

ALCOR LIFE EXTENSION FOUNDATION

A Non-Profit Organization

# CRYONICS

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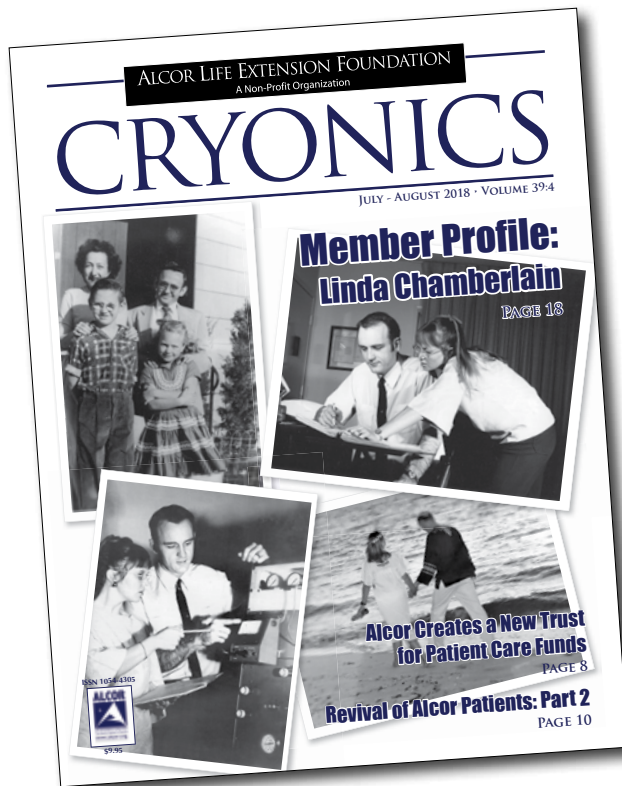
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# CRYONICS



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Reviving Alcor's patients from cryopreservation is fundamental to its mission. As the revival technology begins to come into focus, the process of planning patient revival can begin. An extensive treatment of revival technologies and the principles and ethics of revival validation by Ralph Merkle.



# CRYONICS

## *Editorial Board*

Saul Kent  
Ralph C. Merkle, Ph.D.  
R. Michael Perry, Ph.D.

## *Editor*

Aschwin de Wolf

## *Contributing Writers*

Aschwin de Wolf  
Taya Maki  
Ralph C. Merkle, Ph.D.  
Max More, Ph.D.  
R. Michael Perry, Ph.D.  
Nicole Weinstock

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Address correspondence to:

*Cryonics* Magazine  
7895 East Acoma Drive, Suite 110  
Scottsdale, Arizona 85260  
Phone: 480.905.1906  
Toll free: 877.462.5267  
Fax: 480.922.9027

Letters to the Editor welcome:

aschwin@alcor.org

Advertising inquiries:

480.905.1906 x113  
advertise@alcor.org  
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# EDITORIAL

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



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## WHY DON'T YOU START WITH STANDBY FIRST? By Aschwin de Wolf

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In the 15 years I have been involved in cryonics I have observed a predictable pattern. An enthusiastic group of people want to create a new cryonics organization. Reasons can range from wanting to have a cryonics organization in their own continent or country (Europe, Australia) to having a distinctly different vision how cryonics should be practiced. Some of these attempts have succeeded and others have failed. The common denominator I have seen in the failed attempts is to do "something else" first before offering long-term maintenance. If this "something else" would simply comprise exercising due diligence in having a sensible financial and legal framework in place before accepting patients that is understandable. But here "something else" concerns achieving something even harder as a *precondition* for building a storage facility: creating state-of-the-art response capabilities.

One argument for this approach is that without adequate standby and stabilization having a cryonics storage facility is pointless. I do not think this is true and if this argument is followed to its logical conclusion there will *never* be a good moment to start offering storage as long as cryonics is as unpopular as it is right now. Sure, it is indisputable that a cryonics patient who receives a prompt response and

good stabilization procedures will sustain less damage and better cryoprotection. This does not mean, however, that anything that falls short of this is doomed. The ultrastructure of the post-mortem brain is more robust than even most cryonicists assume and ice formation does not necessarily render the original structure of the brain un-inferable.

The other argument is often a variant on the idea that the most challenging element of a cryonics endeavour (i.e. storage) should be done last. But the hardest part of cryonics is not storage but standby. Creating cost-effective, dependable, responsible capabilities for a region larger than a city or small country is a non-trivial challenge. Let's consider Europe for example. Providing standby coverage for all countries would require a massive initial investment with numerous medical professionals on retainers being available for a case at the right time at the right place...a case which may not happen for many years. Will such an organization be able to keep its supporters motivated and financially committed? In reality this mandate often creates a situation where the organization cannot live up to its standby claims, storage is (indefinitely) postponed, and interest wanes until the next attempt is made to do the same thing. It is no surprise, in my

opinion, that some of the newer cryonics organizations (KrioRus, Oregon Cryonics) accepted patients for long term care from the get-go.

Standby is important and I do not pretend that it will take care of itself when there is storage. But whereas storage needs to be *centralized* (having a storage facility in each of the European countries at this point would be ludicrous) having sound and dependable standby capabilities is a *decentralized* process which can be pursued by different groups in different states or countries based on their different needs and (financial resources). As we speak, the UK and the Netherlands have made impressive efforts to create such capabilities and these efforts will further grow and spread when there is a facility with patients to care for. One needs to start somewhere and the most realistic path is to first create a sensible storage solution followed by de-centralized efforts to transport patients to the facility in the best possible condition. ■

# CEO Statement on Membership Statistics

By Max More



Although you can find the basic numbers on the Membership Statistics page, each issue of *Cryonics* magazine I like to update membership numbers and trends. As of April 30, 2018, Alcor had 1,176 members.

That's a net gain of 33 since the start of the year. Annualized, this represents a growth rate of 8.7%. If this can be sustained – which cannot be guaranteed in part because we may have a higher number of cancellations – it would be the fastest growth rate since 2005, and the largest total net gain in members ever.

**But what does the growth in “members” mean and how does it compare to the membership numbers of other cryonics organizations?**

The American Cryonics Society (ACS) publishes no membership statistics. Oregon Cryonics doesn't have members. Nor does Yinfeng in China. I did not find any official number for KrioRus members, but their Wikipedia entry says “200” based on an unofficial source (in Russian). “Osiris Back to Life” – a new and largely unknown organization – appears to have members but publishes no statistics. That leaves only the Cryonics Institute as a comparative reference point.

As of April 2018, on its “CI Membership” page, CI claimed to have “TOTAL 1,882”. This top-line total number is the one repeated on Facebook, in their Wikipedia entry, in published pamphlets, and elsewhere. However, in smaller lettering, “Members” is listed at 1,525. The “total” comes from adding to that number both patients (165) and “Associate Members” (192). (I have been unable to find a definition of “Associate Member” anywhere on CI's website.)

Alcor's membership number of 1,176 refers to those who have made full contractual and financial arrangements to be cryopreserved and who are paying membership dues. It does not include patients. Nor does it include Associate Members. So, what is the comparable number for CI?

Since March 2015, this has been impossible to answer.

After that date, CI stopped publishing the comparable number,

which used to be listed in a column called “CRYO”. The last record put “CRYO” members at 575. Although CI removed that information from public display, you can find it using the Wayback Machine, or you can see the screenshot I took before they deleted that data. “CRYO” was defined as “Funded Members with Contracts”. [Also as: “CRYO = CI Members with Funding and Contracts for Human Cryopreservation (a subcategory of MEMBERS) (See Becoming a Member)”] Back in October 2012, that was 505 out of a “Total Membership” of 1,040.

Another curious omission: “New CI members per year” is not listed in the yearly summary after 2016 here: <http://www.cryonics.org/ci-landing/member-statistics/>

CI's definition of membership seems to require no more than paying membership dues: “For Yearly Membership the application must be accompanied by the initial dues payment and a \$75 initiation fee. This secures your current membership and the right to execute a contract.” In other words, CI counts someone as a member so long as they are paying dues, even if they have not signed any contracts or made financial arrangements to be cryopreserved.

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*CI counts someone as a member so long as they are paying dues, even if they have not signed any contracts or made financial arrangements to be cryopreserved.*

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## SPECULATIVE ARITHMETIC

In October 2012, Alcor-equivalent membership was 505, compared to a total of 1,040. That meant that 48.6% of “total members” were Alcor-equivalent members. If that same ratio holds now, we get  $(0.486 \times 1,525) = 740$ .

What is the highest possible number of Alcor-equivalent members? Start with 1,525. Subtract “Pets”, “Assoc. Members”, “DNA/Tissue”, and you end up with 922. There may well be many people who are counted as members because they pay/paid dues but do not fit the three categories above. 922 is the highest number for real, full membership that I can come up with.

The real number is either equal to or lower than this and, perhaps most likely, around 740.

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*I've been surprised by how many people are fooled by CI's manipulation of the way it presents its membership numbers and its repeated claim that it is the organization with the largest number of members.*

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Why does this matter?

I've been surprised by how many people are fooled by CI's manipulation of the way it presents its membership numbers and its repeated claim that it is the organization with the largest number of members. Transparency matters greatly in this endeavor. It is unseemly for CI to parade its “low costs” and also claim to have more members than any other cryonics organization.

What are the trends in CI's membership numbers? I'm interested only in members with cryopreservation arrangements, so that limits me to numbers no later than March 2015.

#### **March 2015**

Members: 1180. CRYO: 575

Increase of 98 “Cryo” members, i.e. real members, in the 3 years from March 2012 to March 2015.  
32.67/year average.

#### **March 2010 to March 2011**

From 404 to 442 = 38 = 9.4%.

#### **March 2011 to March 2012**

From 442 to 477 = 35 = 7.9%.

#### **March 2012 to April 2013**

(there is no listing for March 2013)

From 477 to 503 = 27 (or 25 annualized) = 5.24%.

#### **April 2013 to April 2014**

From 504 to 563 = 59 = 11.7%.

#### **April 2014 to March 2015**

From 563 to 575 = 12 (or 13 annualized) = 2.3%.

We are seeing a declining trend, with the exception of 2013 to 2014. Is this why the core membership numbers are no longer published? We can only speculate. It is interesting that over the last few years, Alcor's membership growth trend has been rising, not

declining. That is despite Alcor's dues being significantly higher than CI's.

In March 2015, CI had 575 cryopreservation members. Alcor had 1,027. In other words, CI's cryopreservation membership was 56% of Alcor's. Given evidence on recent trends (and hearsay from alienated CI members), that percentage has probably shrunk.

By the way, I have brought this numerical sleight-of-hand directly to the attention of CI's leadership. The response was clear: They are going to keep doing it.

#### **GROWTH IN PATIENTS VS. MEMBERS AT CI**

Until quite recently and for a few years, Alcor and CI had almost exactly the same number of patients. But as of April 2018, CI had 165 patients compared to Alcor's 156. CI acquired 35 patients in 3 years. That's about 150% of the number of Alcor patients in the same time, despite about half the membership. In other words, CI's growth in patient population is around 300% that of Alcor's relative to number of members. This suggests that one or both of the following must be true: 1. CI's membership is much older with a higher mortality rate than Alcor's. 2. CI takes a vastly higher number of “post-mortem” third-party cases, a category of cases much more prone to lack of strong informed consent and to litigation.

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*My hope is that CI will clarify and change the way they report their membership numbers.*

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CI's website refers to “Our ‘Members-Only’ policy for cryonic services”. However, unless there is high mortality among existing members this is highly misleading, since it would then appear that most people who are cryopreserved by CI were not members at the time.

At Alcor, we are currently working to reduce the loss of members, especially those who cite financial reasons for discontinuing their arrangements. The Cryonics Institute has added some interesting information to their Member Statistics page, apparently fairly recently: “At least one-fifth of Yearly Members allow their Membership to lapse.”

Although annual member dues with CI are a fraction of that of Alcor's, CI nevertheless clearly loses quite a few members. I know that some of those are lost because they switch to Alcor. For the others, I don't know the cause, nor whether it tells us anything about the price sensitivity of Alcor members and potential members.

My hope is that CI will clarify and change the way they report their membership numbers. Failing that, this article will serve as a reference to assess the “largest number of members” claim. ■





## Alcor Creates a New Trust for Patient Care Funds

**W**hen Alcor created the Alcor Patient Care Trust ("PCT") in 1997, our purpose was to create a safe place to grow and protect the funds reserved for care of Alcor's cryopreserved patients. The number one purpose of Alcor is and has to be to maintain the already cryopreserved patients. Who would trust a cryonics organization which couldn't do that?

The Patient Care Fund (before it was a separate Trust) was originally part of Alcor's regular internal fund accounting system. By late 1991, this fund approached one million dollars and was by far the largest segment of Alcor's assets. The Alcor Board realized that a better way was needed to protect this money. For one thing, it was a possible "deep pocket" in any potential lawsuit against any part of Alcor's operation. For another thing, there was the potential temptation to use the fund for other purposes during tight financial times. So the idea was born

to create a legally separate Trust to shield the fund from either of these possibilities.

We were advised to create the PCT under Alcor's corporate tax ID number to take advantage of Alcor's tax-exempt non-profit status. Over the years as the Trust funds grew ever larger, Alcor's leaders began to look for a way to separate the PCT further from its Alcor corporate existence and to provide the Trust with its own tax ID. Unfortunately the two attorneys we asked about this advised us that it was extremely unlikely the IRS would approve that kind of separation without a lengthy and expensive court proceeding. They also felt like the Patient Care Trust, being part of Alcor, was not as secure from outside lawsuits as it could be. However, they did have experience with the IRS approving a Trust which took the form of a Type 2 Supporting Organization, which could have its own separate existence, tax ID number, and 501(c)(3) tax status.

<https://www.irs.gov/charities-non-profits/charitable-organizations/supporting-organizations-requirements-and-types>

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*At some point in the future, we also anticipate that the ACT will provide funding for research into the technologies necessary to resuscitate our patients.*

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Fortunately we had set up the PCT to include the ability "to form any other separate legal entities to hold title to the assets of the Trust in order to carry out the substantive provisions of this Agreement."



And of course, Alcor always has the right to set up other entities.

While a Type 2 Supporting Organization did seem like a useful organization to create, it had one provision that we struggled with: The majority of the Directors (or in this case, Trustees) of a Type 2 Supporting Organization had to be Directors of the Supported Organization – in this case, that means Alcor Directors. While the new Trust would be much safer from outside “attack,” we worried that we might create something that was more vulnerable to inside manipulation from future Alcor Boards of Directors. We think we have solved that problem, however, by keeping the PCT Trustees directly involved in the distribution of funds and payment of expenses, as described below.

