuticals and create new materials, as well as turning cryptography on its head. But the reality is more complicated. "You'll struggle to find any [researcher] who likes the term 'quantum supremacy,'" says Simon Benjamin, a quantum expert at Oxford …

Martin Giles, Will Knight / MIT Technology Review
9 Mar. 2018
https://www.technologyreview.com/s/610274/google-thinks-its-close-to-quantum-supremacy-heres-what-that-really-means/

Rewinding the Aging Clock

We are as old as our arteries, the adage goes, so could reversing the aging of blood vessels hold the key to restoring youthful vitality? The answer appears to be yes, at least in mice, according to a new study led by investigators at Harvard Medical School. The research, published March 22 in *Cell*, identifies the key cellular mechanisms behind vascular aging and its effects on muscle health and has successfully reversed the process in animals. The findings pinpoint a glitch in the normal crosstalk that occurs between muscles and blood vessels and keeps both tissues healthy. Using the synthetic precursors of two molecules naturally present in the body, the scientists also managed to reverse blood vessel demise and muscle atrophy in aging mice, boosting their exercise endurance in the process. The achievement, the team said, paves the way to identifying related therapies for humans. The researchers caution that many promising treatments in mice don't have the same effect in humans due to critical differences in biology. However …

Ekaterina Pesheva / Harvard Medical School
22 Mar. 2018
https://hms.harvard.edu/news/rewinding-clock

Peptide-Based Biogenic Dental Product May Cure Cavities

Researchers at the University of Washington have designed a convenient and natural product that uses proteins to rebuild tooth enamel and treat dental cavities. The research finding was first published in ACS Biomaterials Science and Engineering. "Remineralization guided by peptides is a healthy alternative to current dental health care," said lead author Mehmet Sarikaya, professor of materials science and engineering and adjunct professor in the Department of Chemical Engineering and Department of Oral Health Sciences. The new biogenic dental products can – in theory – rebuild teeth and cure cavities without today's costly and uncomfortable treatments. "Peptide-enabled formulations will be simple and would be implemented in over-the-counter or clinical products," Sarikaya said. Cavities are more than just a nuisance. According to the World Health Organization, dental cavities affect nearly every age group and they are accompanied by serious health concerns, along with contributing to a huge economic burden for individuals and health care systems.

Jackson Holtz / UW News
12 Apr. 2018
https://www.washington.edu/news/2018/04/12/peptide-based-biogenic-dental-product-may-cure-cavities/

Reversing Brain Injury in Newborns and Adults

Children and adults diagnosed with brain conditions such as cerebral palsy, multiple sclerosis and dementia may be one step closer to obtaining new treatments that could help to restore normal function. Researchers at OHSU in Portland, Oregon, have identified a new molecule within the brain's white matter that blocks the organ's ability to repair itself following injury. "By preventing the production of this molecule, we can create an effective pathway to allow the brain to continue its regenerative process," said Stephen Back, M.D., Ph.D. The results of the study were published today in the *Journal of Clinical Investigation*. "For many years, researchers and clinicians alike have struggled to understand and effectively treat the significant physical disabilities associated with white matter injury," said study co-author Larry Sherman, Ph.D. "This discovery means that we now have the potential to start looking at multiple ways of intervening to promote brain repair that weren't available to use before."

Tracy Brawley / OHSU News
16 Apr. 2018
https://news.ohsu.edu/2018/04/16/reversing-brain-injury-in-newborns-and-adults

Harvard Stealth Startup Wants to Reverse Aging in Dogs; Humans Could Be Next

The world's most influential synthetic biologist is behind a new company that plans to rejuvenate dogs using gene therapy. If it works, he plans to try the same approach in people, and he might be one of the first volunteers. The stealth startup Rejuvenate Bio, cofounded by George Church of Harvard Medical School, thinks dogs aren't just man's best friend but also the best way to bring age-defeating treatments to market. The company, which has carried out preliminary tests on beagles, claims it will make animals "younger" by adding new DNA instructions to their bodies. Its age-reversal plans build on tantalizing clues seen in simple organisms like worms and flies. Tweaking their genes can increase their life spans by double or better. Other research has shown that giving old mice blood transfusions from young ones can restore some biomarkers to youthful levels. "We have already done a bunch of trials in mice and we are doing some in dogs, and then we'll move on to humans," Church told the podcaster Rob Reid earlier this year.

