ALCOR LIFE EXTENSION FOUNDATION
A Non-Profit Organization

CRYONICS

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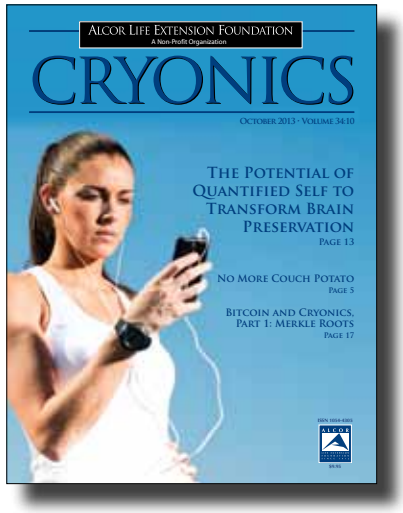

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The James Bedford Society

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. ■

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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.

IS AGING A CHOICE? By Aschwin de Wolf

The idea that aging is a choice will strike many readers as preposterous and I will admit at the outset that such a position can ultimately not be maintained. But in a milder sense, it should be recognized that we can make decisions in life regarding diet and lifestyle that can mitigate or accelerate the aging process. This "wiggle room" may turn out to be of great importance for reaching a time when serious rejuvenation biotechnologies will become available.

According to biologist Michael R. Rose (see the interview in *Cryonics* magazine, September 2013) aging is not an immutable process of wear and tear that unfolds through iron logic without being sensitive to lifestyle and diet. Aging begins after the start of reproduction and the forces of natural selection decline with chronological age, eventually stopping at late age (which raises the possibility that aging stops).

Some things that we associate with aging are not inevitable physiological processes but choices or decisions to conform to expectations. For example, when people reach adulthood, and pursue a family and career, they often conform to a lifestyle that involves more time sitting at a desk or in cars, more time spent inside, less time socializing with friends, and are subject to increasing amounts of stress and sleep deprivation.

As the physiological consequences of such a lifestyle (obesity, higher blood pressure, declining free hormone levels) express themselves many people tell themselves such things are the inevitable effects of getting older. But alternative scenarios may be possible if we remain aware of our environment, lifestyle, and diet.

In the case of diet the dominant opinion remains that a healthy diet can be identified regardless of age, sex, and population group. There is increasing evidence that such a perspective leaves a lot to be desired and that too much reductionism in these matters is not a good thing. There are, however, a number of observations that can be made. Restriction of calories (or intermittent fasting or meal skipping) seems to trigger a beneficial stress response that improves health and perhaps even extends life. Similarly, adopting a diet that more closely mimics that of hunter gatherers in conjunction with giving up a sedentary lifestyle has been successful in improving the lives (and looks!) of many people, in particular in the case of obesity.

What makes it rather difficult to adopt such lifestyle changes is that we are almost continuously exposed to an environment that makes it rather difficult to effect such changes. Most of our food is highly processed, loaded with carbs and sugar, and served in portion sizes that always seem to increase. When we move from one location to another the emphasis is on minimizing energy expenditure and eliminating resistance. We work in dark and confined spaces during the day and are exposed to light until we go to sleep (or sometimes even during sleep!). When we come home we turn on the television or the computer to "socialize." It should not surprise us that such an "unnatural" lifestyle translates into the classic signs of aging and functional deterioration.

There is a lot at stake here. As daunting as it may seem, the idea that aging is not a uniform "process" that swallows us up at a constant rate opens up the possibilities of positive change. Armed with the latest findings in evolutionary biology and medicine we can start pushing back, stabilize the situation as best as we can, and reach a time when more radical rejuvenation biotechnologies will become available. Start moving, start lifting, go camping, make new friends, eat organic and fermented foods, skip the occasional meal and cut the sugar! ■

CEO Update

By Max More

Alcor held the annual Strategic Meeting on September 6-8, 2013. These meetings are an opportunity for the board and management to consider crucial issues in more detail. It's also the time when director elections are held. Sessions started at 3:00 pm on Friday September 6, ran all day on Saturday, and finished up on Sunday at noon. Although some directors wanted to discuss several items privately, I agreed with those who wanted to include as many as possible in the public part of the meeting. The public meeting started an hour earlier than usual, at 10:00 am on Saturday, and ran for almost 5.5 hours.

Let's start with four agenda items that led to specific and formal decisions by the board.

NEW DISCOUNTS FOR ALCOR MEMBERS OF 25 AND 30 YEARS STANDING

Not long ago, I proposed that those who had been Alcor members for 20 years or longer should receive a 30% discount on their membership dues. This is a reward for their loyalty and a strong sign that members will not face ever-escalating dues.

Adding to this, at the September 7, 2013 board meeting, I proposed that members of 25 years standing should receive a 40% discount, and members of 30 years standing should receive a 50% discount. The board unanimously approved the motion. Here is the motion that was passed:

Starting January 1, 2014, the discount on membership dues given to members of 25 years standing will increase from 30% to 40%, and the discount on membership dues given to members of 30 years standing will increase from 30% to 50%.

HOLD THE PRESSES! MEMBERSHIP DUES REDUCED 5%!

You'll have to excuse the newspaper-style headline. The popular story is that Alcor dues just keep going up. (That's not surprising, since the price of almost everything goes up due to inflation. A dollar today is worth less than a dollar of any previous year. That has been true for many decades.)

However, Alcor members paying the regular rate of dues (that is, not receiving discounts as family members, students, or long-term members) will—from January 1, 2014—receive a 5% discount. My proposal was supported by the Alcor board at the September 7 board meeting.

Five percent is not a large amount in absolute terms. But: It is the first time that dues have gone DOWN. Other initiatives presented at the meeting (to be covered in detail in *Cryonics* magazine) may enable further reductions. We will continue to do our best to reduce the cost of cryonics. Remember—you will receive a credit on your dues if you get someone else to join and credit you for doing so.

Here is the wording of the motion that passed:

Starting January 1, 2014, dues for members paying the full rate of $620 will be reduced by 5% (rounded down to $30). If funds are received specifically for the purpose of reducing dues (such as through the proposed Membership Dues Reduction Fund), the 5% reduction will be folded into the new reductions rather than added on to them. That is, if the Membership Dues Reduction Fund reduces the top rate by 30%, the reduction will be 30% and not 5% + 30%.

ALCOR'S NEWEST BOARD MEMBER: CATHERINE BALDWIN

Alcor welcomes Catherine Baldwin, general manager of Suspended Animation, to its board of directors.

UNRESTRICTED DONATION DISTRIBUTION PROPOSAL

The following motion passed unanimously: Management is to inform the board of any unrestricted donation or bequest or above-minimum funding that exceeds $50,000 so that the board can decide how to allocate it.

That motion emerged from the discussion of an earlier proposal by one director to divide all unrestricted donations, bequests, and overfunding equally between the Endowment and PCT. My objection to that was that it would starve operations of much-needed funds, increasing pressure to raise membership dues. That is especially true because of a recently-adopted policy that requires management to provide the Patient Care Trust Fund with its full allocation ($115,000 for a whole body patient and $25,000 for a neuro patient) no matter how underfunded a case may be.

UNDECIDED BUSINESS

Two weeks prior to the meeting, four directors put forth a proposal for discussion

which would have extended the services that SA provides to Alcor. The Board had a long and detailed discussion about the pros and cons of the proposal, including input from several Alcor staff and advisers. As no consensus was reached at the Strategic Meeting, the subject will likely continue to be discussed by email and possibly at future meetings.

Insufficient time caused several agenda items to be deferred to future meetings. These included:

CMS: The possibility of waiving the comprehensive member standby (CMS) fee for members with cryopreservation funding sufficiently over current minimums. This would shift costs for those members away from annual fees to cryopreservation funding typically covered by life insurance. The difficulty in implementing this is that it would primarily benefit younger members but they are precisely those who are unlikely to be cryopreserved for many years, leaving CMS shortchanged. This possibility will be studied further to determine whether a workable proposal can be developed.

Life Membership: Similarly, I would like to see whether life membership should be reintroduced. The prospect of a specific amount that, when paid, means that you will never pay membership dues again has an obvious appeal. Among the challenges are settling on an appropriate amount given that dues change over time; ensuring that collected payments are not spent quickly; and ensuring that Life Members actually do pay the full amount—which has not always been the case in the past.

Alternative Funding Methods: I was especially disappointed that we were unable to talk about widening the range of payment options for cryopreservation. Many of our older members who have become underfunded may have lower incomes than in their earlier years but may have significant assets, such as real estate or 401(k) plans. If the risks and difficulties involved in accepting such assets as partial payment for cryopreservation can be addressed effectively, alternative funding methods could greatly help members keep up with the effects of inflation on cryopreservation minimums.

The Budget: Although Alcor has been in the black over the last couple of years, that is largely due to a grant from the donor coalition to support salaries and due to case income. That grant ends this year and, to the best of my knowledge, will not be renewed. That means the structural budget has actually been in deficit. The structural budget provides a picture of Alcor's finances after removing all unpredictable and unusual income. It excludes income to operations from cryopreservations and from unpredictable gifts and bequests. This yields a highly conservative picture since we almost always receive some unpredictable income—sometimes a considerable amount. But it does give us a financially strict target at which to aim.

Over the last two years or more, it was looking like Alcor would be substantially in deficit in 2014. However, due to major cost reductions—primarily but not exclusively found in staffing and utilities—the budget projection presented during the Strategic Meeting showed a surplus of $8,500. I believe that is the first structural surplus in several years and perhaps *ever*. It should be noted that the dues discounts agreed upon at the meeting change that picture somewhat, but we remain close to structural balance.

Membership Costs and Size: Growth in membership has slowed over the years, dropped below 2% a year, then 1%, and recently has entirely halted. (As of the end of August 2013, membership is actually *down* for the year.) Based on what we have heard over and over, it's very clear that this is strongly related to the cost of membership. Dues rose in both the two years (2010 and 2011) before I came aboard as president (and CMS fees in 2011). We are losing members in difficult financial circumstances and we are finding it harder to get new members to sign up.

If we can restart membership growth, the future would look much brighter. We could double or triple in membership with little increase in expenditures. That would mean we could reduce membership dues. Lower dues would make it easier to grow faster, and that puts us in a virtuous cycle of lower dues and faster growth. One way to reignite growth would be to substantially reduce dues. We could not do that without plunging into the red—*unless* we can raise money specifically for that purpose.

For instance, suppose our wealthier members contributed $1.4 million into a Membership Dues Reduction Fund (MDRF). Drawing on that over a ten-year period, we could reduce the top rates of dues by 33% ($205/year) and include 15% reductions for all other categories of members, with a little to spare. On plausible assumptions Alcor would be financially better off after ten years at the lower rate of dues, even if the fund was then completely depleted and not renewed. For more information on the Membership Dues Reduction Fund appeal, please see elsewhere in this issue.

International Capabilities: Plans to greatly improve our capabilities for cryoprotection and shipping on dry ice from the United Kingdom were on hold for a while. Recently, we reactivated those plans and have almost completed what needed to be done. By the time you read this, perfusate, medications, a portable ice bath, tubing packs, neuro dry ice shipper box, and other supplies should have joined the refrigerator and freezer we located at a cooperating international mortuary in London. We are also in the process of resupplying the volunteer group, Cryonics UK.

Endowment Fund: The open spots on the Endowment Fund board have now been filled. Paperwork is about to be submitted and we hope that the full legal framework will be in place by the end of the year. In recent years, the Alcor board has been more disciplined than in earlier years, drawing no more than 2% per year from the endowment. However, nothing but self-discipline prevents the board from increasing the draw to unsustainably high levels. Once the Endowment Fund is established with a distinct governing body and strict rules for disbursement of funds, we can *guarantee* to potential contributors that the draw will never exceed 2%. By limiting the draw in this way, the Fund should survive even very long downturns in the market, even without the addition of new money. Our wealthier members are more likely to contribute money when they are assured that the Fund will provide *long-term* support for Alcor operations. ■

THE WHOLE BODY CRYOPRESERVATION COMMITTEE

In 2012, Alcor CEO Max More authorized Aschwin de Wolf to create a whole body cryopreservation committee (WBC). The committee is composed of Alcor members with whole body arrangements who have backgrounds in diverse fields such as cryobiology and molecular nanotechnology. The aims of this committee include ensuring neutral cost allocation between neuro- and whole body patients, keeping whole body cryopreservation affordable, and strengthening whole body cryopreservation protocols.

