

CRYONICS

4th Qtr. 1995

A PUBLICATION OF THE ALCOR LIFE EXTENSION FOUNDATION

Volume 16:4

How Secure is Your Cryonics Funding?



Read *The Funding Game* by Steve Bridge and find out

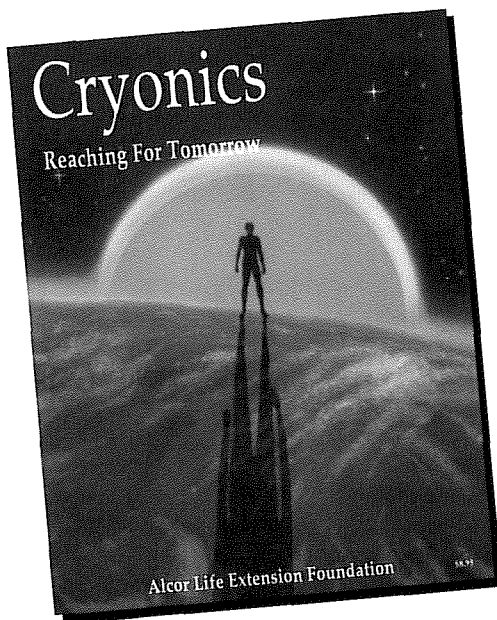
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\$4.50

“What is cryonics?”

Cryonics is the ultra-low-temperature preservation (biostasis) of terminal patients. The goal of biostasis and the technology of cryonics is the transport of today's terminal patients to a time in the future when cell and tissue repair technology will be available, and restoration to full function and health will be possible.

As human knowledge and medical technology continue to expand in scope, people considered beyond hope of restoration (by today's medical standards) will be restored to health. (This historical trend is very clear.) The coming control over living systems should allow fabrication of new organisms and sub-cell-sized devices. These molecular repair devices should be able to eliminate virtually all of today's diseases, including aging, and should allow for repair and revival of patients waiting in cryonic suspension. The challenge for cryonicists today is to devise techniques that will ensure the patients' survival.



“How do I find out more?”

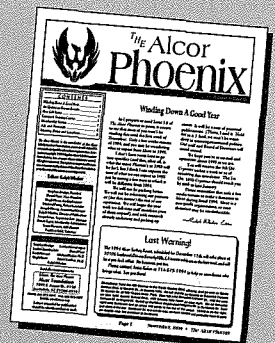
The best source of detailed introductory information about cryonics is *Cryonics: Reaching For Tomorrow*. Over 100 pages long, *Reaching For Tomorrow* presents a sweeping examination of the social, practical, and scientific arguments that support the continuing refinement of today's imperfect cryonic suspension techniques, in pursuit of a perfected “suspended animation” technology.

This new edition features an updated and lengthened chapter on revival, as well as the appendices “The Cryobiological Case for Cryonics” and “Suspension Pricing and the Cost of Patient Care.” Order your copy for \$7.95, or receive it FREE when you subscribe to *Cryonics* magazine for the first time. (See the Order Form on page 40 of this issue.)

For those considering Alcor Membership. . .

If you're intrigued enough with cryonics and Alcor that you're considering Membership, you might want to check out *The Alcor Phoenix*, Alcor's Membership newsletter. *The Phoenix* is a Membership benefit, so it's free to Members and Applicants, but anyone can receive it for \$20/year (\$25/year if you live overseas). It's released 8 times each year, on the “off months” of the quarterly *Cryonics* (February,

March, May, June, August, September, November, and December). *The Phoenix* is shorter than *Cryonics*, but appears twice as often and is mailed First Class. Being a Membership newsletter, *The Phoenix* focuses on Membership issues such as financing cryonics, staff and management matters, developments in Patient Care and Emergency Response, etc. These issues will impact you directly if you decide to become a Member, and may help you make a more informed decision in the meantime.



Feature Articles

**Alcor Member
Mona Dick Enters Suspension**
Tanya Jones

**Progress in
Assessing Cryonics Effectiveness**
Brian Shock and Hugh Hixon

The Prophet of Immortality, Part II
Derek Ryan Interviews Robert Ettinger

**The "Russian Trace"
in the History of Cryonics**
Michael V. Soloviov

**Post-Mortem Brain
Changes: A New Controversy**
Michael Perry, Ph.D.

**Notes
from the
President.....6**
Stephen W. Bridge

For the Record.....3
Michael Perry, Ph.D.

The Donaldson Perspective.....26
Thomas Donaldson, Ph.D.

COLUMNS

DEPARTMENTS

Membership Status.....16

Ads and Personals.....5

Meetings.....33

Up Front.....2

Reviews.....27

UP FRONT

BY RALPH WHELAN, EDITOR

It's a little hard to believe that 1995 is coming to a close. We're breezing past the halfway point of the final decade of this millenium. The year 2001 is no further away than the year 1990. The first generation in history who will live free of the threat of death from old age may already walk among us. Human eggs are being frozen successfully for the first time. Anti-aging specialists are saying—to the press—things like, "We may see practical immortality within our lifetime," (Dr. Ronald Klatz, president of the American Academy of Anti-Aging Medicine).