Antonio Regalado / MIT Technology Review
9 May 2018
https://www.technologyreview.com/s/611018/a-stealthy-harvard-startup-wants-to-reverse-aging-in-dogs-and-humans-could-be-next/

A New Puzzle Piece to Control of Aging and Age-Related Diseases

A basic discovery of how the cellular functions are connected to control aging is presented in the journal *Cell Metabolism*. The study shows that an increasingly deteriorating communication between the cells' organelles is an important cause of aging. The discovery is the result of a collaboration between five research groups at the University of Stockholm and Gothenburg. Organelles are the cell's equivalent to the body's organs, each fulfilling a specific function. Previous research has shown that in aging cells, the various organelles stop functioning one after the other, but it is unclear what causes this observation. Because the organelles are coordinated to counteract damage to proteins that occur in cells, their interdependencies are of great importance for aging and health. "The whole project aims at finding new ways to address the problems of aging and, in the long term, to slow down or treat the onset of age-related diseases such as neurological diseases and dementia," explains Martin Ott, professor at Stockholm University.

Stockholm University / EurekAlert!
10 May 2018
https://www.eurekalert.org/pub_releases/2018-05/su-anp050918.php

Mind-Reading Machines

Our smartphones have given us fast, portable access to a vast range of human knowledge, and we already use the internet as an external storage device. But the way we interact with it is via two incredibly blunt tools: our thumbs. "We're all cyborgs, we're just low-efficiency cyborgs," said Elon Musk – who has his own company, Neuralink, aimed at tackling the problem – in an over-subscribed Q&A session at the South by Southwest (SXSW) conference in Austin, Texas in March. Engineers all over the planet are attempting to design and build human-machine interfaces to connect our brains directly to our devices. Some, like the team at Neurable, are focused on wearable devices that can read our intentions from our brain waves. Others are digging into the cortex itself, leaning on advances in materials science to create chips to be implanted into the brain. These devices are already changing the lives of patients with brain damage and disorders, and in the future they could allow us to transmit complex thoughts to our devices.

Amit Katwala / Institution of Mechanical Engineers
10 May 2018
http://www.imeche.org/news/news-article/feature-this-machine-can-read-your-mind-engineers-unlock-secrets-of-the-brain

RNA Moves a Memory From One Snail to Another

Aplysia californica *or "sea hare" spraying defensive ink, WIKIMEDIA, GENNY ANDERSON*

Researchers have transferred a memory from one snail to another via RNA, they report today (May 14) in *eNeuro*. If confirmed in other species, the finding may lead to a shift in scientists' thinking about how memories

are made – rather than cemented in nerve-cell connections, they may be spurred on by RNA-induced epigenetic changes. "The study suggests that RNA populations are the missing link in the search for memory," Bridget Queenan, a neuroscientist at the University of California, Santa Barbara, who was not involved in the study, writes in an email. "If circulating neural RNAs can transfer behavioral states and tendencies, orchestrating both the transient feeling and the more permanent memory, it suggests that human memory – just like mood – will only be explained by exploring the interplay between bodies and brains." For decades, researchers have tried to pinpoint how, when, and where memories form. In the 1940s, Canadian psychologist Donald Hebb proposed memories are made in the connections between neurons, called synapses and stored as those connections grow …

Ashley Yeager / *The Scientist*
14 May 2018
https://www.the-scientist.com/?articles.view/articleNo/54565/title/RNA-Moves-a-Memory-From-One-Snail-to-Another/

