

ALCOR LIFE EXTENSION FOUNDATION

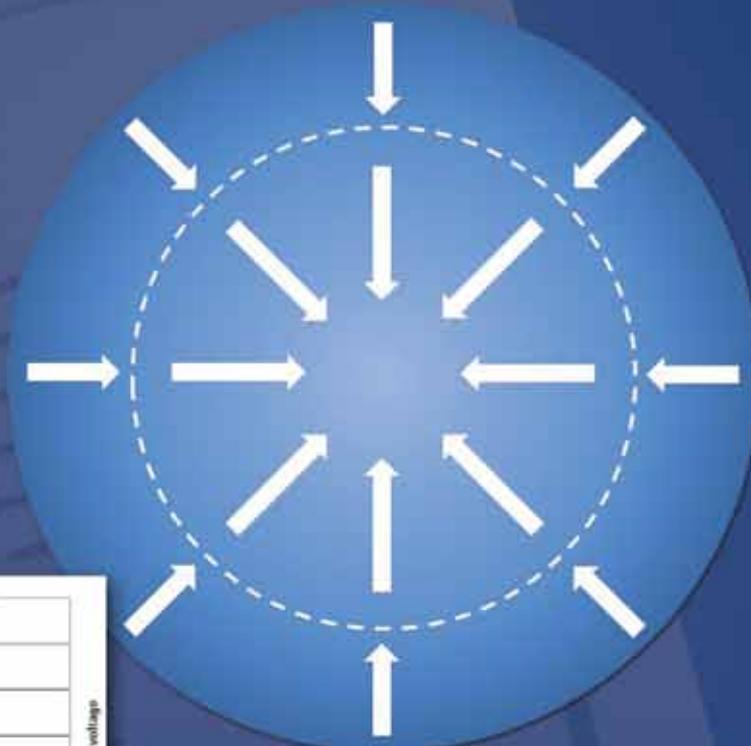
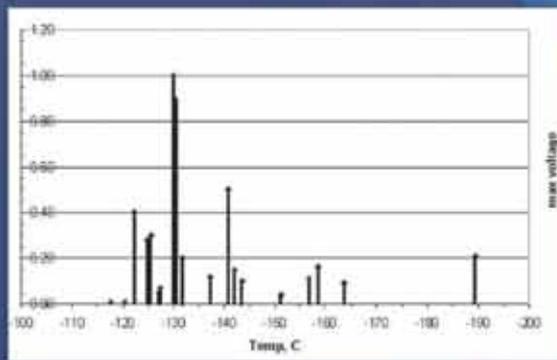
A Non-Profit Organization

CRYONICS

JULY 2013 · VOLUME 34:7

EFFECTS OF TEMPERATURE ON PRESERVATION AND RESTORATION OF CRYONICS PATIENTS

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WHAT DO WE REALLY KNOW ABOUT FRACTURING?

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RECONSTRUCTIVE CONNECTOMICS

PAGE 26

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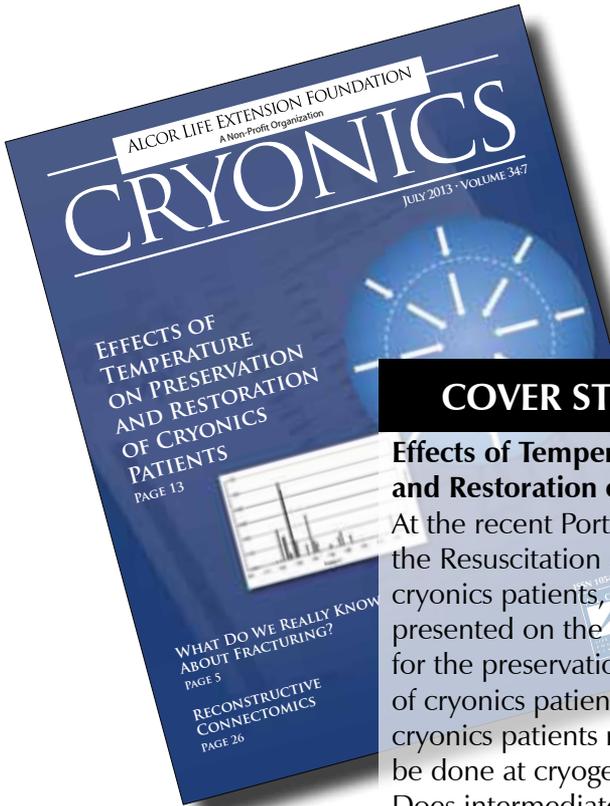
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CRYONICS



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Effects of Temperature on Preservation and Restoration of Cryonics Patients

At the recent Portland symposium about the Resuscitation and Reintegration of cryonics patients, CI director Ben Best presented on the effects of temperature for the preservation and restoration of cryonics patients. Do repairs of cryonics patients necessarily need to be done at cryogenic temperatures? Does intermediate temperature storage involve a risk of ongoing molecular mobility and associated damage? Will all cryonics patients require repair of some kind? Ben Best surveys the issues in this technical article.

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The James Bedford Society



Gifts have played a fundamental role in the cryonics movement since its earliest days. Dr. James Bedford, a man whose extraordinary vision led him to become the first person to be cryopreserved, and the first to make a bequest to a cryonics organization, exemplified the determination of the early pioneers of cryonics. We invite you to follow in his footsteps, and join the James Bedford Society.

The James Bedford Society recognizes those who make a bequest of any size to the Alcor Life Extension Foundation. If you have already provided a gift for Alcor in your estate, please send a copy of your relevant documents to Alcor's Finance Director, Bonnie Magee.

If you'd like to learn more about setting up a bequest, send an email to bonnie@alcor.org or call 480-905-1906 x114 to discuss your gift. ■



2013 Annual Giving Program

Alcor provides a wide array of services for you the member, and the general public. We inform and educate, we protect and preserve, and we strive to remain at the forefront of cryonics technology.

Since its founding, Alcor has relied on member support to maintain its mission and attract new members. Your support, regardless of size, can provide a better future for all cryonicists. Please act now.

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We encourage every member to donate. Even if you can only afford \$5 right now, you will make a significant contribution to Alcor's future.

Donations may be made via the Donations button on the Alcor website or by contacting Alcor's Finance Director, Bonnie Magee, at bonnie@alcor.org. Your donation may be made as a lump sum or divided into easy monthly payments. ■

QUOD INCEPIMUS CONFICIEMUS



Photo: Cryo-Care Equipment Corporation at 2340 E. Washington St., Phoenix, AZ.
Dr. Bedford's "home" in 1970 or 1971.



WHAT DO WE REALLY KNOW ABOUT FRACTURING? By Aschwin de Wolf

The goal of any credible cryonics organization is to develop reversible cryopreservation to avoid passing on problems with the cryopreservation process itself to the next generation. While there is a lot of recognition for the need to eliminate cryoprotectant toxicity, it is rather obvious that it will not be possible to restore integrated function in a fractured brain.

The 2011 3rd Quarter issue of *Cryonics* magazine features a comprehensive update on intermediate temperature storage (ITS) by Dr. Brian Wowk. This article contains an important observation:

Acoustic events consistent with fracturing were found to be universal during cooling through the cryogenic temperature range. They occurred whether patients were frozen or vitrified. If cryoprotection is good, they typically begin below the glass transition temperature (-123°C for M22 vitrification solution). If cryoprotective perfusion does not go well, then fracturing events begin at temperatures as warm as -90°C. Higher fracturing temperatures are believed to occur when tissue freezes instead of vitrifies because freezing increases the glass transition temperature of solution between ice crystals. The temperature at which fractures begin is therefore believed to be a surrogate measure of goodness of cryoprotection, with lower temperatures being better.

This is an important observation because one of the arguments that is still being

made against intermediate temperature storage is that Alcor routinely records fracturing events *above* the nominal glass transition temperature (T_g) of the vitrification solution. But if we recognize that such events can be (partly) attributed to ice formation due to ischemia-induced perfusion impairment it should be obvious that the recording of fracturing events above T_g *as such* cannot be an argument against ITS. After all, we also do not argue against the use of vitrification solutions because ice formation will still occur in ischemic patients that are perfused with vitrification solutions. Because cryonics patients almost invariably suffer some degree of ischemia prior to cryoprotective perfusion and cryopreservation, our knowledge about fracturing events in "ideal" human cases remains incomplete.

Hugh Hixon has developed a "crackphone" to detect acoustic events that are presumed to reflect fracturing events. A preliminary survey of the data reveals, roughly, that the first temperature at which cracking events are recorded is lower for the newer generation of vitrification solutions than for the older glycerol solutions. Does this mean that fracturing occurs at lower temperatures in "vitrified" patients? "The lowest first fracturing event recorded at

Alcor was at a temperature of -134°C for M22."

Is this what we can expect for M22 for all patients, or was this an "ideal" case, too? Would -130°C be a safe storage temperature? Does molecular-scale ice nucleation, as distinct from ice growth, constitute damage?

Despite all the articles and discussions that have been devoted to the topic of intermediate temperature storage, we do not seem to know much yet about fracturing in (large) tissues that are well equilibrated with a vitrification solution and subjected to a responsible cooling protocol. While the crackphone data seem to support the use of the newer vitrification solutions for reducing fracturing, controlled studies of fracturing in vitrified tissues will need to be conducted in a lab to really understand what we can expect under ideal (non-ischemic) circumstances. ■

Dr. Bedford's "home" had been incorrectly attributed in the banner illustration to Aschwin's regular column "Quod Incepimus Conficiemus." The building was right but the location and time were not. We thank Frank Reichenbacher and Ted Kraver who helped care for Dr. Bedford in the early days for supplying the correct information and apologize for the error. — editorial staff.

CEO Update

By Max More



THE UNDERFUNDING PLAN

Suppose that you are talking to a young adult. He tells you that he has decided to save up to buy an automobile when he reaches his 70th birthday. Checking current prices, he sees that the car he wants for his older self currently sells for around \$20,000. “Let’s see. That’s about 50 years in the future. I only need to save \$400 per year,” he says. Most of us will immediately see the absurdity of this approach. You would tell the young fellow that in 50 years, this car may cost more because it is of a higher quality and comes with more features. More critically, he is failing to allow for inflation.

Since inflation has averaged a little over 3% annually over the long term, prices can reasonably be expected to double about every 24 years. In 50 years, prices are likely to double and then double again. That \$20,000 car may cost around \$80,000 in the currency of the future. The real cost, in inflation-adjusted prices, may be no higher than today’s, and incomes will also have gone up in nominal terms, but a plan to save a nominal amount of \$400 per year is doomed to failure.

Inflation affects everything, including the provision of cryonics. It was never realistic to believe that 1980s prices of \$35,000 for neuro and \$100,000 for whole body cryopreservation would be adequate decades later. And, indeed, it has never been official policy to grandfather members at old cryopreservation rates, but in practice this has been allowed to happen. Both members and administrators may have expected much higher membership growth

rates, so that the early members, signed up at lower rates, would be a small percentage of the total.

In reality, growth rates have declined over the years. The majority of Alcor members are funded at levels below current minimums. The total amount of underfunding grew to over \$32 million. (It has since come down to around \$25.5 million.) Continuing to cryopreserve members at very outdated rates would bankrupt the organization and lead to the permanent death of all existing patients. This problem has been allowed to fester for too long. The longer we wait to deal with it, the more painful any solution would be. After two years of information gathering and discussion, in March of this year the current Alcor board reached majority agreement on an Underfunding Plan. This plan creates a means to reduce and eventually eliminate the underfunding problem while creating options to enable badly underfunded members to remain covered.

Our first preference is, whenever possible, for underfunded members to raise their funding levels to at least current minimums. *These remain unchanged* at \$200,000 for members choosing whole-body cryopreservation and \$80,000 for members choosing neurocryopreservation. This can be done by purchasing additional life insurance, annuities, or other approved financial instruments, or by prepaying the difference. Whole body members who are underfunded have another option: They can change to neuropreservation. In almost

all cases, this would result in underfunded whole members becoming neuro members with funding of at least the current minimum.

Members with cryopreservation funding below today’s minimum levels of funding will be required to pay additional membership dues to help reduce Alcor’s underfunding liability. The additional annual membership dues required of underfunded Alcor members will be based upon the following formula: the amount of money the member is underfunded that year will be multiplied by 1%. Thus, if a member is underfunded by \$60,000, the amount of additional dues that member will be required to pay over a year will be \$600. The normal monthly rate would be 1/12 of 1% of the amount the member is underfunded that year, our example member paying \$50.

Additional membership dues for underfunded members will start on September 1, 2013 but the additional dues will be phased in gradually. From September 1, 2013 until December 31, 2013, underfunded members will be required to pay 1/3rd of the normal monthly rate for 4 months. From January 1, 2014 until December 31, 2014, underfunded members will be required to pay 2/3rds of 1% of the amount of their underfunding. From January 1, 2015 and in subsequent years, underfunded members will be required to pay 1% of the amount of their underfunding. The Alcor Board will evaluate the effects of the Underfunding Plan every year and reserves

the right to make changes in the plan or eliminate it entirely.

Underfunding dues will be rounded to the nearest \$5. Let's say you remain underfunded by \$50,000. How much will the additional bill be for the rest of this year, and for subsequent years? These are the amounts:

September-December 2013: \$55.

2014: \$335 (or \$30/month)

2015: \$500 (\$40/month).

All underfunded members will receive one bill for September through December 2013, regardless of their payment frequency.

For 2014 and forward, the member will receive a bill for their underfunded amount with their regular dues bills. All additional dues will be shown as a separate line on a member's regular membership dues invoice and billed at the same frequency and date that they are typically billed.

What happens if you are an underfunded neuro member and simply cannot raise your funding to current minimums? Underfunded neurocryopreservation members who do not pay the additional dues or increase their funding to the current minimum will be referred to the Underfunding Committee to attempt to work out a solution to enable them to maintain their Alcor membership. One alternative that may become available to such members is financial help from the Alcor Hardship Fund. This fund will be seeded with money from Alcor's reserve account, and we hope to raise money to add to that initial amount.

It is possible that in the future, we will be able to add another option: a reduced level of service for underfunded members who cannot raise their funding or pay the additional dues. However, this is not part of the current plan, and there is no agreement on what such a reduced level of service would look like. It's also possible (and a major goal of mine) that we will be able to reduce the standard membership dues, thereby reducing the increase in overall costs. Again, these are speculative possibilities for the future; they are not current options.

Life Members will not be charged additional membership dues under the Underfunding Plan unless they request and sign the "Underfunding Plan Opt-In Form" (available to Life Members upon request from Alcor). Choosing to opt-in to the Underfunding Plan is a means for underfunded Life Members to continue their arrangements without increasing their cryopreservation funding to meet current minimums.

The option to pay additional dues in place of ensuring funding at or above minimums is available only to members who joined Alcor on or before May 12, 2013. For details of the plan, see the Underfunding Plan documents in this issue.

Alcor's board and management understand that the Underfunding Plan will result in some difficult decisions for some members. We hope that you understand the critical importance of finally dealing with this problem and work with us in solving it. If, after reading the accompanying Plan documents, you have questions or comments about the Underfunding Plan or its implementation, you should call me at Alcor toll-free at 1-877-462-5267, Ext.113 or Bonnie Magee, Finance Director, Ext.114.

Cryopreservations this year

2012 was a slow year for cryopreservations. We expect eight per year on average, based on the size and age distribution of Alcor's membership. We cryopreserved only three members last year. Barely into the third month of 2013, this year appeared determined to catch up to statistical averages. About three weeks after Kim Suozzi entered our care, we cryopreserved a member we can only refer to as A-1349 on February 6. One month later, on March 6, we cryopreserved member A-2605, who became Alcor's 116th patient. And on March 10, we received our 117th patient (and fourth of the year), following a standby by Suspended Animation. Since then, however, things have calmed down and we've seen no new cases as of mid-June.

At the Strategic Meeting in September 2012, the board and I agreed on five top priorities. Recently, I've structured my

board reports to reflect a focus on those priorities. In this update, I'll draw on those reports to show what I've been doing to move us forward.