Our first preliminary report was presented to the Alcor Board of Directors at the annual Strategic Meeting on September 6-8, 2013. The most important outcome of our brief presentation is that a proposal to raise whole body cryopreservation minimums was postponed until further fact finding and recommendations by the committee have been presented to the Alcor Board of Directors. The committee has committed itself to complete this objective before the end of 2013.

A number of potential measures have been identified to keep whole body cryopreservation affordable for Alcor members. These measures range from creating separate neuro and whole body accounts in the Patient Care Trust (PCT) with the aim of allowing the whole body account to operate under different financial assumptions, changes in whole body cryoprotectant composition, new dewar and whole body storage methods, and seeking further cost reductions by conducting cryoprotection in the field. Future issues of *Cryonics* magazine will provide more details on the findings and recommendations of the whole body committee.

Aschwin de Wolf

RESEARCH AT ALCOR

While Alcor no longer conducts in-house animal research, the organization continues to financially and logistically support research aimed at improving the quality of cryopreservation and developing new protocols in collaboration with research companies such as 21st Century Medicine and Advanced Neural Biosciences. Alcor also still conducts in-house research and development projects such as the development and validation of acoustic sensors to record (presumed) fracturing events during cryogenic cool down of patients and seeks to obtain a greater understanding of the images obtained in CT scans of cryopreserved patients.

In 2012 Alcor collaborated with Advanced Neural Biosciences on research to compare field washout protocols against "field cryoprotection" protocols. Field cryoprotection offers great potential for improving patient care by reducing or eliminating the cold ischemic injury associated with (long) transport times to the Alcor facility. Field cryoprotection could also contribute to a reduction in costs associated with cryopreservation by rolling stabilization and cryoprotection (the two most expensive procedures) into one logistical operation. In the coming months Alcor will announce field cryoprotection for overseas cases and outline a trajectory towards universal implementation of this procedure.

In 2013 Alcor collaborated with Advanced Neural Biosciences to obtain a comprehensive set of electron micrographs of brains subjected to various periods of cold ischemia. One of the reasons for conducting this research is to generate more evidence-based criteria for deciding when to accept or turn down last-minute cases of people who have been maintained at cold temperatures for an extended period of time prior to contacting Alcor. A perfusion model has also been used to compare Alcor's current organ preservation solution, MHP-2, against newer brain preservation solutions. The final phase of this project will repeat a number of the cold ischemia experiments and process them for 3D "connectome" reconstruction. When this project is completed Alcor will prepare a paper that presents the results of all its warm ischemia and cold ischemia histological studies.

For the remainder of 2013 and 2014 Alcor will further strengthen its research efforts by improving the communication and output of the Alcor Research and Development Committee and a continuation of contract work. A list of potential research projects was discussed at Alcor's annual Strategic Meeting in September. Potential research and development projects include investigating Alcor's stabilization medications protocol with ice formation as an endpoint, reducing the number of separate drugs and fluids by combining them in a smaller number of stable solutions, validating the Alcor "crackphone," and comparing M22 (Alcor's cryoprotectant), VM-1 (the Cryonics Institute's cryoprotectant) and alternative, low-cost, low-toxicity whole body cryoprotectants.

Aschwin de Wolf

Membership Dues Reduction Fund

By Max More

Growth matters to Alcor for several reasons. One of the most important reasons is that growing membership enables us to enjoy economies of scale: We could double or triple in membership with little increase in expenditures. That would mean we could reduce membership dues. Lower dues would make it easier to grow faster, and that puts us in a virtuous cycle of lower dues and faster growth.

This is why it's so frustrating that we are finding it difficult to retain Alcor members and acquire new ones. We have raised dues for good reasons in the past—primarily to reduce chronic operating deficits and to reduce reliance on uncertain bequests. But dues have reached a level where members in financial stress are dropping out at higher rates than ever, and potential members are putting off joining because of the cost. Growth in membership has slowed over the years, dropped below 2% a year, then 1%, and recently has entirely halted. (As of the end of August 2013, membership is actually *down* for the year.)

Having cut operating costs over the last two years, the pressure to further raise dues has abated. What we must do now is find a way to *reduce* dues and reignite growth.

Alcor's wealthier members can make an enormous difference by contributing to the new Membership Dues Reduction Fund. Here's the basic idea: Accumulate a fund that will enable us to reduce dues—especially for those not receiving discounts for being family members, students, or long-term—by a significant amount over a period of ten years. By the time the fund was used up (assuming it was not refilled), faster growth would leave Alcor better off at the lower rates than it would have been at the higher rates.

If you accept the logic and are ready to help, please skip to the end. Here, I'm going to show what we could do with a fund of $1.2 million or $2 million, as examples.

Dues paid by members who receive no discounts—about 57% of all members right now—are $620 plus $180 for the Comprehensive Membership Standby fund, for a total of $800. **What if those members had to pay $595 instead?** ($415 in dues plus CMS.) $595 looks significantly better than does $800.

That would reduce the highest level of dues to close to what they were from 2005 to 2009. Growth in 2008 was 4.4%. In 2009 it was 4.3%. Given that our capabilities are better than ever, it seems plausible to expect a return to at least that rate of growth. More on the assumptions below.

So, what would it take to pay for a dues reduction of this amount for ten years for those paying the highest rate?

Using the current number of members paying the full rate (558), a $205 reduction (or 33%) would cost $114,390 per year. To maintain the reward for long-term members, let's add an additional 15% reduction for those who have been members for 20 years or longer (81). That would add another $5,273. The 10-year total cost would be $1,196,631. The fund would need to be **$1.2 million** to cover this.

With a $1.4 million fund, we could include 15% reductions for all other categories of members, with a little to spare.

Obviously a bigger reduction in dues should have a larger effect on both member retention and growth. Suppose we had a fund of **$2 million** available. That would enable us to reduce dues by 50% for those paying full rates and to **reduce rates by another 15% for everyone else.** (Calculations available on request.) That would reduce dues costs to the levels last seen in 1996 to 2005. Actually, the real rates would be lower, because a 2013 dollar is worth less than a dollar in that period. The average growth rate in that period was 7.96%.

How would these reductions pay for themselves?

How much of an improvement in retention and new-member growth would it take for Alcor to end up better off in ten years at the lower rates? Is it plausible to think that we would achieve that much more growth?

We have to make assumptions here, but we can base them on what we have observed in the past.

Suppose, after reducing dues by 33% + 15%, we lose 2 fewer members per month and gain 1.5 extra members per month. (The first element seems entirely plausible considering the recent rate of losses of members.) That yields 42 more members per year. At the reduced rate of $415 = $17,430 (excluding CMS). After 10 years, that's 420 additional members @ $415 = $174,300/year. That means donors have expended $128,000/year to eventually generate an additional $174,300/year (excluding additional case income, gifts, and bequests).

If typical proportions of new members are adult dependents, minors, or students, the additional annual revenue would be about $133,770.

So, on plausible assumptions **Alcor would be financially better off after ten years at the lower rate of dues,** even if

the fund was then completely depleted and not renewed.

These assumptions are conservative:

- CMS dues would still be collected, so the real benefit of improved retention and growth would be greater than shown since the CMS fund would grow more.
- Some of the new/retained members would improve Alcor's finances through bequests, donations, and other forms of support.

All the newly-acquired members would be fully funded, improving the projected condition of the Patient Care Trust Fund.

What happens if the Dues Reduction Fund succeeds and our wealthier members add to it? Various scenarios can be created. With $4 million, for instance, we may be able to reduce dues by 80% for all members over a period of 10 years, or by 40% over 20 years. With larger amounts, either the dues reduction could be increased, or the period of the reduction extended. If the Endowment Fund grows over that period, it's possible that we may never again need to raise dues above a modest amount comparable to the levels in Alcor's earliest days, adjusted for inflation.

Please contribute to the Fund! Make Alcor stronger. ■

To make a tax-deductible contribution, contact Bonnie Magee, Alcor's Finance Director at 480-905-1906 x114, or bonnie@alcor.org. If you have questions about the Membership Dues Reduction Fund, contact Max More at 480-905-1906 x113 or max@alcor.org.

HOW YOU CAN HELP—AND WHY YOU SHOULD

If you are one of Alcor's wealthier members, you may wonder why you should contribute funds to help reduce dues for members paying the highest rate of dues. The answer is clear: Making membership more affordable enables Alcor to grow—in size, in wealth, and in the pool of skills from which to draw. These all make Alcor stronger and more robust:

» We will be able to afford more research, bringing closer the day when you can be revived.

» We will be able to afford better protocols in every stage of the cryopreservation process.

» We will be better able to protect ourselves against litigation and regulatory assaults.

» If membership stagnates or even declines—as it appears on the cusp of doing—all these benefits are lost and the organization goes into decline, worsening everyone's chances.

HERE'S HOW YOU CAN HELP: Make a contribution to the Membership Dues Reduction Fund. You can either simply contribute the funds or make a pledge to give them on specific dates. Or you can specify a condition—perhaps you want to ensure that your contribution is matched by enough others to make a substantial difference. You could say: "I will contribute $200,000 to the Fund so long as total pledges or contributions are sufficient to cut the highest rate of dues by at least 15% over ten years. (Or by 20% over 7 years, etc.)

All funds received will be separately accounted for and carefully tracked.

HERE'S ANOTHER OPTION: One of our allies has raised the possibility of contributing an amount of money that would allow us to reduce dues by 60% for a year for more than two dozen members facing the severest hardship over dues. You might also make a contribution to the Hardship Fund, which will be used to help members who are substantially underfunded and who are unable to raise their funding or to pay the additional underfunding membership dues.

THE POTENTIAL OF QUANTIFIED SELF TO TRANSFORM BRAIN PRESERVATION:
DATA SCIENCE, MULTI-FUNCTIONALITY AND SCALING

By Stuart R G Calimport

FUTURE POTENTIAL OF QUANTIFIED SELF DATA FOR BRAIN STASIS

We have entered an age of big and personal data. Storing and sharing our personal, medical, social, and health data with multiple entities is commonplace. The benefits of tracking health and personality data for brain preservation and brain reconstruction are numerous, powerful, and multi-functional.

The most obvious future potential of the data is that "Quantified Self" personality, life history, and biometric data may be useful to reconstruct and restore the brain. There are levels of damage that may occur before death, during the dying process, after legal death during the cryopreservation process, and during resuscitation, and additional data may be medically useful.

Personal data—such as the genome, personal preferences, and experiences can also be seen as an asset, much like financial wealth, that can aid future survival of the patient and others. This personal data could be kept for after the future revival of a patient without the legal issues that accompany holding wealth and other assets for a patient in stasis.

I would like to move quickly away from over-speculating about the future and summarize the future potential for personal data as such: The more data and tools that may help us reconstruct the brains and lives of patients—and if these resources are cost effective, easily accessible and easily stored—then we should be collecting the data after a quick cost-benefit analysis.

CURRENT POTENTIAL OF QUANTIFIED SELF DATA FOR BRAIN STASIS

I would like to hypothesize that the largest gains from the big data and "Quantified Self" are not in the future to aid brain restoration—but now!

To serve as an example case study I am collecting large amounts of personal data, and with the growth and mainstreaming of self-tracking technologies, this is allowing diverse types of personal data to be collected. I am recording varied data such as thoughts and phrases[1], GPS locations, internet bookmarks, accelerometer data for both arms, image databases, continuous heart rate, continuous perspiration levels, continuous skin temperature, blood biochemistry, testosterone, triglycerides, HDL, LDL, glucose, professional and personal contact networks, communications, social timeline, blood pressure, vascular age, behaviors, photographs of self, athletic data, intellectual content that I have created, DNA profiling, telomere length data, nutrition logs, cognitive enhancer logs, geroprotector logs, weight and BMI, sleep data, confidence data and mood data.