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***The Alcor Care Trust  
Supporting Organization  
("ACT") was created on  
June 6, 2016 and approved  
by the IRS as a tax-exempt  
501(c)(3) organization on  
June 20, 2017.***

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The Alcor Care Trust Supporting Organization (“ACT”) was created on June 6, 2016 and approved by the IRS as a tax-exempt 501(c)(3) organization on June 20, 2017. Since then the Alcor Board of Directors, the Trustees of the PCT, and the Trustees of the ACT have worked carefully to put together an ACT Operating Agreement that details the relationship between the three entities. Funds were transferred from the PCT to the ACT on March 21, 2018. As they have been for many years, the funds are in the custody of Morgan Stanley Smith Barney, LLC, but are now managed by the ACT Trustees.

The purpose of the new ACT is primarily to hold the Patient Care investment funds and to invest them in such a way as to allow them to grow at the fastest rate that is consistent with a low level of risk. The

strategy being used is the same as that which was pursued by the PCT Trustees.

The PCT continues in existence with the primary purposes of initially receiving the Patient Care funds from Alcor after each cryopreservation and paying the quarterly bills for Patient Care Expenses. At the end of each year (or more often, if warranted), the PCT will pass along excess funds to the ACT for investment. If expenses exceed what the PCT has on hand, the ACT is specifically authorized by the ACT Operating Agreement to return funds to the PCT sufficient for the payment of Patient Care expenses. This arrangement also allows the two Trust Boards to be a potential check on each other and on the Alcor Board of Directors.

At some point in the future, we also anticipate that the ACT will provide funding for research into the technologies necessary to resuscitate our patients.

The ideal arrangement would be that each Trustee Board include three members who have a relative or significant other in cryopreservation at Alcor. This is sometimes difficult to accomplish, but we are actively looking to increase our pool of qualified future Trustees. For now, we allow no more than two Trustees to be on both Trustee Boards. As we increase our pool of potential Trustees, we anticipate less duplication. The Patient Care Trustees are elected on staggered terms (1 Trustee comes up for election each year) by the Alcor Board of Directors. The Alcor Care Trustees are self-electing (by law), also on staggered terms.

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to grow at the fastest rate  
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a low level of risk.***

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The current members of the PCT and ACT Trust Boards are:

**Patient Care Trust:**

Michael Riskin (Alcor Director)  
Robert Schwarz  
Michael Korn  
David Brandt-Erichsen  
[One currently open seat]

**Alcor Care Trust Supporting  
Organization:**

Michael Riskin (Alcor Director)  
Brian Wowk (Alcor Director)  
Andy Aymeloglu (Alcor Director)  
Stephen Bridge  
Michael Korn

On March 21, 2018, the Patient Care Trust assigned \$12,707,650.65 in investments and cash to the Alcor Care Trust Supporting Organization. The Patient Care Trust retained \$700,000 in cash as a cushion for Patient Care expenses in 2018, as well as its ownership position in Cryonics Property, LLC (the company that owns the building that Alcor occupies), and its ownership of Patient dewars and related equipment.

The full text of the ACT’s Articles of Organization, Operating Agreement (the equivalent of Bylaws), and other documents can be found on the Alcor website here:

<http://www.alcor.org/AboutAlcor/patientcaretrustfund.html> ■

A vibrant, futuristic cityscape with a person walking a dog near a sleek, modern car. The scene is set in a lush green area with a paved path. In the background, there are tall, modern buildings and a large, curved structure that looks like a futuristic car or a piece of art. The overall atmosphere is one of a advanced, high-tech future.

# Revival

## of Alcor Patients Part 2 of 2

By Ralph C. Merkle

### A HUMAN CRYONICS REVIVAL PROGRAM

Applying the previously-mentioned Horizon Mission Methodology, we can now look back at the present from the perspective of a future in which the objective of human revival from the cryopreserved state has already been successfully achieved. These revivals are assumed to take place in the year 20xx, a future world in which MNT has been fully developed and in which medical nanorobots are used in medical diagnostic and therapeutic practice. This is a world in which today's most common medical causes of death – e.g., cancer, heart disease, stroke, diabetes, and even aging – will be entirely curable conditions. “Terminal” patients are likely to be rare, unless cost or personal choice are issues.

By the year 20xx, Alcor will be reviving its patients. A substantial fraction of the patients will likely have been revived using *in situ* repair. Some patients who have suffered greater cryopreservation damage will have been revived by using molecular scan-and-restore. Patients who prefer being revived as WBEs might have been revived using scan-to-WBE. We now ask, looking backward from the year 20xx: How might this have occurred?

### ETHICAL PRINCIPLES FOR REVIVAL

Before describing a possible revival program, we first must discuss the fundamental ethical principles that should govern the revival of cryopreserved patients. It would seem advisable for Alcor to convene an appropriate committee of well informed

cryonicists to consider the issues raised by this Section so that the actual process of reviving patients can proceed smoothly and without causing unexpected concerns.

Four ethical principles seem applicable to the revival of cryonics patients:

**Principle 1:** Informed consent. Any party subject to an experimental procedure should be informed, as well as possible, about the procedure and its possible outcomes.

**Principle 2:** Before any procedure is applied to the revival of cryopreserved patients, it should be adequately tested on experimental animals, including primates, and also on human volunteers, if that is legally and ethically possible.

**Principle 3:** Adequate testing of a procedure for reviving cryopreserved patients should verify that as much personality-relevant information as possible is retained.

**Principle 4:** The risk of information-theoretic death to a patient should be minimized. As a corollary, before carrying out any procedure on a patient that might pose any risk, all available personality-relevant information from that patient should be digitized, copied and securely stored – if this is legally and ethically possible and if, on balance, this reduces the risk of information-theoretic death.

Principle 1 is well known and generally agreed to. It has an extensive literature.

“Informed consent is a process for getting permission before conducting a healthcare intervention on a person. A health care provider may ask a patient to

consent to receive therapy before providing it, or a clinical researcher may ask a research participant before enrolling that person into a clinical trial. Informed consent is collected according to guidelines from the fields of medical ethics and research ethics.”<sup>34</sup>

Principle 2 is the application to the revival of cryopreserved patients of the more general principle that any medical treatment should be adequately tested before it is put into general use. How to “legally and ethically” test revival methods on human volunteers deserves further discussion.

Principle 3 is new. We have already discussed it under “Did We Do It Right?” When combined with our other principles it has consequences that require further consideration.

Principle 4 is also new. Minimizing the risk of information theoretic death is, in some sense, just a modern restatement of the age-old dictum: “First, do no harm.”<sup>35</sup> The corollary given in Principle 4 will be familiar to anyone who has ever carried out a major edit operation on a file: back it up first, or you might regret it. Medical technology today cannot backup patients. However, we anticipate that the technology that will enable revival of cryopreserved patients will also enable backup of those patients. Because this is a new concept, generally accepted practices have not yet been worked out. Patient wishes must be properly taken into consideration before carrying out any procedure.

## AN ETHICAL Q&A

We review the ethical issues in the form of a Q&A, describing what we can and cannot ethically do. Following each question and answer, we discuss the ethical issues in greater detail, giving the justification for the conclusion in greater depth.

### **Q1: Is it ethical to implant neurobots into a human volunteer?**

A1: Yes, provided the human volunteer provides informed consent and the process complies with appropriate medical safety guidelines.

In Q1, we must safely introduce neurobots into the human volunteer, gather data, and then remove them. Complying with principle 1, informed consent, should be feasible. Principles 2 and 3 are not applicable, as this step does not involve revival from cryopreservation. Principle 4 does not appear applicable, as introduction of neurobots does not appear to pose a risk of information-theoretic death.

We are, therefore, left with informed consent. As we are assuming that nanomedicine in general, and medical nanorobotics in particular, have already been developed and are in use, the introduction, operation and removal of neurobots into a test subject should be within the normal ambit of an experimental protocol of that time. This will be especially true when we consider that introduction of neurobots into human test subjects will be done only after they have been safely introduced into animals, including primates, and have been proven to be safe.

It should be possible to conduct an experimental protocol to validate the safety of neurobots in human volunteers while complying with the ethical principles given here, and also with the ethical principles that must normally be complied with in human clinical trials.

### **Q2: Is it ethical to use the data obtained in Q1 to construct and run a WBE?**

A2: Yes, provided the volunteer provides informed consent. The rights of the WBE so constructed must be respected.

Q2 involves the construction of a WBE from the data gathered by neurobots, whose safe introduction and removal has already been validated using an ethical protocol, in accordance with the answer to Q1. It is unlikely that legal issues will be a problem

in this step, as manipulation of data, even data that describes a human mind, is not yet significantly constrained by law, and will likely not be so constrained for some time. The primary issues will be ethical.<sup>36</sup> It is worth emphasizing that experimental tests of WBEs of primates will have been successfully concluded, and that the long term stability of WBEs of primates in virtual environments will have been demonstrated before work on human WBEs begins. The primary remaining issue will be informed consent, including negotiations with the test subject over the appropriate protocols to be followed both during the debugging process and afterwards. For example, should a failure happen “quickly” (a few seconds? A few minutes?<sup>37</sup>) then, with the prior consent of the subject and (hopefully) isolation of the problem, the data from the failed attempt could be erased.<sup>38</sup>

Should a failure happen “slowly” (several weeks? A few months?) then the WBE could be preserved on stable storage until it was possible, sometime in the future, to be restored to full mental health. To put it another way, the unsuccessful WBE would be like an Alcor patient, awaiting future technology to be restored to full mental health.

### **Q3: Is it ethical to implant neurobots in a terminally ill volunteer, construct a WBE, and cryopreserve them with an experimental cryopreservation protocol following their legal death?**

A3: Yes, provided the volunteer provides informed consent and the process complies with appropriate medical safety guidelines, and the rights of the WBE so constructed are respected.

Q3 presents a greater challenge. Following the implantation of neurobots and the construction of a WBE, we cryopreserve the test subject. Worse, we cryopreserve the test subject using protocols similar to those actually used on Alcor patients today, which in some cases are less than optimal by today's standards, let alone the future standards in force at the time this test program will be conducted.

Is this ethical?

Legally, it seems likely that cryopreservation using today's methods will still be viewed as causing legal death, at least at the time at which the protocols

for reviving a patient cryopreserved using those methods are still being tested. It might therefore be difficult to legally ask for a healthy volunteer to submit to this experimental protocol, regardless of their motivations or expectations.<sup>39</sup>

However, we could ask for terminally ill volunteers. After volunteering, they would be implanted with neurobots, from which a WBE could be constructed. We know this is ethically permissible from Q1 and Q2. They could then be (legally) cryopreserved immediately following legal death, as is done today in cryonics. This solves the legal problem.<sup>40</sup> It would also be necessary to obtain informed consent.

What causes our experimental subject to volunteer? Arguably, when medical nanorobots are available and neurobots are available at least experimentally, most terminal diseases will be treatable. Our volunteer must (a) be suffering from a terminal illness which is, for some reason, not treatable by the available nanomedical technology, or (b) not be able to afford the nanomedical treatment, or (c) have declined the nanomedical treatment despite its effectiveness. Further, our volunteer must be willing to accept a sub-standard cryopreservation despite the fact that better cryopreservation technology will surely be available.

Those suffering from a terminal illness which was not treatable by the available nanomedical technology might view a WBE as a definite plus when considering whether or not to volunteer for this experiment, although the number of volunteers falling into this category might be small.

Those not able to afford the nanomedical treatment might likewise view a WBE as a major advantage when considering whether or not to volunteer for this experiment. On the other hand, it might be viewed as coercive to offer a WBE to a person who can't afford nanomedical treatment. It certainly seems perverse to refuse admission to an experimental program to those who can't afford nanomedical treatment on the grounds they might prefer a nanomedical treatment to the proffered WBE. It is also unclear how to reliably determine the motive for declining nanomedical treatment, as determining human motivations is frequently difficult. Whether or not a



person declined nanomedical treatment because they couldn't afford it, or because they wanted a WBE, might not be clear, even to the person making the decision.

Finally, those who declined nanomedical treatment despite being able to afford it and the fact they knew it would be effective might include some who were specifically interested in becoming a WBE, and declined treatment precisely because neurobots and WBE technology had recently become available. The opportunity to have someone else pay for the procedure might be attractive.

The latter two groups would be particularly interested in whether the neurobot and WBE technology were both fully tested and reliable. Offering members of these groups an untested technology might be viewed as unethical or coercive, suggesting that both the neurobots and the neurobot-to-WBE algorithm should be fully tested and validated prior to seeking volunteers who might fall into these categories.

The most straightforward course of action, ethically, would be to fully test and validate both the neurobots and the neurobot-to-WBE technology using healthy volunteers, relying on the answers to Q1 and Q2 to enable us to ethically carry out these validations, and then move on to the next task: seeking terminally ill volunteers.

If neurobots and neurobot-to-WBE have been experimentally validated, then the person who volunteers for the experiment to evaluate Q3 will receive an important benefit that many may regard as compelling. The volunteer will first be implanted with neurobots using a validated procedure *that has been tested and has been shown to work*, from which a WBE will be constructed *using a procedure which has also been tested and has been shown to work*. That is, the person volunteering for this can expect to get a WBE using known and tested procedures before the experimental cryopreservation procedure even begins. A volunteer who desires a WBE for whatever reasons will thus obtain one. Their WBE will survive, regardless of what happens to their biological body. Many people will find this a worthwhile proposition.

The prospect of helping cryopreserved patients may be an additional psychological bonus for these volunteers, generating

a positive mental state analogous to the feeling experienced by today's altruistic kidney donor<sup>41</sup> who knows they're saving the life of a fellow human being by their actions.

In summary, the "before" WBE is constructed from the brain of the human volunteer, using the neural traffic information provided by the neurobots.<sup>42</sup> The volunteer is then cryopreserved using historical cryopreservation methods similar to those that were originally applied to the Alcor patients who are awaiting revival.

It should be possible to find willing volunteers for this part of the protocol who fully understand it and its consequences for themselves, while remaining in full compliance with accepted ethical principles.

**Q4: Is it ethical to apply an experimental protocol to revive the volunteer of Q3 for the purpose of evaluating the effectiveness of the experimental protocol?**

A4: No.

Some in the cryonics community might be disappointed at this conclusion, as reviving cryopreserved experimental human subjects would seem the obvious test of an experimental revival protocol. Unfortunately, the ethical problem can be stated quite succinctly. The problem is not getting the informed consent of the person who was cryopreserved. As discussed in Q3, there are conditions under which this consent can reasonably be obtained.

The problem is twofold. First, we must get the informed consent of the person who is revived, who might be a different person from the person who was cryopreserved. Second, we must get the approval from the broader society for what amounts to a new process for creating a human life.

If the revival process goes awry, it is possible that it might create a new person, a person who has not been consulted and who has not been given the opportunity to provide informed consent. Worse, the cryopreservation protocol utilized was not in keeping with the standard-of-care for that future time, thus creating an enhanced risk that the experimental revival protocol might produce an inappropriate outcome.

From the societal perspective, we are no longer dealing with the traditional, and actually rather safe, issue that cryonics

normally deals with: that of saving an existing human life: we are now dealing with the issue of possibly creating a new human life. This issue is well known to be socially, politically, and ethically divisive. The purpose for which we are asking society to deal with this issue is the rather abstract one of testing a cryopreservation revival protocol.