New Evidence that the Brain Stores Information in Discrete Form

Does the brain store information in discrete or analog form? Neuroscientists have long pondered this issue, and many believe that it probably uses some form of analog data storage. But the evidence in favor of discrete or analog data storage has never been decisive. Today that changes at least in part, thanks to the work of James Tee and Desmond Taylor at the University of Canterbury in New Zealand. These guys have measured the way people make certain types of decisions and say that their statistical analysis of the results strongly suggests that the brain must store information in discrete form. Their conclusion has significant implications for neuroscientists and other researchers building devices to connect to the brain. According to Tee and Taylor: "It is very plausible that different parts of the brain operate at different levels of discreteness based on different numbers of quantization levels." Indeed, engineers have found this in designing products for the real world. Images are usually encoded with a 24-bit quantization, whereas music is generally quantized using a 16-bit system.

MIT Technology Review
21 May 2018
https://www.technologyreview.com/s/611165/does-the-brain-store-information-in-discrete-or-analog-form/?set=

A Roadmap to Revival

Successful revival of cryonics patients will require three distinct technologies: (1) A cure for the disease that put the patient in a critical condition prior to cryopreservation; (2) biological or mechanical cell repair technologies that can reverse any injury associated with the cryopreservation process and long-term care at low temperatures; (3) rejuvenation biotechnologies that restore the patient to good health prior to resuscitation. OR it will require some entirely new approach such as (1) mapping the ultrastructure of cryopreserved brain tissue using nanotechnology, and (2) using this information to deduce the original structure and repairing, replicating or simulating tissue or structure in some viable form so the person "comes back."

The following is a list of landmark papers and books that reflect ongoing progress towards the revival of cryonics patients:

Jerome B. White, "**Viral-Induced Repair of Damaged Neurons with Preservation of Long-Term Information Content**," Second Annual Conference of the Cryonics Societies of America, University of Michigan at Ann Arbor, April 11-12, 1969, by J. B. White. Reprinted in *Cryonics* 35(10) (October 2014): 8-17.

Michael G. Darwin, "**The Anabolocyte: A Biological Approach to Repairing Cryoinjury**," *Life Extension Magazine* (July-August 1977):80-83. Reprinted in *Cryonics* 29(4) (4th Quarter 2008):14-17.

Gregory M. Fahy, "**A 'Realistic' Scenario for Nanotechnological Repair of the Frozen Human Brain**," in Brian Wowk, Michael Darwin, eds., *Cryonics: Reaching for Tomorrow*, Alcor Life Extension Foundation, 1991.

Ralph C. Merkle, "**The Molecular Repair of the Brain**," *Cryonics* 15(1) (January 1994):16-31 (Part I) & *Cryonics* 15(2) (April 1994):20-32 (Part II).

Ralph C. Merkle, "**Cryonics, Cryptography, and Maximum Likelihood Estimation**," First Extropy Institute Conference, Sunnyvale CA, 1994, updated version at http://www.merkle.com/cryo/cryptoCryo.html.

Aubrey de Grey & Michael Rae, "**Ending Aging: The Rejuvenation Breakthroughs That Could Reverse Human Aging in Our Lifetime**." St. Martin's Press, 2007.

Robert A. Freitas Jr., "**Comprehensive Nanorobotic Control of Human Morbidity and Aging**," in Gregory M. Fahy, Michael D. West, L. Stephen Coles, and Steven B. Harris, eds, *The Future of Aging: Pathways to Human Life Extension*, Springer, New York, 2010, 685-805.

Chana Phaedra, "**Reconstructive Connectomics**," *Cryonics* 34(7) (July 2013): 26-28.

Robert A. Freitas Jr., "**The Alzheimer Protocols: A Nanorobotic Cure for Alzheimer's Disease and Related Neurodegenerative Conditions**," *IMM Report* No. 48, June 2016.