The data that I most value is my thoughts and phrases data—my "Memome"- the collection of memes that I associate with myself. This data collection stems from my Quantified Self project to sequence a human memome and develop personal memomic analytics[2,3], and experiments such as editing my preferences and hacking my rate of personal growth and beneficial meme uptake rate.

The major reason that I value my memomic data the most is that in many ways the dataset most fully represents my intelligence and personality. This is mainly due to a memetic classification experiment to categorize memes by whether I predict they will increase or decrease lifespan—which includes a database of all the risks I have encountered, researched or envisioned[4].

Much of my personal data is open, shared with multiple entities or available on request to aid brain preservation, lifespan extension and Quantified Self development. I am performing various experiments retrospectively and prospectively with this data to extend my lifespan through biological or non-biological means which I have spoken about at The Quantified Self London Meetup[2] and Quantified Self EU 2013 Conference[3]. Thus a self-tracking approach at the very least may be able to keep us alive for longer, and if we do enter a period of stasis, we have reason to hypothesize that it may improve odds of reconstruction.

Thinking beyond using Quantified Self data for brain reconstruction, there are many other advantages to storing personality and biometric data.

If we can develop Quantified Self practices that increase health, longevity, cognition, business revenue, rate of innovation and other important variables and metrics then the single most important function of this will be to stop people from dying in the first place—as they have become business moguls, top researchers, thought leaders and have personally extended human lifespans.

By logging and sharing Quantified Self data now we may be able to extend human lifespan now and perhaps reach the point when we are repairing ourselves faster than we are aging, known as "Longevity Escape Velocity"[5]. In addition, Quantified Self tracking would allow us to monitor and calculate whether we have indeed reached this velocity. If we do not reach longevity escape velocity our data can serve forensically as big data to inform the living on what went wrong, which should also increase the chances of living people reaching longevity escape velocity and also increase the chance of reviving preserved service users. (Note: "big data" is a recently-coined term Wikipedia defines as "a collection of data sets so large and

complex that it becomes difficult to process using on-hand database management tools or traditional data processing applications.")

Real-time health monitoring could also be used to alert services when to deploy a standby and also improve emergency response times. This may be a very powerful way to reduce brain damage through pre-emption, expedition and increased responsiveness. Perhaps rethinking the iconic cryonics medical bracelet to be a continuous health monitor watch might be an interesting concept?

The displaying and sharing of personal histories and stories could be useful to humanize brain preservation and create empathy to the preserved service users and also be a powerful way to engage people on the subject of preservation. If you could log on and see the stories and life events of a service user and the things they experienced, did for humanity etc. then this would create an understanding, public conscience and additional empathy to want to revive preserved service users. In addition, online databases of personality data may help raise the profile and visibility of individual preserved service users—which offers an incentive for each cryonicist to record and share their data, personality and story.

Online databases of preserved patients and example interactive online profiles could also serve as a medical, scientific, artistic, historical and educational resource which would reach many other types of people and allow them to become interested and engaged with brain preservation. It would also allow for additional revenue streams to be created to further fund preservation, scaling, research, and development.

BRAIN BANKING

Can we scale up brain preservation to match data warehousing? Row upon row of computer servers in bunkers and warehouses now exist.

The brain equivalent of data warehousing—brain banking—has already been achieved for medical research such as the Medical Research Council UK Brain Banks[6] although on a smaller scale than data warehousing or the storage capacity we need.

Over 100,000 people die every day—and the percentage we are storing per day of brain and data for these people, is for most days, 0%. We need industrial processing, distribution, logistics and medical grade storage on an industrial scale to deal with this. Can brain banking and data warehousing offer ways to make this possible?

NEURAL WAREHOUSING

Brain and data banking—neural warehousing—could be combined to create novel resources, novel business models and novel reasons to fund brain preservation that allows for scaling, alternative revenue streams, mainstreaming and novel collaborations with varied research areas.

Having a large bank of brains and personality data would, with non-invasive research methods, be a valuable resource for forensic science—including forensic neuroscience, forensic biometrics and forensic linguistics. Being able to analyze personality, biometric and brain data for a single service user and also for multiple service users might also give insights on how to live longer and healthier lives. For instance which behaviors and memes lead to long lives and which do not? Predictive analytics and personal health forecasting could also be calculated from the data and analysis platforms could be built on top of the data, allowing data from preservations to feed back into healthcare, risk analysis and Quantified Self. Thus this neural warehouse of brains and data could also be of use to many living people, which then expands the types of users and also creates more diverse business models and business opportunities—this cannot be overstated.

As a preliminary experiment into meme-longevity and personality-longevity interactions I have begun a proof-of-principle citizen science project, "The Human Memome Project"[7] to record known longevity predictors and memetic data from the crowd and have nearly 400 participants at this time point with many opting to make the dataset open (available on request). There is a potential for this Quantified Self approach to retrospectively, prospectively and forensically be of use to store core longevity predictor and personality data for both preserved patients, members, and users of other services to perform comparative analytics, predictive analytics and forecasting for health and longevity.

Once brain preservation is turned into a data science many new business models can be built on top of the research-based and service-based areas. I can imagine businesses based on combining and analyzing real-time personal, health, and social data, real-time big data alongside the personal and big data from preserved service users—learning from both the animate and those in stasis. The potential for this data is so powerful that I predict that, along with crowdfunding and new media, it could transform the preservation arena and create a booming business ecosystem. Tools that take advantage of machine learning and comparative analysis for personality-longevity interactions, meme-longevity interactions, memome-longevity interactions and behaviour-longevity interactions would be a solid start. ■

Endnotes

1 http://www-958.ibm.com/software/analytics/manyeyes/users/stuartcalimport

2 http://quantifiedself.com/2012/11/stuart-calimport-on-the-memome-project/

3 http://www.slideshare.net/stuartcalimport/memomics-and-memelongevity-interactions

4 http://www-958.ibm.com/software/analytics/manyeyes/datasets/memes-predicted-optimal-or-sub-opt-13/versions/1

5 de Grey ADNJ (2004) Escape Velocity: Why the Prospect of Extreme Human Life Extension Matters Now. PLoS Biol 2(6): e187. doi:10.1371/journal.pbio.0020187

6 http://www.mrc.ac.uk/Ourresearch/Resourceservices/UKBrainBanksnetwork/index.htm

7 http://www.thehumanmemomeproject.com/

Stuart Calimport is a post-graduate researcher and is currently working on technology to assess molecular changes that occur with aging and oxidative stress, and is also a Co-founder of The Human Memome Project. He is a volunteer for the SENS Research Foundation and interned at ImmunePath Inc. He holds a BSc. in Bioinformatics from The University of Birmingham, a MA in Practical Ethics from The University York, and a MSc in Molecular Medicine from Imperial College London. He is passionate about scientific, social and business innovation to extend lifespans and sees innovation in all these areas as complementary and necessary to succeed.

COOLER MINDS PREVAIL

NO MORE COUCH POTATO

By Chana de Wolf

In my review of *The SharpBrains Guide to Brain Fitness* a couple of months ago, the importance of certain lifestyle choices—particularly physical exercise—to maintain and enhance brain health was emphasized at length. Intuitively, we all know that physical activity is good for us. The metaphorical "couch potato" is assumed to be a person in poor health, precisely because of his or her lack of movement (and, of course, lazily consumed snacks and mind-numbing television). But even those of us who admonish the couch potato are moving our bodies a lot less these days due to an increase in the number of jobs requiring long periods of sitting. And current research is clear: all that sitting is taking a toll on our health.

So we know we need to get up and get moving. But what kind of exercise is best? So far, cardiovascular, or aerobic, exercise has received most of the attention in the literature. Because it is light-to-moderate in intensity and long in duration, aerobic exercise increases heart rate and circulation for extended periods, which is presumed to trigger biochemical changes in the brain that spur neuroplasticity—the production of new connections between neurons and even of new neurons themselves. It appears that the best regimen of aerobic exercise incorporates, at a minimum, three 30 to 60 minute sessions per week. In short, plenty of research has found that myriad positive physical and cognitive health benefits are correlated with aerobic exercise.

But what about non-aerobic exercise, such as strength training? The truth is that very little is known about the effects of non-aerobic exercise on cognitive health. What few studies exist show a positive effect of strength training on cognitive health, but the findings are definitely less conclusive than the plethora of evidence supporting aerobic exercise.

However, a lack of research should not be interpreted as negative results. I think non-aerobic exercise has received less research attention because, well, it is harder and appears less accessible than aerobic exercise. It is probably easier to get research participants to commit to a straightforward exercise regimen that doesn't involve a lot of explanation or study to figure out. Let's face it: pushing pedals on a stationary bike requires less mental effort than figuring out how to perform weight-bearing exercises with good form.

At worst, we may ultimately discover that non-aerobic exercise has no cognitive benefits. But let's not throw the baby out with the bathwater. Because strength training *does*, in fact, promote a number of physical effects that are of great overall benefit to health, especially to the aging individual. Indeed, one would be remiss to omit strength training from any exercise regimen designed to promote healthy aging and a long, physically fit life.

The primary, and most obvious, effect of strength training is that of muscle development, or *hypertrophy*. Muscles function to produce force and motion and skeletal muscles are responsible for maintaining and changing posture, locomotion, and balance. Anyone who wishes to look and feel strong, physically capable, and well-balanced would do well to develop the appropriate muscles to reach these goals. Muscle mass declines with age, so it is smart to build a reserve of muscle in a relatively youthful state and to maintain it with regular workouts for as long as possible. Doing so will stave off the functional decline known as *frailty*, a recognized geriatric syndrome associated with weakness, slowing, decreased energy, lower activity, and unintended weight loss.

Those who know me know that I am very, very thin. At 5 foot 9 inches, it has always been a struggle to maintain my weight above 90 lbs.—a full 40 lbs. underweight for a woman of my height. This is almost certainly due, in large part, to genetics (my parents are both rail-thin), and no amount of eating has ever worked to put on additional pounds. Over the years, I grew more concerned about what my underweight meant in terms of disease risks as I age. In particular, dual energy x-ray absorbiometry (DEXA) scans for bone mineral density at age 27 and 33 showed accelerated bone loss beyond what is normal for my age. I was on a trajectory for a diagnosis of osteoporosis by my mid-40s.

Besides ensuring adequate calcium intake, I knew that the best prescription for slowing down bone loss is to perform weight-bearing exercises. Strength training causes the muscles to pull on the bone, resulting in increased bone strength. Strength training also increases muscle strength and flexibility, which reduces the

likelihood of falling—the number-one risk factor for hip fracture.

So I dusted off my long-unused gym pass and started strength training 3 to 4 times a week. I was too weak to even lift weights in the beginning, so I started with body weight exercises and gradually progressed to weight machines. Weight machines allow you to build strength and to gain an understanding of how an exercise works a particular muscle or group of muscles. Many machines also have a limited range of motion within which to perform the exercise, providing some guidance on how to perform the movement. As I made improvements in strength, I began reading about strength training exercises online and downloaded some apps to help me in the gym.

For a basic "how-to," nothing beats a video. There are plenty of exercise demonstration videos on YouTube.com and several other sites, but I prefer the definitive (and straight-to-the-point) visual aids provided by Bodybuilding.com. They offer short instructional videos for just about every strength training exercise in existence. The videos also download quickly and play easily on a mobile device, in case you need a refresher in the gym.

There are a lot of great apps out there, too. My favorites so far include PerfectBody (and associated apps by the same developer), GymPact, and Fitocracy. PerfectBody provides weekly workout routines, complete with illustrated descriptions of exercises and the ability to track your progress by documenting weight lifted and number of repetitions (reps) for each exercise. It is an all-in-one fitness program for learning foundational exercises and building strength and confidence in the gym.