Growth in membership

The goal is to double the rate of net membership growth from 2% to 4%. (Growth has actually been lower than 2% recently.) This can be accomplished by a combination of increasing the number of new members and reducing the attrition rate.

I have been continuing to work on my plan for a Membership Dues Reduction Fund. This is an extremely high priority. Too often, I hear about a member dropping their membership because of the high level of dues. After working through various scenarios and amounts, I estimate that—if we could raise around \$1.3 million for this fund—we could reduce membership dues from \$800 to \$595 for those paying full rates (i.e., those paid by members who receive no reductions as family members, students, or long-term members). The funds raised would be kept in a reserve account and used over a ten-year period. The idea is to grow membership while having a positive net effect (based on conservative assumptions) on dues income even when the fund is exhausted.

All the evidence on the elasticity of demand for our services tells me we are now past the point of revenue optimization and that a cut in dues is needed to spur both retention and growth. I'm currently fleshing out this proposal so as to present it to the board and then, if approved, communicate it to our wealthier members.

I have proposed, and the board has accepted, a plan to give discounts on membership dues for those who have been members for at least 20 years. This has already clearly helped us retain at least one long-term member who was considering dropping his arrangements due to the cost. I will propose (modest) new discounts for long-term members (25 years and 30 years) to improve retention.

In order to reward members who bring in new members (meaning that the new person would have to complete the signup process and start paying dues), I introduced

and publicized a dues waiver for bringing in new members. 4,522 people have seen the Facebook post that links to the Alcor blog entry about this.

We are working to build up regional interest and response capabilities. This includes finalizing a location for stationing a kit in Canada, supporting a new effort in Germany, and holding a gathering of Arizona members (which took place on Saturday March 9).

I have been working with a media consultant, with whom we've worked in the past. Among the projects he will be working on with us are a new b-roll for sending out to media. He has already converted video of the Alcor-40 conference talks into a better format, ready for uploading, and worked with us to create a new ad for *Life Extension* magazine to replace the current one with one that we hope will be more effective. I have recorded the first five of the YouTube video series that I've long wanted to do. We filmed these in a nearby studio so as to avoid the distraction of aircraft. Now our consultant will insert graphics, video, and animations as appropriate. Once these are ready, I will announce on Alcor's blog and Facebook page where to find them.

Here's a speculative idea for boosting growth by introducing a new class of members: Much lower dues, but higher CP minimums, maybe \$500,000 for WB, \$200,000 for N (to rise in line with inflation). This option might initially only be for new members, but could be extended to existing members—but with smaller reduction in dues. This would help the move from dues to CP funding without reducing existing operating income. The extra funds from cryopreserving this class of members could be divided between the operating reserve fund, the Hardship Fund, and the Endowment.

Media

Engaging effectively with media spreads awareness of cryonics and spurs interest, hopefully eventually leading to new members. Our Membership Administrator, Diane Cremeens, says she has seen an increase in applications and calls asking for information, and many of these callers mention hearing about Alcor in the media.

Over the last few months, I've dealt with numerous media inquiries, and several photo shoots and filmed interviews. This included frequent contact with the *New York Times* concerning their planned detailed coverage of Kim Suozzi's situation and cryopreservation. I fact-checked and suggested revisions to the script of a BBC documentary largely based on interviews with UK cryonicists. After considerable preparation, I made a frustratingly brief call-in appearance on the very popular CBS daytime TV show, *The Doctors*, which was shown on Monday March 4.

On April 8, I and others were filmed for the NOVA special, "Colder," which is part of the *Making Stuff* special series. This episode will cover cryo-medicine, cryobiology, cryosurgery, organ freezing, suspended animation, vitrification, and cryonics, and should air in fall 2013. Media outreach has also included responding to initial inquiries from *National Geographic*; from the show *Joe Rogan Questions Everything*; an interview for the widely-circulated French publication, *VSD*; and filming for a documentary, *How Much Time, Time Has*; and a *Boston Globe* piece on what it might be like if Ted Williams is revived. The article was spurred by a new novel in which this happens.

The weekend of June 8 to 10 and the start of the following week saw a major spurt of cryonics media coverage coming out of England. This got started with a comment by Lord Rees at the Hay literary festival. During his talk he remarked something about cryonics that spurred the interest of the *Sunday Times*. A *Times* journalist talked to Alcor member Anders Sandberg, and things developed from there, leading to copycat pieces in the *Daily Mail*, *The Independent*, *International Business Times*, and *iScienceTimes* with titles like "Oxford scholars want heads frozen after they die" and "Academics at Oxford University pay to be cryogenically preserved and brought back to life in the future." Anders broke his record by giving 7 interviews in one day.

I am currently considering a new design for the Alcor website that reflects currently-favored styles, and that is more accessible (and less overwhelming) for visitors looking for information. The idea is not to make changes to content but to

(a) make the look more contemporary and appealing; and (b) help visitors with specific needs to better find what they are looking for. One of Alcor's members is putting together a proposed new look, at no charge to us.

It's not quite "media," but on Saturday March 30, I gave a talk and participated in a panel on transhumanism at the Pacific meeting of the American Philosophical Association in San Francisco. I answered questions about cryonics. The session was recorded on video and put online, hopefully raising awareness of cryonics and related concerns among philosophers.

Finally, following my talk to the New Community Jewish High School in Southern California (an annual tradition), I received a note of thanks saying, "After your presentation our head of school was approached by students in deep conversation concerning life extension and Judaism."

Fundraising

The goal set is to cultivate relationships with six or more wealthy patrons; add \$5 to \$7 million to the endowment fund. The 2% annual draw on the Endowment Fund currently contributes \$70,000 to \$80,000 toward Alcor's operational expenses. That's already a significant help, but a \$12,000,000 fund would contribute \$240,000 per year. That would reduce our reliance on membership dues and unpredictable bequests and other gifts.

Getting wealthy living members to contribute to the Endowment Fund is difficult because the full legal structure is not yet in place to guarantee that we will not draw more than 2% per year. In the past, endowments have been drawn down at faster rates for projects that seemed urgent at the time. Over the last several years, the board has exercised real discipline in keeping to the 2% draw-down limit, but nothing in principle prevents this from happening. We are currently working on finally creating a true Endowment Fund that does include such a guarantee. At that point, it should become somewhat easier to raise funds. In the meantime, as mentioned above, I am focusing my fundraising efforts on completing a proposal for a Membership

Dues Reduction Fund and on meeting with Alcor's known wealthier members to explain the benefits of contributing to this fund.

During my time in the Bay Area from March 28 to April 2, I drove almost 600 miles among numerous meetings. These included several entrepreneurs, and both members and non-members with considerable resources. I also met with Michael West, who has long been on Alcor's Scientific Advisory Board. Among many other helpful thoughts, Michael suggested prominent people to contact. My last meeting in the area was with Ray Kurzweil, who is now working at Google. Although cryonics is only "Plan D" for Ray, he is supportive of Alcor and so we might hope he will eventually stimulate interest among Google executives.

SOPs and backup training

The goal here is to minimize the disruption of losing staff. We want to produce detailed standard operating procedures (SOPs) for every staff member as well as to think about who could take over any given position. This project is to be completed within 12 months (by the September 2013 Strategic Meeting). Given the wide range of tasks involved in most jobs at Alcor, getting this done takes a lot of work, but lends itself to an incremental approach.

I have been meeting with staff members to go over their list of SOPs and to set priorities for completing them. Many SOPs have been completed, but plenty remains to be done. Creating SOPs may seem like a boring and formal process; but consider what it would be like to suddenly lose someone like Hugh Hixon. Hugh has been with Alcor since well back into the 1980s and carries with him a vast amount and variety and depth of knowledge about our procedures. If he were to have a heart attack or be run over by a bus tomorrow, how would we manage? Creating SOPs and developing a succession management plan is extremely important and long overdue. The task is more difficult than it might seem: converting the implicit knowledge of years of experience into explicit written (and sometimes illustrated) instructions can often be challenging.

Improved coordination with SA

The goal is to improve communication and coordination with Suspended Animation (SA). Since Alcor now depends on Suspended Animation for standby, stabilization, and transport of Alcor members in all US states outside of Arizona (but not outside of the USA), obviously we need to ensure optimal communication and coordination between the two organizations. We need to cooperate effectively while ensuring quality control. To further this, Catherine Baldwin and I have agreed to talk at least monthly about any issues or concerns or opportunities. I have been trumpeting the cause of "evidence-based cryonics," which includes improving objective feedback about our procedures. SA's recent agreement to provide Alcor with a video recording of their entire procedure is therefore very welcome and much appreciated.

Here is an update from SA, as of June 12, 2013: Suspended Animation occupies leased spaces in South Florida and Southern California to support its client services and research and development operations. SA has offices, equipment and mobile operating vehicles in both of these locations and SA staff and contractors work from both places.

In December 2012, SA purchased a building in Southern California and in January 2013, they leased a new space in South Florida. Over the course of 2013, SA will continue operating out of its existing facilities in Southern California and South Florida while the new ones are being redesigned and remodeled. Once completed, SA will move from its old facilities into the new facilities.

Cryopreservation patient field recovery services based in South Florida and Southern California will be unaffected by the moves. (SA responded rapidly to handle two Alcor patients already this year.) Research and development projects are being migrated temporarily to the laboratories of SA partners and collaborators to minimize disruption when SA's labs are moved. SA ran its regular quarterly training in the first quarter of 2013 and although no training will be offered during the second quarter of 2013, training sessions will resume in the third quarter of 2013.

Achieving structural financial balance

The goal here is to be able to cover all operating expenses without relying on extraordinary income. "Structural financial balance" means being able to cover all our regular expenses with regular income, without relying on unpredictable and variable income such as donations, bequests, and case income. In my view, it is an extremely conservative goal since—at least over the course of several years—"unpredictable" income is practically inevitable even when the amount is uncertain. Even so, shooting for this goal helps move us toward a strongly defensible long-term financial position—something that never existed for the first several decades of cryonics history.

Balance in structural finances can be achieved through a combination of controlling or reducing costs and increasing regular revenues (primarily membership dues and Endowment Fund income). We have been reaping savings from the insulation installed throughout the building just over a year ago. We greatly appreciate LEF's support that enables us to produce, print, and mail copies of *Cryonics* magazine at no cost to Alcor. (Too many members are unaware of this and think we are wasting money on printing paper copies. Since we know that quite a few members did not read the online-only version, the LEF contribution helps improve communications with members and potential members.)

Together with Finance Director Bonnie Magee, I've examined both big and small expenses to see where savings might be made, and considered possible ways of reducing operating expenses without cutting into our capabilities. A modest improvement to the structural budget has also come from a more accurate distribution of costs among operations, PCT, CMS, and Research.

We recently lost our highly-valued, eight-year front office administrator D'Bora Tarrant, who has moved on to a new position after completing law classes. As part of the effort to reduce expenses, I decided to replace the full-time position with a part-time person with fewer hours and benefits. I estimate that the savings

could more than half the current estimate for the structural deficit in 2014.

Although health insurance costs in our area for organizations like us are going up 20% this year, by making some changes we managed to keep the rise down to under 10%. In addition, two staff members might soon be covered by other health insurance, creating further savings and probably entirely eliminating the cost increase this year.

Finally, Bonnie and I met with representatives from the bank where we have our checking account and two reserve accounts. We are discussing options for reducing fees and raising returns (since the balances currently earn less than inflation), and for possibly investing some portion of the reserves for a higher return.

In addition to these top five areas, I am giving priority to three additional areas: research and feedback; continuous improvement; and organization robustness.

Research and feedback

The first of these involves Alcor either conducting or funding good quality research, as well as improving the quality of information on our procedures. We have entered discussions for possible research to be conducted in Germany. In February, we had CT scans of two neuro patients (both of whom had given prior explicit permission). One of our regular surgeons, who is a neurosurgeon, examined the results and gave us useful feedback. We will soon complete documenting the process of CT scanning neuro patients. Although the Cryopreservation Agreement allows us to conduct these scans, we want to show members exactly how they are done.

Two phases of a new research collaboration between Advanced Neural Biosciences (ANB) and Alcor have been completed. ANB is generating rat brain electron micrographs after various periods of cold ischemia to generate data that allows Alcor to make more informed decisions about last-minute “post-mortem” cases. We also are comparing our organ preservation solution, MHP-2, against a new 21st Century Medicine brain preservation solution to see if progress can be made in that area, too.

Improvements

There are several areas in which I’m currently looking to improve various aspects of our operations. A recent discussion about when to terminate cardiopulmonary support (CPS) and start surgery and perfusion led to improved guidelines. Rather than a set temperature target of 20°C, we will instead look at the rate of cooling. If cooling is rapid, CPS may be terminated at a lower temperature. At 30°C, we want to see a cooling rate of at least 0.10 C/minute. At 20°C, it should be at least 0.067 C/minute. And at 15°C, it should be at least 0.05 C/minute. Slower rates indicate terminating CPS, gaining surgical access and then rapidly cooling by passing cryoprotectant through a heat exchanger.

We are looking to improve surgical procedures, inviting feedback from new surgeons, and filming and reviewing surgical procedures in high definition digital video. Suspended Animation has agreed to supply us with HD video recording of their procedures on our patients.

We have set up an agreement with an agency for round-the-clock monitoring of patients and the ability to pronounce without delay. We are also looking into better patient monitoring and the use of existing devices or developing new devices to provide alerts of sudden and critical changes in patient condition. We are hoping to purchase some cooling masks, to further accelerate cooling in local cases, and we have stocked up on highly absorbent material to soak up potentially hazardous fluids on the OR floor. Although happy with our regular two surgeons, I’ve been concerned about unusual circumstances in which neither is available when needed. We now have two additional surgeons who have observed and now conducted surgery.

I put in place a new policy for case reports: A first draft is to be prepared within 7 to 10 days of a new case. These are important forms of documenting our procedures as actually implemented. Normative descriptions of procedures are being gathered in the *Human Cryopreservation Procedures* manual. I have asked that the

perfusion chapter be tackled very soon, and noted the lack of a planned chapter for surgery.

Finally, on the non-technical side, I have set out to improve strategic alignment between Alcor’s core goals and each staff member’s activities, and I’m introducing two new tools. The first is the “Waiting On” list, which helps everyone to know who is waiting on them for information or action in order for a project to move forward. The second is a new way for everyone to organize their To Do lists. I’ve organized my own task list into six quadrants, based primarily on the five top priorities we agreed on at the last Strategic Meeting. Each staff member will have to relate their own top areas of activity to my own. This should help highlight to each individual where he or she should be spending most of their time. This approach was discussed at a recent staff meeting, and I’ll be monitoring adherence and effectiveness.

Robustness

You could think of this as risk management and building organizational resilience. It involves continuing to identify potential failure modes in all aspects of Alcor’s work and find ways to mitigate them. A top security expert recently spent a day at Alcor, looking closely into many aspects of our physical and operational security. The measures we could take to improve security are endless. Certain kinds of attacks cannot feasibly be prevented. What we can do is improve deterrence, delay intrusions so as to give police more time to respond, and set up procedures and drills that could make a significant difference to the security of patients and staff. Some improvements are relatively inexpensive and can be done quickly. Others will be more expensive and might be considered for implementation over a number of years. There are limits to what we can do with the building we have.

Finally, to protect Alcor’s human capital and reduce the probability of injuries from falls (especially among our more senior staff), I am introducing a (voluntary) exercise routine. The goal is to build strength, stability and balance, and reduce health risks and accidents. ■

ALCOR UNDERFUNDING COMMITTEE

Version 2.11b-5a

May 4th, 2013

Underfunding Committee

The Alcor Board of Directors will appoint a committee (the “Underfunding Committee”) composed of at least one Alcor Board member and at least 2 other Alcor Members, all to serve 2 year terms. Members who face difficulties in increasing their funding or paying their Membership Dues may contact the Underfunding Committee to explore potential solutions. The Underfunding Committee will seek to work proactively and flexibly with these Underfunded Members to attempt to find funding solutions that retain them as Members while ensuring Alcor’s long-term financial health. The Underfunding Committee will not be deemed a fiduciary of any Member, but instead a liaison to discuss alternatives, if any, that an Underfunded Member might have to continue membership. The Underfunding Committee will not have any obligation to provide funding to Underfunded Members, and does so at its sole discretion. The Underfunding Committee has no authority to modify the terms of a Member’s agreement with Alcor.