If there are any who might argue that it would be ethically acceptable to move forward with an experimental program on human subjects that poses questions about creating new human life, consider just the pragmatic political vulnerability this creates. While the legal system usually works relatively slowly, laws against human cloning appeared well before any actual practice of human cloning posed any societal risks.<sup>43</sup> It would be reasonable to be concerned that adverse publicity that paid little attention to the facts but was framed in a manner intended to play on people's emotions could adversely impact any organization that pursued experimental work in this area.

Possibly creating human life for the purpose of evaluating protocols for reviving cryopreserved patients is not something we should pursue.

**Q5: Is it ethical to scan the legally dead cryopreserved brain of the volunteer of Q3?**

A5: Yes.

Carrying out scientific research on legally dead human remains that have been donated for the purpose is an established activity carried out in the context of a well-established regulatory environment, and provides valuable information that saves lives. Indeed, we would be scanning a cryopreserved human brain to develop methods for saving the lives of cryopreserved patients, and will, *inter alia*, be providing a great deal of medically useful information.

**Q6: Is it ethical to use the brain scan data from Q5 to construct a WBE using an experimental algorithm?**

A6: Yes.

It is worth noting here that we are running an experimental scan-to-WBE algorithm, but are carefully not running the WBE. The ethical issues involved in running a WBE only arise when the WBE is "switched on". The data describing a

WBE is just that: data. The data describing a WBE that is sitting on a DVD, for example, cannot feel pain. Only when the DVD is loaded into a computer and the computer starts running are we concerned that the WBE, now a running process, might feel pain (depending on exactly what input is provided and exactly what the WBE is doing).

As a consequence, we can confidently state that running an experimental scan-to-WBE algorithm, but not actually running the WBE, avoids the ethical issues that are typically associated with WBEs.

**Q7: Is it ethical to run the WBE constructed in Q6?**

A7: No.

Recall that the WBE was constructed using an experimental scan-to-WBE algorithm applied to data derived from a scan of a volunteer cryopreserved using a method similar to those used on existing Alcor patients, and therefore not best practice (and likely falling significantly short of best practice) for the time that it was done.

This combination of an experimental scan-to-WBE algorithm applied to data derived from a less-than-best-practice cryopreservation makes it ethically dubious to “switch on” the resulting WBE.

**Q8: Is it ethical to compare the WBE from Q6 with the WBE constructed in Q3?**

A8: Yes.

This answer is simple. A WBE that is not running is simply data. We are comparing one set of data with another set of data. This is trivially ethically permissible. We are not running the WBE from Q6, and are not running the WBE from Q3 for the purpose of evaluating the revival protocol. Simply comparing two sets of data does not pose any significant ethical issues.

## AN ETHICALLY ACCEPTABLE PROTOCOL FOR EVALUATING A REVIVAL PROTOCOL

Now that we have walked through the ethical issues, we can describe an ethically acceptable protocol for evaluating a revival protocol, an experimental scan technology and an experimental scan-to-WBE algorithm on human volunteers.

1. Implant neurobots into a terminally ill human volunteer, after asking the volunteer for informed consent, using a successfully tested and validated protocol that complies with appropriate medical and ethical principles.
2. Cryopreserve the volunteer following their legal death using a cryopreservation protocol modeled after those actually used to cryopreserve Alcor patients.
3. Use the data obtained from the neurobots implanted in 1 to construct a WBE using a successfully tested and validated neurobot-to-WBE algorithm. Run the WBE in a suitable environment if that was part of the agreement with the terminally ill volunteer.
4. Carry out those parts of the revival protocol that take place at cryogenic temperatures.
5. Scan the cryopreserved brain produced by step 4 using the experimental scan technology.
6. If the purpose is to evaluate a biological revival protocol, then the scan in step 5 should either be a non-destructive scan or a destructive molecular scan. If it was a destructive molecular scan, rebuild an atomically precise duplicate of the cryopreserved brain that was destructively scanned using the scan data. Otherwise, simply continue.
7. Re-warm isolated one-cubic-millimeter samples of tissue from the cryopreserved volunteer to verify the re-warming phase of the protocol. This must be permitted by the informed consent obtained in step 1.
8. Construct a WBE from the scan data obtained in step 5, using the experimental algorithm. Do not run this WBE.
9. Compare the WBE from step 2 with the WBE from step 8.
10. Compute the percentage difference between the two WBEs. Subtract

this percentage difference from 100 and call it the “revival fidelity”. If there is no difference, we will have achieved 100% revival fidelity. A 100% revival fidelity is the best that can possibly be achieved.

This is an ethically acceptable protocol which can be used to evaluate both a scan technology and a scan-to-WBE algorithm. It will yield a result that ranges from 0% to 100%. If the focus is on the scan-to-WBE algorithm, we can use a molecular scan technology. The use of a molecular scan eliminates the concern that the scan technology itself might have resulted in information loss. By using a molecular scan and a high-quality computationally intensive scan-to-WBE algorithm, it should be possible to achieve the highest possible revival fidelity given the level of damage caused by the possibly poor quality of the cryopreservation technology. Ideally, the revival fidelity would approach 100%. Should this prove to be the case, the revival protocol could be deployed with confidence that it would faithfully revive Alcor patients with high fidelity. If the revival fidelity is significantly below 100%, and if, after sufficient work and effort, the revival fidelity does not improve but remains significantly below 100%, and if a molecular scan has been used in step 5, then the poor revival fidelity must be attributed to the poor quality of the cryopreservation carried out in step 2.

At some point, if molecular scans are used and after sufficient<sup>44</sup> work on improving the scan-to-WBE algorithm has been carried out so that further improvement in the revival fidelity is not expected, it will be necessary to move forward with the revival of Alcor patients even if the revival fidelity is significantly less than 100%. The result will be a healthy patient with some degree of amnesia. Ideally, amnesia about commonly known facts (the ability to speak and understand a common language, for example) could be filled in by adjustments to the damaged memory system.

It is worth reviewing and emphasizing a few points.

First, neither of the two WBEs is actually “switched on” during the evaluation process for the purposes of the evaluation. Both WBEs are constructed, one from neurobot

data, the other from scan data, for the purpose of evaluating the changes resulting from the cryopreservation process and the cryogenic stages of the revival process.

The human volunteer might have requested that the WBE constructed in step 3 be switched on. This action, if taken, will be taken solely in the context of steps 1 and 3 of the protocol, will be entirely independent of the other steps in the protocol, and will not be done for the purposes of the evaluation protocol. As such, the ethical issues involved in switching on the WBE constructed in step 3 should be evaluated without consideration of anything that might happen in any of the other steps. This action will have been taken in consequence of the wishes of the human volunteer, and must be evaluated in that context.

Second, at no point does the evaluation of the experimental revival process result in either living or even biologically functioning whole tissues. At one stage of the protocol, isolated one-cubic-millimeter tissue samples are taken, similar to isolated tissue samples that are taken today in laboratories around the world for medical testing purposes. At all other times, the experimental process works with tissues that are at cryogenic temperatures. The purpose is to evaluate the revival process, not to revive a patient.

Third, the possible use of a destructive molecular scan as part of the evaluation process is part of the evaluation of the revival process, not part of carrying out a revival. The philosophical interests of the volunteer have already been addressed by informed consent. They are very different from the possible philosophical interests of an Alcor patient who might be revived by a protocol being evaluated by this evaluation protocol.

Because the evaluation interrupts the revival protocol after it has completed all of the cryogenic phases of the process and before it begins warming the experimental subject, there is no direct evaluation of the effectiveness of the post-cryogenic phase of the revival protocol. For this reason, the post-cryogenic phase of the revival process must be evaluated separately. Fortunately, this evaluation is less complex. As discussed previously, any cracks, fractures, or

other damage to membranes that would compromise cellular compartments must be repaired at cryogenic temperatures, as failure to do so would result in further damage upon rewarming. Further, selection of “good” regions and repair of “bad” regions must already have been completed, and all preparations for rewarming must have been completed.

While we cannot complete the revival protocol and evaluate the effects of rewarming on the cryogenically repaired brain, it is ethically allowable to carry out a direct experimental test of the results of warming samples of cryopreserved tissue following cryogenic repairs.

Take small samples of cryopreserved tissue following the cryogenic repairs to the tissue and rewarm the samples at the same rate as if had they stayed part of the whole, and examine the results. For example, if a randomly chosen single cubic millimeter of cryopreserved tissue was selected and rewarmed, it could be used to experimentally demonstrate what happened upon rewarming without creating any ethical risk. A single cubic millimeter of tissue is neither conscious, nor can it feel pain, nor could it exhibit any organized neurological response. Taking this to its logical conclusion, the entire legally dead cryopreserved volunteer could, following cryogenic repairs and with appropriate informed consent, be divided into separate one-cubic-millimeter-cubes, and all the tiny cubes could be rewarmed in isolation and the results analyzed. Provided these tiny cubes remained completely isolated from each other, there would continue to be no ethical risk, as each tiny cube would simply be a small piece of isolated tissue.

By these means, it is possible to carry out a complete experimental evaluation of a cryopreservation revival protocol on a human patient who has been cryopreserved using a sub-standard protocol without ever actually reviving a human patient, and while remaining in compliance with sound ethical principles.

The risk that an experimental program to develop a cryopreservation revival protocol might result in an experimental revival that “goes bad” and results in a human subject in pain and anguish can, and should be, completely avoided.

## WHOLE BRAIN EMULATION AND CRYONICS

Because neurobots and scan technologies will be essential tools for providing the information that allows us to evaluate whether or not our cryopreservation and revival methods have been successful, and because the construction of WBEs from neurobots or from scans will be equally essential tools in allowing us to evaluate the success of our revival procedures, the cryonics community as a whole has an interest in making sure that all of these technologies are developed.

Will the mainstream community develop neurobots, scan technology and WBEs in the absence of cryonics community support?

While there does seem to be research interest in the neuroscience community in developing better tools for monitoring nerve impulses, neurobots as described here have been described as “second-generation” approaches even for the nanorobotic treatment of Alzheimer’s disease,<sup>45</sup> so there does not appear to be the kind of urgent driving force behind the development of neurobots and WBEs that will be needed for cryonics applications. Scan technology also does not appear to be high on the priority list of mainstream research. This suggests that the cryonics community might have to step up to the plate and facilitate the development of neurobots, scan technology and WBEs. The interests of the cryonics community are quite specific. A focused effort by the cryonics community might be decisive in consolidating the rather diffuse interests of other groups.

In other words, the hope that others will develop the specific tools that we want and hand them to us on a platter seems overly optimistic. A more realistic strategy is to assume that if we want neurobots, scan technology and WBEs, we’ll have to, at the very least, be at the forefront of their development, if not actually shoulder the major burden of their development.

It’s helpful to reiterate that the primary motivation for developing neurobots, scan technology and WBEs is to evaluate and demonstrate the validity of the revival technology that we need to develop, and not merely to satisfy the predilections of those in the cryonics community who are personally interested in uploading.



## CONCLUSION

The third item in Alcor's Mission Statement is:

“Eventually restore to health and reintegrate into society all patients in Alcor's care.”

The technology that will allow us to carry out this component of our mission is becoming clearer. We have now reached the stage where we can begin the process of planning for the revival of Alcor's patients.

While molecular nanotechnology and nanomedicine will eventually be developed regardless of what the cryonics community does, cryobots (medical nanorobots capable of operating in and repairing cryopreserved tissue) might not be developed by mainstream science for some time. Members of the cryonics community should systematically review all of the technologies needed to revive cryopreserved

patients, identify those technologies that the mainstream might not develop, and plan for their development.

The areas of greatest interest to the cryonics community include at least the following:

1. Directly funding the development of cryobots.
2. Actively promoting mainstream reasons for funding the development of cryobots, thereby securing mainstream funding for their development.
3. Actively promoting the development of neurobots, scan technology, and WBEs, and likely pursuing direct development of all of them.
4. Encouraging and promoting the investigation of non-destructive molecular scan technologies.

Just as computer simulations have proven useful in the development of other new technologies,<sup>46</sup> it appears that extensive use of computer technology and computer simulations can be used to reduce the cost and speed the revival of cryopreserved patients.

## ACKNOWLEDGEMENTS

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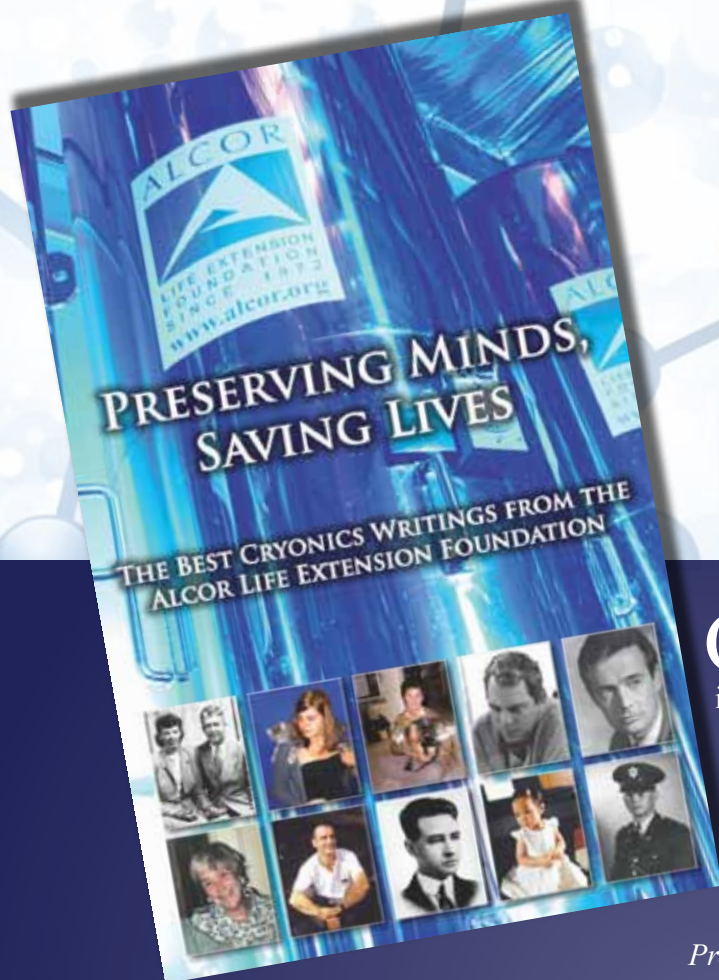
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35. [https://en.wikipedia.org/wiki/Primum\\_non\\_nocere](https://en.wikipedia.org/wiki/Primum_non_nocere).
36. We assume that, whatever the law might say at the time, a successful WBE of a human is, in fact, a human and deserving of all the rights that a biological human might have.
37. These time frames would, of course, have to be reviewed and agreed to by the experimental subject prior to the experiment, and would constitute part of the experimental protocol that would have to be disclosed pursuant to Principle 1, informed consent.
38. This would be particularly true if the failure mode was such as to cause pain or suffering to the WBE. Note that the data originally collected from the neurobots would be retained, in compliance with Principle 4. The data erased would be the “current simulation state” of the WBE sometime after the initial state.
39. It is possible that it will eventually become a legal right for a person to transfer their mind from a biological substrate to a non-biological substrate. If this happens, it might become legal for a person to record their brain activities before they become unconscious, then to become unconscious, for the data describing their brain activities to be used to construct a WBE, which would then be “switched on”, and for their biological bodies then to be “switched off” without ever regaining consciousness. Should this become legal, those wishing to do this could then donate their no-longer-needed biological bodies for experimental use in evaluation of cryopreservation protocols.
40. “Death with dignity” laws, while potentially beneficial for cryonics, do not change the fact that cryopreservation would still take place following legal death. They do, however, allow for the scheduling of the time of legal death, and reduce the risk of pre-mortem dementia and brain damage that might be irreversible, even by advanced future technology.
41. [https://en.wikipedia.org/wiki/Kidney\\_transplantation#Living\\_donors](https://en.wikipedia.org/wiki/Kidney_transplantation#Living_donors).
42. The “before” WBE should normally use neurobot data taken as close in time to the subsequent cryopreservation as possible. Otherwise, there will be a loss of conscious experience following the time when neurobot data stops being recorded and the time that legal death occurs. In some cases, loss of this data might be seen as a benefit. Conditions for deleting undesired data could be arranged in advance with the volunteer.
43. “In 2015 it was reported that about 70 countries had banned human cloning.” [https://en.wikipedia.org/wiki/Human\\_cloning#Current\\_law](https://en.wikipedia.org/wiki/Human_cloning#Current_law)
44. The author recognizes that the term “sufficient” has not been fully defined. The closest analogy that comes to mind is the effort involved in validating the security of an encryption function, which is likewise not fully defined.
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46. For example, Boeing will “build” and “fly” a new airplane entirely on a computer before doing these things physically, greatly reducing the cost and shortening development time; [http://www.boeing.com/news/frontiers/archive/2009/february/i\\_ca02.pdf](http://www.boeing.com/news/frontiers/archive/2009/february/i_ca02.pdf).