If you have a hard time committing to a workout schedule, Gympact may help. One of the latest in a series of apps that make you put your money where your mouth is, you make a Gympact agreement to go to the gym a minimum number of times per week in order to earn monetary rewards for doing so. The catch is that you are *charged* money if you fail to meet your pact (which helps to pay all those committed gym-goers who didn't renege on their promises). For many, the thought of losing money can provide quite the incentive to get your tail to the gym.

Now that you've got exercise examples, progress tracking, and motivation to actually get to the gym, how about some fun? Fitocracy is an app that turns exercise into a game, letting you track your exercise in return for points and "level ups" like a video game. There are challenges to meet and quests to conquer, adding to the competitive game-play element. But there's also a nice social aspect, with friends and groups enabling people to "prop" one another and to provide support and advice.

Once you start pumping iron, you may quickly realize a need for nutrition adequate to meet your new muscle-building goals. As we all know, protein is the most important nutrient for building muscle. And while I will not attempt to provide advice regarding the appropriate nutrient ratio for the calories you consume each day, I can tell you that it is generally recommended to get at least 1 gram of protein per pound of body weight per day if you want to support muscle growth.

Adequate protein consumption is necessary even if you are not strength training and becomes even more important as you age. Reduced appetite and food intake, impaired nutrient absorption, and age-related medical and social changes often result in malnourishment. An insufficient intake of protein, in particular, can lead to loss of muscle mass, reduced strength, and many other negative factors leading to frailty.

It seems that whey protein provides the ultimate benefits in this arena. Whey, which is derived from milk, is a high-quality protein supplement with a rich source of branched-chain amino acids (BCAAs) to stimulate protein synthesis and inhibit protein breakdown, helping to prevent age-related muscle-wasting (i.e., sarcopenia). Besides muscle support, a growing number of studies indicate other positive, anti-aging effects of whey such as antioxidant enhancement, anti-hypertensive effect, hypoglycemic effect, and the promotion of bone formation and suppression of bone resorption. Life Extension Foundation recently reported that these effects mimic the benefits of calorie restriction without a reduction of food intake, playing roles in hormone secretion and action, intracellular signaling, and regulation of gene transcription and translation.

There are many whey protein powder supplements on the market in a variety of formulations and flavors. Whey protein *isolate* is quickly absorbed and incorporated into muscles, making it a good post-workout option, whereas whey protein *concentrate* is absorbed and incorporated more slowly, making it ideal for consumption just before bedtime. A whey protein powder may consist of isolate only, *concentrate* only, or both. Choose what best meets your needs and purposes.

Flavor is an important factor to consider, as well. Most major brands offer a variety of flavors such as vanilla, chocolate, strawberry, and some exotic options. Unflavored powders are sometimes available and are a great neutral protein base for mixing into (green) smoothies or other recipes. Some whey protein powders may actually include sugars to "improve" taste, so make sure to read the ingredients. Even many zero carb powders are still quite sweet. Many brands offer sample size packets which can be very helpful in determining whether or not you like a particular flavor or overall taste prior to buying an entire container.

Lastly, consider the sources of whey protein powder ingredients carefully. Not all whey is created equal, and many commercial brands on the market derive their ingredients from dubious sources or from animals treated with hormones and living in less-than-stellar conditions. But there are many great products out there, including Life Extension's New Zealand Whey Protein Concentrate, which is derived from grass-fed, free range cows living healthy lives in New Zealand and *not* treated with Growth Hormone (rBST). If you have reservations about whey protein, there are also alternative protein powders that are derived from plants or egg white.

In summary, while the jury is still out regarding the cognitive benefits of non-aerobic exercise, such exercise is still a very important part of an overall plan to support health and longevity. Adequate nutritional support in the form of whey protein supplementation is generally indicated for its many health benefits, and is absolutely integral to muscle-building efforts. At the very least, strength training should complement brain-boosting aerobic exercise and will help to stave off bone loss and frailty as you age. So erase any pre-conceived notions you may have had about bodybuilding and start lifting today! ■

BITCOIN AND CRYONICS, PART 1:
MERKLE ROOTS

By Keegan Macintosh

In this two-parter, I want to introduce you to Bitcoin, a topic that fascinates me *almost* as much as cryonics. Many *Cryonics* readers will have already heard of Bitcoin (certainly my first introductions to it were by members of the cryonics community), but in order to go on and talk about cryonics-specific uses for Bitcoin in the second part, I think it is important to give the actual technology a proper introduction, as well as a brief history of its creation and development. But perhaps most importantly, cryonicists have had important involvement in Bitcoin's inception and spread, and through the backward-looking lens of history, I believe this is a connection the cryonics community will be proud of. [At this point, I think it's important to make the following disclaimer: I own bitcoins, and am very optimistic about their future, both in value, and their potential as a highly positive disruption in the global financial system.]

WHAT IS BITCOIN?[1]

A "peer-to-peer electronic cash system" is what Bitcoin's creator, Satoshi Nakamoto called his idea in its initial design paper. The more wieldy name for Bitcoin and the many, lesser-known "altcoins" that have been developed in Bitcoin's wake, is cryptocurrency, the prefix *crypto*—referring to the fundamental role cryptography plays in its operation. Bitcoin is sometimes called a "virtual currency," and while this is certainly an easier way of communicating the general idea to the uninitiated, it does ignore what differentiates Bitcoin from other, equally "virtual" currencies in online games, such as World of Warcraft "gold" that has acquired real-world value (to the game's players, at least) and is traded for regular currency. Online merchants such as Amazon have also developed virtual currencies specific to their brands, as the next paradigm of prepaid gift cards and loyalty rewards programs. But all these other sorts of virtual currencies are ultimately controlled by a single entity—not unlike governments' control over their local currencies—whereas Bitcoin operates by consensus over a distributed peer-to-peer network. So bitcoins, World of Warcraft gold, and Amazon Coins are really apples, oranges, and bananas.

Others reject the "currency" characterization entirely, instead conceiving of Bitcoin as a "digital commodity." But to me, that simply begs the question of what features of the bitcoins themselves has commodified them? If it is their usefulness as a means of transferring value, are they not a currency first, and a commodity second? There is something of a chicken-and-egg aspect to that debate, so I will leave it to the economists and philosophers. Personally, I think it is more useful to define Bitcoin descriptively, in which case Bitcoin is a globally distributed ledger of transactions of a unit called "a bitcoin." A bitcoin has whatever value (in other currencies, or goods) that those who concur in Bitcoin's utility agree it has—voting with their traditional currencies by purchasing bitcoins with them. And so far, the global market's valuation of Bitcoin has increased by at least six orders of magnitude since it was released into the world in early 2009.

Now, the distributed ledger which forms the backbone of the Bitcoin network actually has a name of its own—the "blockchain"—so called because transactions between addresses of the network are recorded in the ledger in sequential "blocks" of data one megabyte in size. The transactions are collected into these blocks, verified for validity, and added to the blockchain by specialized users of the network, who must first "solve" the block by running it through a computationally intensive process called "hashing" until a particular result is reached, at which point that block is added to the chain and that user is rewarded with new bitcoins, along with any of the (optional) transaction fees included with the transactions in that block.[2] Because doing this work that keeps the network functioning is incentivized with the block reward, this whole process is referred to as "mining" bitcoins. The block reward halves approximately every four years, and the number of bitcoins will never exceed 21 million, though they can be subdivided further by adding additional decimal places as necessary.

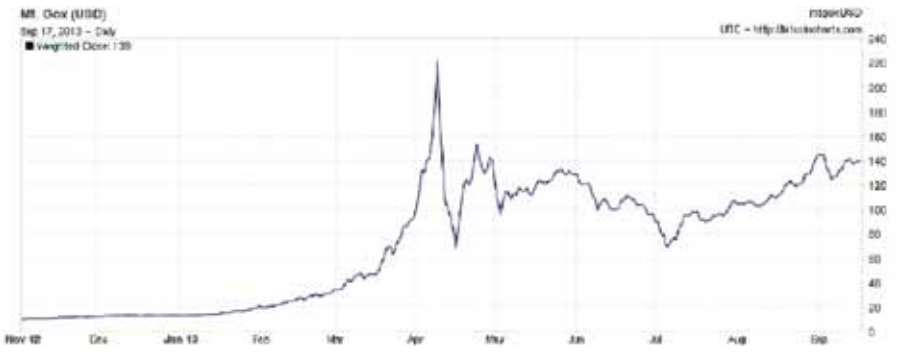
Bitcoins reside at bitcoin addresses, which are rather unsexy

strings of letters and numbers, like **14cD6PwopFAoeyPwtGAsSiMwJcLxS9ePC**. However, these addresses can be represented as QR codes like the one to the left, which are a little more sender-friendly. Bitcoin is often referred to as an "anonymous" currency, but this really isn't true. Being a public ledger, it is only an anonymous system for a particular user if there is no way of tying their real-world identity to the transaction(s) that they wish to be anonymous. However, in contrast with IP addresses on the internet, one can have as many bitcoin addresses as one likes (and the private keys entitling them to transact with the bitcoins at those addresses), without ever paying for them or asking for someone's permission to have one. This is because the bitcoin addresses and associated private keys are all generated algorithmically, and the algorithm used to define them provides for many more than enough for everyone on the planet (approximately 2x10^38 per capita, at present). Thus, *pseudo*nymity can be approximated by never using the same address twice, and this behavior is built into most Bitcoin wallet software by default.

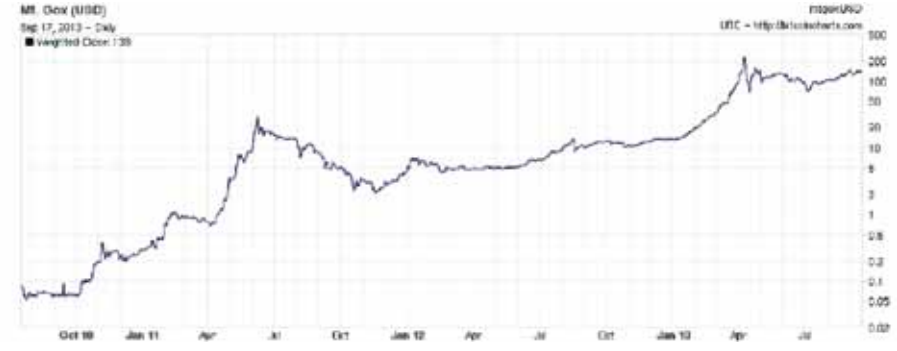
A VERY ABRIDGED HISTORY OF BITCOIN

Nakamoto's original design paper was posted to Perry E. Metzger's cryptography mailing list in late 2008.[3] The "genesis block" of the chain, containing the first 50 bitcoins, was brought into existence by Nakamoto in January of 2009, with the first version of the Bitcoin client released a week thereafter. Interest in Nakamoto's creation was sufficient to attract other developers to refine the protocol and the client, and design new clients—and of course mine for bitcoins, which at the time could be done with ordinary CPUs. In those very early days, it was not easy to pin any particular value on bitcoins themselves, but a now famous $25 pizza was ordered by one Bitcoin user at the request of another, in exchange for Ƀ10,000 in May of 2010. (At today's exchange rate, that pizza would now be worth nearly $1.3 million.) Two months later one bitcoin surpassed $0.01 in value, and later still in 2010, after the first major bitcoin exchange, Mt. Gox opened its virtual doors, $0.10. Bitcoin reached parity with the dollar in early 2011, hit $10 on June 2 of that year, and then "bubbled" up to over $30 within the next six days, before "popping" back to $10 and retreating all the way back down to $2 over the next six months. But by the second half of 2012, Bitcoin was back over $10, and jumped another order of magnitude to $100 during the first half of this year, shooting over $200 briefly in April before resettling to a (slightly) less volatile hover pattern around $100 over the months following. This more recent "bubble" received significantly more mainstream media attention, despite having a significantly more stable outcome than the 2011 bubble.