Hardship Fund

The “Hardship Fund” is hereby established and seeded with a \$20,000 loan from Alcor’s Reserve Fund to provide financial assistance to Members who cannot pay their Membership Dues due to demonstrated financial hardship, in the sole discretion of the Underfunding Committee. The loan shall be repaid in the event that the Underfunding Committee determines that such repayment can be made without detriment to the purposes of the hardship fund. Suspended Animation, Inc. (“SA”) has agreed to provide field washouts free of charge for cases of Members accepted by the Underfunding Committee. When Alcor receives the benefit of such a free field washout, the funds not paid to Suspended Animation, Inc. will be paid to the Hardship Fund from the CMS Fund (or, if the CMS Fund no longer exists or is no longer used to pay SA for its standby services when it performs a field washout, then from such Fund as is normally used to pay SA for such services). SA’s offer to pay for field washouts for cases of Members accepted by the Underfunding Committee shall be reconsidered by SA on an annual basis.

Decisions with respect to payments from the Hardship Fund will be made by the Underfunding Committee. The Hardship Fund will pay the least part of the additional Membership Dues, caused by the Underfunding Plan, of Members who have selected the neurocryopreservation option, that it determines is reasonably sufficient to allow these Members to meet their obligations. Payment from the Hardship Fund on behalf of a Member in a particular year is not a guarantee of payment in

a future year. The Underfunding Committee shall reconsider requests for subsidized payments on an annual basis.

In no event shall the Underfunding Committee authorize a payment in excess of the funds available in the Hardship Fund. The Underfunding Committee will annually evaluate whether total payments and future projected payments will result in the eventual depletion of the Hardship Fund and report this evaluation and their recommendations on how to avoid such depletion to the Board at the annual September Alcor Board meeting.

There is no guarantee that the Hardship Fund or the Underfunding Committee will exist in the future, and any subsidization and/or payments authorized by the Underfunding Committee shall not be construed or deemed a modification of any Member’s agreement with Alcor. The Hardship Fund and the Underfunding Committee are independent and separate from any agreement between a Member and Alcor. Neither the establishment of the Underfunding Committee or the Hardship Fund will be deemed a modification to the agreement between a Member and Alcor.

Donations to the Hardship Fund

The Hardship Fund shall be described, as appropriate, in fundraising materials as an Alcor fund available for directed donation.

Purpose

Subject to the foregoing terms, the Hardship Fund is intended to provide relief to Neurocryopreservation Members who are unable to pay their Membership Dues because of increases in their minimum required amount of funding. Alcor expects to continue previous policies with regard to non-payment of dues for other reasons or non-payment of CMS fees, including but not limited to cancellation of membership in accordance with the terms of a Member’s Cryopreservation Agreement or Cryonic Suspension Agreement. In addition, the Hardship Fund is not intended to be a substitute for maintaining “minimum funding” as defined in a Member’s Cryopreservation Agreement or Cryonic Suspension Agreement that was required when the Member first joined Alcor; Alcor expects to continue previous policies with regard to minimum funding, including but not limited to cancellation in accordance with the terms of a Member’s Cryopreservation Agreement. For example, a Member whose life insurance policy has been canceled cannot simply pay increased Membership Dues to avoid cancellation of his or her Membership. ■

ALCOR UNDERFUNDING PLAN

Version 2.11b-5a

May 4th, 2013

Summary

Underfunded Alcor Members who became Members of Alcor prior to adoption of this Underfunding Plan (“Existing Members who are or become Underfunded”) shall pay Additional Membership Dues, as described herein, in addition to any other applicable Membership Dues, commencing on September 1st, 2013.

Notice of Increase in Minimums

All Alcor Members will be given 90 days written notice, in accordance with their Cryopreservation Agreement or Cryonic Suspension Agreement, that their required minimum funding will now and in the future be the current Required Cryopreservation Funding Minimum for the membership option they have selected (whole body cryopreservation or neurocryopreservation, as appropriate). The current Required Cryopreservation Funding Minimum for whole body cryopreservation is \$200,000.00 and

the current Required Cryopreservation Funding Minimum for neurocryopreservation is \$80,000.00. Alcor will change or increase the current Required Cryopreservation Funding Minimums from time to time, and will give notice to Members of such change or increase. Members with funding at or above their required minimums are not affected by this Notice and need take no immediate action. Underfunded Members may (a) provide increased funding in order to comply with their new minimum funding requirements or (b) take advantage of this Underfunding Plan or (c) select a less expensive membership option. The Underfunding Plan can be helpful to Members in managing their short term finances. It is not expected to be the most economical method of providing long term funding. Underfunded Members are encouraged to increase their funding to the extent practical. Alcor’s preference is for all its Members to be and remain fully funded. ■



Alcor Member Forums

Discussion board of the Alcor Life Extension Foundation

Discuss Alcor and cryonics topics with other members and Alcor officials.

- The Alcor Foundation
- Cell Repair Technologies
- Cryobiology
- Events and Meetings
- Financial
- Rejuvenation
- Stabilization

Other features include pseudonyms (pending verification of membership status) and a private forum.

<http://www.alcor.org/forums/>

EFFECTS OF TEMPERATURE ON PRESERVATION AND RESTORATION OF CRYONICS PATIENTS

By Ben Best

[The following is a text adaptation of a PowerPoint presentation given on Sunday, May 12, 2013 at the Resuscitation and Reintegration of Cryonics Patients Symposium in Portland, Oregon]

An understanding of probable future repair requirements for cryonics patients could affect current cryo-storage temperature practices. I believe that molecular nanotechnology at cryogenic temperatures will probably be required for repair and revival of all cryonics patients in cryo-storage now and in the foreseeable future. Current nanotechnology is far from being adequate for that task. I believe that warming cryonics patients to temperatures where diffusion-based devices could operate would result in dissolution of structure by hydrolysis and similar molecular motion before repair could be achieved. I believe that the technologies for scanning the brain/mind of a cryonics patient, and reconstructing a patient from the scan are much more remote in the future than cryogenic nanotechnology.

Cryonicists face a credibility problem. It is important to show that resuscitation technology is possible (or not impossible) if cryonicists are to convince ourselves or convince others that current cryonics practice is not a waste of money and effort. For some people it is adequate to know that the anatomical basis of the mind is being preserved well enough — even if in a very fragmented form — that some unspecified future technology could repair and restore memory and personal identity. Other people want more detailed elaboration.

Books have detailed what nanotechnology robots (nanorobots) will look-like and be capable-of, including (notably) *Nanosystems* by K. Eric Drexler (1992) and *Nanomedicine* by Robert A. Freitas, Jr. (Volume I, 1999; Volume IIA,

2003). The online Alcor library contains articles detailing repair of cryonics patients by nanorobots at cryogenic temperature, in particular, “A Cryopreservation Revival Scenario using Molecular Nanotechnology” by Ralph Merkle and Robert Freitas as well as “‘Realistic’ Scenario for Nanotechnological Repair of the Frozen Human Brain.” Despite the detailed descriptions, calculations, and quantitative analyses that have been given, any technology as remote from present capabilities as cryogenic nanotechnology is certain to be very different from whatever anyone may currently imagine. It is difficult to argue against claims that all such descriptions are nothing more than hand-waving, blue-sky speculations.

Current medical applications of nanotechnology are mainly limited to the use of nanoparticles for drug delivery.¹ Nanomachines are being built, but they are little more than toys — including a rotor that can propel a molecule² or microcantilever deflection of DNA by electrostatic force.³

In classical mechanics and kinetic theory of gases, on a molecular level, temperature is defined in terms of the average translational kinetic energy of molecules, which means that the lower the temperature the slower the motion of the molecules. According to the Arrhenius Equation, the rate of a chemical reaction declines exponentially with temperature decline. It would be wrong to conclude that nanomachines would barely be able to move at cryogenic temperatures, however. Nanomachines operate by mechanical movement of constituent atoms, a process



that is temperature-independent. In fact, nanomachines would probably operate more effectively at cryogenic temperature because there would be far less jostling of atoms in the molecular structures upon which nanomachines would operate. Nanomachines would also be less vulnerable to reactions with oxygen at cryogenic temperature, although it would nonetheless be preferable for cryogenic nanorepair to occur in an oxygen-free environment.

Although under ideal circumstances ice formation can be prevented in cryonics patients, circumstances too often result in at least some freezing—such as inability to perfuse with vitrification solution, or poor perfusion with vitrification solution because of ischemia due to delayed treatment. Past cryonics patients were perfused with the (anti-freeze) cryoprotectant glycerol, whereas cryonics patients are currently perfused with cryoprotectant solutions that include ethylene glycol and dimethylsulfoxide (DMSO). Unlike water, which forms crystalline ice when solidifying upon cooling, cryoprotectants form an amorphous (non-crystalline, vitreous) solid (a “hardened liquid”) when solidifying upon cooling. The “hardened liquid” is a glass rather than an ice. The temperature at which the solidification (vitrification) occurs is called the glass transition temperature (T_g).

For M22, the cryoprotectant used by Alcor to vitrify cryonics patients, T_g is typically between -123°C and -124°C (depending on the cooling rate). T_g is about the same for the cryoprotectant (VM-1) used for cryonics patients at the

Cryonics Institute.

Although freezing can be reduced or eliminated by perfusing cryonics patients with vitrification solution before cooling to T_g , eliminating cracking is a more difficult problem. Cryonics patients are cooled to cryogenic temperatures by external cooling. Thermal conductivity is slow in a cryonics patient, which means that the outside gets much colder than the inside. When the outside of a sample cools more quickly than the inside of the sample, thermal stress results. A vitrified patient subjected to such thermal stress can crack or fracture. No efforts have been made to find additives to M22 that would have a similar effect as boron oxide has on allowing Pyrex glass to avoid thermal stress.

If a vitrified sample is small enough, and if cooling is slow enough, the sample can be cooled far below T_g — down to liquid nitrogen temperature — without cracking. A rabbit kidney (10 milliliter volume) can be cooled down to liquid nitrogen temperature in two days without cracking/fracturing.⁶ Cryonics patients are much too large to be cooled to liquid nitrogen temperature over a period of days without cracking. The amount of time required for cooling vitrified cryonics patients to liquid nitrogen temperature without cracking is unknown, and would probably be much too long.

In 1990 cryobiologist Dr. Gregory Fahy published results of cracking experiments that he performed on samples of the cryoprotectant propylene glycol.⁴ T_g for propylene glycol is -108°C , but in RPS-2 carrier solution the T_g is -107°C . In one experiment he demonstrated that cracking began at lower temperatures for smaller samples, specifically: -143°C for 46 mL, -116°C for 482 mL, and -111°C for 1412 mL. (The last volume is comparable to the volume of an adult human brain.) Dr. Fahy also demonstrated that cracking could be delayed by cooling at slower cooling rates. But when cracking did occur, the cracks formed at the lower temperatures were finer and more numerous.

Based on evidence that large cracks formed at higher temperatures by more rapid cooling results in a relief of thermal stress that prevents the fine and more numerous cracks formed when cracking begins at lower temperature, the Cryonics Institute (CI) altered its cooling protocol

for cryonics patients. CI patients are cooled quickly from -118°C to -145°C , and then cooled slowly to -196°C .⁵

In order to minimize or eliminate cracking in cryonics patients, proposals have been made to store the patients at temperatures lower than T_g (-124°C), but higher than liquid nitrogen temperature (-196°C).⁶ Such a cryo-storage protocol is described as Intermediate Temperature Storage (ITS). Alcor currently cares for a number of ITS patients at -140°C , but a consensus has not yet been reached about what ITS temperature will be chosen when this service is made available to all Alcor members.

Although Alcor's vitrification solution M22 can prevent ice formation with some samples and protocols, M22 cannot prevent ice nuclei from forming at cryogenic temperatures. Ice nuclei are local clusters of water molecules that rotate into an orientation that favors later growth of ice crystals when a solution is warmed. Ice nuclei are not damaging, but the fact that ice nuclei can form indicates molecular mobility which could be damaging. Specifically, between the temperatures of -100°C and -135°C , ice nuclei can form in M22, with the maximum ice nucleation rate occurring near T_g . At -140°C the ice nucleation rate for M22 is undetectable. But nuclei will be probably formed in cooling to -140°C .

Although cryostorage at -140°C is an attempt to minimize cracking and minimize nucleation, this ITS neither eliminates cracking nor ice nuclei formation. Cryonics patients slowly cooled from T_g to -140°C will surely experience some ice nucleation. Alcor places a listening device ("crackphone") under the skull of its cryonics patients for the purpose of monitoring cracking events. My understanding is that for most Alcor patients the crackphone detects cracking at T_g or only slightly below T_g , although there was reportedly one M22-perfused patient for which the first fracturing event occurred at -134°C . The propylene glycol experiments would support the view of cracking occurring slightly below T_g , but vitrified biological samples resist cracking better than pure cryoprotectant solutions. With ice formation, cracking could occur at temperatures higher than T_g . Although ITS may prevent the formation of cracking that could occur in cooling below -140°C , it does not prevent the cracks that occur in

cooling from T_g to -140°C .

I have wondered whether there are forms of damage which would occur in a cryonics patient stored at -140°C that would not occur during storage at -196°C . A solid cryogenic state of matter does not prevent molecular motion. Molecular motion in a biological sample held at cryogenic temperature could result in damage to that sample.

Ions generated by radiation are much more mobile than molecules. An ionic species (probably protons) in trimethylammonium dihydrogen phosphate glass is nine orders of magnitude more mobile than the glass molecules—and sodium ions in sodium disilicate glass are twelve orders of magnitude more mobile than the glass molecules.⁹

Cryobiologist Peter Mazur has stated that below -130°C "...viscosity is so high ($>10^{13}$ Poise) that diffusion is insignificant over less than geological time spans." He adds that "...there is no confirmed case of cell death ascribed to storage at -196°C for some 2-15 years and none even when cells are exposed to levels of ionizing radiation some 100 times background for up to 5 yr."¹⁰ Frozen 8-cell mouse embryos subjected to the equivalent of 2,000 years of background gamma rays during 5 to 8 months in liquid nitrogen showed no evident detrimental effect on survival or development.¹¹

In attempting to evaluate damaging effects of temperature and radiation, it could be valuable to analyze chemical alterations, rather than complete cell death or viability. Acetylcholinesterase enzyme subjected to X-ray irradiation shows conformational changes at -118°C , but no conformational changes when irradiated at -173°C .¹² X-ray irradiation of insulin and elastase crystals resulted in four times as much damage to disulfide bridges at -173°C compared to -223°C .¹³ Another study showed a 25% crystal diffraction lifetime extension for D-xylose isomerase crystals X-ray irradiated at less than -253°C compared to those irradiated at -173°C .¹⁴

One study showed that lettuce seeds show measurable deterioration when stored at liquid nitrogen temperature for periods of 10 to 20 years. Rotational molecular mobility was quantified. A graphical plot was generated showing increasing times for when 50% of lettuce seeds would fail to germinate as a function of decreasing

temperature. Those times were estimated to be about 500 years for -135°C and about 3,400 years for -196°C .¹⁵ Translational vibrational motion has been given as an explanation for seed quality deterioration at cryogenic temperatures.¹⁶ The mean square vibrational amplitude of a water molecule is not even zero at 0 Kelvins (-273°C), and has been determined to be 0.0082 square Angstroms. The mean square vibrational amplitude is 0.0171 square Angstroms at -173°C and 0.0339 square Angstroms at -73°C .¹⁷

Realistically, however, 3,400 years is much longer than cryonics patients are likely to be stored. Storage in liquid helium at -269°C or in a shadowed moon crater at -235°C ¹⁸ would certainly be more trouble than it is worth. Northern wood frogs spend months in a semi-frozen state at -3°C to -6°C , and are able to revive with full recovery of heartbeat upon re-warming.¹⁹ An empirical study of a cryoprotectant very similar to M22 (VS55) showed viscosity continuing to increase exponentially below T_g , just as viscosity increases exponentially with temperature decrease above T_g .²⁰ The exponential decrease in viscosity (molecular mobility) that makes ice nucleation cease at -135°C indicates that there is probably little molecular mobility at -140°C , despite the possibility of damage from ionic species or vibrational motion. All things considered, however, my personal preference is for storage in liquid nitrogen, rather than some intermediate temperature above -196°C . I would also prefer for cryogenic nanorobot repair to be at liquid nitrogen temperature.