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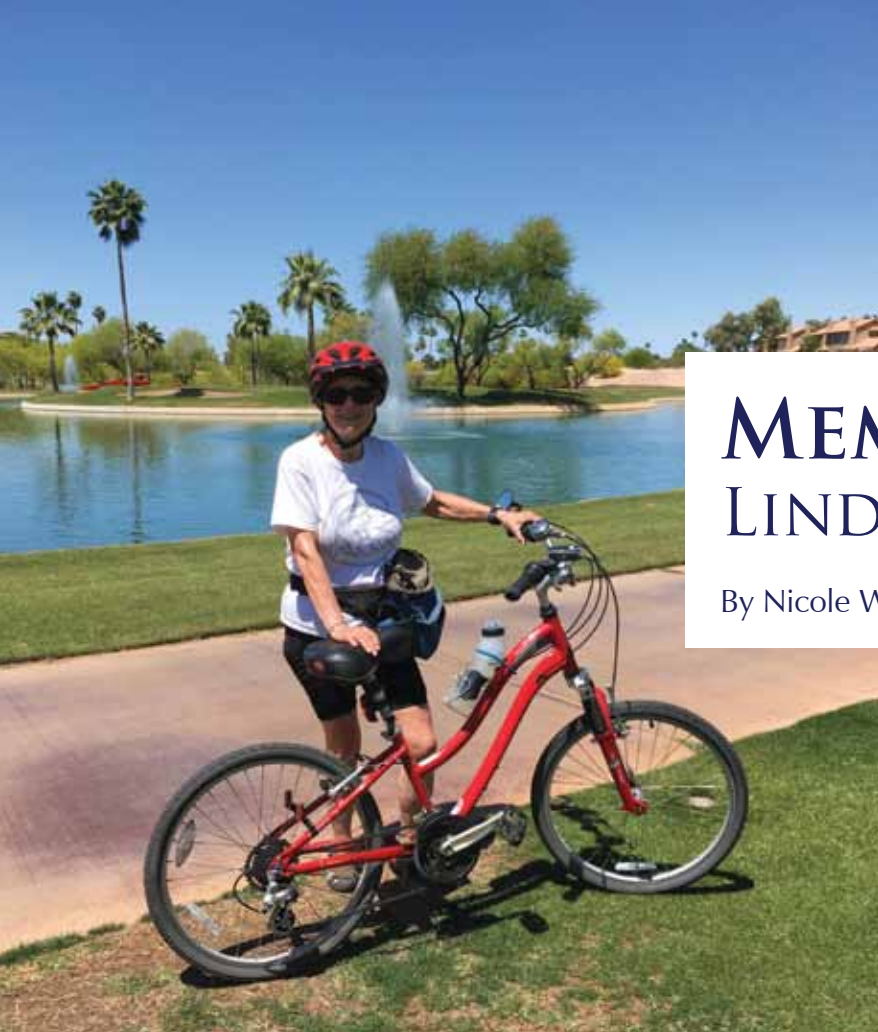
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For an existing member to receive the dues waiver, they must (a) be credited by the person who has signed up; (b) ask for the waiver; (c) not be otherwise profiting from the signup; (d) wait until the new member has completed all essential cryopreservation 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.

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# MEMBER PROFILE LINDA CHAMBERLAIN

By Nicole Weinstock

*Linda takes a photo break on a weekend bike ride in 2018.*

“A couple young kids full of spit and hubris. We had no idea how hard it would be ... So we decided we’d just start Alcor.” It’s hard to fault Linda for that extra serving of chutzpah so many years ago, given that she and her husband, Fred, succeeded in creating a now 46-year-old organization responsible for the future cryopreservation of more than 1,000 people with 156 patients in storage – something that was purely theoretical in the days of Alcor’s founding. Indeed, a youthful degree of pomposity was quite the asset from where we stand now, although, one is hard-pressed to observe any trace of it from the gently self-deprecating laughter on the other end of the phone.

## THE GYPSY LIFE

There’s a certain get-up-and-go about Linda, a pioneering shade of determination mixed with classic Midwestern work ethic that seems to have colored her life from a young age. She was one of those kids who

grew up everywhere and nowhere. “Well, I guess you’d have to say I was kind of a gypsy,” says Linda. “I was born in the state of Washington, and moved when I was three months old. Then I never stopped moving.” She eventually landed in the Los Angeles area for high school by way of Montana and Wyoming, where she spent the bulk portion of her elementary and middle school years.

Right around the time of their Southern California move, Linda’s parents divorced, and she and her older brother moved in with her mom, Arlene. Linda has fond memories of the three of them spending Friday and Saturday nights in with a glass of wine, chatting politics and philosophy. They were underaged, but her mom wanted to ensure that any experimentation occurred under her supervision.

Arlene was an independent thinker and a strong feminist who Linda credits for much of her individualism. “The main thing that I got from my mother was, ‘Be yourself,’ and always question authority.’ So I’m sure that

was the roots of why I was independent as far as thinking about cryonics and wanting to become a philosophy professor. Things like that.”

Indeed, Linda might’ve rubbed elbows with Plato in the cave were it not for her discovery of cryonics. “Philosophy was extremely interesting to me. I couldn’t get enough. I couldn’t read enough about philosophy.” She became enamored with the writings and philosophy of Ayn Rand, author of best-sellers *Atlas Shrugged* and *The Fountainhead*, among other successes. But though Rand promoted her objectivist philosophy rather heavily throughout college campuses during the 1960s and ’70s, her work wasn’t represented in Linda’s classes. “I was very dismayed, because I thought, ‘She’s the most important modern thinker we have,’ but she was just totally dismissed.” And so, for a time, Linda was intent on becoming a philosophy professor in an effort to do justice to Rand’s literature in academia.



*Linda poses for a family photo at bottom right.*

## AN EXCITING PROSPECT

As she delved further into philosophy, Linda stumbled upon Robert Ettinger, and his groundbreaking book, *The Prospect of Immortality*. "Being an atheist, I just got on to it immediately," Linda recalls. "I had given up on there being any afterlife or anything else, and so I just assumed that when I'm dead, I'm gone, that's it. Then I read Ettinger's book, and I thought 'Hallelujah! Maybe not!'"

She didn't waste any time investigating that possibility. Linda wrote a letter to Ettinger inquiring about any cryonics organizations or activities to speak of in California. He suggested that she get in touch with a small organization that was going to be working to sponsor the Third Annual Cryonics Conference to be held in Los Angeles that year. Linda joined the event committee, and one fateful committee lunch later, found herself face to face with her future partner in love and in work.

## FROM BURGER TO BELOVED

"[Fred] was sitting directly across from me. He was so excited. He was talking about this company – I think it was Altair – and how you could send away to get the plans and the parts to build your own personal computer ... Lightning was flashing out of his eyes .... His hamburger came, and

he just kept talking. He didn't skip a beat. He picked up the hamburger – it was huge, like, the kind of thing you couldn't put your mouth around – and ate half of it at once. He was munching away, talking about personal computers, and I thought, 'I really want to get to know this guy. He's fascinating!'"

After their initial introduction, Linda and Fred came to know each other through regular carpooling to the committee meetings. She asked for a ride one week when her car was out of commission, but Fred offered to pick her up anytime moving forward.

Their budding friendship was strained by Linda's decision to move to Idaho with her then boyfriend. The couple planned to escape urban life, and homestead in a cabin of their own construction in Idaho. But soon after her relocation, Linda realized that she couldn't satisfy her passion for cryonics under the circumstances, so they separated, and she returned to Los Angeles. Unbeknownst to each other, Fred had reached the same conclusion at home in Pasadena. Both newly single in LA, their commitment to cryonics and shared enthusiasm for an objectivist framework helped bring them together. They became legally married in 1971.

"I always tell people Fred was the romantic," Linda says. After a brief and

disappointing marriage of her own, her parents' divorce, and that of other friends around her, she was quite skeptical about the prospect of marriage. "I was really worried that it would ruin our love affair." But Fred was committed to making it official, so Linda suggested a compromise: as long as they could skip the "standard trappings" – the white dress, the church, etc – then she would acquiesce to a civil marriage at city hall. But at the last minute, a cryonics research colleague with a minister's license, offered to marry them at home. They agreed, and exchanged rings one fine Sunday afternoon.

## FOUNDING ALCOR

Linda and Fred didn't waste any time after the altar to found Alcor, which became official the very next year. Their swift pacing was fueled, in large part, by the ailing health of Fred's father, Fred Chamberlain Jr. He had lived through a couple of strokes already, and suffered from poor kidneys and diabetes. "We knew he didn't have very much time left," says Linda. "But there was no capability in California, and we didn't want to move to Detroit. We had to create the capability."

Now we've come full circle to the "spit and hubris" moment, as Linda put it before. One of the reasons why a certain amount of courage in conviction was so vital at that



*Fred and Linda hard at work on the very first Alcor cryonics manual.*





*The Grand Canyon frames Fred and Linda on a southwestern adventure.*

time, was due to the largely theoretical nature of cryonics:

“In those days everybody looked at us as a couple of idiots. We were just lunatics. I remember the first time we were interviewed on TV – wow! We get down there and find out that it was an afternoon talk show. They were going to have multiple guests, and we were scheduled between a retired bullfighter and a prostitute.”

Apart from the media challenges, they also faced a lack of inertia from those people who *were* interested in cryonics. As Linda puts it, “They just wanted to get together on Sunday afternoon and talk about it.” But she

and Fred needed to actually do something about it; Fred’s father depended on it.

Though socio-cultural circumstances may not have been in their favor, professional circumstances were. At the time, Fred was working as an engineer for the NASA Jet Propulsion Laboratory (JPL), making enough money to support the two of them. They decided to take advantage of that, so Linda could put her full force towards building Alcor. Fred continued to work Monday through Friday at JPL, while Linda spent her workweek drumming up support and securing contracts. But there’s no rest for the weary, as they say, so they also spent weekends out of the city together in their camper to develop the very first manual detailing standby and transport procedures for volunteer technicians to-be.

It’s a rare couple that can last in business and in love, but the Chamberlains made it with flying colors. “Well, we were enormously lucky in that we were so complementary that we never had an argument. We worked hand in hand.” Their shared passion for objective reality also cleared a path of mutual understanding. “If we have a difference of opinion,” says Linda, “neither one of us is attempting to convert the other one to our way of thinking. We’re both trying to figure out, ‘What is the objective reality here?’ Not what one of us wants it to be.”

Part of paving the way for a stable Alcor, was the creation of a sister company. Alcor had to be a nonprofit, in order to use the

Uniform Anatomical Gift Act (UAGA) so it could accept member patients. The nonprofit framework also allows for the prioritization of members and patients, as opposed to shareholders. But since Linda and Fred were libertarian leaning, and asking for donations wasn’t on their Christmas list, they created Manrise Corporation to support the infrastructure necessary to fulfilling Alcor’s mission.

Their dedication to each other, and to Alcor, paid off in the summer of 1976 when Fred’s father was successfully cryopreserved. It was the first neuropreservation in history.

## TAKING A STEP BACK

Despite this and other successes at Alcor over the years that followed, the Chamberlains’ ultimate goal was always to create a thriving organization with others at the helm. “Fred and I never really saw ourselves as being the heads of Alcor forever. We wanted to build it to be sufficiently strong, to attract the MDs and the PhDs and the MBAs that it would need to become a robust, long-lasting, ethical organization.”

Slowly but surely, they released day-to-day operational responsibilities to other talent, and eventually became members of the Board of Directors. Shortly after the neuropreservation of Fred’s father in 1976, they moved to Lake Tahoe to start a property management company, feeling confident leaving the organization in the hands of Mike Darwin and Jerry Leaf. “They were doing an awesome job of building it up,” says Linda. From their new mountain home, meanwhile, Fred and Linda ran the annual Lake Tahoe Life Extension Festival, a great platform for presentations and other membership-boosting activities.