Personally, I prefer the characterization of these sudden upward price movements followed by downward corrections before resuming the long-term upward trend, as "hypermonetization"[4] events, as opposed to bubbles. Unlike tulips (the famous economic bubble example), Bitcoin has far clearer fundamentals supporting its increasing valuation by the global market. The more people that are exposed to the network and start using it, the bigger it gets, making it less vulnerable to attack, more useful as a currency, and more secure as a store of value (there is some debate around this, particularly around a possible trend towards *centralization* of mining on account of the more specialized and expensive equipment now required, but I think the general idea holds true). Furthermore, while the service-layer infrastructure around Bitcoin it is still somewhat lacking—notably widespread, easy-to-use ways of turning traditional



Linear graph of 2013 BTC price "bubble."



Logarithmic graph of price since July 2010, better showing relative sizes of 2011 and 2013 price events.

currencies into bitcoins and back again[5]—the existing financial transactions paradigm simply cannot compete with Bitcoin when it comes to transmitting wealth across the world as cheaply as to someone standing immediately next to you. Even PayPal has had to take note, and Western Union, too.[6]

In addition to becoming an accepted form of payment with more and more online merchants (and even some brick-and-mortar ones) every day, bitcoin mining has become an industry in its own right, due to the ever increasing difficulty of the mining algorithm. Difficulty increases are a design feature of the protocol intended to secure it from a malicious entity simply amassing enough computing power to centralize control over the network, thereby destroying its primary fundamental value. Thus, the required hardware for anyone looking to derive profit from mining has graduated from regular old CPUs, to high-end GPUs, and now finally to chips specifically designed for the task (application-specific integrated circuits, or ASICs). Setting up and maintaining GPU "farms," and now, more recently, developing and deploying ASICs has required significant investment, precipitating the arrival of "virtual" companies that raise capital through Bitcoin IPOs on virtual securities exchanges, sharing the profits back with the "virtual" shareholders. (This of course being a securities regulator's nightmare, but we'll leave that alone for now.)

"Bitcoin reached parity with the dollar in early 2011, hit $10 on June 2 of that year, and then "bubbled" up to over $30 within the next six days, before "popping" back to $10 and retreating all the way back down to $2 over the next six months."

EARLY CONNECTIONS TO CRYONICS

By now, you are probably wondering how any of this relates to cryonics. Perhaps it would surprise you to know that one of Alcor's long-time board members' names is written right into the Bitcoin protocol? Indeed, without Ralph Merkle's work in cryptography some decades prior, Bitcoin might not even exist—or at least not in its current form. Public key cryoptography, for which Merkle was inducted into the 2011 National Inventors Hall of Fame, is a core enabling technology of Bitcoin. A cryptographic data structure called a "Merkle tree" (and associated "Merkle root") is an integral part of the bitcoin hashing algorithm, so our illustrious Mr. Merkle's work is essentially stamped on every block in the blockchain. While Merkle's website does not indicate a personal interest in bitcoins, it does include the following foreboding prediction:

> "The likely development of quantum computers (QCs) in the next one or two decades would compromise all widely used public-key cryptosystems (PKCSs)... [I]t may already be too late to deploy a QC-resistant PKCS standard throughout the world before quantum computers become available. [...] The developers of a quantum computer are likely to keep its existence secret for some time, during which time they could freely forge signatures for any system that was not QC-resistant: signatures that most would find hard to dispute."

That being said, the Bitcoin community is aware of the threat quantum computing could represent (a threat to which the traditional financial transactions insitutions, i.e. banks, credit card networks, etc, will be highly vulnerable as well), and already has ideas of how to upgrade the protocol's security when necessary.[7] Regardless, Ralph Merkle's contributions to cryptography have made possible a major leap forward in the very idea of what money can be.

But the early connection between Bitcoin and cryonics goes further. A man named Hal Finney was an early responder to Nakamoto's initial posts to the cryptography mailing list, and ended up being the recipient of the very first bitcoin transaction, from Nakamoto himself in early 2009. Finney also identified a specific kind of double-spend attack possible against merchants who accepted payments without waiting for network confirmations of the transaction, which has been given the name the "Finney attack." Finney was also a member of the Less Wrong online community (created by well-known cryonicist and Friendly AI researcher, Eliezer Yudkowsky), and later in 2009, Finney posted to Less Wrong that he had been diagnosed with ALS.[8] In the responses to Finney's post, Yudkowsky asked him if he had cryonics arrangements in place, to which Finney replied that he had been an Alcor member for 20 years. Finney's involvement on Bitcoin forums and Less Wrong did diminish over time, but after the 2013 price rise, Finney made a post on bitcointalk.org relating his early involvement in Bitcoin's development, his diagnosis with ALS, and his continued work developing more secure Bitcoin wallet clients.[9]

THE MYSTERY OF SATOSHI NAKAMOTO

An interesting twist in the story of Bitcoin is that the true identity of its creator is not known. Satoshi Nakamoto's writing style, and the timing of his daily activity/inactivity cycles have led many to doubt that he was the 37-year old Japanese man he claimed to be, with some even suspecting that Nakamoto was a singular virtual identity masking a group effort. Having written the first Bitcoin client himself, Nakamoto's coding has been described as "elegant in some ways and inelegant in others," potentially indicating that Nakamoto was not a professional programmer, though not a complete amateur either.[10] Whoever he/she/they was or were, Nakamoto's involvement in the project waned over the course of 2010, and the task of continuing to refine Bitcoin has become a collaborative effort clustered around one person who is paid to develop the protocol full-time.[11] But in honour of Satoshi Nakamoto's grand idea,

"Perhaps it would surprise you to know that one of Alcor's long-time board members' names is written right into the Bitcoin protocol?"

the (current) smallest subunit of a bitcoin, Ƀ0.00000001, is called a *satoshi*.

And boy-oh-boy, does Satoshi ever have a lot of satoshis! As one of the earliest dedicated users and miners, at a time when mining could be done with ordinary CPUs and the network was not nearly as distributed as today, Nakamoto amassed quite a hoard of bitcoins. However, since his disappearance in 2010, the lion's share of the bitcoins traced back to the protocol's creator (over a million of them) were never spent.[12] Depending on the real-world identity of the person or persons behind "Satoshi Nakamoto," and the underlying motives behind creating Bitcoin and then retreating away right as it started attracting real attention to itself, maybe those coins will never be spent. ■

In the second part: the legal status of bitcoins, some risks and concerns regarding the technology, and cryonics-specific uses.

LEARN MORE:

http://bitcoin.org/en/

ENDNOTES

For those who might be irritated by my switching back and forth between "Bitcoin" and "bitcoin," the capitalized former is usually reserved for referring to the protocol as a whole, whereas the non-capitalized latter refers to units of the currency itself.

Transaction fees are not required to broadcast a transaction to the network, but miners can opt only to include transactions with fees in any blocks they solve, so including a fee will result in faster confirmation by the network. The current default fee (no matter how large the transaction) is Ƀ0.0001—approximately one cent.

http://www.mail-archive.com/cryptography@metzdowd.com/msg09959.html

http://konradsgraf.com/blog1/2013/4/6/hyper-monetization-questioning-the-bitcoin-bubble-bubble.html

That said, the world's first operational Bitcoin ATM will be installed in Vancouver this month, with four others in Toronto, Montreal, Calgary and Ottawa: http://www.ibtimes.com/worlds-first-bitcoin-atm-coming-canada-robocoin-kiosk-hits-vancouver-october-1404346

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Gavin is paid a salary by the Bitcoin Foundation, a non-profit working to standardize, protect, and promote the Bitcoin protocol: https://bitcoinfoundation.org/

https://bitslog.wordpress.com/2013/04/17/the-well-deserved-fortune-of-satoshi-nakamoto/

Already a Bitcoin user? **Consider making a donation to the Lifespan Society of British Columbia using the address in the article above. The Institute for Evidence Based Cryonics (www.evidencebasedcryonics.org) also accepts bitcoins, at 1Mouv8BcRUmqVHRRNPaQPmFkzskMqoiSDk. (see QR code to the right)**

Keegan Macintosh is Executive Director of the Lifespan Society of British Columbia, where he is working to address issues of access to life extension technologies (keegan@lifespanbc.ca).

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CARREL AND LINDBERGH:
WHY NOT IMMORTALITY?

By R. Michael Perry

Early Sunday morning, March 8, 1908, three ashen-faced men stood pounding on the door of a New York City apartment. When their friend and colleague, Dr. Alexis Carrel, answered, one of them, Adrian Lambert, also an M.D., explained that his five-day-old infant, Mary, was close to death and Carrel seemed the only one who could help. Lambert was there with his two brothers, both surgeons in the area, and the combined expertise of the three was baffled. The baby, it turned out, was suffering from a rare malady, melena neonatorum ("hemorrhaging of the newborn"), which caused extensive bleeding from the nose and mouth and was robbing the little girl of her blood supply.[1]

Carrel, a Frenchman, had left his native country a few years before when his outspoken views had angered both the doctors and the clergy, to the point that he was having difficulty finding work. (He had witnessed and reported as genuine a "miracle cure" at the famed pilgrimage shrine of Lourdes, something many doctors dismissed as fantasy or fraud, but Carrel also would not affirm it was a genuine miracle, though privately he appears to have thought so.[2]) After a brief stay in Montreal he'd gone on to Chicago where, during another brief stay, he'd perfected a new method for suturing blood vessels he called anastomosis from a Greek word meaning "to provide with an outlet." Very fine silk threads and petroleum jelly were used, along with a special technique of stretching the vessel walls into straight lines which made controlled stitching much easier—for one who possessed Carrel's surgical skills. In this way he had managed to join two severed vessels from different organisms, an artery of one to a vein of the other, achieving the difficult feat of a subject-to-subject blood transfusion without the obstructing clots that could form all too readily in surgically invaded tissue and abort the whole procedure. Anastomosis actually had many uses, including repair or replacement of damaged vessels, reconnecting severed vessels, and grafting of tissue.[3] Carrel soon left Chicago for New York City, where he finally found what would be his place of employment for most of the rest of his life, at a research center founded and funded by the legendary financier, John D. Rockefeller. Carrel's work at the Rockefeller Institute for Medical Research, though, was pure research and involved only animal subjects; he was not licensed to practice medicine in the U.S.[4]

Yet a human life was now at stake, and Carrel was soon at the Lambert home preparing for the operation, hoping for the best with what had worked with animals. Little Mary, unconscious and deathly pale, was taped to an ironing board and her father positioned prone beside her. After several tries Carrel managed to suture the severed, exposed radial artery in the man's left wrist to the popliteal vein in the crook of the child's right knee joint, the only vessel large enough and suitable in other ways to be useful. Blood began to flow from father to child. At first it seemed to have no effect but then the tiny ears began to redden and soon the child's color changed all over, from porcelain white to pink then finally to red. The child woke up and began to cry. "You'd better turn it off or she'll burst!" one of the brothers cried out, and the operation was terminated successfully. The single transfusion saved the girl's life and she survived to adulthood. One stroke of fortune, in an era when blood typing was only starting to be understood by a few, not yet including Carrel, was that the father's blood type was compatible with his daughter's—otherwise disaster would have followed, as it often had before when transfusions were attempted.

Bringing the child back from near death had important consequences for Carrel, in particular, opposition to his animal experiments from antivivisectionists died down and he was able to work with greater confidence. In 1912 he won the Nobel Prize in Medicine or Physiology for his technique of anastomosis and work with blood vessel and organ transplants in animal models. Before that date he had also done controversial experiments in tissue culture where it appeared that he could keep cells alive indefinitely, without aging,

just by supplying nutrient and clearing out metabolites. "My results," he declared in 1911 in the *Journal of the American Medical Association*, "demonstrate … that death is not a necessary, but merely a contingent, phenomenon." Scientists were skeptical, so in January 1912, some months before the Nobel award was announced, he started one more experiment. A small lump of tissue was extracted from the heart of a nine-day-old chick embryo and the still-beating cells were cultured in a dish. The beating stopped after a few months but the colony lived on, year after year, in apparent defiance of any mortal restrictions, far longer in fact than the lifespan of a chicken (and actually longer than Carrel himself, though finally the results were called in question; more later). With results such as this, and the other animal experiments, Carrel thought that death might be physically overcome, given enough research.[5] Years later he consulted an attorney, Arthur Train, about the problems that might follow from restoring a legally dead person to life.