I am by no means a nanotechnology expert, but I can give a brief description of my own views of how cryogenic nanotechnology repair of a cryonics patient would proceed. I must thank Ralph Merkle for his assistance in allowing me to consult with him to formulate and clarify many of my views.

I believe that repair of cryonics patients at cryogenic temperature would be a combination of nano-mining and nano-archeology. Nanorobots (nanometer-sized robots) would first clear blood vessels of water, cryoprotectant, plasma, blood cells, etc. The blood vessels would become mining shafts that would provide access to all body tissues. Nanometer-sized conveyor belts or trucks on rails could remove blood vessel contents. Where freezing

or ischemia had destroyed blood vessels, artificial shafts would be created. Unlike the nano-mining that simply removes all blood vessel contents, the creation of artificial shafts would have the character of an archeological dig. Care would be taken in removing material to avoid damaging precious artifacts that might indicate original structure — which could be discovered at any unexpected moment.

Section 13.4 of K. Eric Drexler's book *Nanosystems* provides diagrams and details of a nanorobot manipulator arm. Such a "diamondoid" component would contain about four million atoms, and could be fitted with a variety of tools at the end of the arm. A variety of tips with varying degrees of chemical reactivity could allow for reversible, temporary chemical bonds that could be used for grabbing and moving molecules. These could range from radicals or carbenes that would form strong covalent bonds, to boron that can form relatively weak and reversible bonds to nitrogen and oxygen, to simple O-H groups that can form even weaker hydrogen bonds. Tools for digging need not be so refined. The manipulator arm is depicted as being 100 nanometers long and 50 nanometers wide, although nanorobots would need to be larger to include capability for locomotion, computation, and power. A complete nanorobot could be as large as a few thousand nanometers in size. A capillary is between 5,000 to 10,000 nanometers in diameter, so there should be plenty of room for many such nanorobots to operate. Ralph Merkle estimates that 3,200 trillion nanorobots weighing a total of 53 grams could repair a cryonics patient in about 3 years.^{21,22} Like many of the calculations associated with nanotechnology, I take these figures with a pound of salt. It is certainly true, however, that it could take years to repair a patient, and that there should not be a rush to finish the job.

Merkle & Freitas have suggested that nanorobots be powered by electrostatic motors. Stators and rotors would be electric rather than magnetic. Tiny moving charged plates are easier to fabricate than tiny coils and tiny iron cores, but more fundamentally, magnetic properties do not scale well with reduced size (i.e., molecular-scale magnetic motors don't work), whereas electrostatic properties do scale well with reduced size. Electrostatic actuators are already being

used in microelectromechanical systems (MEMS).²³ High density batteries could provide power for days, and recharging stations could be located throughout the patient. Alternatively, nanotube cables could bring power to the patient from the outside. Such cables could also be a means of transmitting and receiving computational data. Nanotube cables could also be used to reunite fracture faces created by cracking. Scanning and image processing capabilities would need to evaluate what needs to be fixed.

As much as possible I would favor replacement rather than repair, which would greatly simplify the process. It would be much easier to replace a kidney than to repair the diseased kidney of an elderly patient who died of kidney disease. Curing disease and rejuvenation would thus become part of the repair of a cryonics patient. Of course, neuro patients would require an entirely new body. The brain would be the major exception to replacement strategy because the brain could not be replaced without loss of memory and personal identity.

Even within the brain, however, it could be feasible to replace many components without loss of memory and personal identity. It could be feasible to replace many organelles such as mitochondria, lysosomes, etc., and many macromolecules such as proteins, carbohydrates, and lipids. DNA could be repaired, and possibly even modified to cure genetic disease, but epigenetic expression in neurons may be critical for reconstruction of synaptic structure. Synaptic connections would not only be restored, but the quantity and quality of neurotransmitter contents should be restored. It is not simply a matter that some neurotransmitters are inhibitory and others are stimulatory. There are more than 40 different neurotransmitters used in the brain, and there must be a good reason why such variety is necessitated.

Part of the repair process could involve removal of ice nuclei, nearly all of which would be extracellular. Re-created blood vessel contents would include fresh cryoprotectant, water, plasma, and blood cells without the original ice nuclei. Although some repair scenarios favor different types of repair above cryogenic temperature, I doubt that this is necessary or desirable.

Alternative repair scenarios involve splitting the brain in half, and halving

the halves repeatedly at cryogenic temperature—with digitization at each step—until the brain has been totally digitized.^{21,22} Or digitization could be done by repetitive nano-microtomes at cryogenic temperature. The digital data could be used for full reconstruction. Some people might object that if one individual could be created from digital data, many such individuals could be created—raising questions of which are duplicates and which is the original. There is detailed discussion of the duplicates problem/paradox in the philosophy section of my

website BENBEST.COM.

Although other repair scenarios could prove to be feasible, I believe that cryogenic nanotechnology will be required for all cryonics patients in the foreseeable future until the problem of cryoprotectant toxicity can be solved. With effective nontoxic cryoprotectants, sufficient cryoprotectant could be used to prevent ice nuclei formation at all temperatures, prevent devitrification (freezing) upon rewarming, and eliminate all toxic damage. In such a case, there could be true reversible cryopreservation

(suspended animation).

What is needed to create the nanotechnology required for repair of cryonics patients? Small machines will need to build parts for smaller machines, which would in turn build even smaller machines. Many details of machine operation must be perfected at each stage. Current modern technological civilization began with cave people pounding on rocks. Ralph Merkle has said that compared to future technology, current technology is pounding on rocks. ■

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WE SHALL OVERCOME: LEGAL APPROACHES TOWARD CRYONICS PATIENT PERSONHOOD

By Keegan Macintosh



The current medico-legal definition of death creates numerous obstacles to the successful resuscitation and reintegration of cryonics patients: our ability to be cryopreserved under optimal conditions is restricted in the first place, and once cryopreserved, we are no longer legal persons, so we are only weakly protected from undesired interferences and we cannot continue holding property that we would like to have post-resuscitation. That said, the cryonics community is not the first to desire enhanced legal status and protection for its members. In this article, I will survey some instances of legal activism in historical and contemporary personhood movements, evaluating their success and applicability to the cryonics movement.

Why personhood?

Personhood is important to cryonics because it is important to us right now, though we probably take the status for granted. Though it is not necessarily true to say all persons enjoy equal protection under the law, by default the level of protection (that is to say, the rules on others not to interfere) of persons is much higher. Furthermore, personhood is what gives us access to the legal system, and with it the ability to enter enforceable contracts with other people, own property and exclude others from the use of it. For cryonics asset preservation, this last feature is probably the most important, though protection of the patient from undesired

physical interferences is still of paramount importance to the overall endeavor. However, while we take these abilities for granted as being features of our present personhood, not all persons have always enjoyed these, and not all beings who are currently persons were always so. There are also beings that are not persons that some argue should be, and some non-beings that are persons, that some argue should not be (corporations, and other “legal” persons). Generally speaking, there has been an expansion of personhood to include more beings in recent centuries, and also an increase in the protections afforded those beings (at least on paper). Some of these advancements have come about as a result of legal activism, i.e. members of the excluded or under-protected groups (or their advocates) petitioning courts either to recognize novel classes within existing definitions, or make principled alterations to historical criteria for membership. Other gains have been made through political activism, but this article will focus primarily on the role of legal activism in the expansion or attempted expansion of personhood to particular groups (slaves, women, fetuses and animals) and enhancements of protections afforded certain subgroups. The second part of this article will consider whether anything can be learned from these historical and contemporary movements, and look at opportunities for legal activism in cryonics. A follow-up article will look at a novel

way that corporate (artificial) personhood could enhance the protection of cryonics patients and/or their assets.

Slaves

In 1772, the English case of *Somerset v Stewart* set an important precedent in the global abolition movement. Three years prior to the case, a customs officer named Charles Stewart had brought a slave purchased in America back to England with him. The slave, James Somersett, escaped in 1771, but was recaptured and imprisoned by Stewart, whereupon three people claiming to be Somersett’s godparents by baptism in England applied for his release on the grounds that there was no lawful reason for his imprisonment. However, far from being based on humanitarian principles, the arguments put forward on Somersett’s behalf simply relied on the absence of any statutory or common law in England recognizing slavery (serfdom having been abolished over 600 years prior). Since the common law of contract could not bind a person absent their consent, Somersett’s imprisonment was unlawful, it was argued.

Lord Mansfield of the Court of King’s Bench agreed with this argument, proclaiming that “the state of slavery is of such a nature, that it is incapable of now being introduced by Courts of Justice upon mere reasoning or inferences from any principles, natural or political; it must take its rise from positive law.” Lord Mansfield held that the legal status of an alleged slave

depended not on the law of the state where he or she originated, but on the law of the jurisdiction of the legal action, in this case England. Thus, while the institution of slavery was alive and well in America, a slave was free to withdraw from the service of his former master upon arrival in England.

“Generally speaking, there has been an expansion of personhood to include more beings in recent centuries, and also an increase in the protections afforded those beings...”

The result is pleasing enough, but unfortunately for our purposes the decision avoids the hard moral, philosophical, and most of all legal question of what makes a person; rather, it presumes that in the absence of a law declaring him to be anything else, *Somerset* was a person and not property. The arguments based on contract law relied on this—after all, property cannot enter into contracts in the first place. No reasoning was put forward by the plaintiffs, nor considered by the court, as to what qualities distinguish a person from property, either in the abstract or in the specific context of an American slave of African descent.

Not long after *Somerset*'s case, the United States did enact positive law recognizing slavery, in Article Four of the United States Constitution: “No person held to service or labour in one state, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labour, but shall be delivered up on claim of the party to whom such service or labour may be due.” This law was essentially an answer to the decision in *Somerset*'s case (which, while not binding on the States, was still an open question there), as between the slave states and the free states.

The U.S. abolition movement did not reach its boiling point until 80 years later, with the case of *Dred Scott v Sandford*, (1857). Mr. Scott sued for his freedom on grounds that he and his master had resided for a time in a state where slavery had been banned, but the Supreme Court of the United States held that as a person of African ancestry, Scott was not a citizen of the United States and had no right to sue in federal court (notwithstanding the fact that free blacks in some states did enjoy the rights of citizens of those states). According to Chief Justice Taney, the drafters of the U.S. Constitution viewed all blacks as “beings of an inferior order, and altogether unfit to associate with the white race, either in social or political relations, and so far inferior that they had no rights which white man was bound to respect.” Unsurprisingly, the Chief Justice is not taking personal responsibility for the morality of this position, merely declaring it to be the intent behind the law he is bound to apply.

Now technically, the jurisdictional issue in *Dred Scott* turned on the question of citizenship, not personhood, as this was the language of the relevant section; however, in obiter dicta, Chief Justice Taney also held that the Fifth Amendment prevented any law from depriving a slaveholder of his property, such as his slaves, upon the incidence of migration into free territory. It is implicit to this holding that slaves were no more persons than they were citizens.

The essential reasoning of *Dred Scott* was: (1) the being talking to us needs to be a citizen for us to listen; (2) a citizen is what the people who chose that word when drafting the statute would have meant by citizen; (3) historical analysis reveals the drafters would not have considered you a citizen because you are a Negro descended from a slave; therefore (4) you are not a citizen. The English decision, on the other hand, simply presumed *Somerset* to be a person in the absence of any positive law making another status possible, without explaining why (this may not be that surprising, however, since there were, at the time, free blacks in England). Both courts let slip the opportunity to expound upon the qualities of the being before them that

are, or would be, necessary and sufficient to a finding of personhood, even though such a finding was a necessary prerequisite to the disposition of each case.

Ultimately, it took a constitutional amendment subsequent to the American Civil War to elevate the status of American slaves to persons and citizens. However, in stating that “[a]ll persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside,” the Fourteenth Amendment does not actually accord slaves freed under the Thirteenth Amendment the status of personhood—like Lord Mansfield in *Somerset v Stewart*, their personhood is simply presumed.

Women

Of course, neither personhood nor citizenship guarantee equal protections and participation in public life. Women, for instance, were recognized as citizens of the United States falling within the meaning of the 14th Amendment in *Minor v Happersett* (1875), which as we'll recall requires an implicit finding of personhood, but the decision in that case held the right to vote was not one of the “privileges or immunities of citizens of the United States” when the Fourteenth Amendment was adopted (1868). Indeed, at the time the 14th Amendment was adopted, in many places women actually lost legal rights under local marriage laws—among those the capacity to own property. And once more, a constitutional amendment—a political achievement as opposed to a legal one—was required to enhance the status of women to equal footing with men on the issue of voting (19th Amendment, 1920).

However, the question of women's personhood was directly considered in the Canadian case of *Edwards v Canada (AG)* (1929), aka the “Persons case.” At issue there was whether the phrase “qualified Persons” in Section 24 of the British North America Act (the precursor title of Canada's Constitution), in reference to senate appointments, included women. The Supreme Court of Canada found that based on (i) the usage of the word “He” in the nearby section detailing the necessary

qualifications, (ii) the historical intentions which could be imputed to the drafters of the of the Act, and (iii) the common law incapacity of women to exercise public functions at the time, women were excluded from Section 24.

Luckily, the Supreme Court of Canada was not the final say in the matter at that time, and the case was appealed to the Judicial Committee of the Privy Council in England. Overturning the decision, Viscount Sankey ruled that “[t]he British North America Act planted in Canada living tree capable of growth and expansion within its natural limits... Their Lordships to do not conceive it to be the duty of this Board... to cut down the provisions of the Act by a narrow and technical construction, but rather to give it a large and liberal interpretation....” But once again, the Privy Council’s decision on the definitional matter at issue doesn’t actually consider whether women are in fact persons, and why, but rather whether the term “person” in that context impliedly excludes “female persons.” Instead of being about what makes a person, the debate turns on what kinds of persons the drafters meant by “persons.” It assumes that women can be persons, either if those responsible for drafting the document giving persons certain capacities meant to include female persons, or, in the Privy Council’s opinion, by default unless exclusion is explicit. This is still a textualist interpretation, just a progressive one as opposed to originalist. But it most certainly isn’t semantic—that would require an examination of what qualities define personhood.

Fetuses

Perhaps we need to go looking for a case that forces the “qualities” of personhood into determination. In the landmark abortion/fetal rights case of *Roe v Wade* (1973), the respondent argued that a fetus was a person within the meaning of the Fourteenth Amendment, guaranteeing its right to life. In its decision, the U.S. Supreme Court noted that the Constitution does not define “person,” and found that there was no intra-textual support for a pre-natal interpretation, nor any legal precedent to support this interpretation

either. But then, instead of addressing the issue head on, Justice Blackmun wavers, saying “[w]e need not resolve the difficult question of when life begins. When those trained in the respective disciplines of medicine, philosophy and theology are unable to arrive at any consensus, the judiciary, at this point in the development of man’s knowledge, is not in a position to speculate.” Nevertheless, it is apparent he is tempted at the prospect, responding to the conception theory of the beginning of life (and personhood) by pointing to the problems with this view caused “by new embryological data that purport to indicate that conception is a ‘process’ over time, rather than an event, and by new medical techniques such as menstrual extraction, the ‘morning-after’ pill, implantation of embryos, artificial insemination, and even artificial wombs.” So this court is not averse to scientific evidence suggesting the question is not as black and white as alive-person vs. non-alive-non-person, but it only applies that evidence one way, to prop up its “legal” conclusion that personhood has always begun at birth. The same process-not-event reasoning could just as easily be applied on the other end, i.e. in the days shortly before birth, against the argument that life and personhood begin at birth—especially since birth can occur prematurely both naturally and as a result of artificial inducement. But Justice Blackmun prefers his concept of the “potentiality of human life,” in which the State’s interest matures to the “compelling” threshold upon viability of the fetus. So, despite not meeting the definition of personhood (however arbitrarily derived), an intermediate category is carved out for the fetus and granted some protection. (Note also that there is a long history, emanating from English law, that a fetus can have a defensible interest in property that is contingent upon its being born.)