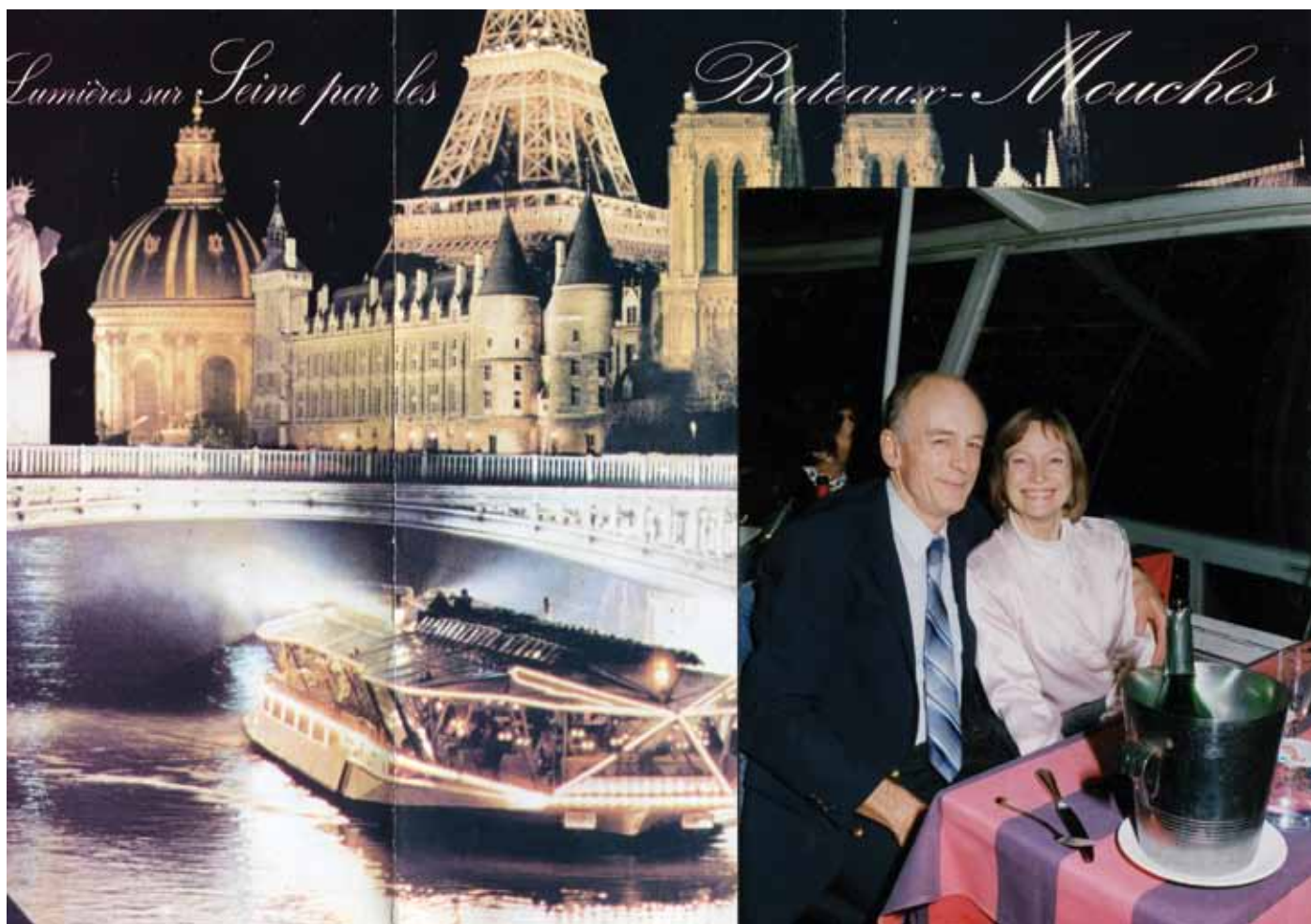
Unfortunately, the mountain cheer was interrupted by a lawsuit related to the Chatsworth disaster. Family members from the nine people who were stored by and thawed through a series of poor decision-making on the part of another cryonics organization, separate from Alcor, were looking for retribution. “They were trying to find any deep pockets that they could find,” recalls Linda. “They didn’t know that Fred and I didn’t have deep pockets.” This prompted the Chamberlain’s departure from the Alcor Board of Directors, hoping their total separation would protect Alcor and Manrise.

Fred and Linda were eventually released from the lawsuit, after paying several



*The Chamberlains study their prototype perfusion machine.*





*Linda and Fred celebrate their anniversary over dinner in Paris in 1998.*

thousand dollars in legal fees. Nevertheless, the experience precipitated two innovative ideas to help safeguard Alcor, its members, and its patients from a similar fate going forward. The first was to have members arrange funding in advance through life insurance; no monthly payments by surviving family relations who could lose interest over time and cease making payments. The second was to begin what, with the efforts and hard work of others within Alcor, has grown into what is now known as the Patient Care Trust, to keep patients safe, to provide for revival and even rehabilitation into a future world should that be necessary.

### CONVINCING ARLENE

One of the greatest challenges of cryonics for many members, is bringing loved ones into the future with you. Linda was no exception to the rule. While she knew that Fred's father and Fred would eventually be cryopreserved, she wanted her mother to be

an indefinite part of her future. For years, Arlene dismissed cryonics. Linda says, "I would try to talk to her about cryonics, and she would tell her friends, 'This is just another one of those crazy ideas that my daughter is into these days. It's like when she was growing up and wanted to be a fireman, a lion tamer'... She never took it seriously no matter how much I tried to talk to her." But eventually, after a very emotional appeal from her daughter, Arlene agreed to be cryopreserved. "I don't know if it was the alcohol or the argument, but she decided to do it," laughs Linda. However, she adds, "She continued to tell her friends, 'I'm only doing it for my daughter.'"

At 68 Arlene was diagnosed with terminal cancer. Doctors expected her to live six months at most. After suffering a rapid decline in health, she made the courageous decision to speed her passing via voluntary dehydration in her own home. Volunteers began showing up there, thanks to Linda and Fred's careful standby planning,

an effort that impacted more than the quality of Arlene's cryopreservation. Linda describes the scene:

"At that point, with all these people there sleeping on the floor and setting up the equipment, [my mom] told me that she was very impressed. She said, 'You know, my own friends have stopped coming to visit me, and you have all these people here who don't even know me, who have taken off work to help me. There's a tremendous amount of commitment, and all this commitment makes me rethink. I guess I am really interested in doing this for myself after all.'"

Linda was so moved by her mom's shift in attitude, that she made her a promise inspired by Carl Sagan's TV series, *Cosmos*: to one day toast their collective return to life in the most expensive resort on Titan, overlooking the rings of Saturn.

## MOVING CLOSER TO TITAN

"I guess, because I always loved philosophy, I tend to be one of those people that thinks that the future is going to be a really great place," says Linda. She is a big proponent of Ray Kurzweil and the singularity. Linda takes heart in the fact that the future can bring many solutions to problems that impact us now. She anticipates the value of nanotechnology in solving some of our greatest environmental concerns, and excitedly anticipates the colonization of other planets, not to mention merging with AI.

"I think it will be a continual march upwards as we go into the future. I don't think we'll ever be bored due to the fact that we'll have unlimited life spans. There will still be challenges. There will be things to work on."

A significant factor in closing in on the proverbial Titan, is how members approach cryonics *now*. After all, if you're not alive, it'll be hard to join Linda and her family in their celebratory inspired cocktail. To that end, Linda urges members to be transparent about their cryonics arrangements:

"It used to be difficult due to fear that people would reject you. My husband, Fred, and I have lost friends over the decades. But those cases were mostly in the 1970s, 1980s and 1990s. I have always been very open about my involvement in Alcor. In the last decade or so I find that no one has decided to unfriend me. On the contrary, people usually find it fascinating. When I was retired



*Linda and Fred pose at their vow renewal in 2002.*

in Florida, I became the local celebrity in our mobile home community. When introducing me to someone, people would almost always point out very enthusiastically that I was involved in cryonics."

Talent is another vital area in the fruition of a future through cryonics. "Medical skills and research skills are both very important to continue to create better and better protocols." Linda believes that being fully accepted into the medical community hinges, in large part, on the ability to recruit allied doctors and nurses. Not only do they lend credibility to the cause, but they can also staff the many cryonics-

friendly facilities that Linda dreams of seeing around the country.

## LOVE RENEWED

In 2002, the Chamberlains decided to renew their marriage vows on the Mexican island of Cozumel. After a surprise second session of scuba diving, they hiked back up to their hotel, sopping wet, to change into their traditional Mayan wedding garb. To mark their 31 years of marriage, they had decided to celebrate with a Mayan ceremony. Remembering her initial reservations about marriage, Linda was sure to include this note in her renewal vows: "Thirty-one years after we've been married, I think I can say that our marriage never came close to having a negative effect on our love affair."



*The couple shows off their traditional Mayan wedding garb as they walk the sands of Cozumel for their vow renewal.*

The affair continues as the two wait to be reunited after Fred's cryopreservation at Alcor in 2012. In the meantime, Linda has since returned to work at Alcor as their Special Projects Manager, a daily reminder of the fruits of strength and perseverance. As her mother once put it, "You and I are both tough broads."

To reach Linda, you can email her at [linda@alcor.org](mailto:linda@alcor.org), or learn more about her visions of the future by reading one of her two books, available on Amazon: *Star Pebble*, and *LifeQuest: Dozens of Stories about Cryonics, Uploading, and other Transhuman Adventures* (co-authored with Fred).



*Did you know Chamberlains used to spelunk? Here's Linda in one of nature's greatest hugs.*



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## CRYONICS NEWSLETTERS: SOME HISTORICAL HIGHLIGHTS, PART 2B: NEW YORK

By R. Michael Perry

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This is a multipart series, starting from the beginning. Part 1 covered the newsletters of Ev Cooper's Life Extension Society, which started in 1964 and extended to 1969. Here in Part 2 we are looking at the next important group, those of the Cryonics Society of New York, which cover the period 1966-1971. There was a lot of material to cover, so I split this part into subparts 2a and 2b; 2a was reported in a previous issue<sup>31</sup>. 2b, reported here, will start in 1969 and go to the end, in 1971.

### REST OF 1969

In all, 1969 was a good year for CSNY and *Cryonics Reports*. The newsletter had a new, professional format using double-columned text in roman font for its main pages, with some vibrant artwork from a local, underground cartoonist of note, many other contributors, and much news both from inside and outside its parent organization.

In the February issue is a recounting of someone trying almost single-handedly to establish a cryonics facility on a multi-acre plot of land.<sup>32</sup> I am not talking about Ev Cooper, whose heroic if ultimately futile efforts in this direction have been covered in a previous issue<sup>33</sup>, but Joe (Joseph George) Cannon. Cannon was an engineer, building contractor, and entrepreneur who lived part-time in Appleton, Wisconsin, with a residence and business also in Florida. As the article relates, Joe saw Robert Ettinger on TV shortly after the

publication of *The Prospect of Immortality* and was intrigued. In July 1965, after an exchange of letters, he flew to Oak Park, Michigan and met personally with Ettinger. Both concluded that "the missing link in the cryonics program was a facility for indefinite custodial care of the suspended bodies." Some months passed with nothing happening, so early the following year Cannon phoned Ettinger and offered his services to help build a storage facility. A search for land was made around Ann Arbor, Michigan but ran aground when "the local politicians and bureaucrats refused to allow such a controversial project."

Most of another year went by. Then the news came that Bedford had been frozen, and Joe decided it was time for another try. Land was purchased by him in March 1967 in a rural area about 12 miles north of Appleton. Construction was carried out and the cryonics storage facility was given the name "Hope Knoll." Several friends helped draw up plans, transport materials, and assemble the structure, "but essentially it has been the lonely struggle of a man determined to turn a dream into reality."

The results were impressive enough, at least for a startup from scratch. Situated on 30 acres of land (Cooper's plot had 19) the building that was built, which looks like a rather nice house, measured 68 x 29.67 feet outside dimensions (2,017 sq. ft.), with a vault or basement inside, intended for storage of patients, of 42.67 x 28.33 feet (1,209 sq. ft.). The basement had a minimum floor to ceiling clearance of 8.5

feet. By comparison, the LES building constructed by Cooper was smaller, about 50 feet x 30 feet (1,500 sq. ft.) with a smaller basement (about 25 x 25 or 625 sq. ft.), 10 feet deep.

Joe Cannon in 1945



Completed Hope Knoll

"In the basement ceiling, there are 3 holes for the introduction of individual storage units – a long hole for horizontal units and 2 square ones on each side of the main beam for vertical units. At the front of the facility there is a loading dock for trucks with a piped connection running to the vault for liquid nitrogen transfer."

Cannon also had the advantage of funding which Cooper, it appears, never had, yet his noble attempt was also doomed to failure – Hope Knoll would never be used. In this case the culprit was not lack of funding or dedication but, as with Ann

Cannon asked for clarification of certain matters, however, and a response was long in coming, about a year. When it finally arrived, there were certain provisions that would preclude operating the facility as intended: It would have to be “within the confines of an established cemetery, containing 20 acres or more,” and “burial vaults must be hermetically sealed.” Cannon planned “to introduce a new bill into the 1969 Wisconsin legislative session aimed at excluding cryonic suspension from certain provisions intended for conventional vaults.” These efforts, however, would prove unsuccessful and the Hope Knoll facility remained unused, as noted.



Turning from this discouragement to a happier topic, the newsletter engaged

“My knowledge of cryonics began when Steven became a member through an ad that he had seen in a science fiction magazine. I was a little put out at the idea. I felt it was morbid and something that he shouldn’t be thinking about. I remember being very annoyed every time a piece of mail came. But he was very interested in it and all the science facts. After a while he got me to read some of the material. But I really didn’t want to discuss it with him, because when a person is ill, you don’t want to go into anything that deals with death – you don’t even want to believe it. I do remember that he wanted a policy for this ... and I didn’t fight it because I knew it was going to give him peace of mind. He set up the papers for the trust fund. At this time he had to go back into the hospital for some reevaluation of his condition and they found that he needed another operation and in the hospital he said to me, half-kiddingly: ‘Now don’t forget mom, if anything happens make

"There is no finality about it. It's scientific and even when Steven was placed in the capsule, I was present and I didn't find it hard. There's nothing cemetery-like about it, or death-like. It's scientific. It's like having a

patient people are working on, experimenting on, or trying to help. I feel very strongly that freezing a person is almost like doing a medical experiment on them. There's certainly nothing to lose – they're dead. Science has a great future and certainly, if there's any chance at all for Steven or for somebody else because of Steven, we haven't lost anything. Steven certainly hasn't.

"I'm afraid, if someone called me just 'part of a cult,' I would react rather violently. I've had these things said to me and by the time I get through explaining my feelings on the matter and the way I've seen cryonics people work, I have them completely convinced. They want information. They want to send a donation. Having no actual knowledge of what the workings of the Society are – what the actual freezing process consists of and what the Society's plans are aside from freezing – most of these people just don't realize just *how* much cryonics is delving into, the work they're doing and just what it means."

(Despite these brave words, Steven was eventually lost, along with the other CSNY patients, and all the other cases prior to 1974, except James Bedford.<sup>35</sup>) In March CSNY froze another patient, Paul M. Hurst, who arrested suddenly in Florida. With backing from the son, Paul Jr., an experimental psychologist, personnel from Cryo-Span Corporation (the sister organization to CSNY that was now doing actual cryopreservations) jetted to Ft. Lauderdale to retrieve the patient. Within 24 hours he had been transported back to Cryo-Span's home base on Long Island and frozen.<sup>36</sup>

The April 1969 issue reports that the Cryonics Societies of America has presented Prof. Isamu Suda with an award for outstanding research in cryobiology. (Suda's landmark experiments with cat brains established that coordinated brainwave activity could be recovered after months of storage at subfreezing temperature, and helped bolster the credibility of cryonics, though much skepticism remained.) In accepting the award, Suda responded: "I feel highly honored by the award of the



1969 National Cryonics Conference, Ann Arbor, Michigan, from left to right: speakers Dr. Peter Gouras, Curtis Henderson, Jerry White; fashion show, Holly Douglas right.