"Your point," the incredulous Train responded, "is that if a man is dead, and you resurrect him, with, say, a transplanted organ from another man, you think the law might hold you responsible for the recipient's debts—regarding you as standing in loco parentis? Surely you don't suggest that's a practical question."

"Of course I do," Carrel replied. "I've done it with animals; humans will follow. Death takes place only at that mysterious and conjectural moment when life can no longer be re-instilled into the body. And that depends upon nothing except the technical ingenuity and mechanical skill of man."[6]

While Carrel was doing his early research at the Rockefeller Institute, a youngster was growing up who would eventually join the Nobel-winning surgeon in some of his later important work. Before that he would become the most famous person in the world, with a single, death-defying act in another field, aviation. Charles Lindbergh is still best known for the solo flight, the first of its kind, which he made in 1927 at the age of 25 from New York to Paris in his custom-built airplane, *The Spirit of St. Louis*.[7] (The successful flight occurred just 12 days after an attempt in the opposite direction, Paris to New York, by renowned French pilots Charles Nungesser and Francois Coli, that ended tragically; they were never found. Four other aviators also died, trying or training, to cross the Atlantic before Lindbergh.[8]) But Lindbergh was not just an aviation superstar and daredevil. From an early age he wondered, "if God is so great why did he make you die? … Why should he not let you live forever?" After his historic flight, which along with instant fame also soon brought wealth and influence to the bright, articulate young man, the question had become, "if man could learn to fly, why could he not learn to live forever?"[9]

In fact, Lindbergh had wanted to study medicine but was turned away by the demands of schoolwork which was not his strong point and the (mistaken) belief that he would have to learn Latin to become a doctor.[10] But after the flight and his marriage to Anne Morrow a problem surfaced that focused his mind in this direction again. His wife's sister Elisabeth was suffering from a faulty heart valve, the result of a bout with rheumatic fever. With his knowledge and skills in mechanics Lindbergh wondered why you couldn't just replace the valve with another one, an artificial one to be sure, but much as you'd do with a machine that needed repair—and the body is a machine after all. To replace the valve you'd also need to be able to work on the heart in isolation, keeping it alive somehow without using its own, self-supporting mechanism. When he questioned others with more medical knowledge the whole thing seemed fantastic but his persistent inquiries finally led to one person who would not dismiss it out of hand, Alexis Carrel.[11]

Their first meeting was at the end of November, 1930, in Carrel's laboratory at the Rockefeller Institute. Carrel talked and talked about his latest project, to keep an organ (not just a tissue sample) alive outside the body indefinitely, and showed Lindburgh his apparatus for doing so, in which fluids were circulated through the action of a piston that was moved from the outside by electromagnets. Briefly the

Lindbergh (left) and Carrel with perfusion pump, by S. J. Woolf, 1938.

organs thrived, but soon they succumbed to bacterial infection. Lindbergh's reaction was mixed. "As impressed as I was by the perfection of Carrel's biological techniques, I was astounded by the crudeness of his device."[12] The problem was that fluids were coming in direct contact with metal components, which could not be adequately sterilized. Lindbergh proposed a better device, in which the fluids would be entirely confined within glass surfaces. After some labor his new device was ready and the infection problem was overcome, though the perfusion pressure was not very large and thus only small specimens could be maintained this way. But with further effort this problem too was solved so large mammalian organs could be maintained for extended periods outside the body or ex vivo. (The device did not become practical as a way of storing organs for transplant, however. It was difficult to use and there was the additional problem of supplying adequate nutrients for extended periods ex vivo. Today organs for transplant are generally chilled and stored without perfusion, and have shelf lives of no more than about 36 hours, an ongoing problem in cryobiology.[13]) Though the device still had its limitations, Carrel was jubilant, avowing that scientists now had

"a new method of opposing death" by studying whole organs outside the body under controlled conditions, "analyzing the conditions responsible for the aging of tissues."[14]

In addition to his work with Lindbergh and the "immortal" chicken heart cells, Carrel conducted experiments with mice, varying their diets and other conditions of existence in an attempt to make them stronger, healthier, and longer-lived. Though some 12,000 mice were involved in this multiyear study, results were never published and it appears that they must have been disappointing.[15] (One wonders if Carrel narrowly missed discovering that calorie restriction could substantially extend the maximum life-span of mice, as did his contemporaries, Clive McCay and colleagues, who published this important finding in 1935.[16]) In fact, as the decade of the 1930s progressed both Carrel and Lindbergh would wind down their biological research in favor of other interests, particularly with the ominous approach of World War II.

Indulging an interest in philosophy, in 1935 Carrel published *Man the Unknown*, a book which quickly became a bestseller. From it one must conclude that, while in some ways Carrel was transhumanist and immortalist, in important other ways he fails the litmus test. The grandeur and loftiness of his intentions are expressed in the Preface: "Humanity's attention must turn from the machines and the world of inanimate matter to the body and the soul of man, to the organic and mental processes which have created the machines and the universe of Newton and Einstein."[17] What counts is ourselves, not the inanimate surroundings, and we must further our own betterment, which Carrel proceeds to advocate, in suggesting that both life extension and rejuvenation—reversal of aging—are worthy projects to pursue through scientific advances and medical technology. Later he rises to sublime heights.

"We must liberate man from the cosmos created by the genius of physicists and astronomers, that cosmos in which, since the Renaissance, he has been imprisoned. Despite its stupendous immensity, the world of matter is too narrow for him. Like our economic and social environment, it does not fit him. We cannot adhere to the faith in its exclusive reality. We know that we are not altogether comprised within its dimensions, that we extend somewhere else, outside the physical continuum."[18]

It is interesting that Carrel believed that we create our own realities, so that, for instance, the cosmos of the physicists is not the only possible "world" there is. Carrel in fact was a mystic who believed in paranormal or "metapsychical" phenomena such as telepathy and clairvoyance, though he considered these to be rare and marginal effects and his main emphasis is on mainstream science.[19] There his vision is soaring—but also seriously undermined. Carrel was a product of his times and circumstances. He did not really believe death could be overcome, though he did think better times were coming through advances in medicine.

"Never will [man] vanquish death. Death is the price he has to pay for his brain and his personality. But some day, medicine will teach him that old age, free from diseases of the body and the soul, is not to be feared. To illness, and not to senescence, are due most of our woes."[20]

(Here it is appropriate to mention that Carrel's "immortalization" of chicken heart cells would eventually be discounted, long after Carrel's death and the termination of the experiment in 1946, by the 1960s discovery of the Hayflick limit. Leonard Hayflick in particular found that chicken heart cells can only divide about 15-35 times before losing this ability so the whole colony dies.[21] How did Carrel's colony appear to last indefinitely? No one is really sure, but the results have never been duplicated, and it has been suggested that a small but steady trickle of fresh cells was introduced inadvertently in the chick embryo extract used as nutrient broth, despite efforts to prevent such contamination.[22])

In other ways Carrel's vision was limited. He was really much more a eugenicist than an immortalist as we today would understand it and his thoughts centered on groups of people more than on the individual. One sought to improve the species or race rather than to indefinitely prolong existence at the personal level. Along with this came an attitude of ethnocentric chauvinism. The position that one's own culture is superior to others and even ought to dominate was more common and more respectable before the Nazis shocked the world with the atrocities they committed against "inferior" peoples, murdering millions of innocents. Before this it did not seem so out of place for Westerners to extol "white civilization" and feel it should prevail in the world, as Carrel did (and Lindbergh also). In *Man the Unknown,* for example, Carrel said "The Caucasian nervous system is superior to that found in any other race," along with, "Democracies thwart citizens of imagination and courage," and "Natural selection no longer plays its part because the weak are saved along with the strong."[23] Moreover, while Carrel did advocate life and health prolongation, he did not feel this should apply to persons in general but instead noted that "it would not be wise to give everybody a long existence." This is further elaborated in a passage in which not just murderers but others including "those who have misled the public in important matters" (corrupt politicians?) "should be humanely and economically disposed of in small euthanasic institutions supplied with proper gases. A similar treatment," he adds, "could be advantageously applied to the insane, guilty of criminal acts. Modern society should not hesitate to organize itself with reference to the normal individual. Philosophical systems and sentimental prejudices must give way before such a necessity. The development of human personality is the ultimate purpose of civilization."[24]

Nazi Germany was one country where such ideas found a sympathetic audience. Carrel's book was translated into nearly twenty languages, and for the German edition, at the request of authorities, Carrel obligingly added in the preface: "Germany has taken energetic measures against the propagation of retarded individuals, mental patients, and criminals. The ideal solution would be the suppression of each

of these individuals as soon as he proved dangerous. Criminality and madness can be prevented only by the rejection of all sentimentality."[25]

Carrel in fact was no great sympathizer with Germany, despite the similarity of views that had developed in that country with the coming of Hitler. World War I found Carrel in his native France aiding the war effort against Germany by treating wounded soldiers. (Working with chemist Henry J. Dakin he developed an important treatment for infection.[26]) His laboratory during this absence was kept in readiness by the sympathetic director of the Rockefeller Institute, Simon Flexner,[27] and Carrel returned to work there after the war and eventually met Lindbergh. The two, besides being partners in research, would share many political views. But Lindbergh, who unlike Carrel had not been involved in a war effort against Germany, actually found much to admire in that country, despite some misgivings, and made several visits,[28] on one of which he accepted a top civilian award, the German Service Cross, for his contributions to aviation.[29] Germany, it was clear to Lindbergh, was preparing for war, but if it must happen he hoped it would be in defense of European culture. "Under any circumstances," he wrote later, "I believed that a victory by Germany's European peoples would be preferable to one by Russia's semi-Asiatic Soviet Union. Hitler would not live forever, and I felt sure the Germans would eventually moderate the excesses of his Nazi regime."[30]

Like Carrel, Lindbergh was not hopeful about really solving the problem of death, a viewpoint his personal experience would painfully reinforce. There was the horrific, 1932 kidnapping-for-ransom and murder of his eldest child, 20-month-old Charles Junior; then the death in 1934 of his heart-damaged sister-in-law, this despite any progress Lindbergh and Carrel were making with their perfusion pumps.[31] Science in general was too primitive. Lindbergh would comment: "Even with his fragment of chicken heart, I realized, Carrel had not achieved eternal life, for it, too, kept dividing into new individuals and generations, just as man did—and the dilution of identity was similar. The essence of life, I concluded, did not lie in the material."[32] So Lindbergh also turned to other matters, though (like Carrel) not all at once. He had gone with his family to England in December 1935 to escape the endless attention of the media and others, and did find greater privacy, while continuing to work with Carrel back in New York, though the distance made it harder. In 1938 he bought an island off the coast of Brittany that was rowing distance from another island where Carrel lived with his wife during the summer months. (She didn't like New York, so Carrel lived alone while he worked at Rockefeller Institute.) Lindbergh and Carrel contemplated research at their two-island retreat, but little if any was done because of Lindbergh's feeling that "our civilization was at stake" and he must do what he could to "prevent a war in Europe."[33]

Lindbergh returned to the States in 1939. World War II began in September with the attack on Poland by Germany and the Soviet Union. Lindbergh campaigned against U.S. entry into the war and fighting against Germany. Carrel, who finally retired from Rockefeller Institute in 1939, aged 65, ended up in German-occupied France in charge of a eugenics-oriented institute. Known informally as the Carrel Foundation, among other things, it helped enact a national policy of supervised marriages so the partners would be free of syphilis.[34]

Lindbergh's efforts to keep the U.S. out of the war abruptly ended with the Japanese attack on Pearl Harbor in December 1941, followed shortly by the German declaration of war on the U.S. From that point Lindbergh sought to aid the U.S. war effort, but was mistrusted due to his previous antiwar crusading and known German sympathies. Finally, as a civilian advisor, he flew some 50 combat missions against the Japanese in the South Pacific, shot down an enemy plane and otherwise risked his life, and was widely felt to have restored his previously tarnished reputation.[35]