In the decades since *Roe v Wade*, a number of attempts to enact “personhood amendments” at the state constitution level have mostly failed to gain traction. However, in March 2012, the North Dakota House of Representatives passed an amendment to its constitution that “the inalienable right to life of every human

being at any stage of development must be recognized and protected.” Reactions to this have included concerns that such a drastic redefinition would effectively outlaw not only abortions in all circumstances, but many reproductive technologies that involve production, storage, and disposal of excess embryos. It remains to be seen whether this amendment will survive a challenge founded on the U.S. Constitution and *Roe v Wade*. Nevertheless, political activism appears a more viable option for activism than legal challenges.

“Because courts have been so reluctant to comment on what qualities make a person, it is not easy to say what kind of evidence would need to be brought in order to carve out a similar intermediate category for cryonics patients.”

Non-human Animals

Of course, while fetuses’ presence at the blurry category boundary between non-life and life has obvious analogical relevance to cryonics patients, it is not a perfect model because it involves a presently unavoidable contest between the fundamental rights of two beings, the mother’s and the fetus’s (that is, if rights are imputed to fetuses at all). The question of non-human animal personhood does not pose this same issue, and there have been a number of interesting developments regarding the legal protection of these beings. However, despite how these are usually reported, none have granted “rights” to any animals, nor conferred upon them the personhood they would require in order to have rights, in the legal sense. Rather, of the numerous reports of non-human animals being granted rights, what has in fact occurred includes: (i) constitutional recognition of the “dignity” of animals, which need be considered by the state in regulating research activities (Switzerland, 1992), (ii) somewhat vague imperatives to protect

animals by legislation (Germany, 2002), and (iii) expanded protections of some classes of animals, like the great apes, preventing their use in research or testing (New Zealand, 1999).

Attempts at legal activism towards non-human animal personhood have been less successful. In *Citizens to End Animal Suffering and Exploitation v The New England Aquarium* (1993), the Massachusetts district court held that Kama the dolphin lacks standing to maintain an action under the Marine Mammal Protection Act, as the Act only authorizes suits brought by persons. As we should be coming to expect by this point, the decision simply accepts as a foregone conclusion that animals are not persons without asking why. Similarly, in *Cetacean Community v Bush* (2004), the Ninth Circuit Court held that “the Cetaceans do not have statutory standing to sue,” as they are not persons—no deeper questions asked.

Nevertheless, the will behind these suits is strong. An organization called GRASP (Great Ape Standing & Personhood), hosts a model legal brief on its website titled “From Property to Person—The Case of Evelyn Hart,” however, the organization is not very active, and the brief itself has not been used. Much more impressive is the Nonhuman Rights Project (NHRP), headed by Steven M. Wise. The NHRP is working to identify American state jurisdictions that may be most receptive to animal personhood arguments, and which have retained the old, common law causes of action used by human slaves and their advocates to challenge their “unfreedom,” namely the writs of habeas corpus, and *de homine replegiando*. Wise sums the objective and strategy up thusly:

“James Somerset’s legal transubstantiation from thing to person at the hands of Lord Mansfield in 1772 marked the beginning of the end of human slavery. Persuading an American state high court to similarly transform a nonhuman animal is a primary objective of the Nonhuman Rights Project.... A court confronted with a plaintiff’s claim to possess any legal right need only determine the plaintiff’s species. If the plaintiff is human, the answer is, ‘It is possible that the plaintiff has the legal right she claims.’ If the plaintiff is

a nonhuman animal, the answer is, ‘Impossible.’ The goal of the interdisciplinary Nonhuman Rights Project is to change this paradigm. It intends to demand that American state high courts declare that a nonhuman animal has the capacity to possess at least one legal right, to declare that she is a... legal person. Once a court recognizes her capacity, the next legal question is... which legal rights she should possess, an appropriate shift from the irrational, biased, hyper-formalistic, and overly simplistic question, ‘What species is the plaintiff?’ to the rational, nuanced, value-laden question, ‘Does the plaintiff possess the qualities relevant to whether she should be entitled to the legal rights she claims?’ ”

Whether one supports this objective or not, the approach is certainly admirable, and the relevance of the project, and other personhood initiatives to the issue of cryonics patient personhood cannot be denied.

Preliminary Conclusion

In the slave cases we see courts avoiding the question of what makes a person, deferring to legal precedent, historical context and textual analysis; we see the same in the women cases, the fetus cases, and the animal cases. Even though on occasion the decisions flow with the progressive expansion of personhood instead of against it, there is definitely a resisting inertia, especially in the cases where the claimants cannot speak for themselves (fetuses, non-human animals). Generally, it appears that political activism reaps the greater gains, especially, of course, where the status quo is entrenched in statutory law as opposed to common law, as it was in the status of slaves in the U.S.

In light of this, it seems that achieving reclassification of cryonics patients to persons through the courts would be somewhat unlikely at this juncture—not that anyone is seriously advocating for it right now. However, looking at the all-important fetal rights case, *Roe v. Wade*, we do see some willingness to consider scientific data that threatens previously binary legal concepts of life and death, and also to carve out intermediate categories therein which receive enhanced protections. Because courts have been so reluctant to

comment on what qualities make a person, it is not easy to say what kind of evidence would need to be brought in order to carve out a similar intermediate category for cryonics patients. I would hazard a guess that the “potentiality of life” would need to be known, and I think this goes further than retrieving organized electrical activity from cryopreserved brains. I think whole animals would need to be resuscitated from cryopreservation—with return of cognition and “personality.” Then legal arguments could be made that humans cryopreserved with the same process (or close), who are not yet being resuscitated because the procedure needs to be refined before it would be ethical to attempt on humans, contained the same “potential” for life, and should receive some heightened protection from interferences. The capacity to have contingent interests in property might also be obtainable at this point.

Otherwise, as we see from history, political activism remains an option. And cryonics patients do have the advantage of being able to speak out for themselves prior to becoming voiceless patients. What we lack, currently, is numbers, both in actual membership and also moral supporters. Hopefully that will change as time goes on, but in the interim there are still opportunities for legal activism and innovation that would increase the protection of cryonics patients, both before and after cryopreservation, as well as the protection of their assets. Attempts by governments to regulate cryonics represent possible opportunities to bring constitutional challenges on the basis of cryonicists’ liberty and freedom of belief. Corporate personhood may also present a bootstrap solution to some of the problems caused by cryonics patients’ loss of personhood, which I will address in a future article. ■

Keegan Macintosh is Research Fellow for the Lifespan Society of British Columbia, where he is working to address issues of access to life extension technologies.
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LIFE, OUR ASSET MOST WORTHY OF PRESERVATION

By Daniel Witt

A REVIEW OF SUZANNE SOMERS' BOOK "BOMBSHELL"

[The following is the text of a presentation given on Saturday, May 11, 2013 at the Asset Preservation Group meeting in Portland, Oregon]

Hi, I'm Dan Witt. My wife Becky and I have attended all but one of these asset preservation meetings. Through most of the meetings we sit quietly and learn from the speakers who come from quite diverse backgrounds. They are usually quite accomplished and have covered a myriad of topics, most of which were concerned about preserving and even growing our estates during our expected long period of inactivity but have also touched on progress being made in suspension procedures and portable vital signs monitoring.

Lately, there seems to be more interest in the actual revival of suspended individuals and their reintegration into society.

All of these topics are noteworthy, their discussion is necessary and advancement in them remains imperative. I have noticed, however, that each time I attend one of these events we all have an additional wrinkle or two, a little more grey hair, walk a little slower and generally, ever so gradually, appear to be wearing out. We

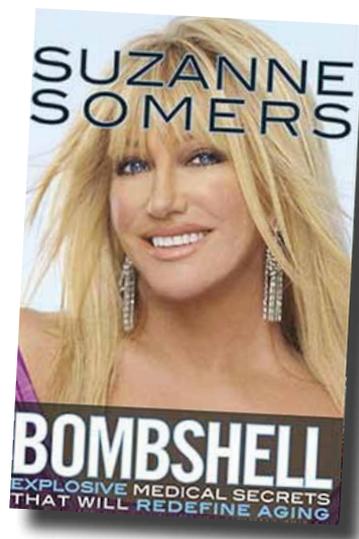
don't discuss it much, but each time we meet, we are a little closer to having to endure the second worst thing that can happen to us—cryonic suspension.

Becky and I joined Alcor after my sister showed us an article about them in 1985. The next day I called Alcor and asked them to send us the paperwork. There was no debate or soul searching. It was the only show in town. As a consulting actuary I figured the odds against it working were about 20,000-1 (now I figure the odds at about 10-1) but it was certainly better than the alternative. I can never understand people who can afford suspension hesitating for a second. But that's just me. Incidentally, my sister never signed up-or even considered it.

As a person intrigued by numbers almost since birth, I've always been well aware of the limited human lifespan. When I was about 5, I remember picturing the dates of birth and death on each of my family's gravestones. I figured for me, my epitaph would be something like: R. Daniel Witt, 3rd baseman, (1942-2020).

This has always been a burden for me. At age 25 I would say "well, it's a third over" to anyone who would listen. At age 40 I wailed, "it's half over" and so on. After a while everyone got very tired of my play by play reporting of the gradual expiration of my life. That's why I grabbed for Alcor as the first chance I had, albeit remote, to take control of my lifespan.

Along the way I've had a number of



reminders of my approaching demise. In 1962 my father died of a heart attack at 57. He died five weeks before my 48-year-old mother, who he was worrying about dying of cancer. Then all of my uncles started dying of heart attacks and my aunts of cancer. No one made it to 60. All of my grandparents died before I was born. The picture was bleak. When a doctor asked me if osteoporosis ran in my family I said "I don't know. No one's ever gotten old enough to get it."

I'm a proactive kind of guy, so as a teen I began following a healthy lifestyle of the right diet, plenty of regimented exercise, good sleeping habits, vitamin and dietary supplements, the cultivation of good friends and above all a fabulous spouse.

"The book that seems to best summarize a comprehensive program of retarding, stopping and even reversing aging is called 'Bombshell.'"

I've beaten the odds, so far, by celebrating my 70th birthday and have found that while all of my contemporaries lately have shrunk noticeably, I have not. I can only attribute that to my taking NGH growth hormone for the last 15 years.

"This book offers us the first real opportunity I have come across to control our own lifespans since Alcor gave me that shred of hope in 1985."

This is all positive but going back to my initial observation—that we are all aging (maybe some of us a little slower than others)—and that unless we do something now to slow, stop or even reverse it, we or one of our loved ones will in the not too distant future be making that call to our cryonics organization or, worse yet, to the cemetery or crematorium.

In 2004 my wife alerted me to a diet being promoted by Suzanne Somers, the blond from TV fame. It was supposed to help with my cardiac panel indicator ratios and to help me lose the belly that was suddenly enhancing my mid-section. My first reaction was "what does a dizzy blond know about science?" Well apparently quite a lot. We have been on her diet for nearly 10 years now. It is simple and it works brilliantly.

In addition, she has written 23 books, a number of which delve into all areas of anti-aging. Since she had credibility with us through her diet, we started reading those which appear to most impact us today, as there is little time to lose.

The book that seems to best summarize a comprehensive program of retarding, stopping and even reversing aging is called *Bombshell*. It has a sexy picture of Suzanne on the cover, which I feel she must feel she still has to do to gain attention, but what is inside is remarkable as to its content and even more so as it is put together by someone with no formal scientific training.

The book has 3 main sections. The first section (Chapters 1-4) covers: —**What**

Aging Looks Like Now – And In The Future, the second section (Chapters 5-16) is devoted to: —**Explosive Medical Information to Help You Reverse Age** and the third section (Chapters 17-18) summarizes it all in: —**Putting It All Together**.

More specifically, Chapter 1 urges us to make a plan to get us to our desired goals as they relate to the aging process. Chapter 2 lists the things that cause us to age. Chapter 3 explores what the future will look like and features Ray Kurzweil discussing among other things, the prospect of nanobots repairing our cells from within. Chapter 4 introduces us to a new kind of doctor, an anti-aging specialist, Dr. Michael Galitzer from Santa Monica. Galitzer discusses balancing hormones, how to strengthen our weakest organs and glands, how to strengthen the body to fight disease and how to detoxify the body on an ongoing basis from the constant onslaught of toxins.

In Chapter 5, Suzanne recounts her bout 11 years ago with breast cancer and how she pioneered the process, in this country, of regrowing her lost breast using her own stem cells. Chapter 6 features an interview with our own Bill Faloon who reviews how we can avoid catastrophic events like a heart attack through ingestion of appropriate supplements. Chapter 7 explores with Harvard professor, Dr. Abraham Morgentaler, testosterone supplementation as a youth giving, bone-building, non-cancer causing substance that gives men their maleness. For women, in Chapter 8, Suzanne discusses hormone replacement and nutritional interventions to make them feel youthful, smart, and sexy with gynecologist Prudence Hall, M.D., of Santa Monica. Chapter 9 features an interview with Dr. Jonathan Wright of Tahoma, Washington, known as the father of bioidentical hormone treatment, who believes that the cells in the body can actually be rejuvenated to, in essence, restart themselves again. This is reverse aging at its best. Organs and glands rejuvenated to youthful levels.

Chapter 10 explores how the supplement TA-65, currently being marketed by Noel Patton, a businessman with a background in telomere biology, provides for us today

the enzyme telomerase which appears to have the potential to rejuvenate human cells and keep them from dying of old age. In Chapter 11 she interviews Dr. Russell Blaylock, a well-known neurosurgeon, who discusses how chemicals in our environment and our diet are killing our brains and what we can do about them. Chapter 12 features Dr. Garry Gordon, the author of *The Chelation Answer*, who talks about the natural effective alternative to bypass surgery. Chapter 13 has an interview with Dr. Dipnarine Maharaj, the founder of the South Florida Bone Marrow/Stem Cell Transplant Institute, who talks about how stem cell treatment may soon eradicate cancer.

Chapter 14 starts with a quote from our Dave Kekich and Suzanne then goes on to discuss a skin patch she currently uses and other patches which are available, that when worn, may slow down aging, with supplier David Schmidt. Mr. Schmidt has a background in biology and is something of an inventor who has developed technologies in a number of varied industries. In Chapter 15, she explores the "switching off" of cancer cells with Drs. Stanislaw Burzynski and Nicholas Gonzalez. Chapter 16's interview is with Dr. William Rea, a specialist in environmental health who talks about how you can keep the toxic environment we live in from killing you.

In Chapter 17, Suzanne talks about how each individual can develop his or her unique age reversal plan and in addition supplies us with 18 age reversing ideas to consider. Chapter 18 is devoted to advanced age reversal, enumerating 18 aging factors, followed by the methods of dealing with each.

This book offers us the first real opportunity I have come across to control our own lifespans since Alcor gave me that shred of hope in 1985. And, as with Alcor, I am wasting no time incorporating all facets I can of her anti-aging regimen into our regular lifestyle. Our diet currently doesn't need too much modification. Our exercise and sleep patterns are pretty good. What we did do just this past week is contact a physician, who specializes in anti-aging, from the list found on one of the websites referred to in *Bombshell*.

The physician is Dr. Harvey Bartnof in San Francisco. There are a number of like-minded physicians in California, thousands all across the country for that matter. That is quite striking, as Suzanne states that when she wrote her first anti-aging book only 6 years ago, she could list only 11. Dr. Bartnof called Becky and me the day after we first contacted his office and spent 1½ hours on the phone with us gathering information, with no obligation to use his services.

“A growing number of highly-respected physicians now agree that it is quite possible for us, as mature adults, to live to 130-150.”

We have since signed on to his program and each of us is scheduled for an 8 hour session on May 31st and June 1st, where they will do a complete analysis of what we need in the area of bioidentical hormone and enzyme replacement. Hopefully, replacing what we have lost due to the “normal aging process,” will retard and even reverse the aging of our bodies.

He will also determine if we need chelation to remove the toxins that we have acquired over the years from our environment. In addition, he will dispense the patches Suzanne describes in her book, where necessary. Hopefully, he’ll act as our reverse aging coordinator. We can’t wait to get started.