Cryonics Societies of America, and desire to express my gratitude. I believe the cryonics program is quite appropriate and meaningful, although cryobiology still has to make a long journey before it guarantees people's desires. Let us hope the day comes in the near future. I wish you all good fortune."<sup>37</sup>

In the same issue there are two lengthy articles, with illustrations, on the Second Annual Cryonics Conference, held that year at Ann Arbor, Michigan, April 11-12.<sup>38</sup> Some introductory remarks by Saul Kent suggest the flavor and scope of the event: "Immortality is here. Today. Before you.' The message was loud and clear. Expressed in a multiplicity of ways, it spread with lightning-like rapidity throughout the Michigan Union building – the site of this year's national cryonics conference." The reader is reminded that "[a] frozen body is undeniable evidence that death is not necessarily final, and activity that polarizes around this evidence must inevitably lead to the search for further knowledge." Presentations were offered "in three basic areas: the cryonics program, the life extension sciences, and the impact of cryonics."

In fact there were some thirty presentations in all, judging from the forecast in the March issue that preceded the conference.<sup>39</sup> To mention but a few (and assuming the forecast was accurate and last-minute changes were minimal, as appearances suggest): Elaine Ettinger, wife of Robert, had a slide presentation, "Cryonics Highlights and Sidelights," while her husband, the principal founder of the movement, ironically discussed "The Threat of Immortality." Joe Cannon

had a report on his facility in Wisconsin, hopefully soon to be operational. M. Coleman Harris, M.D., reported on cryonics and the medical profession; Fred Horn, on cryonics and the funeral industry. Jerry White delivered a talk on "logical foundations of cryonics," along with a paper, "Viral-Induced Repair of Damaged Neurons with Preservation of Long-Term Information Content." (The latter was eventually recognized as a landmark for its time and recently reprinted in *Cryonics*.<sup>40</sup>) Robert Ettinger presented the award for outstanding research in cryobiology in absentia to Dr. Isamu Suda on behalf of the Cryonics Societies of America (see above). Peter Gouras discussed the need for cryoprotective agents in cryobiology, with emphasis on his work with the retina of the eye. Judie Walton reported on "Brain Cell Viability after Perfusion and Freezing." Dr. Benjamin Frank dealt with "The Reversal of Aging," while "Cryonics and the Cross: Reflections on Immortality" was the topic of Rev. Robert R. Johansen. Several "survivors" with cryopreserved relatives related their experiences. Holly Douglas directed a fashion show of "clothes of the future" during lunch breaks. Dick Clair (Dick Jones) and partner Jenna McMahon had a comedy sketch to conclude the proceedings.

A day after the conference ended there was a CSA meeting at the home of Ron Havelock. It was decided that the following year's conference would be hosted by the Cryonics Society of California in Los Angeles.

Another interesting development reported in 1969 was the publication of *The Immortalist* by Alan Harrington.<sup>41</sup> Some



readers may remember the book's ringing opening lines: "Death is an imposition on the human race and no longer acceptable. Men and women have all but lost their ability to accommodate themselves to personal extinction; they must now proceed physically to overcome it."

Alan Harrington was mainly known as a novelist, though sometimes his efforts turned to nonfiction, as here. *The Immortalist* has its strong points, attempting as it does to address rationally the ages-old problem of mortality, but it also disappoints the serious immortalist, that is to say, cryonicist. A tour de force, it is true, of attitudes about death with emphasis on our wish to be rid of it, it notes our waning belief in supernatural or mystical means to accomplish our deliverance, and considers prospects for a scientific solution to the problem. A chapter, "The Cryonics Underground," offers an upbeat assessment of the nascent freezing movement but in the end concludes that, as a pathway to the conquest of death, "[a]n intensified drive to control the aging process seems far more promising." Harrington says he "has not been able to share" "the profound convictions of the efficacy of the freezing process" advocated by Ettinger and others, and refuses "to fake a conviction in order to conform to a party line."

(As a brief epilogue: unfortunately, it appears Harrington was never convinced cryonics was something to go for himself, any more than Ettinger was ever in doubt. Harrington died in 1997 and was cremated, his ashes buried near Oracle, AZ. The burial marker's sadly ironic epitaph reads, "Get me out of here." Did he think this task would be no harder with burning than with freezing? Or was it mainly a matter of lack of funds for cryonics arrangements?)

A few additional items from the 1969 *Cryonics Reports* can be noted. In the August issue there is an editorial by Saul Kent, "The Death of Man." Saul explains:

"By the death of man I don't mean the extermination of the species by thermonuclear holocaust, but the metamorphosis of a weak and virtually helpless creature into a rapidly evolving immortal. In his new and exciting book *The Second Genesis* (Prentice-Hall) Albert Rosenfeld explores the recent developments in biology and their dramatic

implications for the control and re-ordering of natural phenomena. In my opinion the results of this probing into the secrets of life will be, not to preserve the essence of our humanity, but to destroy it – to eliminate all vestiges of our mortal coil in order to reach for something better, something more divine."<sup>42</sup>

In the November issue there was an article by Anatole Dolinoff, President of the Cryonics Society of France, with coverage of cryonics activity in Europe.<sup>43</sup> France, Spain, Germany, Austria, Italy, England: all had their little groups apparently flourishing. Said Dolinoff at the end: "Europe has just begun to awaken to the challenge of cryonics. At present, serious commitment is limited to a handful. But we are determined to succeed and we will."

No one, however, had actually been frozen in Europe or outside the U.S. for cryonics purposes. In the same issue Saul Kent in an editorial notes "a sharp decline in the rate of freezings during 1969," with no freezing since the previous March. "We are hard-put to determine the reasons for this decline: perhaps we aren't getting our message across effectively; perhaps there aren't enough people willing to make the sacrifices necessary for cryonic suspension yet; perhaps there are important factors we haven't taken into consideration." His "only answer to the problem" is "personal preparations for cryonic suspension."

The December issue has an editorial by Kent, "Trouble in Southern California?"<sup>44</sup> At the conference in Ann Arbor the previous April there had been a presentation by Marshall Neel concerning "a new cryonic storage facility which, according to Mr. Neel, was close to completion." Slides were shown of the process of construction, "and it was stated that within a short period there would be a grand opening before the media." Several patients then in individual units would be placed in a single, multi-patient storage container. "Cryonic Interment, Inc. was the name of the company that was said to own the facility; Mr. Neel was announced as President." But in the more than six months that had now elapsed, "the facility has not been opened and there is no evidence to indicate that it will [be]. ... We don't know what has been going on in Southern California because the entire operation has been veiled in secrecy.

... We therefore plead with the leadership of Cryonic Interment Inc to set the record straight. What stage of development is your facility in? ..."

(Unfortunately, the troubles of Cryonic Interment, Inc. would continue and culminate in the Chatsworth disaster in which nine cryonics patients were thawed and lost. But all the patients of CSNY were also lost, though without the bitter legal recriminations that accompanied the California failure. Better funding policies and other organizational strengthening have improved prospects since then, and further terminations of cryopreservations have been rare.<sup>45</sup>)

On a more positive note, in the same issue there is an article, "Bringing the War Back Home," by David Ettinger, the son of cryonics founder Robert.<sup>46</sup> David was then a college freshman at the University of Michigan. He noted problems in getting the academically-oriented students and others to consider action now and not just debate and speculate, as academics are wont to do. But even talk has its value: "A university Cryonics group playing debating games can become a vital force on campus. If so, it will necessarily attract many supporters, whether for central or spurious reasons. No kind of support, so long as it is based on the truth, will hurt, and the increased publicity should attract students who will eventually dedicate their lives to the pursuit of immortality, as well as the typical student who is interested only in ideology." His proposed Cryonics Club will not do any magic transformations but by fostering discussions attempt to motivate at least some of those involved to do more than just talk. He concludes:

"This is the course of action we intend to take at the University of Michigan, with our Cryonics Club. If we can succeed in stirring up controversy on any aspect of Cryonics, we will have been successful, and if we convince five people to go into cryobiological research we'll retire (that will increase the full-time field by something like 50%). But, if nothing else, we will have brought the issue of life and death back to the home of ideas where it belongs. If we can bring the war back home we may even start winning our battles."

## 1970: NEW TITLE, NEW HOPE IN THE MIDST OF AUSTERITY

As 1969 closed out, the Cryonics Society of New York could take pride in their accomplishments. Several had been frozen by CSNY (or their sister organization, CryoSpan) and were now in long-term care under their supervision. Their newsletter *Cryonics Reports* was the leader in the field and their technical expertise was quite high for such a small, controversial movement. They had established sister Cryonics Society groups in other parts of the country (notably, Michigan and California) which, at least loosely, formed a whole community and also fostered an oversight organization, the Cryonics Societies of America. They had hosted the first cryonics-themed conference after the pioneering efforts of Ev Cooper, which were now coming to a standstill. But downsides were apparent also, particularly when it came to cryopreservations. Steven Mandell had been less than forthright about his medical history in applying for an insurance policy to pay for his. When he was frozen, the insurance company refused to honor the \$10,000 policy, leaving his mother, Pauline, struggling to raise the funds. A funding problem also developed over Ann DeBlasio. Indeed, the only patient for which funds were always provided as needed was Paul Hurst. Hurst would be the last case at CSNY for the rest of the year.<sup>47</sup>

Still, the start of 1970 seemed to offer new opportunities for the young movement now entering its second decade. A change of title now seemed in order; henceforth the publication would be known (boldly) as *Immortality*. The newly named publication “will continue to focus upon the activities of the Cryonics Societies throughout the world. It will also attempt to explore in greater depth the whole spectrum of thought and behavior revolving around man’s efforts to extend his life and capabilities.”<sup>48</sup>

In the same issue there is a short work of fiction by Saul Kent, “Conflict of Interest,” that explores the problems faced by someone who must be on call 24/7 for inquiries about cryonics and who also has more usual personal interests. An incoming call might be a life-or-death emergency and thus cannot be ignored no matter the circumstances. The piece well underscores some of the difficulties faced by the early cryonics practitioners, who were attempting a strange mission of rescue, also often very demanding.<sup>49</sup>

The next issue of the newsletter, Feb.-Mar. 1970, has two interesting articles, “Immortality and the Population Explosion” by Curtis Henderson,<sup>50</sup> and “Religious Objections to Cryonics” by Mae A. Junod (future second wife of Robert Ettinger).<sup>51</sup> Henderson, who lived on Long Island, was well acquainted with the population issue in his crowded location, and how it was raised in connection with cryonics. He would sometimes give a snappy answer to someone who was concerned about excessive population, that they consider suicide. He noted with some sarcasm that most people stop short of wanting to go that far, whatever their concerns. The fact remains, as he notes, that population growth is exponential, and that it cannot continue indefinitely. He concludes: “Only the achievement of true immortality [defined in the article as ‘the indefinite extension of human life,’ presumably, the life of *each individual*] will convince us that it is undesirable for us to have too many children. It will also enable us to deal with our children in a more rational way – as equals and fellow immortals.”



*The best motive for controlling population is not having to die.*

Mae Junod in turn has interesting things to say about the reactions of religious people to cryonics, based on the efforts of Shelley, Robert Ettinger’s high-school-age daughter, to promote cryonics in her area (Oak Park, Michigan). In a community “composed largely of blue collar workers, who are for the most part Baptists and Fundamentalists,” the objections were mostly of three types.

Some thought the person was expressed via a mystical soul which leaves the body at (legal) death, so that, if the body were ever revived it would be “soulless” and not the same person. Others referred to the Bible, particularly where it says, “dust thou art, and unto dust,” not cryopreservation, “shalt thou return” (Gen. 3:19). Still others believed “that there are a limited number of ‘slots’ which are vacated at death and slipped into upon birth.” Choosing cryonics would mean refusing to relinquish one’s “slot” so that “a potential person is deprived of the opportunity to be born.” The first two objections were relatively easy to deal with. Ms. Junod insisted, but the third was “much more difficult,” and also has parallels in non-Western traditions such as Hinduism and Buddhism.

Overall in 1970 the signs of a decline in the movement were apparent. The April issue of the newsletter has an editorial whose opening paragraph sounds a note of pessimism: “In many ways the past year has been disappointing – no one has been frozen, there have been cutbacks in government biomedical research funding, one group (the Life Extension Society) seems to have dropped out of the movement, and both companies in the cryonic suspension field (Cryospan & Cryonic Interment) have been forced to postpone vital projects.”

Some positives are noted also, including a cryonics symposium recently held in the Bay Area in northern California, the upcoming third annual National Cryonics Conference, to be held in Los Angeles in May, and plans for a Cryonics Society of Illinois, based in Chicago. Yet, further signs of a slowdown are noted in the next issue to be published, June-July 1970, in a short editorial reporting on the conference which has now been held, here reprinted with many short paragraphs combined.<sup>52</sup>

“This years’ National Cryonics Conference in Los Angeles, was, from all reports, a success in several ways, but a failure in one significant area. The program was interesting, educational, and entertaining. The Conference provided a highly personal experience for those who sought a deeper degree of interaction with others in the movement. And, it provided an opportunity for some to view the Cryonic Interment storage facility. The one area in

which the Conference failed was as a public relations vehicle. Few new people were in attendance, and little publicity was generated by the event.

"One of the primary functions of a national conference is to provide a medium for attention. Even the smallest, most staid scientific groups recognize this. The growth of cryonics is particularly dependent upon public awareness and acceptance of the idea. It is imperative, therefore, that we make every effort to promote our Conferences. It was decided in Los Angeles that next year's Conference will be held in San Francisco sometime next spring, sponsored by the Bay Area Cryonics Society (BACS). Because of this, as well as our desire to work on other projects, the Cryonics Society of New York has decided to call off the Conference we had planned for the Fall.

"One of the reasons for the low Conference attendance this year was lack of recent progress in Cryonics. Combined with the depression of the nation's economy, this lack of progress has had its dampening effects. Both CSNY leaders, Curtis Henderson and Saul Kent, for example, were not at the Conference because of financial considerations. It is likely that others failed to attend for similar reasons.

"In addition, lack of funds has made it necessary to cut back on production of IMMORTALITY. This is the first issue since April and, for the foreseeable future, IMMORTALITY will be published every other month, instead of monthly. CSNY has also been forced to stop free distribution of copies of IMMORTALITY to other Cryonics Societies and Coordinators. Such groups and individuals will henceforth be required to send us pre-paid, the cost of production and postage of any copies they desire. The rate for copies of IMMORTALITY is:

20¢ per copy, which is equivalent to 5 copies for \$1 and 50 copies for \$10.

"If we are to make progress in the coming year, primary attention must be turned to two areas – placing people into Cryonic Suspension and raising fund for research in the Life Extension Sciences. If we can't move forward in these areas, we are wasting our time – however short it may be."

As noted, neither Saul Kent nor Curtis Henderson were able to attend the 1970 Cryonics Conference at the Airport Marina Hotel in Los Angeles. A report on the Conference by Michelle Navarette of the Bay Area Cryonics Society (BACS) is included in the June-July issue, however, and contains some interesting opening material:<sup>53</sup>

"Blanketed in choking smog, the third national Cryonics Conference was certainly conducive to thoughts of death. Why wasn't the entire Los Angeles population battering at the doors of the Airport Marina Hotel? Cryonics may be their only hope of survival.