Carrel was still working at his Foundation, headquartered in Paris, when that city was liberated by the Allies in August 1944. Carrel was accused of collaborating with the Nazis, which he denied; he died in November at age 71, escaping any actions that might have been taken.[36]

Lindbergh after the war was devastated to learn the true extent of the Nazi extermination ideology and its heinous implementation and was also horrified by the wartime use of nuclear weapons—another Western initiative—and what the proliferation of such devices could mean for the future of civilization. Thereafter he devoted himself mostly to conservationist causes and felt that what the world needed was not to be saved by the West so much as to be saved from the West. He died in 1974 at age 72.[37]

While it is understandable that one would be repelled, as was Lindbergh, by science and technology when used to bring death and destruction on a massive scale, it is also unfortunate if such repulsion leads to the denial of benefits—"throwing out the baby with the bathwater." In the summer of 1931, while Lindbergh was working as a recent arrival at Carrel's laboratory, a boy of twelve read a science fiction story about a man who dies but is preserved very carefully and is restored to life after a wait of many centuries. The boy, whose name was Robert Ettinger, would go on to implement this idea in what we now know as the cryonics movement, in which the recently clinically dead are preserved cryogenically in hopes that future technology can restore them to full function.[38] Such an alternate approach to life extension was considerably removed from the research perspectives of Carrel and Lindbergh, and it appears they never considered it with any seriousness, if at all. If they had, and had focused more on the individual and less on races or nationalities, the cryonics movement might have gotten started earlier, with more backing from the scientific community and many more being cryopreserved. ■

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6. Available at: http://www.ifosprogram.com/consumer-reports.aspx. Accessed March 18, 2013.
7. *J Nutr Sci Vitaminol (Tokyo).* 2003 Aug;49(4):270-6.

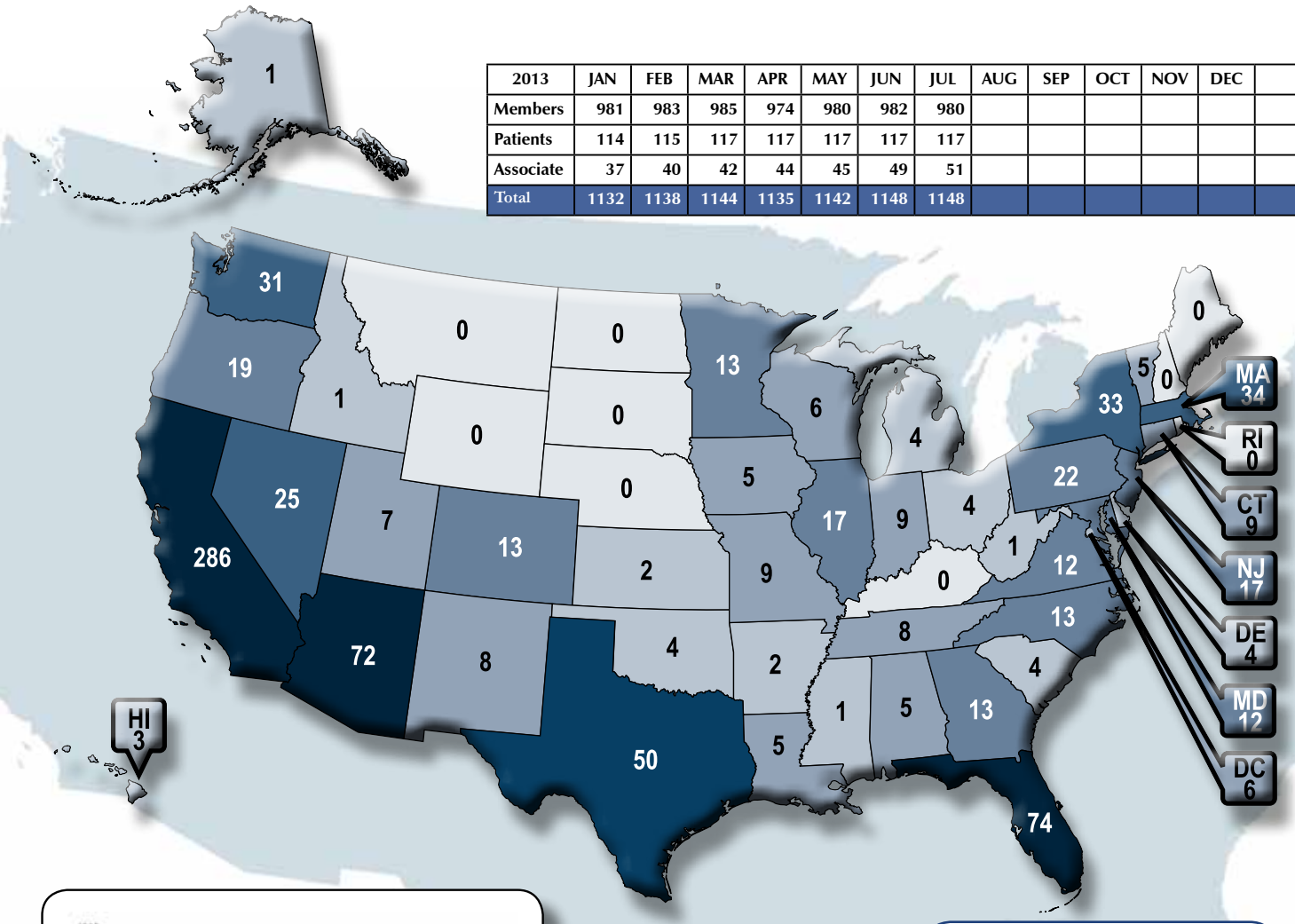
CAUTION: If you are taking anti-coagulant or anti-platelet medications, or have a bleeding disorder, consult your healthcare provider before taking this product.

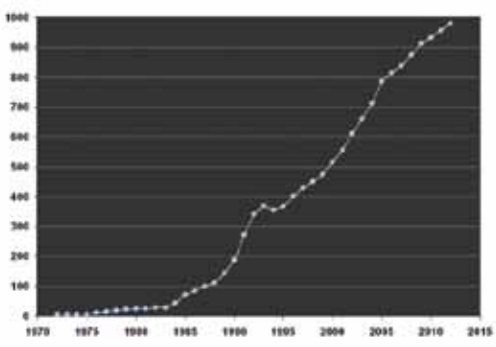
Supportive but not conclusive evidence shows that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease. IFOS™ certification mark is a registered trademark of Nutrasource Diagnostics, Inc. These products have been tested to the quality and purity standards of the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

To order the most advanced fish oil supplement, Super Omega-3 EPA/DHA with Sesame Lignans and Olive Fruit Extract (with or without enteric coating), call 1-800-544-4440 or visit www.LifeExtension.com

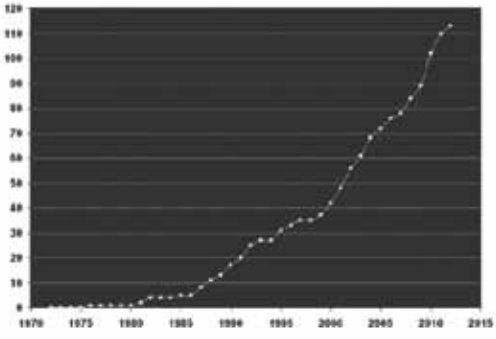
Membership Statistics

2013	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
Members	981	983	985	974	980	982	980						
Patients	114	115	117	117	117	117	117						
Associate	37	40	42	44	45	49	51						
Total	1132	1138	1144	1135	1142	1148	1148						





Number of Alcor members



Number of Alcor patients

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

International

Country	Members	Patients
Aruba	1	0
Australia	13	2
Canada	41	2
Denmark	2	0
France	0	0
Germany	4	0
Israel	1	1
Italy	2	0
Lebanon	1	0
Luxembourg	1	0
Mexico	4	0
Monaco	2	0
Netherlands	2	0
New Zealand	2	0
Norway	1	0
Portugal	4	0
Spain	2	1
Thailand	3	0
United Arab Emirates	1	0
United Kingdom	23	2
TOTAL	**112**	**8**

Scientists Power Mobile Phone Using Urine

British scientists said they have harnessed the power of urine and are able to charge a mobile phone with enough electricity to send texts and surf the Internet. Researchers from the University of Bristol and Bristol Robotics Laboratory in south west England said they had created a fuel cell that uses bacteria to break down urine to generate electricity, in a study published in the Royal Society of Chemistry journal Physical Chemistry Chemical Physics. "No one has harnessed power from urine to do this so it's an exciting discovery," said engineer Ioannis Ieropoulos Tuesday. "The beauty of this fuel source is that we are not relying on the erratic nature of the wind or the sun; we are actually reusing waste to create energy. The team grew bacteria on carbon fiber anodes and placed them inside ceramic cylinders. The bacteria broke down chemicals in urine passed through the cylinders, building up a small amount of electrical charge which was stored on a capacitor. Ieropoulos hoped that the cell, which is currently the size of a car battery, could be developed for many applications.

NewsDaily / AFP
16 Jul. 2013
http://www.newsdaily.com/article/26f960e5427baca1629beba88c775ab8/scientists-power-mobile-phone-using-urine

Cloned Quarter Horses Get Victory in Federal Court

Two Texas horsemen should be allowed to register cloned horses with the American Quarter Horse Association, a federal court jury said July 30, possibly clearing the way for the animals to compete in sanctioned races across the U.S. The jury in U.S. District Court for the Northern District of Texas in Amarillo found in favor of rancher Jason Abraham of Canadian, Texas, and veterinarian Gregg Veneklasen of Amarillo, saying the association violated the federal Sherman Antitrust Act and the Texas Free Enterprise and Antitrust Act. The plaintiffs had asked for $2 million to $5 million in damages, but the jury provided no money award. The jury verdict does not mean cloned horses automatically get registered. But the plaintiffs' lawyers said they hoped the American Quarter Horse Association would allow registration without a court hearing on a permanent injunction. Opponents of cloning within the association countered by saying that natural breeding produced the most desirable traits and that cloning undermines the progression of the breed.

Lynn Roberts / AP file / NBC News
30 Jul. 2013
http://investigations.nbcnews.com/_news/2013/07/30/19777745-cleared-to-race-cloned-quarter-horses-get-victory-in-federal-court?lite

New Signal Stabilizes Atherosclerotic Plaques

Atherosclerosis is an inflammatory disease with accumulation of cholesterol in the vessel walls. The atherosclerotic plaque is built up throughout life and when it ruptures it leads to heart attack or stroke. T cells are important immune cells able to direct the immune response; they are present in the plaques at all stages and signal to other cells through contact or secretion of cytokines, a type of hormone-like signal molecule. In the present study Karolinska Institute researchers identified a cytokine produced by T cells that can stabilize atherosclerotic plaques and protect them from rupture. The finding was made while investigating a new mouse model together with scientists at Yale University and Howard Hughes Medical Institute in the United States. "When we analyzed the mouse model the result puzzled us. The outcome was opposite to our initial hypothesis," says Anton Gisterå, one of the researchers who conducted the study. "We had to conduct a series of new experiments to understand what was going on, and ended up identifying the cytokine interleukin-17 as a signal that can stabilize plaques."

Karolinska Institute / Eurekalert
31 Jul. 2013
http://www.eurekalert.org/pub_releases/2013-07/ki-nss072413.php

Study Reveals Genes That Drive Brain Cancer

A team of researchers at the Herbert Irving Comprehensive Cancer Center at Columbia University Medical Center has identified 18 new genes responsible for driving glioblastoma multiforme, the most common—and most aggressive—form of brain cancer in adults. The study was published August 5, 2013, in *Nature Genetics*. "Cancers rely on driver genes to remain cancers, and driver genes are the best targets for therapy," said Antonio Iavarone, MD, professor of pathology and neurology at Columbia University Medical Center and a principal author of the study. "Once you know the driver in a particular tumor and you hit it, the cancer collapses. We think our study has identified the vast majority of drivers in glioblastoma, and therefore a list of the most important targets for glioblastoma drug development and the basis for personalized treatment of brain cancer." Personalized treatment could be a reality soon for about 15 percent of glioblastoma patients, said Anna Lasorella, MD, associate professor of pediatrics and of pathology & cell biology at CUMC.