Finally, last Tuesday I contacted a physician I found on a website referred to in *Bombshell*, who specializes in banking our own healthy stem cells. These stem cells will then always be there for us when needed to repair or replace defective body parts.

Why am I going through all of this today you ask? Over the years I have recognized that while I may not be the smartest guy in the room, I do have the ability to stand back and analyze the accepted beliefs and actions of the majority and sometimes challenge them with an alternative viewpoint. **In this case, I urge us to focus much of our**

energy on living in health, for so long that we will never need suspension.

So as I stated in my initial comments, since we’ve become a part of this group, as planned, Becky and I have spent meaningful hours planning for our assets to be there when we will ultimately need them and have followed the progress of our cryonics organizations in their quest to suspend us as intact as possible. During this period we have worked with Peggy Hoyt to develop a comprehensive trust with a succession of trustees, a long term plan for their place in the preservation of our assets and their use to ensure our prompt revival when it becomes feasible. In addition, Alcor now has its own trust into which we will begin placing some of our assets.

On the best possible suspension front, it seems that our biggest fear remains that if we suffer a sudden heart attack or similar malady, out of the view of another human, our cryonics organization will not be made aware of our need for their services until it is far too late for an optimum suspension. My best guess is that all of us recognize this problem and that some great minds are working on a viable monitoring system.

So, at this point our assets are protected as best as they can be. The big brains are perfecting cryonic suspension and revival. We’re signed up with Alcor to be suspended if the worst happens. I’ll try to stay in the line of sight of someone in case I have my heart attack. I exercise and take vitamins. But if I do nothing else, like the rest of you here, I’m aging myself right into the Alcor tin-can with decidedly uncertain ultimate results. What else can I do? After reading Suzanne’s book the answer seems obvious. And that is to follow a completely new focus of medicine: age prevention. We can now literally turn back the clock when it comes to the condition of our bodies. A growing number of highly respected physicians now agree that it is quite possible for us, as mature adults, to live to 130-150. And if we can achieve that, by then science will have undoubtedly produced the ability for us to live far longer. Think of it. We may never have to wind up in the tin-can after all!!!!

Another thing I’ve always tried to do is enlist the help of experts in the areas in

which I have had interest, to help me with a goal that I had set. Today I stand before a group with far more scientific knowledge than I have. To possibly interest you in the topic of anti-aging, Becky and I are providing a copy of the Suzanne Somers book, *Bombshell*, for each of you.

Becky and I have embarked on this unknown journey. We feel we would do far better on this journey if accompanied by as many like-minded, bright, interesting associates as possible. If this sounds reasonable to you, read the book, read her other books, research all facets of anti-aging and let us know anything you know or discover in this area of which we may not be aware.

I’m sure Suzanne Somers and the people she has interviewed don’t have all the answers or even the best methods. It’s a fast evolving field and who better than a group of creative cryonicists can work together to formulate a comprehensive, constantly evolving plan to avoid the tin-can. Becky and I would love to have you join us in our quest for a long, long, long existence at 98.6 degrees Fahrenheit. ■

RECONSTRUCTIVE CONNECTOMICS

By Chana de Wolf



“If we are acquainted with the principles upon which this mechanism [the brain] operates, we may infer its function from its structure, regarding the former as a natural outcome of the latter.” – Theodor Meynert, 1885

If you’ve been paying attention to the latest initiatives in neuroscience you likely have heard something about the “connectome.” You may be wondering what the connectome is and what all the hubbub is about. This month’s article seeks to briefly define the connectome, describe the goals of connectomics, and make a case for using what we learn (and what we already know) from connectomics to pursue meaningful cryonics resuscitation research today.

The connectome is a comprehensive description of how neurons and brain regions are interconnected. It is commonly conceptualized as a sort of “wiring diagram” of the brain. Connectomics, then, is the branch of biotechnology concerned with applying the techniques of image acquisition and analysis to the structural mapping of sets of neural circuits, with organizing the results in databases, and with applications of the data.

Motivating modern research in this area is the hypothesis that mapping of anatomical circuits represents a fundamental step toward understanding brain function and physiology. Until now, functional studies of cells and circuits have largely been carried out in the absence of detailed and specific information about the underlying connectivity.

Connectome mapping can be carried out directly, by deploying anatomical techniques, or indirectly, by attempting to infer connections between circuit elements based on their temporal dynamics or functional responses. Besides increased general knowledge, the most obvious application of connectomics data includes the treatment of disease, as in neurology or fundamental neuroscience (i.e., to learn more about the role of connective disturbances in brain dysfunction and disease).

“Even if we do not have the biological or mechanical cell repair technologies that would be required for repair of the brain at the molecular level, using techniques in connectomics we can do things like simulate a specific kind of damage (e.g., ice formation, ischemia) and create 3D neural wiring maps that can be compared to controls.”

Another application or goal of connectomics can be to repair damage associated with cryopreservation with the intention of patient resuscitation. This kind of “reconstructive connectomics” (a phrase coined by Aschwin de Wolf in *Cryonics* May 2013) would be a sub-discipline of the field of connectomics that studies the pathological changes of neural connections in the brain with the aim of *in silico* (i.e., computer-aided) repair.

Reconstructive connectomics is the modern-day realization of what Thomas Donaldson termed “neural archeology,” a concept described in detail in his 1987 article of the same name. In general terms, Donaldson equates the task ahead of cryonicists with that encountered by traditional archeologists. Though space limits our ability to consider this prescient article in full, let us look at a most illuminating section:

“The first thing done in examining an archeological site is to carefully plot the relation of all the fragments to one another. Debris has a structure too. We discover this structure by looking at the relations of its parts to one another, not just by looking at the parts. (Archaeologists in Central America complain constantly that valuable artifacts are taken away and sold, with no record of where they were found, in relation to what.) If a protein has



Figure 1 Facial reconstruction provides a good example of inferring an original structure from incomplete information.

two degradation parts, we can learn a lot by knowing where these parts are found in the remains of a cell.

In fact, one way of looking at cryonics is that it is simply a way of making such a detailed record. Here is a patient's brain, in the condition it was when we lost him."

Indeed, many fields use reconstructive techniques—taking a limited amount of information from a system and extrapolating what is known about that system to “fill in the gaps” and reconstruct the original system state. For example, facial reconstruction is performed in forensics and archeology. Mathematical and scientific modeling is also used in genomics and bioinformatics.

Inherent to Donaldson's statement above is the fact that some amount of damage has been inflicted upon the brain of the cryonics patient. Indeed, while repair is not intrinsic to cryonics, most cryonics patients will require repair. However, one of the biggest myths in cryonics today is that not much of interest can currently be said about repair, let alone that repair efforts can begin now.

I will argue otherwise. In the context of resuscitating a cryopreserved patient, we

must answer three important questions: (1) What needs to be repaired? (2) What repair strategies can be utilized? and (3) What level of information resolution is sufficient? By characterizing the amount and type of damage in detail and linking those forms of damage to contemporary or envisioned repair strategies, especially making use of information obtained from connectomics research, we can begin the process of reconstructing the functional person from the preserved brain, whatever state that brain may be in at the time of preservation.

Some people may believe that scanning of the patient's damaged brain and *in silico* repair is sufficient for meaningful resuscitation (i.e., mind uploading). I recognize this point but remain agnostic. Let us work from the assumption that repair will be on the biological brain with the help of computer modeling.

Even if we do not have the biological or mechanical cell repair technologies that

would be required for repair of the brain at the molecular level, using techniques in connectomics we can do things like simulate a specific kind of damage (e.g., ice formation, ischemia) and create 3D neural wiring maps that can be compared to controls.

Often this is not even necessary because we understand the universal language of biology and if we observe damage (e.g., a ruptured cell membrane), we know how it is *supposed* to look. In fact, using our knowledge of what a brain *should* look like, and how they *should* function, can get us surprisingly far. Observe, for instance, the following electron micrographs (EMs) produced by my research company, Advanced Neural Biosciences. (A) is an EM of normal, undamaged rat cortical tissue (i.e., the “control” sample), while (B) is an EM at the same magnification of rat cortical tissue that has suffered 21 hours of warm ischemia.

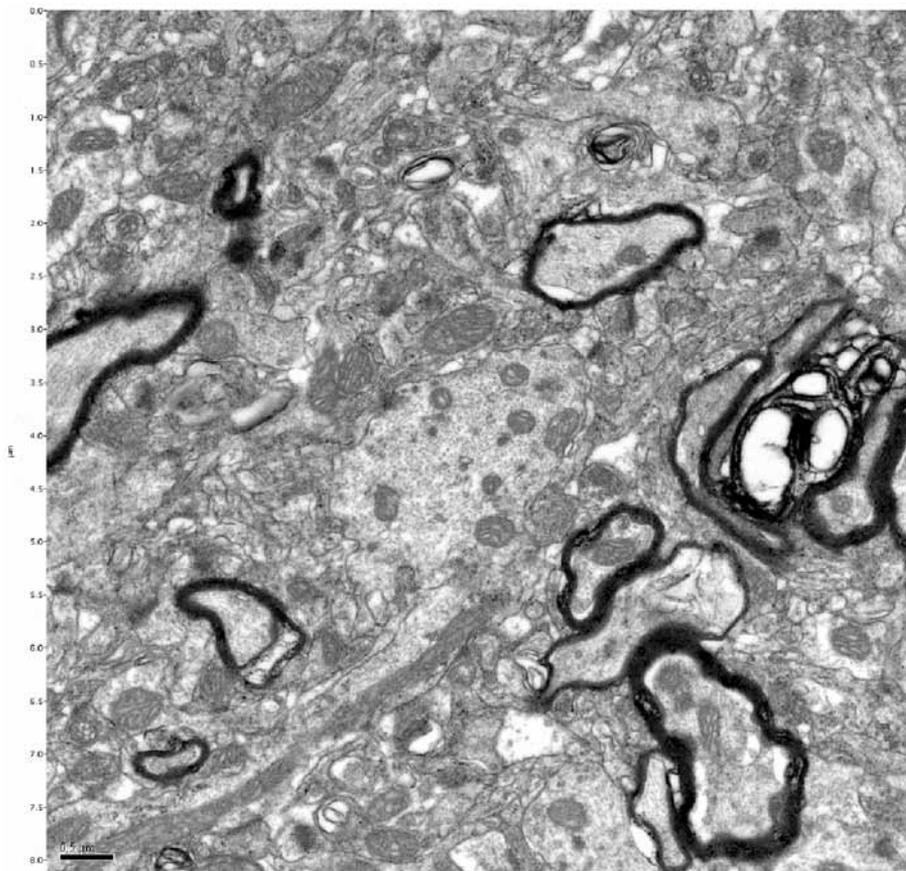


Figure 2 – A control cortical electron micrograph of the rat brain.

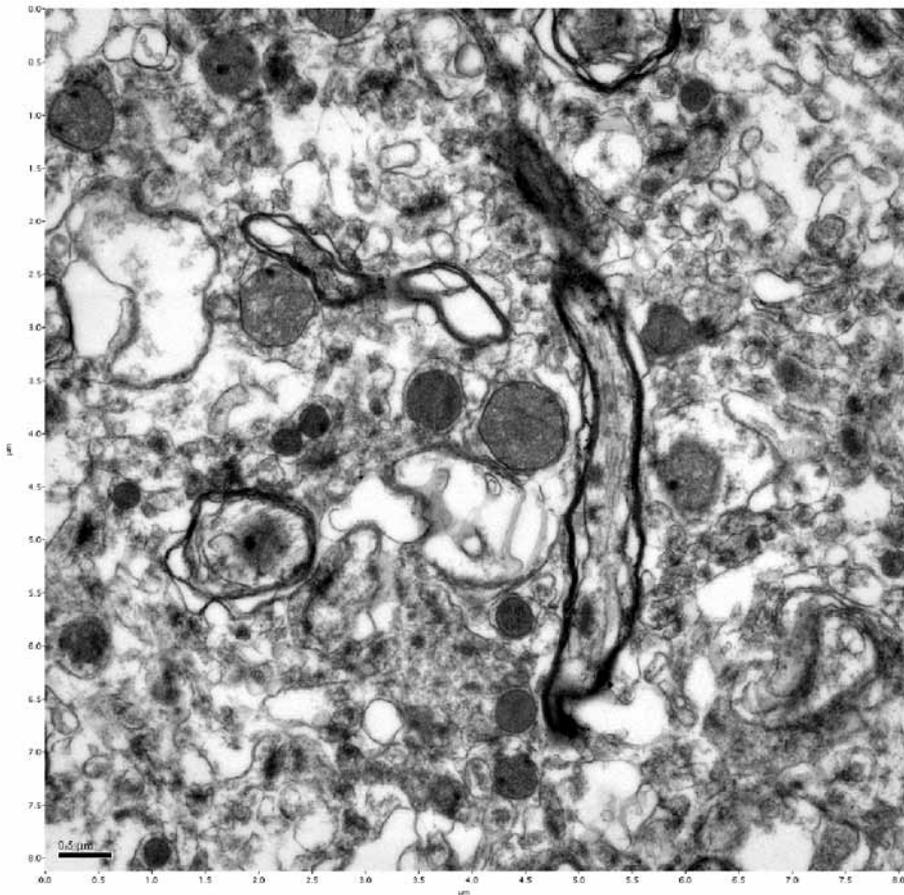


Figure 3 – Cortical electron micrograph of the rat brain after 21 hours of warm ischemia. Structure and organelles can still be clearly identified.

It is remarkable that in both the control and the 21 hour sample myelin sheaths can be easily identified. If you look at these images closely you will observe deformed/ruptured organelles and evidence of disintegration in the 21 hour group, but for many structures: (a) we know how they should look, and (b) memory and identity are not encoded in individual organelles such as mitochondria. There is substantial information still present in this damaged system to utilize in reconstructing the original state.

Much work has already been done in characterizing damage in cryonics. In brief, damage falls into the following categories: damage incurred prior to cryopreservation (i.e., “pre-mortem damage”), cerebral ischemia, cryoprotectant toxicity, ice formation, chilling injury, and dehydration. The question of utmost importance in considering these forms of damage is

whether we should expect any of them to destroy (our ability to reconstruct) the connectome.

I think not.

Computational limitations currently constrain the scale and complexity at which we can do these reconstructions, but it is not necessary to do reconstructive connectomics in a human-sized brain to obtain a much greater understanding of the mechanisms of damage, the type of repair required, and the empirical content of concepts like information-theoretic death.

An open question is whether the connectome will provide sufficient information to enable resuscitation from cryopreservation. One could argue that we may need to preserve detailed information at even higher resolution (e.g., the “synaptome,” ion channels, microtubules, neurotransmitters, etc.). That the connectome is sufficient to reconstruct

individual identity and memory is an assumption of mine; however, if other biochemical mechanisms are involved, similar reasoning can be applied.

It is important to keep in mind that connectome data exists at multiple scales (micro vs. macro). Very little progress has been made to date in merging or cross-referencing of connectome data across scales—for example, relating connection data from networks at cellular resolution to large-scale projections and pathways. The development of multi-modal registration tools and connectivity-based data formats for diffusion and functional MRI provides a potential model for future integration efforts across scales.

So what kind of resuscitation research can be undertaken NOW? To start, we can better characterize damage and changes to the brain incurred prior to and as a result of cryopreservation. We can then use computer modeling to reconstruct the original state *in silico*. Additionally, we can utilize the tools of synthetic biology to develop biological cell repair technologies.

“...many fields use reconstructive techniques—taking a limited amount of information from a system and extrapolating what is known about that system to “fill in the gaps” and reconstruct the original system state.”

A specific project that is currently being undertaken by Advanced Neural Biosciences is to compare control (i.e., undamaged) and straight-frozen neural tissue by modeling each state in 3D. By assessing the degree and type of damage in a straight freeze scenario, we hope to begin building the requisite knowledge base for further, more rapid advances in reconstructive connectomics.