REDUCE YOUR ALCOR DUES WITH THE CMS WAIVER

Alcor members pay general dues to cover Alcor's operating expenses and also make annual contributions to the Comprehensive Member Standby fund pool to cover the costs of readiness and standby. Benefits of Comprehensive Member Standby include no out-of-pocket expense for standby services at the time of need, and up to $10,000 for relocation assistance to the Scottsdale, Arizona area.

Instead of paying $180 per year in CMS dues, Alcor also provides members the option to cover all CMS-associated costs through life insurance or pre-payment. Members who provide an additional $20,000 in minimum funding will no longer have to pay the $180 CMS (Comprehensive Member Standby fund) fee. This increase in minimums is permanent (for example, if in the future Alcor were to raise the cost of a neurocryopreservation to $90,000, the new minimum for neurocryopreservation members under this election would be $110,000). Once this election is made, the member cannot change back to the original minimums in the future.

To have the CMS fee waived, these are the minimums:

- **$220,000 Whole Body Cryopreservation ($115,000 to the Patient Care Trust, $60,000 for cryopreservation, $45,000 to the CMS Fund).**
- **$100,000 Neurocryopreservation ($25,000 to the Patient Care Trust, $30,000 for cryopreservation, $45,000 to the CMS Fund).**

If you have adequate funding and would like to take advantage of the CMS waiver, contact **Diane Cremeens at diane@alcor.org.**

Become An Alcor Associate Member!

Supporters of Alcor who are not yet ready to make cryopreservation arrangements can become an Associate Member for $5/month (or $15/quarter or $60 annually). Associate Members are members of the Alcor Life Extension Foundation who have not made cryonics arrangements but financially support the organization. Associate Members will receive:

- ***Cryonics* magazine by mail**
- **Discounts on Alcor conferences**
- **Access to post in the Alcor Member Forums**
- **A dollar-for-dollar credit toward full membership sign-up fees for any dues paid for Associate Membership**

To become an Associate Member send a check or money order ($5/month or $15/quarter or $60 annually) to Alcor Life Extension Foundation, 7895 E. Acoma Dr., Suite 110, Scottsdale, Arizona 85260, or call Marji Klima at (480) 905-1906 ext. 101 with your credit card information.

Or you can pay online via PayPal using the following link: http://www.alcor.org/BecomeMember/associate.html (quarterly option is not available this way).

Associate Members can improve their chances of being cryopreserved in an emergency if they complete and provide us with a Declaration of Intent to be Cryopreserved (http://www.alcor.org/Library/html/declarationofintent.html). Financial provisions would still have to be made by you or someone acting for you, but the combination of Associate Membership and Declaration of Intent meets the informed consent requirement and makes it much more likely that we could move ahead in a critical situation.

Start preparing your

MEMORY BOX ...now!

Start your own time-capsule!

Create a Memory Box with items to augment your memories when you are resuscitated.

No one knows better than you what you will want to have with you.

Alcor makes available to every member and patient, without charge, one acid free Memory Box about the size of a standard banker's box (H10" x W12" x L15") for memorabilia to be stored underground at a commercial storage site called Underground Vaults and Storage (UGVS) in Kansas. Additional Boxes are a one-time charge of $250 each for perpetual storage.

Some of the most popular items that have been placed into storage are such things as letters, cards, photographs, diaries, journals, notebooks, books, clippings, army records, directories, recipes, video tapes, cassettes, medical records, flash drives, and external drives.

If you would like to begin working on your own Memory Box, or perhaps contribute items to a Box for an Alcor Member already in stasis, or if you have any questions, please contact **Linda Chamberlain at linda@alcor.org or call toll free at 877-462-5267 ext 115**.

ALCOR
LIFE EXTENSION FOUNDATION
The World's Leader in Cryonics
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Consult your healthcare provider before use if you have a bleeding disorder, are taking anticoagulant or antiplatelet medications or beta-blockers such as Nadolol. Keep out of reach of children. Do not exceed recommended dose.