"But while the crowd passed by unknowing, uncaring, or both, a nucleus of dedicated people were engaging in the most involved Cryonics Conference ever held. Talks were listened to with avid concentration; knots of people talked animatedly between sessions; there was the warmth of recognition."

As for the conference itself, one thing to keep in mind is that the early cryonics conferences were not just about cryonics per se but very much about what it is intended for: the defeat of death. Another important theater in this landscape is the effort to understand and control the aging process. The report recounts the efforts of one researcher which were presented at the conference (a follow-up from the previous year), to a somewhat skeptical audience:

"The controversial Dr. Benjamin Frank, who claims to have reversed the aging process in several of his patients, aroused the usual rapt attention from his lay audience, and the



*The 1970 National Cryonics Conference in Los Angeles, California.*

*TOP PHOTO: Holly Douglas and Robert Nelson announce awards.*

*BOTTOM PHOTO: Russ Van Norden (left) confers with Dr. Benjamin Frank.*

usual antagonism from his colleagues. Who would quibble about research presentation when offered eternal youth? The doctors, that's who! The cynical rumbling that began after Dr. Frank's talk last year erupted this time with a direct challenge from Dr. Peter Gouras, taken up by other physicians in attendance.

"But Dr. Frank refused to jump through any establishment hoops. He evaluated his patients, he persisted, by measuring his patients – how they looked, how they felt, how they acted: how their skins were firmer, less wrinkled, how they could walk without losing their breath. This was all the proof necessary for Dr. Frank – and, one imagined, for his patients whom he invited



the sceptics to come and see for themselves.”

(Dr. Frank died in his mid-fifties in 1979, but his anti-aging theories and treatments were still of interest decades later.<sup>54</sup>)

Among the other presentations at the conference were: “Low Temperature Tissue Preservation” by Harry H. Elden, Ph.D.; “Clones and Immortality Treatments” by Robert D. Enzman, Ph.D.; “Polywater and the Physical Chemistry of Suppressing Damage to Organs During Freezing and Thawing,” by Stanley W. Mayer, Ph.D.; “Cryonic Suspension and Perfusion Techniques” by Joseph Klockgether; “Cryonics – A Step into Tomorrow” by Robert F. Nelson; “The Semantics of Survival” by Marshall Neel; “Cryonics in Wisconsin” by Joseph Cannon; “CSNY Cryonic Suspension Program” by Curtis Henderson (read by John Bull); and “The Technology of Cryonic Suspension,” by Jerome B. White.

The next issue of the CSNY newsletter, and the final one for the year, was dated August-September 1970. It shows a “cryonics rescue vehicle” belonging to the Cryonics Society of Michigan, and features an amazing article by Dante Brunol, “Why We Must Be Frozen.”<sup>55</sup> Quoting from the article:

“It is my belief that there is a feeling of great ecstasy whenever the real ego is free from electrical impulses – a constant experiencing of pleasure similar to the height of sexual orgasm. During this time we lose all sense of self – we do not know our name or what we were or what we will become. Many people take chemicals such as LSD in order to reach for a similar state of consciousness. Eastern mystics practice exotic rituals in attempts to reach this kind of sublime happiness.

“This ecstatic state of being will last until electrical impulses or ionization reaches the atoms of the DNA of our real ego. Ionization is produced by heat, electricity, ultraviolet light, and radiation. Thus, if we are cremated, we will suffer horrible pain in the process. If we are buried our real ego will be destroyed.

“We can, however, escape this fate by having our bodies frozen

after death. As long as we are kept in a dark, cold place the DNA atoms of our real ego will radiate with happiness. This state of happiness can be maintained on this planet until the sun explodes to produce billions of years of ionized hell. We can only escape this fate if we arrange to have ourselves shipped in space to a far off corner of the universe before the sun explodes.”

Brunol, readers of this column will remember, was the pioneer perfusionist who supervised the freezing of James Bedford and Marie Phelps-Sweet in 1967. (Despite this and other accomplishments, including the brave if bizarre words above, he dropped out of cryonics and died in 1978 without being frozen.)

### 1971: THE END

The next issue of *Immortality* is dated Winter 1971, and shows on the cover a “frozen body exhibit” at the “Immortality Pavillion” of the “Man and His World” Exhibition in Montreal. The Exposition was a continuation of 1967 International and Universal Exposition or Expo 67, and finally closed in 1984 when attendance had greatly declined.<sup>56</sup> The exhibit itself was unfavorably reviewed in an editorial, which also points up the failure of the public to understand and address the problems of the scientific conquest of death.<sup>57</sup> Some paragraphs are excerpted:

“A huge pavilion building was dedicated to the theme of immortality, primarily through cryonics. (*They call it cryogenics.*) At the foot of this futuristic construct, there stood seven glass-enclosed, aluminum-foil-wrapped dummies, meant to represent frozen bodies, but looking more like ghost costumes for a Halloween ball.

“Inside, one was led upon a winding tour through semi-darkened, cave-like hollows filled with models that illustrated biological principles or were simulations of cryonics equipment.

“There was a large simplified replica of the human brain that was electrified with flashing nerve signals augmented by a

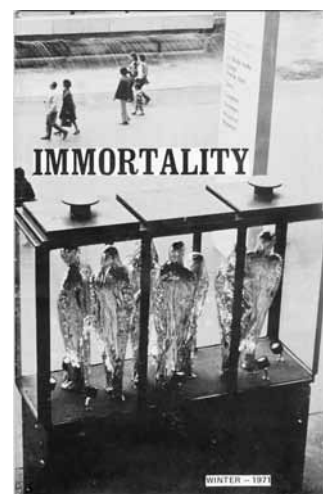
recording that explained what was happening.

“There was a huge cryo-capsule with doorways to enable people to walk through it, and another more realistic version (behind glass) patterned after the Cryo-Care Equipment Corp’s now obsolete initial unit.

“And, finally, there was a small auditorium with body-shaped, resting pockets in the wall, from which to view continuous projections of a short, silent, color film about freezing people. Its attempts at humor were entirely inept and stupid.

“Parts of this \$million pavilion were impressive, others were amateurish and inadequate, but what staggers the imagination is the idea of such a gigantic amount of money and time having been expended for a representative image of the search for extended youth, without any apparent interest in contributing to that search.

“Nowhere in the building was there any reference to reality. No Cryonics Society addresses, no literature, no information on life extension research. Nothing. Just a mythical concept in a vacuum.”



“Immortality” Pavilion exhibit at the 1970 Expo in Montreal, shown on the cover of *Immortality*.

On a more positive note, an article in this issue reports on the whereabouts and condition of James Bedford, who in 1967 became the first person frozen under

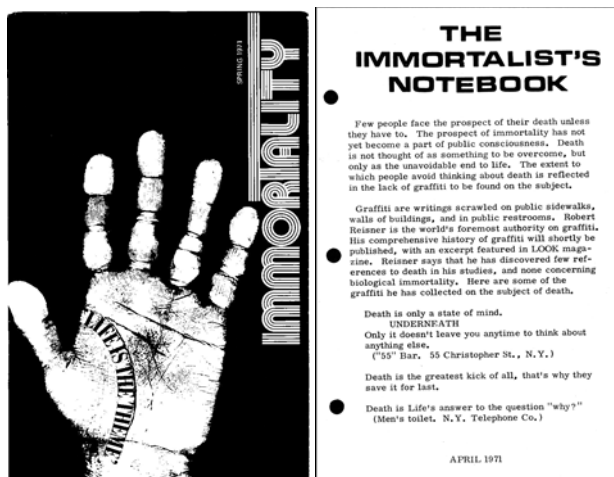
controlled conditions for possible eventual revival.<sup>58</sup> It was feared that Bedford might have been thawed but no, he was still being maintained by his son Norman and had been transferred to a new, horizontal capsule. (The Bedford capsule with its occupant was transferred to Alcor's official custody in 1987, and the capsule finally retired in 1991. Bedford remains a patient at Alcor.)

The next issue of the newsletter, dated Spring 1971, was the last. It is a lively, engaging publication like its predecessors, with the usual quality printing (double columns, fine roman type, close-grained halftones, 32 pages). There is an article by Dr. Frank on aging reversal. Saul Kent interviews Paul Segall on educating children about the possibilities of overcoming death scientifically, "Part 1" of a series to be continued. There is an appeal to attend the next major gathering, the "Fourth Annual Cryonics Conference and Scientific Congress," to be held in San Francisco in June, with major players such as Dr. Peter Gouras, Curtis Henderson, Paul Segall, Fred Chamberlain, and Robert Nelson expected to give presentations. There is an unusual article about storing a patient in dry ice, as a temporary measure until storage in liquid nitrogen can be arranged. In all, it is an issue that seems up to the usual high standards of the CSNY newsletters.

And then – it ends. The reasons appear twofold, one, the usual bugaboo of lack of money. The other appears also to be a simple one. Saul Kent, the newsletter editor, general factotum, and tireless promoter of



Saul Kent, editor and general factotum of the CSNY newsletters.



Last issue of Immortality and of its short-lived sister publication, The Immortalist's Notebook.

the cause, decided to leave the New York area and go to Florida.<sup>59</sup> His cryonics activities did not cease, but did change focus, a major consequence being the eventual formation of the Life Extension Foundation with its support for cryonics and cryobiology, along with anti-aging research and attempted aging intervention through dietary supplements.<sup>60</sup>

In all, the newsletter had 48 issues: 7 in 1966, 12 each in 1967 and 1968, 10 in 1969, 5 in 1970, and 2 in 1971. In addition to offering material of a more speculative nature, it faithfully chronicled events at the basic level of the cryopreservations that were done, both within and outside the organization. That is, with one major omission. Herman Greenberg was frozen in May 1970 at CSNY, but there is no mention of this in the CSNY newsletters (nor any other contemporary source). It seems likely that his daughter, the teenaged Beverly, who strong-armed his freezing (his embalmed body was retrieved from ground burial with a backhoe as a start) also wanted airtight confidentiality, at least initially. (Later Ms. Greenberg was more open about the freezing.)<sup>61</sup>

In the closing months of its newsletter, CSNY also issued another, small newsletter, *The Immortalist's Notebook*, in a four-page format. It was to be "an informal publication, which will provide information about organizational efforts aimed at the attainment of immortality, important events taking place as the result of these efforts, and the research findings in the Life Extension Sciences. It will also

include fragmented material that is best suited to this format." The publication appears to have been a replacement and expansion of "Cryo News Capsules," a feature of the main newsletter which had persisted for years but finally was dropped with the 1971 issues. In addition to brief news notes about cryonics, the *Notebook* covered other life-extension matters, such as anti-aging research. It only lasted, however, for four monthly issues, January through April, 1971.

After the demise of its newsletters, CSNY struggled on for a few more years, one ray of hope being the involvement of Beverly Greenberg, who became vice president of the organization. But her efforts came to a tragic end with her death at the CSNY facility in November 1973, and shortly thereafter the organization ceased to function. ■

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# Cryonics Standby Training



## with Cryonics UK Report

Utrecht, Netherlands | March 2-3, 2018

By Taya Maki

It was a pleasure to attend the recent Cryonics standby and support training in Utrecht, led by Tim Gibson of Cryonics UK and organized by Jappie Hoekstra. Over 30 participants from 9 different European countries attended the event! The Cryonics UK team members were 3 less than anticipated due to snowy weather in England, but Tim Gibson, David Farlow, and Frank Wilson braved the snowy and icy roads in their standby ambulance.

The Saturday morning session started with a warm welcome and introduction from Jappie. This included the reasons for holding such an event, special thanks to Cryonics UK for coming, and the importance of European Cryonicists to develop a strong network of people and resources. He has done much work and research to acquire equipment and knowledge for the Netherlands group to become a valuable asset for the European Cryonics movement, including the recent design and building of a cutting edge dry ice shipper, which has already been successfully used.

After Jappie's introduction, José Luiz Cordeiro suggested that all participants introduce themselves, which was a nice way for us to get to know each other.

Tim then gave an overview of the whole standby procedure, demonstrating the use of

the equipment and its purpose in starting the patient's successful cryopreservation. The most important thing, as he emphasized, is the rapid cooling of the patient in the ice bath to reduce or slow any possible damage. The cooling process is greatly aided by the use of a mechanical chest compression device such as the *Lucas*. He explained the necessity of being adaptable, seeing as how the circumstances of each case can change the procedure depending on the situation, the environment, and the cooperation (or lack thereof) of other people, hospital staff, or family involved. He also emphasized how important it is to have the necessary paperwork sorted out and the signature of the doctor involved before being able to go ahead with any standby support. This is very important, especially in countries where there are limitations or setbacks in this regard (such as France!). I really appreciated Tim's candid way of explaining things, and that if you are involved in standby support, you really have to be ready for anything and everything.

After a nice buffet lunch, the participants had the opportunity to try out the procedures and equipment. We split up into 3 groups, each with a Cryonics UK facilitator, to go through the steps of standby support. One station was CPS (cardio-pulmonary support), using both the more modern *Lucas* machine

and an older thumper, both of which are powered by compressed air. Another station involved the use of respiratory support equipment, which would be set up just after or at the same time as the CPS equipment. The next station was the administration of various drugs through an IV system, how to hook it up correctly, and how to use the multiple line IV connector. The German group also brought and set up their ice bath structure which seemed very practical. Another station involved how to measure and prepare the drugs for intravenous administration, including the current protocol used by Cryonics UK, listed in order of priority. Very important to remember: label your drugs! I personally enjoyed being able to manipulate the equipment and go through the procedures physically, as this is the most effective way of learning.

Saturday evening, most of the group met in town for a nice dinner, enjoying the opportunity to discuss and share our many thoughts, inspirations and ideas.

Sunday morning we regrouped, and started the session with a great talk by Aschwin de Wolf. He briefed everyone on current research and progress in cryopreservation. He let us know about new methods being tested by Alcor, including intermediate temperature storage (ITS). He thoroughly detailed different

cryopreservation methods, including aldehyde-stabilized cryopreservation (ASC, "vitrification"), liquid ventilation, and opening the blood-brain barrier. He emphasized the importance of a hybrid model of standby with local support and a strong network of volunteers. It was great to hear some positive research outcomes involving the preservation of brain structure after vitrification using VM1 despite dehydration. Aschwin also outlined the latest medication protocol changes undertaken by Alcor and spoke about the uses and benefits of certain drugs administered during standby. He also mentioned International Cryomedicine Experts (ICE) involving former Alcor staff member Aaron Drake. At the end of his talk, Aschwin opened the floor to various questions from the participants. All in all, a lot of very useful information and, as Tim also made clear, Aschwin reiterated that the most important thing in any cryonics case is rapid cooling and avoiding any delays. This is in the interest of preserving viability, as any attempt of performing perfusion after a certain amount of delay is harder due to swelling (most importantly of the brain) and degradation of blood vessels which would hinder a successful perfusion. Key phrase: FAST COOLING, re-starting circulation, and drugs to keep the patient viable!