Who knows? Even such “worst case scenarios” may not be as bad as we think. ■

CRYONICS IN NEW YORK: HUMAN FREEZINGS AND OTHER EVENTS, 1968-1969

By R. Michael Perry



In earlier columns we have looked at the cryonics movement in New York prior to any human freezings. (Back in those days vitrification as now practiced didn't exist and all cryopreservations were just "freezings" though there was a distinction between straight freezing and the better preservation achieved by initial body washout and cryoprotective perfusion.) During this time an organization was set up, the Cryonics Society of New York, to offer

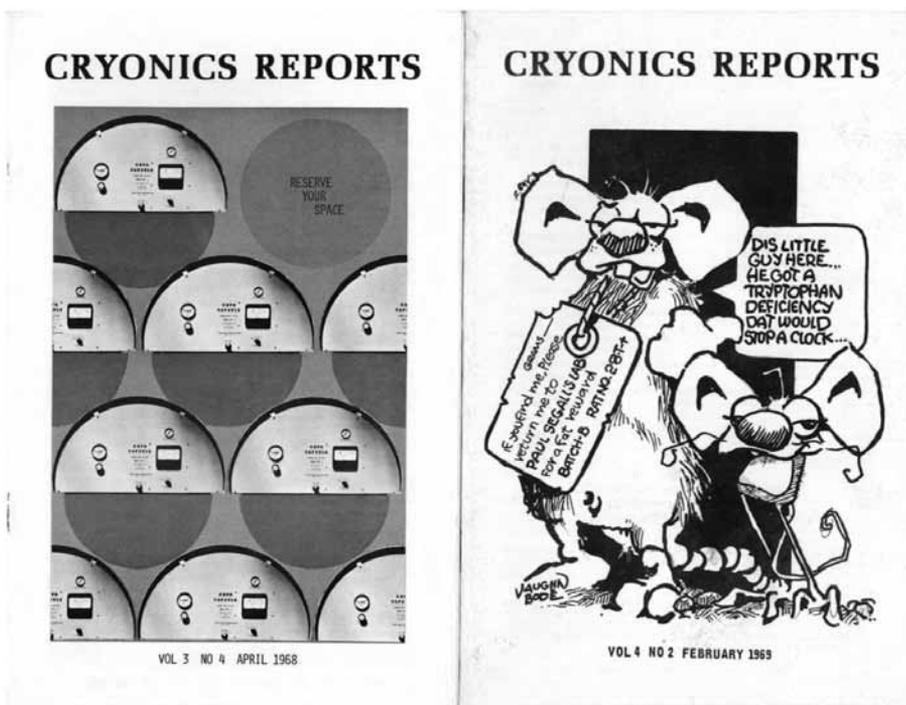
cryopreservation services according to the needs of its members. CSNY's members stayed healthy for a while, several years in fact, but finally, in July 1968, a member was down and it was time to act.

Long before this a need for preparedness had been recognized,¹ as CSNY president Curtis Henderson would later recall. "First of all we realized that you had to have the cooperation of a mortician, because you had to get into the licensing system

of handling a dead body. You couldn't just pop up and say, 'hey, we're a cryonics society, somebody just died, now give us the body,'—they won't do that."² Letters were sent to funeral directors in the area starting in mid-1966.³ There was almost no response. "One man however, Fred Horn at St. James, called us and he said he was interested. We gave him what literature we had, and because he'd broken his leg skiing he took the time to read it. That's literally the truth—he admitted it many times. He never would have read any of it if he hadn't been sitting there with his leg in a cast. But he became interested in it"

When 24-year-old Steven Mandell arrested July 28, 1968, "he more or less put all of us on the spot: Now, this was it, either put up or shut up. ... And of course from then on it ceased to be a discussion group."⁴ Mandell had joined CSNY the previous November, after a year of subscribing to their newsletter, *Cryonics Reports*. He was then a student at New York University in the Bronx, majoring in aeronautical engineering. A science fiction story had sparked his interest. "Although financially limited at the moment," he noted in his application, "I am fully committed to the cryonics movement and will contribute all I can to its progress and acceptance." Reporting his health as "fair," in fact he would soon succumb to Crohn's disease or regional enteritis, an inflammatory bowel disorder. Financially, matters seemed to be in order. A \$10,000 insurance policy (about \$67,000 in 2013 dollars⁵) plus donations

PHOTO CREDIT: Cryonics Reports 3(4) (Apr. 1968); Cryonics Reports 4(2) (Feb. 1969).



"Cryonics Reports" covers. (1) Multiple images of end plate of horizontal capsule, probably the one used to store Steven Mandell. (2) Cartoon by Vaughn Bodé relating to Paul Segall's laboratory.



CSNY patients 1968-69, clockwise from lower left: Steven Mandell, Andrew Mihok, Ann DeBlasio, Paul M. Hurst Sr.

from friends and relatives, “placed in a special trust,” would “insure indefinite care of the body.”⁶

Otherwise at a basic level CSNY was prepared. They had a cryogenic capsule (featured in multiple exposures on the April issue of their newsletter. This is an “old style,” horizontal capsule manufactured by Cryo Care Equipment Corporation of Phoenix, Arizona. Only one such capsule was actually used by CSNY).⁷ And they had mortician Fred Horn, who now took charge of legal formalities and also assisted in preparing the body for cryogenic cooling. This involved replacing the blood with a solution of glycerol (20%) in Ringer’s solution, using an embalming pump. The body then was cooled to dry ice temperature. Encapsulation and storage in liquid nitrogen would follow on September 5, at Washington Memorial Park, a cemetery-based facility in Coram, L. I. (Encapsulation was actually a difficult operation. Initially the inner chamber of the capsule where the patient would rest was welded shut and had to be cut open and resealed with a leak-proof seal after the occupant was inside. A master welder—Tom Gartland—and an assistant were required.)⁸ Among the CSNY personnel were Paul Segall and Harold Waitz,⁹ who, along with Saul Kent and Curtis Henderson, would be involved in cryonics long after the organization had

ceased to exist.

Segall and Waitz also were prominent in the Laboratory for Life Extension Research (Segall as Director of Biological Research and Waitz as Director of Engineering Research). Based in Segall’s garage in Lindenhurst, L. I., this laboratory had been founded the previous June by Segall himself under sponsorship of CSNY. Segall offered this explanation:

“My main purpose in creating this laboratory is to create an atmosphere geared solely to research designed to extend the human lifespan. As far as I know, there is no such laboratory or facility in the world. There are several large-scale programs of aging research, perhaps the largest is at the National Institutes of Health in Bethesda, Maryland; but these programs are overly conservative in design and outlook.”

Among the “many avenues of approach to control and reversal of the aging process” Segall proposed “cryonic suspension, clonal reproduction, and manipulation of hormonal balance.” Granted “we have been forced to start on an extremely modest scale with minimal equipment, we do have the freedom to pursue our goals without interference or coercion.” The rather ambitious immediate objectives were: (1) to prove that aging can be halted in mice, with corresponding insight into aging more generally; (2) to achieve reversible suspended animation of mammals through cryopreservation; and (3) to perfect cryonics storage technology, starting from the Cryo Care capsules. (In retrospect let it be said that while goals (1) and (2) were not achieved and are still being pursued today, considerable progress was at least made swiftly with (3), though not through Segall’s laboratory—more later. The laboratory itself did some experiments with deprivation of the amino acid tryptophan in mice which stunted their growth though failed as far as I can tell to produce a demonstrated increase

in their life span. Segall would go on to other tryptophan-deprivation experiments as a post-doc under Paola Timiras at the University of California, Berkeley, which did increase both mean and maximum lifespan in rats.)¹⁰



Cryonics Societies of America emblem by Vaughn Bodé.

In fact cryonics seemed to be guardedly entering a new era of respectability, with New York playing a leading part. A few months before, at a meeting hosted by CSNY just after the Cryonics Conference at the New York Academy of Science, the Cryonics Societies of America had been tentatively formed, with the cryonics societies of New York, Michigan, and California as founding members. (Formal incorporation would be completed the following year.) The CSA would call for basic accountability, submission of regular progress reports, updated lists of officers and directors, and valid addresses for its member organizations.¹¹ An important feature of the CSA, announced in the September 1968 Cryonics Reports along with Steven Mandell’s freezing, was a Scientific Advisory Committee with an impressive list of a dozen or so PhDs and MDs, including cryobiologist Armand Karow Jr. and physicist Gerald Feinberg.¹²

As might be expected, not all developments were favorable. The same issue of the newsletter that reports the freezing of Mandell announces the resignation, effective Aug. 21, of a married couple who were important to CSNY: Karl and Glenda (Allen) Werner. Karl was vice president, newsletter art director, a CSNY cofounder, and the man who coined the term *cryonics*, while Glenda was the CSNY treasurer. Their reasons were religious.

They had been married May 18 in the Church of Scientology. Now they were severing all affiliation with cryonics because it had “opposing goals.”¹³ Later Karl would elaborate on why Scientologists didn’t like the idea of freezing people. “They warned me that if my body was frozen, powerful spiritual beings could prevent the spirit—which they call the Thetan—from getting access to my body, and they might seek to control me to make me do what they wanted [to get my body back].” Eventually Karl would leave Scientology (and also remarry) but continued to believe “that I am a spirit who existed before my body and will exist after my body is gone. We’re all thousands and thousands of years old. Therefore, cryonics is barking up the wrong tree thinking of people just as bodies.” (He would still be proud, however, that he had been the one to name cryonics.)¹⁴

In November another cryonics case occurred, this time under less favorable circumstances, and quickly showed the heartache that can follow. Andrew Mihok was a 48-year-old drill press operator who lived in the upstate New York town of Vestal, a few hours’ drive from CSNY’s facilities in the environs of New York City. He and his wife, Mildred, had read about the freezing idea some two years before but had reached no firm conclusions and had no arrangements themselves. When he died of a heart attack Nov. 19 she decided to act. As she told a reporter, “I loved him so

... I want him back.” By the next evening his chilling body was in the St. James Funeral Home where CSNY cases were now handled by mortician Fred Horn. Paul Segall of CSNY’s volunteer staff along with Horn carried out the cryoprotective perfusion, using a typical, glycerol-saline solution. Mihok was then placed in dry ice, and it appeared would soon be in liquid nitrogen like Mandell. But it was not to be. Fifteen days later, Dec. 5, Mihok was thawed and buried. By this time other family members had all lined up against the continued freezing, saying that Andrew had never actually expressed a wish for it, and besides, the cost of \$10,000 was more than they wanted to help the needy widow pay. “I feel just dreadful about it,” the saddened Mrs. Mihok responded. “I didn’t want it this way.” (Another discouragement from CSNY’s standpoint was that Mrs. Mihok had the unrealistic expectation that cryonics could bring her husband back soon, so he could support her again.)¹⁵

The next case started a few weeks later, under somewhat better, if unusual, circumstances. Ann DeBlasio, a 43-year-old cancer patient, died in New York University Hospital, Manhattan, Jan. 3, 1969 and was frozen by CSNY the next day. (Again it does not appear that prior arrangements were in place.) Though the freezing was not as good as it might have been (I was unable to find details) the body was cooled immediately postmortem



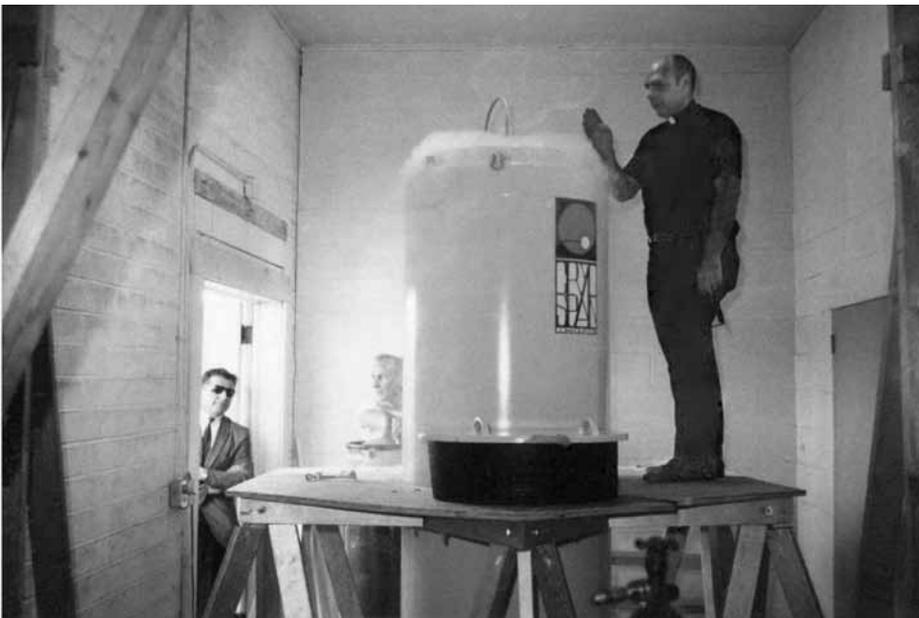
PHOTO CREDIT: Binghamton, N.Y. Press (Nov. 21, 1968)

Mildred Mihok signs paperwork for her husband’s freezing, Nov. 20, 1968. From left: Paul Segall, Mrs. Mihok, Fred Horn.

with water ice and then refrigerated at the insistence of husband Nicholas, a gun-toting policeman whose appearance and demeanor apparently had some influence with reluctant hospital personnel.¹⁶

The freezing of Mrs. DeBlasio also inspired a sympathetic response from the cryobiological community, including cryobiologist Arthur Rowe, a friend and colleague of Armand Karow. Saul Kent later recalled, “I called Art Rowe to ask for basic advice. He had been friendly to cryonics in the past and I was hoping he might be able to make some recommendations or suggestions about what cryoprotectives to use, best temperature to perfuse at

PHOTO CREDIT: CSNY archives, courtesy of Mike Darwin.



Rev. Saverio Mattei consecrates “forever flask” holding Ann Deblasio, Aug. 15, 1969. Husband Nicholas (doorway) and Fred Horn observe.



PHOTO CREDIT: Duke University, Durham, N. C. 1953 yearbook, 59.

Arthur W. Rowe, Duke University, Class of 1953.

and so on. He (Rowe) was surprisingly forthcoming and friendly. He provided a fair amount of practical advice on just those issues ...”¹⁷

The body was stored on dry ice for a few months, until a cryogenic capsule could be obtained. When the specially designed unit finally arrived from Minnesota Valley Engineering it was a great improvement over its predecessor made by Cryo Care. It stood upright and had a lid on top that could be easily removed, rather than the patient being welded inside. Though the boiloff was slightly higher with the more open construction it was far more convenient to work with and took up much less floor space. It also performed more reliably than the earlier, horizontal capsules which required continuous pumping to evacuate or “harden” the vacuum jacket (space between inner and outer walls of the vessel) to insulate against heat leak and reduce boiloff. The family was Catholic and, when Mrs. DeBlasio was placed in the capsule Aug. 15, a priest was on hand to consecrate the “forever flask” as it was now named.¹⁸

Meanwhile in March CSNY froze another patient, Paul M. Hurst Sr., 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 did 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.¹⁹ Later he would be placed in another upright capsule, alongside Mrs. DeBlasio.²⁰



PHOTO CREDIT: Cryonics Reports 4(7), 9 (Jul. 1969).

Alan Harrington in 1969.³⁰

CSNY and its affiliates deserve much the lion’s share of the credit for New York cryonics-related activity during this time, but there was at least one interesting contribution by an outsider. Author Alan Harrington brought out his 1969 book, *The Immortalist*, through the New York City iconic publisher Random House, and also lived in the area. 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.”²¹

Alan Harrington was mainly known as a novelist.²² His nonfiction excursion *The Immortalist* (not the only one) 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 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.”²³ Saul Kent in an editorial in CSNY’s newsletter praises the book but notes “that Harrington fails to appreciate that the cryonics movement is the embodiment of the consciously directed drive to immortality he calls for. The avowed objective of the Cryonics Societies is physical immortality—no other group has, as yet, raised the banner in this fashion. Cryonic suspension is not *one* approach to immortality but *the only available approach*. Its only purpose is to lead to the others.”²⁴ Robert Ettinger in another editorial is less charitable, describing Harrington’s book as “interesting and exasperating ... at once full of insights and inanities, profound perceptions and silly nonsense, shrewd judgments and crude exaggerations. From the point of view of cryonics (Is there any other?) it is both useful and dangerous, like a rusty knife.”²⁵ In a third editorial Harrington responds: “... Ettinger has profound convictions about the present efficacy of the freezing process that, at this point, I



PHOTO CREDIT: CryoCare Report 8, 22 (Jul. 1996).