MKAQAV171106

MEETINGS

ABOUT THE ALCOR FOUNDATION

The Alcor Life Extension Foundation is a nonprofit tax-exempt scientific and educational organization dedicated to advancing the science of cryopreservation and promoting cryonics as a rational option. Being an Alcor member means knowing that—should the worst happen—Alcor's Emergency Response Team is ready to respond for you, 24 hours a day, 365 days a year.

Alcor's Emergency Response capability includes specially trained technicians and customized equipment in Arizona, northern California, southern California, and south Florida, as well as many additional certified technicians on-call around the United States. Alcor's Arizona facility includes a full-time staff, and the Patient Care Bay is personally monitored 24 hours a day.

ARIZONA

FLAGSTAFF: Arizona without the inferno. Cryonics group in beautiful, high-altitude Flagstaff. Two-hour drive to Alcor. Contact eric@flagstaffcryo.com for more information.

PHOENIX: This group meets monthly, usually in the third week of the month. Dates are determined by the activity or event planned. For more information or to RSVP, visit http://cryonics.meetup.com/45/ or email Bonnie Magee at bonnie@alcor.org.

AT ALCOR: Alcor Board of Directors Meetings and Facility Tours—Alcor business meetings are generally held on the second Saturday of every month starting at 11:00 AM MST. Guests are welcome to attend the fully-public board meetings. Facility tours are held every Tuesday at 10:00 AM and Friday at 2:00 PM. For more information or to schedule a tour, call Marji Klima at (877) 462-5267 x101 or email marji@alcor.org.

CALIFORNIA

LOS ANGELES: Alcor Southern California Meetings—For information, call Peter Voss at (310) 822-4533 or e-mail him at peter@optimal.org. Although monthly meetings are not held regularly, you can meet Los Angeles Alcor members by contacting Peter.

SAN FRANCISCO BAY: Alcor Northern California Meetings are held quarterly in January, April, July, and October. A CryoFeast is held once a year. For information on Northern California meetings, call Mark Galeck at (650) 772-1251 or email mark_galeck@pacbell.net.

FLORIDA

Central Florida Life Extension group meets once a month in the Tampa Bay area (Tampa and St. Petersburg) for discussion and socializing. The group has been active since 2007. Email arcturus12453@yahoo.com for more information.

NEVADA

LAS VEGAS: A new group for the Las Vegas areas has been started for those interested. Contact Gilda Cabral at gcabral@korns.com or Mike Korns at mkorns@korns.com for details on upcoming meetings.

NEW ENGLAND

CAMBRIDGE: The New England regional group strives to meet monthly in Cambridge, MA—for information or to be added to the Alcor NE mailing list, please contact Bret Kulakovich at 617-824-8982, alcor@bonfireproductions.com, or on FACEBOOK via the Cryonics Special Interest Group.

NEW YORK CITY

Alcor members in the NYC area can contact Javier El-Hage at javier.elhage@gmail.com for information about local meetings which are held once a month at a midtown location.

PACIFIC NORTHWEST

Alcor Pacific Northwest organizes meetings for Alcor members in the Pacific Northwest. Meetings are usually held in the Portland area but other locations are possible, too. The contact person for the meetings is Aschwin de Wolf: aschwin@alcor.org. See also: https://www.facebook.com/alcor.pnw/

OREGON: The contact person for meetings in the Portland area is Aschwin de Wolf: aschwin@alcor.org. See also: https://www.facebook.com/portland.life.extension.

BRITISH COLUMBIA (CANADA): CryoBC, a special interest group within the nonprofit Lifespan Society of BC (http://www.lifespanbc.ca/) holds meetings for cryonicists in the Vancouver area. To be notified of meetings join the CryoBC mailing list: https://groups.yahoo.com/neo/groups/cryobc/info.