Tim Gibson then discussed the perfusion of a patient in detail. Tim gave a very good overview of the whole process, from the organization of administrative tasks to the actual process of perfusion to shipping the

patient to the US (or Russia). He noted the circumstances in which it is possible or not possible to perform perfusion and the hygiene considerations involved. It is crucial to have the paperwork and finances sorted out before hand, including the documents required before being able to ship a patient's body to the US and the logistics involved (coroner's authority to leave, embassy permission, flight arrangement, shipping case, etc). He also stated the importance of having the cooperation of an embalmer or a surgeon who can perform the surgery to allow access to the carotid (or other) arteries for the perfusion. You also need to have the blood vessels relatively intact and accessible, *i.e.* not have a long delay before cooling. The perfusion fluid, VM-1 as used by Cryonics UK, is supplied by the Cryonics Institute. The concentration has to start at 10%, increase to 30%, and eventually 70%. He also described certain physical signs of change and when they might occur, indicating a successful perfusion. This procedure is also widely variable depending on the situation of the patient and the standby received, considering if any delays were involved. We also had the chance to use the perfusion equipment and try to figure out which tubes go where, which is initially not that simple! Hence why we need this type of regular hands-on practice, for which I am very appreciative as is everyone else I'm sure!

Before lunch, we managed to take a group picture in front of the Cryonics UK ambulance as well as have a look inside. We also had a chance to see the new shipping



container Jappie designed and had built for the Dutch group which recently proved efficient in shipping a patient to Russia.

All in all I found this a very informative, fun and interesting weekend, with many new contacts and renewed inspiration to improve the situation here in France and generally for the movement of Cryonics. Utrecht is a lovely town and the training space was perfect. I really look forward to the next one! I thank Jappie, Tim and the Cryonics UK team for making this possible and Aschwin for his insight.

I also highly recommend that any Cryonicist in Europe attend Cryonics UK trainings which are held quarterly in Sheffield, and any other European training events. The more we create connections and support networks, the better we will be prepared for inevitable cases in our areas. If anyone is interested in getting in touch about Cryonics France, please contact me at [taya@societe-cryonics.fr](mailto:taya@societe-cryonics.fr)

Cryonics UK: Tim Gibson [tim.gibson@cryonics-uk.org](mailto:tim.gibson@cryonics-uk.org)

Remember: RAPID COOLING!

*Taya Maki*

Présidente

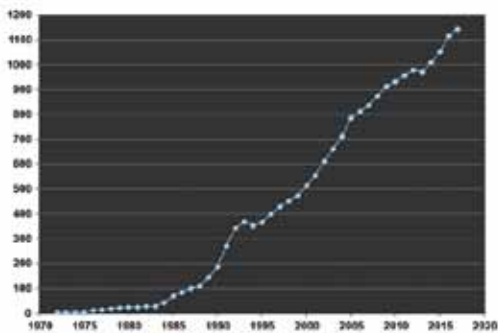
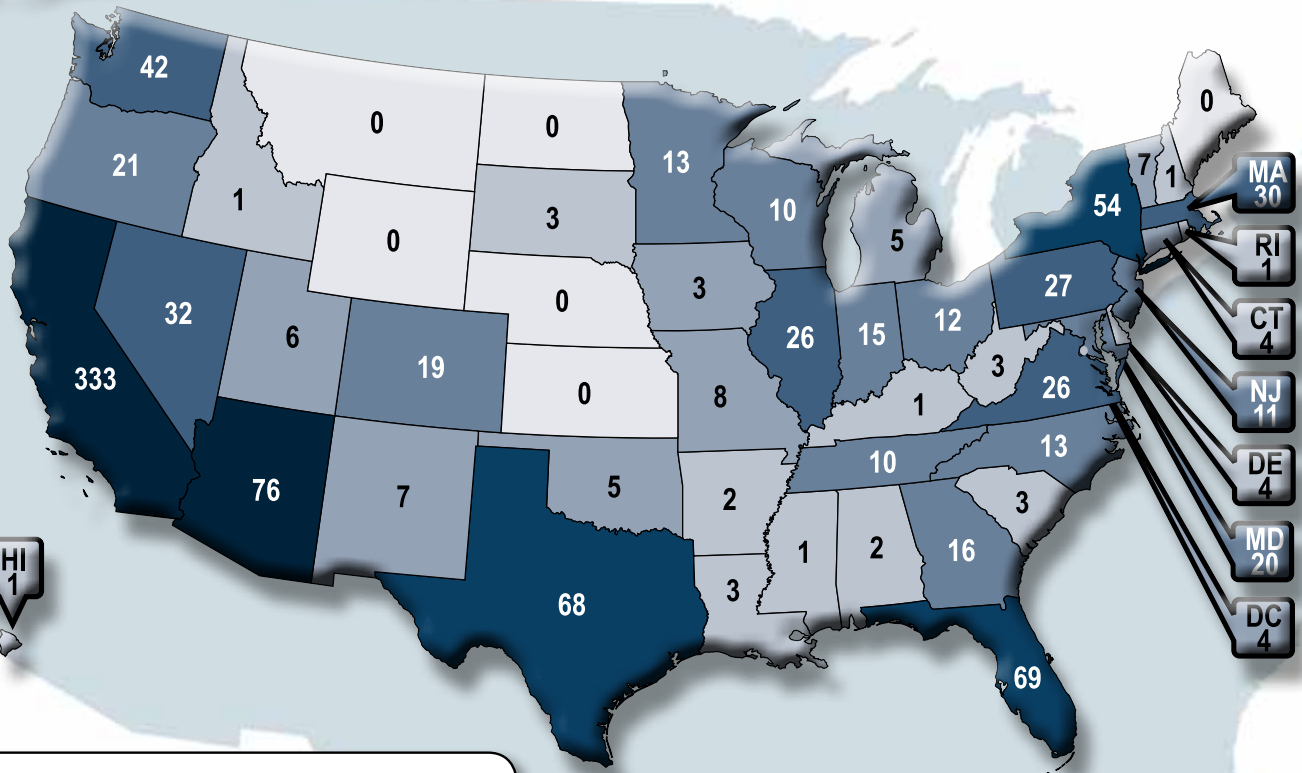
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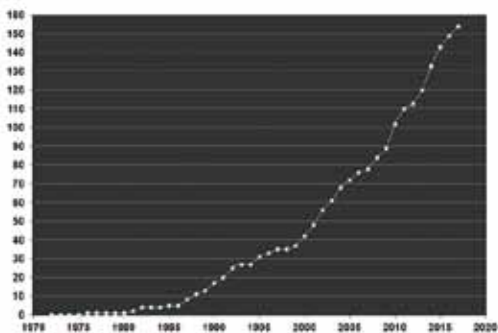


# Membership Statistics

2018	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Members	1149	1159	1171	1176								
Patients	155	156	156	156								
Associate	292	274	271	271								
<i>Total</i>	1596	1589	1598	1603								



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
Chile	1	0
China	0	1
France	0	1
Germany	16	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	33	3
<b>TOTAL</b>	<b>156</b>	<b>14</b>

## Alzheimer's Disease Reversed in Mouse Model

Researchers have found that gradually depleting an enzyme called BACE1 completely reverses the formation of amyloid plaques in the brains of mice with Alzheimer's disease, thereby improving the animals' cognitive function. The study raises hopes that drugs targeting this enzyme will be able to successfully treat Alzheimer's disease in humans. A team of researchers from the Cleveland Clinic Lerner Research Institute have found that gradually depleting an enzyme called BACE1 completely reverses the formation of amyloid plaques in the brains of mice with Alzheimer's disease, thereby improving the animals' cognitive function. The study, which will be published February 14 in the *Journal of Experimental Medicine*, raises hopes that drugs targeting this enzyme will be able to successfully treat Alzheimer's disease in humans. Mice completely lacking BACE1 suffer severe neurodevelopmental defects. To investigate whether inhibiting BACE1 in adults might be less harmful, Riqiang Yan and colleagues generated mice that gradually lose this enzyme as they grow older. ...

Rockefeller University Press / ScienceDaily  
14 Feb. 2018

[https://www.sciencedaily.com/  
releases/2018/02/180214093712.htm](https://www.sciencedaily.com/releases/2018/02/180214093712.htm)

## Induced Pluripotent Stem Cells Could Serve As Cancer Vaccine

Induced pluripotent stem cells, or iPS cells, are a keystone of regenerative medicine. Outside the body, they can be coaxed to become many different types of cells and tissues that can help repair damage due to trauma or disease. Now, a study in mice from the Stanford University School of Medicine suggests another use for iPS cells: training the immune system to attack or even prevent tumors. The results suggest

it may one day be possible to vaccinate an individual with his or her own iPS cells to protect against the development of many types of cancer. The iPS cells work as an anti-cancer vaccine because, like many cancer cells, they resemble developmentally immature progenitor cells, which are free from the growth restrictions built into mature cells that make up the body's tissues. Injecting iPS cells that genetically match the recipient, but that are unable to replicate, can safely expose the immune system to a variety of cancer-specific targets, the researchers found.

Stanford Medicine News Center  
15 Feb. 2018

[http://med.stanford.edu/news/all-  
news/2018/02/induced-pluripotent-stem-  
cells-could-serve-as-cancer-vaccine.html](http://med.stanford.edu/news/all-news/2018/02/induced-pluripotent-stem-cells-could-serve-as-cancer-vaccine.html)

## Researchers Advance CRISPR-Based Tool for Diagnosing Disease

The team that first unveiled the rapid, inexpensive, highly sensitive CRISPR-based diagnostic tool called SHERLOCK has greatly enhanced the tool's power, and has developed a miniature paper test that allows results to be seen with the naked eye – without the need for expensive equipment. The SHERLOCK team developed a simple paper strip to display test results for a single genetic signature, borrowing from the visual cues common in pregnancy tests. Described Feb. 15 in *Science*, the innovations build on the team's earlier version of SHERLOCK (shorthand for Specific High Sensitivity Reporter unLOCKing) and add to a growing field of research that harnesses CRISPR systems for uses beyond gene editing. The work, led by researchers from Harvard and MIT, has the potential for a transformative effect on research and global public health. "SHERLOCK provides an inexpensive, easy-to-use, and sensitive diagnostic method for detecting nucleic acid material – and that can mean a virus,

tumor DNA, and many other targets," said senior author Feng Zhang ...

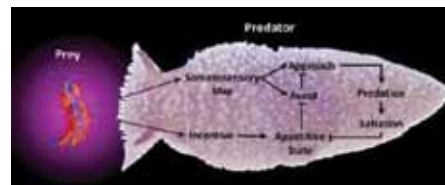
MIT News

15 Feb. 2018

[http://news.mit.edu/2018/researchers-  
advance-crispr-based-tool-diagnosing-  
disease-0215](http://news.mit.edu/2018/researchers-advance-crispr-based-tool-diagnosing-disease-0215)

## Cyberslug: Virtual Predator Makes Decisions Like the Real One

A sea slug's decision to approach or avoid potential prey has been simulated in a virtual environment called Cyberslug. In the future the software, described in a paper published in *eNeuro*, may provide a foundation for the development of more realistic artificial intelligence systems. Sea slugs in the genus *Pleurobranchaea* readily learn to prefer easy prey while avoiding others that protect themselves from predators with a stinging defense, unless forced to eat them by intense hunger. Rhanor Gillette and colleagues were able to reproduce these choices in Cyberslug using data from previous studies of *Pleurobranchaea* brain and behavior. By simulating the relationships between the virtual predator's hunger level and learning ability, the researchers demonstrated how both attributes are required to regulate consumption of the appropriate amount and type of prey. The research suggests that this simple model is poised for improvements and additions that could enable the simulation of complex decision-making, as in addiction and social behavior.



Approach-avoidance modeling  
in *Pleurobranchaea*.

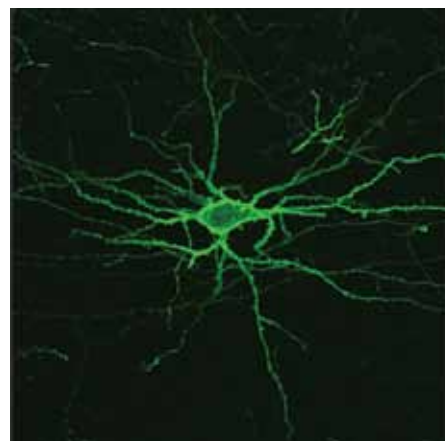
Credit: Brown et al., *eNeuro* (2018)

## Seeing the Brain's Electrical Activity

Neurons in the brain communicate via rapid electrical impulses that allow the brain to coordinate behavior, sensation, thoughts, and emotion. Scientists who want to study this electrical activity usually measure these signals with electrodes inserted into the brain. MIT researchers have now come up with a completely different approach to measuring electrical activity in the brain, which they believe will prove much easier and more informative. They have developed a light-sensitive

protein that can be embedded into neuron membranes, where it emits a fluorescent signal that indicates how much voltage a particular cell is experiencing. This could allow scientists to study how neurons behave, millisecond by millisecond, as the brain performs a particular function. "If you put an electrode in the brain, it's like trying to understand a phone conversation by hearing only one person talk," says Edward Boyden, an associate professor of biological engineering and brain and cognitive sciences at MIT. "Now we can record the neural activity of many cells in a neural circuit and hear them as they talk to each other."

Anne Trafton / MIT News Office  
26 Feb. 2018  
[http://news.mit.edu/2018/seeing-brains-  
electrical-activity-0226](http://news.mit.edu/2018/seeing-brains-electrical-activity-0226)



*MIT researchers have developed a light-sensitive protein that can be embedded into neuron membranes, where it emits a fluorescent signal that indicates how much voltage a particular cell is experiencing. This could allow scientists to study how neurons behave, millisecond by millisecond, as the brain performs a particular function.*

*Courtesy of the researchers*

## 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 Phaendra, "**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](mailto: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](mailto:linda@alcor.org) or call toll free at 877-462-5267 ext 115.



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# 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](mailto: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](mailto: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](mailto: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](mailto: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](mailto: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](mailto: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](mailto:gcabral@korns.com) or Mike Korns at [mkorns@korns.com](mailto: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](mailto: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](mailto: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](mailto: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](mailto: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/](http://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](mailto:tom@blackmagicmissileworks.com).

## JAPAN

Cryonics meetings are held monthly in Tokyo. Send queries to [grand88@yahoo.com](mailto: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](mailto:n-martins@n-martins.com). The Alcor Portugal website is: [www.alcorportugal.com](http://www.alcorportugal.com).

## SWITZERLAND

CryoSuisse, the Swiss Society for Cryonics. To join, email: [info@cryosuisse.ch](mailto:info@cryosuisse.ch) Website: [www.cryosuisse.ch](http://www.cryosuisse.ch)

## UNITED KINGDOM

Alcor members in the UK can contact Garret Smyth at [Alcor-UK@alcor.org](mailto: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?

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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?

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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](http://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?

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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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