The man who named cryonics. A still-youthful-looking Karl Werner in 1996.

have not been able to share. Conceivably, in fact very probably, developments in the state of the art, rapidly evolving developments in Cryonics, may before too long make our positions (in this respect) indistinguishable. But today they are not, and I refuse to fake a conviction in order to conform to a party line.”²⁶

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.²⁷ 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?²⁸ In any case his former wife Peggy on the occasion offered some insight into her and his perceptions of cryonics around the time the book was written.

“*The Immortalist* was in the final stages of draft and Alan was exploring the scientific world of possibility to achieve an end to death. One early summer evening we found ourselves in a dreary mid-Long Island town at the house of a young group of new entrepreneurs. Blue-collar to the core, it was an exurb community of single-family stucco and frame homes with attached garages and plaster gnomes and flamingos gracing the postage-stamp front lawns. In the center of the garage of one of these duplicate dwellings was a gleaming man-sized metal object, a cross between a torpedo and a casket, seated on an undertaker’s folding metal carrier

and bathed in blue light. A prototypical cryocapsule—a container for the deep-frozen remains of a human who would one day be raised into new life.²⁹ Rock music pulsed over loud-speakers (The Doors, Rolling Stones, Janis Joplin, and the like—this was the late '60s), and a mottled group of longhairs in sandals and cutoffs, granny dresses and bare feet swayed a little to the sound, stoned on grass and meth and god knows what and drinking sweating beers out of the can.

“In nearby houses, men in beer-bellies, jeans, and muscle shirts began to emerge, first singly, and then joining in groups moving toward our mad oasis. As the circle grew tighter and perhaps menacing, Alan

grabbed me and said, “Let's dance!”—twirling me around the gleaming capsule. Around we whirled, the mutter rose, when suddenly the tinkling notes of Mr. Frosty reached us and weird science, wild hippy, motorcycle worker, and distinguished author and bride alike dispersed to the curb to refresh on orange popsicles and chocolate softies.”

Unfortunately, in facing death, partying often takes precedence over preparation, especially when it comes to cryonics. In this case the setting made it easy to evade the stresses of taking the cryonics option seriously.

As a final comment I'll add, *pace* Karl Werner, that many cryonicists today

(though probably still a minority) do not think that you are just your body or a part of it. Instead the body is seen as only important, for purposes of resuscitation, as the principal reservoir of information about who you are. From the information alone it should be possible restore the person to healthy consciousness by appropriate instantiation in a replica body or other suitable substrate. That the original person could persist in a disconnected replica has deep philosophical implications which I will not address here but reiterate that such a viewpoint is not uncommon and not an impediment for many who choose cryonics. ■

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30. Date of photograph from which this image is cropped is given in http://weeklywire.com/ww/07-08-97/tw_feat.html.

FAQ Cryonics Convention

Friday, October 25 • Saturday, October 26 • Sunday, October 27, 2013

Sponsored by: *The Society for Venturism, along with the help of Don Laughlin and the Riverside Resort in Laughlin, Nevada*

The Society for Venturism, along with the help of Don Laughlin and the Riverside Resort (and perhaps some other organizations to be named later who want to help as sponsors), are planning to have a cryonics convention in October of this year. The following information is tentative and may change, but I wanted to get the word out early so people can start thinking about whether they want to come.

The Name of the convention will be the FAQ Cryonics Convention.

FAQ, as most people know, stands for Frequently Asked Questions.

So this convention will be open to people who are already signed up for cryonics, and for prospective members as we also expect a good turnout from people who are thinking about signing up for cryonics, and others who are interested in life extension and/or immortalism.

1. There will be speakers on the leading ideas in cryonics and life extension in formal presentations.
2. There will be an adjoining exhibition room with information tables and/or booths where attendees can pick up literature from leading cryonics and life extension organizations, and perhaps talk with some of their representatives in person.
3. There will be at least two buffet dinners, combined with informal parties similar to the old Lake Tahoe Life Extension Festivals, in a third adjoining room. This is where you can meet with other cryonicists and make new contacts.
4. We are inviting media and reporters.

Besides the speakers and programs on subjects of interest to cryonicists and immortalists, we plan to have a “Meet Don Laughlin” presentation where those people who want to meet Don Laughlin and ask him questions and give him suggestions can participate.

The Riverside Resort and Laughlin, Nevada are great places to have conventions and have some fun at the same time. Besides the casino with gambling, bowling alley, several movie theaters, and conventional game rooms, there is swimming in the Colorado River and places for a beach picnic. Or you can rent a ski-doo for river fun. And there is the whole rest of the town of Laughlin with several more casinos to explore that feature Las Vegas type shows.

The rates for the convention, meals, and the rooms will be extremely reduced rates for us as Mr. Laughlin is a long-time cryonicist and wants to help make this an annual and affordable event. You will want to be a “charter attendee” to these conferences!

Some of the tentative confirmed speakers are: Max More, Ph.D. from Alcor, Catherine Baldwin from Suspended Animation, Stephen Valentine from the Timeship Project, Cairn Idun from the Asset Preservation Group, Mike Perry, Ph.D. and cryonics historian, Ben Best on cryonics in Wikipedia, Don Laughlin, David Pizer on the benefits of being a Venturist member, and Mark Plus with a presentation of our current appeal to help Aaron Winborn.

Invited and waiting for confirmation are: A representative from the Cryonics Institute; a representative from the Immortalist Society; a representative from the new life-extension religious organization, The Church of Perpetual Life; a presentation on what happened in the unfortunate Chatsworth incident by Bob Nelson; and a representative from the Teens and Twenties Group—a new cryonics group for young folks.

We are preparing several more invitations to the leading experts in the cryonics, nanotechnology, neuroanatomy, and long term life extension movements.

So this convention will have everything, speakers, info booths, parties, relaxation and fun in the sun AND IT WILL BE VERY AFFORDABLE.

Sincerely,

David Pizer, President

The Society for Venturism

PS: Without making a commitment, we would appreciate a reply as to whether or not you find this desirable, would like more information, and may possibly attend. This would be extremely helpful in our planning phase. To let us know if you are thinking of attending, want to have a booth, want to recommend a speaker or presentation, please contact Venturist Secretary, Mark Plus at: mark.plus@rocketmal.com or call Mark at 928 273-8451

Gene Therapy Cures Leukemia in Eight Days

Within just eight days of starting a novel gene therapy, David Aponte's "incurable" leukemia had vanished. For four other patients, the same happened within eight weeks, although one later died from a blood clot unrelated to the treatment, and another after relapsing. The cured trio, who were all previously diagnosed with usually fatal relapses of acute lymphoblastic leukemia, have now been in remission for between 5 months and 2 years. Michel Sadelain of the Memorial Sloan-Kettering Cancer Center in New York, co-leader of the group that designed the trial, says that a second trial of 50 patients is being readied, and the team is looking into using the technique to treat other cancers. The key to the new therapy is identifying a molecule unique to the surface of cancer cells, then genetically engineering a patient's immune cells to attack it. In acute lymphoblastic leukemia, immune cells called B-cells become malignant. The team were able to target a surface molecule known as CD19 that is only present on B-cells.

Andy Coghlan / *New Scientist*
26 Mar. 2013

<http://www.newscientist.com/article/mg21729104.100-gene-therapy-cures-leukaemia-in-eight-days.html>

Biological Transistor Enables Computing within Living Cells, Study Says

A team of Stanford University bioengineers has taken computing beyond mechanics and electronics into the living realm of biology. In a paper published March 28 in *Science*, the team details a biological transistor made from genetic material—DNA and RNA—in place of gears or electrons. The team calls its biological transistor the "transcriptor." "Transcriptors are the key component behind amplifying

genetic logic—akin to the transistor and electronics," said Jerome Bonnet, PhD, a postdoctoral scholar in bioengineering and the paper's lead author. The creation of the transcriptor allows engineers to compute inside living cells to record, for instance, when cells have been exposed to certain external stimuli or environmental factors, or even to turn on and off cell reproduction as needed. "Biological computers can be used to study and reprogram living systems, monitor environments and improve cellular therapeutics," said Drew Endy, PhD, assistant professor of bioengineering and the paper's senior author.

Andrew Myers / Stanford School of Medicine
28 Mar. 2013

[http://med.stanford.edu/ism/2013/march/bil-gates.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+NewsFromStanfordsSchoolOfMedicine+\(News+from+Stanford's+School+of+Medicine\)](http://med.stanford.edu/ism/2013/march/bil-gates.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+NewsFromStanfordsSchoolOfMedicine+(News+from+Stanford's+School+of+Medicine))

Stem Cell Researchers Reverse Aging of Blood

By reversing, or reprogramming, the stem cells that produce blood, Lund University researchers have succeeded in rejuvenating the blood of mice. Their results suggest that most of the negative aging effects are not caused by primary DNA damage which (today) would be permanent, but are in fact reversible because they are based on epigenetic factors which are programmed over time and can also be reprogrammed. Stem cells are the source of all the cells in the body, since they can divide an unlimited number of times, and each time, one of the resulting cells remains a stem cell while the other matures into the type of cell needed by the body, for example a blood cell. Blood contains a certain mix of B- and T-lymphocytes and myeloid cells. "In older people, the number of B- and T-lymphocytes falls, while the number of

myeloid cells increases," explained Martin Wahlestedt, a doctoral student in stem cell biology at Lund University. When an elderly person is affected by leukemia, the cancer often has its origin in the myeloid cells, of which the elderly have more.

Mark Hoffman, Science World Report
28 Mar. 2013

<http://www.scienceworldreport.com/articles/5864/20130328/stem-cell-researchers-reverse-aging-blood.htm>

3D Printer Can Build Synthetic Tissues

A custom-built programmable 3D printer can create materials with several of the properties of living tissues, Oxford University scientists have demonstrated. The new type of material consists of thousands of connected water droplets, encapsulated within lipid films, which can perform some of the functions of the cells inside our bodies. These printed "droplet networks" could be the building blocks of a new kind of technology for delivering drugs to places where they are needed and potentially one day replacing or interfacing with damaged human tissues. Because droplet networks are entirely synthetic, have no genome and do not replicate, they avoid some of the problems associated with other approaches to creating artificial tissues—such as those that use stem cells. The team report their findings in this week's *Science*. "We aren't trying to make materials that faithfully resemble tissues but rather structures that can carry out the functions of tissues," said Professor Hagan Bayley of Oxford University's Department of Chemistry, who led the research.

University of Oxford
5 Apr. 2013

http://www.ox.ac.uk/media/news_stories/2013/130405.html

VASCULAR BENEFITS OF A Mediterranean Diet

VALIDATED IN HUGE NEW STUDY

A large, rigorous study published in the *New England Journal of Medicine* confirmed the health benefits of those who switch to a **Mediterranean diet** rich in **omega-3 fish oil** as well as protective nutrients called polyphenols found in **olive oil**, fruits, vegetables, nuts like walnuts, and wine.¹ The study ended early because the benefits were so overwhelming, with startling benefits for vascular health, that it was considered unethical to continue to deprive the control group.¹

In addition to the health-promoting benefits of vegetables and fruits with their abundance of polyphenol nutrients, the Mediterranean Diet group took at least **4 tablespoons** of polyphenol-rich extra-virgin **olive oil** a day.¹

LIFE EXTENSION® MEMBERS LONG AGO BENEFITED

Starting in **2005**, Life Extension members began taking a supplement (**Super Omega-3**) that provided potent concentrations of **fish oil** and **olive polyphenols** like hydroxytyrosol and oleuropein. This supplement also provided standardized **sesame lignans** to support the beneficial effect of omega-3 fatty acids in the body.²

Olive oil contains polyphenol nutrients that have demonstrated wide-ranging health benefits.^{3,5} The recommended twice daily dose of **Super Omega-3** supplies a similar polyphenol content to that found in **4 to 6 tablespoons of olive oil**.

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CAUTION: If you are taking anti-coagulant or anti-platelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product.

Supportive but not conclusive evidence shows that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease. IFOS™ certification mark is a registered trademark of Nutrasource Diagnostics, Inc. These products have been tested to the quality and purity standards of the IFOS™ program conducted at Nutrasource Diagnostics, Inc.

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To ensure the purest, most stable, and easy-to-tolerate fish oil, **Super Omega-3 EPA-DHA** is *molecularly distilled*. It enjoys the highest **5-star rating** for **purity, quality, and concentration** from the renowned **International Fish Oil Standards** program.⁶ The **sesame lignans** not only direct the omega-3s toward more effective pathways in the body, but guard the delicate fish oil from oxidation.^{2,7}

A bottle containing 120 softgels of **Super Omega-3 EPA/DHA with Sesame Lignans and Olive Fruit Extract** retails for \$32. If a member buys four bottles, the price is reduced to **\$21** per bottle. If **10 bottles** are purchased, the cost is **\$18.68** per bottle. (Item #01482)

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DHA (docosahexaenoic acid)	1,000 mg
Olive Fruit Extract (std. to 6.5% polyphenols (39 mg), 1.73% hydroxytyrosol/tyrosol (10.4 mg), 0.5% verbascoside/oleuropein (3 mg))	600 mg
Sesame Seed Lignan Extract	20 mg



Item #01482

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These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

MEETINGS

About the Alcor Foundation

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

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

ARIZONA

Flagstaff:

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

Scottsdale:

This group meets the third Friday of each month and gatherings are hosted at a home near Alcor. To RSVP, visit <http://cryonics.meetup.com/45/>.

At Alcor:

Alcor Board of Directors Meetings and Facility Tours—Alcor business meetings are generally held on the first Saturday of every month starting at 11:00 AM MST. Guests are welcome to attend the fully-public board meetings on odd-numbered months. Facility tours are held every Tuesday 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.

The Alcor Volunteer Network, Scottsdale Chapter has a variety of meetings on topics including: member education, training, community outreach, and fundraising. To RSVP, visit: <http://www.meetup.com/AVNScottsdale/members/>

CALIFORNIA

Los Angeles:

Alcor Southern California Meetings—For information, call Peter Voss at (310) 822-4533 or e-mail him at peter@

optimal.org. Although monthly meetings are not held regularly, you can meet Los Angeles Alcor members by contacting Peter.

San Francisco Bay:

Alcor Northern California Meetings are held quarterly in January, April, July, and October. A CryoFeast is held once a year. For information on Northern California meetings, call Mark Galeck at (408) 245-4928 or email Mark_galeck@pacbell.net.

FLORIDA

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

NEW ENGLAND

Cambridge:

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

PACIFIC NORTHWEST

Cryonics Northwest holds regular meetings for members of all cryonics organizations living in the Pacific Northwest. For information about upcoming

meetings and events go to: <http://www.facebook.com/cryonics.northwest>

A Yahoo mailing list is also maintained for cryonists in the Pacific Northwest at <http://tech.groups.yahoo.com/group/CryonicsNW/>.

British Columbia (Canada):

The contact person for meetings in the Vancouver area is Keegan Macintosh: keegan.macintosh@me.com

Oregon:

The contact person for meetings in the Portland area is Chana de Wolf: chana.de.wolf@gmail.com

ALCOR PORTUGAL

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

TEXAS

Dallas:

North Texas Cryonauts, please sign up for our announcements list for meetings (<http://groups.yahoo.com/group/cryonauts-announce>) or contact David Wallace Croft at (214) 636-3790 for details of upcoming meetings.

Austin/Central Texas:

We meet at least quarterly for training, transport kit updates, and discussion. For information: Steve Jackson, 512-447-7866, sj@sjgames.com.

UNITED KINGDOM

There is an Alcor chapter in England. For information about meetings, contact Alan Sinclair at cryoservices@yahoo.co.uk. See the web site at www.alcor-uk.org.

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

WHAT IS CRYONICS?

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

HOW DO I FIND OUT MORE?

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

A fully illustrated color brochure

- A sample of our magazine
- An application for membership and brochure explaining how to join
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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.)

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