TEXAS

DALLAS/NORTH TEXAS: Please join us at www.meetup.com/North-Texas-Cryonauts/ or contact David Wallace Croft at (214) 636-3790.

AUSTIN/CENTRAL TEXAS: A new group for the Austin area has been started for those interested in discussion and understanding of the relevant technologies and issues for cryopreservation, genomics, epigenetics and medical research for increased life/health span. Contact Tom Miller, 760-803-4107 or tom@blackmagicmissileworks.com.

JAPAN

Cryonics meetings are held monthly in Tokyo. Send queries to grand88@yahoo.com.

ALCOR PORTUGAL

Alcor Portugal is working to have good stabilization and transport capabilities. The group meets every Saturday for two hours. For information about meetings, contact Nuno Martins at n-martins@n-martins.com. The Alcor Portugal website is: www.alcorportugal.com.

SWITZERLAND

CryoSuisse, the Swiss Society for Cryonics To join, email: info@cryosuisse.ch Website: www.cryosuisse.ch

UNITED KINGDOM

Alcor members in the UK can contact Garret Smyth at Alcor-UK@alcor.org for information about local meetings.

If you are interested in hosting regular meetings in your area, contact Alcor at 877-462-5267, ext. 113. Meetings are a great way to learn about cryonics, meet others with similar interests, and introduce your friends and family to Alcor members!

What is Cryonics?

Cryonics is an attempt to preserve and protect human life, not reverse death. It is the practice of using extreme cold to attempt to preserve the life of a person who can no longer be supported by today's medicine. Will future medicine, including mature nanotechnology, have the ability to heal at the cellular and molecular levels? Can cryonics successfully carry the cryopreserved person forward through time, for however many decades or centuries might be necessary, until the cryopreservation process can be reversed and the person restored to full health? While cryonics may sound like science fiction, there is a basis for it in real science. The complete scientific story of cryonics is seldom told in media reports, leaving cryonics widely misunderstood. We invite you to reach your own conclusions.

How do I find out more?

The Alcor Life Extension Foundation is the world leader in cryonics research and technology. Alcor is a non-profit organization located in Scottsdale, Arizona, founded in 1972. Our website is one of the best sources of detailed introductory information about Alcor and cryopreservation (www.alcor.org). We also invite you to request our FREE information package on the "Free Information" section of our website. It includes:

- A fully illustrated color brochure
- A sample of our magazine
- An application for membership and brochure explaining how to join
- And more!

Your free package should arrive in 1-2 weeks. (The complete package will be sent free in the U.S., Canada, and the United Kingdom.)

How do I enroll?

Signing up for cryopreservation is easy!

Step 1: Fill out an application and submit it with your $90 application fee.
Step 2: You will then be sent a set of contracts to review and sign.
Step 3: Fund your cryopreservation. While most people use life insurance to fund their cryopreservation, other forms of prepayment are also accepted. Alcor's Membership Coordinator can provide you with a list of insurance agents familiar with satisfying Alcor's current funding requirements.
Finally: After enrolling, you will wear emergency alert tags or carry a special card in your wallet. This is your confirmation that Alcor will respond immediately to an emergency call on your behalf.

Not ready to make full arrangements for cryopreservation? Then ***become an Associate Member*** for $5/month (or $15/quarter or $60 annually). Associate Members will receive:

- ***Cryonics*** magazine by mail
- Discounts on Alcor conferences
- Access to post in the Alcor Member Forums
- A dollar-for-dollar credit toward full membership sign-up fees for any dues paid for Associate Membership

To become an Associate Member send a check or money order ($5/month or $15/quarter or $60 annually) to Alcor Life Extension Foundation, 7895 E. Acoma Dr., Suite 110, Scottsdale, Arizona 85260, or call Marji Klima at (480) 905-1906 ext. 101 with your credit card information. You can also pay using PayPal (and get the Declaration of Intent to Be Cryopreserved) here: http://www.alcor.org/BecomeMember/associate.html

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