Columbia University Medical Center
5 Aug. 2013
http://newsroom.cumc.columbia.edu/2013/08/05/genes-that-drive-brain-cancer/

The $330,000 Hamburger That Was Built in a Lab Hits the Spot

After years of research and weeks of buildup, taste testers on August 5 finally bit into a burger created from stem cells in a culture dish rather than meat from a farm or a store. The burger was cooked in front of reporters and taste-tested by Chicago-based author and food writer Josh Schonwald and Austrian food researcher Hanni Rutzler. Although they struggled to decide whether they liked the taste, both were pleasantly surprised at the texture and juicyness given the absence of natural fats. "It wasn't unpleasant," said Schonwald. "There is quite some intense flavor," Rutzler said, although she added that it needed seasoning. Aided by a €250,000 ($330,000) donation from Google co-founder and entrepreneur Sergey Brin, University of Maastricht physiologist Mark Post who developed the product, has been working since 2008 to produce a palatable food from lab-grown muscle cells. He and other scientists involved in similar projects aren't doing it just for the novelty. They see test-tube meat as a means to head off what could become a global food crisis.

Alastair Jamieson and Alan Boyle / NBC News
5 Aug. 2013
http://www.nbcnews.com/science/intense-flavor-330-000-hamburger-was-built-lab-hits-spot-6C10835460

Tumor-Targeting T Cells Engineered

Scientists have combined the ability to reprogram stem cells into T cells with a recently developed strategy for genetically modifying patients' own T cells to seek and destroy tumors. The result is the capacity to mass-produce in the laboratory an unlimited quantity of cancer-fighting cells that resemble natural T cells, a type of white blood cell that fights cancer and viruses. In a study published August 11 in *Nature Biotechnology,* researchers show that the genetically engineered cells can effectively wipe out tumors in a mouse model of lymphoma. "To put these two techniques together is really groundbreaking," said Pam Ohashi, a cell biologist at the Ontario Cancer Institute, who was not involved in the study. "The idea that you can make unlimited numbers of tumor-killing cells is very exciting." "This is the first proof of principle that it is feasible to use a differentiated-directed process to generate lymphoid T cells endowed with therapeutic properties in vitro," said Michael Sadelain, whose team authored the study at the Memorial Sloan-Kettering Cancer Center.

Chris Palmer / *The Scientist*
11 Aug. 2013
http://www.the-scientist.com//?articles.view/articleNo/36994/title/Tumor-Targeting-T-Cells-Engineered/

Cancer's Origins Revealed

In a recent study researchers of the Wellcome Trust Sanger Institute have provided the first comprehensive compendium of mutational processes that drive tumor development. Together, these processes explain most mutations found in 30 of the most common cancer types. This new understanding of cancer development could help treat and prevent a wide-range of cancers. Each mutational process leaves a particular pattern of mutations, an imprint or signature, in the genomes of cancers it has caused. By studying 7,042 genomes of people with the most common forms of cancer, the team uncovered more than 20 signatures of processes that mutate DNA. For many of the signatures, they also identified the underlying biological process responsible. "We have identified the majority of the mutational signatures that explain the genetic development and history of cancers in patients," says Ludmil Alexandrov, first author of the study. "We are now beginning to understand the complicated biological processes that occur over time and leave these residual mutational signatures on cancer genomes."

Wellcome Trust Sanger Institute
14 Aug. 2013
http://www.sanger.ac.uk/about/press/2013/130814.html

Heart's Own Stem Cells Offer Hope for New Treatment of Heart Failure

Researchers at King's College London have for the first time highlighted the natural regenerative capacity of a group of stem cells that reside in the heart. This new study shows that these cells are responsible for repairing and regenerating muscle tissue damaged by a heart attack which leads to heart failure. The study, published Aug. 15 in the journal *Cell*, shows that if the stem cells are eliminated, the heart is unable to repair itself after damage. If the cardiac stem cells are replaced the heart repairs itself, leading to complete cellular, anatomical and functional heart recovery, with the heart returning to normal and pumping at a regular rate. Also, if the cardiac stem cells are removed and re-injected, they naturally "home" to and repair the damaged heart, a discovery that could lead to less-invasive treatments and even early prevention of heart failure in the future. Dr. Georgina Ellison is first author of the study paper, "Adult c-kitpos Cardiac Stem Cells Are Necessary and Sufficient for Functional Cardiac Regeneration and Repair."

King's College, London
15 Aug. 2013
http://www.kcl.ac.uk/newsevents/news/newsrecords/2013/08-August/Hearts-own-stem-cells-offer-hope-for-new-treatment-of-heart-failure.aspx

Computer Can Read Letters Directly from the Brain

By analyzing MRI images of the brain with an elegant mathematical model, it is

possible to reconstruct thoughts more accurately than ever before. In this way, researchers from Radboud University Nijmegen have succeeded in determining which letter a test subject was looking at; results will appear soon in the journal *Neuroimage*. Functional MRI scanners have been used in cognition research primarily to determine which brain areas are active while test subjects perform a specific task. A research group at the Donders Institute for Brain, Cognition and Behavior at Radboud University has gone a step further. The researchers "taught" a model how small volumes of 2x2x2 mm from the brain scans—known as voxels—respond to individual pixels. By combining all the information about the pixels from the voxels, it became possible to reconstruct the image viewed by the subject. "After this we did something new," says lead researcher Marcel van Gerven. "We gave the model prior knowledge: we taught it what letters look like. This improved the recognition of the letters enormously…."

ScienceDaily
19 Aug. 2013
http://www.sciencedaily.com/releases/2013/08/130819141641.htm

Copper Identified as Culprit in Alzheimer's Disease

Copper appears to be one of the main environmental factors that trigger the onset and enhance the progression of Alzheimer's disease by preventing the clearance and accelerating the accumulation of toxic proteins in the brain. That is the conclusion of a study appearing Aug. 19 in the journal *Proceedings of the National Academy of Sciences*. "It is clear that, over time, copper's cumulative effect is to impair the systems by which amyloid beta is removed from the brain," said Rashid Deane, Ph.D., U. of Rochester Med. Center (URMC) Dept. of Neurosurgery, lead author of the study. "This impairment is one of the key factors that cause the protein to accumulate in the brain and form the plaques that are the hallmark of Alzheimer's disease." Copper's presence in the food supply is ubiquitous. It is found in drinking water carried by copper pipes, nutritional supplements, and in certain foods such as red meats, shellfish, nuts, and many fruits and vegetables. The mineral plays an important and beneficial role in nerve conduction, bone growth, the formation of connective tissue, and hormone secretion.

University of Rochester Medical Center
19 Aug. 2013
http://www.urmc.rochester.edu/news/story/index.cfm?id=3916

Woman Revived from 42 Minutes of Clinical Death

An Australian woman has lived to tell the tale after being brought back to life from being clinically dead for 42 minutes, doctors said Aug. 19. Mother-of-two Vanessa Tanasio, 41, was rushed to Monash Medical Centre in Melbourne last week after a major heart attack, with one of her main arteries fully blocked. She went into cardiac arrest and was declared clinically dead soon after arrival. Doctors refused to give up and used a compression device called a Lucas 2—the only one of its kind in Australia—to keep blood flowing to her brain while cardiologist Wally Ahmar opened an artery to unblock it. Once unblocked, Tanasio's heart was shocked back into a normal rhythm. "[I used] multiple shocks, multiple medications just to resuscitate her," Ahmar said. "Indeed this is a miracle. I did not expect her to be so well." Tanasio said she had no history of heart conditions and was grateful to be alive. "I remember being on my couch, then the floor, then arriving at hospital, and then two days go missing," Tanasio said. "I was dead for nearly an hour and only a week later I feel great. It's surreal."

Huffington Post
19 Aug. 2013
http://www.opposingviews.com/i/health/australian-mother-vanessa-tanasio-brought-back-life-after-being-clinically-dead

Mini Human "Brains" Grown in Lab for First Time

Tiny "brains" that include parts of the cortex, hippocampus and even retinas, have been made for the first time using stem cells. The 3D tissue structures will let researchers study the early stages of human brain development in unprecedented detail. Because human brains are so different from those of most animals, looking at how animal brains develop only gives us a crude understanding of the process in humans. "Mouse models don't cut it," says Juergen Knoblich at the Institute of Molecular Biology (IMB) in Vienna, Austria. To grow their miniature brains, Knoblich and colleagues took induced pluripotent stem (iPS) cells—adult cells reprogrammed to behave like embryonic stem cells—and gave them a mix of nutrients thought to be essential for brain development. The stem cells first differentiated into neuroectoderm tissue, the layer of cells that would eventually become an embryo's nervous system. The tissue was suspended in a gel scaffold to help it develop a 3D structure.

Douglas Heaven / New Scientist
28 Aug. 2013
http://www.newscientist.com/article/dn24114-mini-human-brains-grown-in-lab-for-first-time.html

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.

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 cryonicists 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
- And more!

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

How do I enroll?

Signing up for a cryopreservation is easy!

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

Not ready to make full arrangements for cryopreservation? Then **become an Associate Member** for $10/month (or $30/quarter or $120 annually). Associate Members will receive:

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

To become an Associate Member send a check or money order ($10/month or $30/quarter or $120 annually) to Alcor Life Extension Foundation, 7895 E. Acoma Dr., Suite 110, Scottsdale, Arizona 85260, or call Marji Klima at (480) 905-1906 ext. 101 with your credit card information. You can also pay using PayPal (and get the Declaration of Intent to Be Cryopreserved) here: http://www.alcor.org/BecomeMember/associate.html

ALCOR
LIFE EXTENSION FOUNDATION
SINCE 1972

Call toll-free TODAY to start your application:

877-462-5267 ext. 132 • info@alcor.org • www.alcor.org

Will You Be Alive and Healthy 10...20...30 Years from now?

Your best chance at achieving future immortality is to protect your precious health now so you can benefit from future medical breakthroughs. Staying informed about the latest health discoveries can mean the difference between life and premature death.

And the **Life Extension Foundation** can be your passport to the future. As the largest anti-aging organization in the world, we are dedicated to finding scientific ways to prevent disease, slow aging, and eventually stop death.

For more than three decades, Life Extension has been at the forefront of the movement to support revolutionary anti-aging research that is taking us closer to our goal of extending the healthy human life span indefinitely. We inform our members about path-breaking therapies to help keep them healthy and alive.

Join today and you'll receive these life-prolonging benefits:

- **A subscription to *Life Extension* magazine** ($59.88 yearly newsstand value)...Over 100 full-color pages every month are filled with medical research findings, scientific reports, and practical guidance about using diet, nutrients, hormones, and drugs to prevent disease and slow aging.
- Access to a toll-free phone line to speak with **knowledgeable health advisors,** including naturopathic doctors, nutritionists, and a cancer expert, about your individual health concerns. You can also receive help in developing your own personal life extension program.
- **Discounts on prescription drugs, blood tests, and pharmaceutical quality supplements** that will greatly exceed your membership dues. You'll receive a directory listing the latest vitamins and supplements, backed by scientific research and available through a unique buyers club.

FREE BONUS!

- ***Disease Prevention and Treatment* book** ($49.95 cover price)...this hardbound fourth edition provides novel information on complementary therapies for 133 diseases and illnesses—from Alzheimer's disease to cancer, from arthritis to heart disease—that is based on thousands of scientific studies.

Life Extension Foundation funds advanced vitrification and gene-chip research. Your $75 membership fee helps support scientific projects that could literally save your life.

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LIVE Healthier & Longer

LifeExtension FOUNDATION

Join today. Call toll-free 1-866-820-4967. Or visit www.lef.org/pim

Mention Code: PIM