Technological and theoretical progress supporting the premise of cryonics have far exceeded the expectations of most of us. And yet, cryonics is only marginally more popular than it was at its inception, almost thirty years ago. (This excludes media coverage, which has been phenomenal. I'm talking about genuine *personal interest*.)

We all have our opinions about why this is so. My own is that most people will never be able to sit down and think rationally about the prospect of their own demise until a working solution has been *demonstrated*.

What's your opinion? We've gained many new readers since last we examined this dilemma in the pages of this magazine. Perhaps some of you will have new insights that will help us help others past the psychological obstacles.

Your insights could make a difference. Please consider sharing your thoughts on this fundamental issue via a Letter to the Editor, or even a feature article.

Dear Editor,

I was very interested in Bob Ettinger's interview in the last issue of *Cryonics*. He mentioned involving Funeral Directors and offering them an alternative to burial and cremation.

I think that this is a much more logical approach than our current tendency to rubbish their traditional services. Of course, there is bound to be mutual distrust. Imagine how Funeral Directors felt when after thousands of years of burials the new idea of cremation came along. If we give them the impression that we are in direct opposition to them, then it's only natural if they disparage cryonics in front of their customers. However, if we co-operate with them then surely we can all benefit.

I am sure this is the right way forward. Derek Ryan outlined the idea in the Ettinger interview; possibly using Care Service companies as intermediaries.

Can Alcor approach Funeral Directors with a carefully worded letter introducing our services and stressing that it would be financially worthwhile for them?

The alternative may be that we spend the next 20 years as a tiny fringe organisation with all that implies and 95% of the people will never know we exist. Even worse, Alcor may be bypassed by a larger, more commercially-minded company.

Incidentally, I think Alcor is doing an excellent job with a truly dedicated team.

David D. Flude
England

Stephen Bridge responds:

The Alcor team almost always works with funeral directors on suspensions, since funeral directors know local regulations and can help with permits and transportation and they are willing to rent their work space for a few hours. Some embalmers have been willing to work with us on the suspension procedures as well, and in some distant cases have done the basic procedures themselves, with telephone instructions. We know how important these services are, and we have never "rubbished" (in America we would say "trashed") their services. We see funeral directors as professional service providers, needed for cryonics as it is practiced today, and not as business rivals.

We have written many letters to funeral directors and we hope to advertise in some of the annual directories of the funeral industry as funds become available. A recent issue of *The Director* (official publication of the National Funeral Directors Association) was about Alcor and cryonics, listing the names and contact information for all of the cryonics groups.

That said, we would still like cryonics to move in a direction where, in the next decade or so, this is seen as a medical procedure and is increasingly performed by the hospitals. In the long run, such an approach is more likely to enhance the image of cryonics and much more likely to result in timely and superior suspensions. But until the "long run" arrives and maybe even then, we need to keep our friends in the funeral industry.

PUBLICATION NOTES

Cryonics is the quarterly publication of the Alcor Life Extension Foundation

Editor: Ralph Whelan

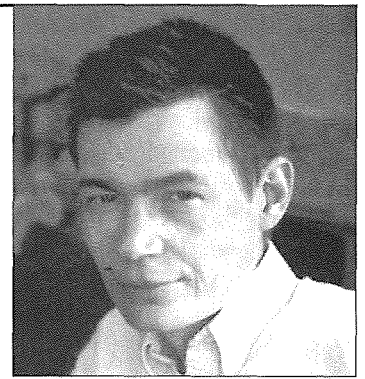
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About the Cover

The cover of this issue was designed by Ralph Whelan, using Aldus Freehand™, Aldus Pagemaker™, and Corel Gallery™.



The Man With the Broken Ear

In a preface to *The Prospect of Immortality*, Robert Ettinger's 1964 book that helped launch the cryonics movement, Jean Rostand speaks of a novel written just over a century before, in 1862. *The Man with the Broken Ear*, by the popular French writer Edmond About, chronicles a case of suspended animation and explores many of the issues that have been raised in our own times over cryonics. The book, a fine pioneering effort in science fiction, was intended as entertainment and is still very entertaining. (An easy search of a local library's files produced an 1867 English translation by Henry Holt, reprinted by Arno Press, 1975.) But the predominantly light-hearted tone offers a glimpse into prevailing attitudes about death and possible resurrection that are still much with us today, and which we need to better understand in our efforts to make the prospect of immortality more acceptable to others.

Like many a good yarn, it opens with a mystery of sorts—a hint of Something Strange that quickly grabs the reader's interest. Leon Renault, a young science student turned entrepreneur, by 1859 has made a respectable fortune through a mining opera-

tion in the Urals. Now he is returning to his home in Fontainebleu, France, where his parents and fiancée Clementine are eager to see him after his three-year absence. His homeward journey from Russia takes him through Berlin; his father wishes some memento from the estate, then being dispersed, of the late German naturalist von Humboldt. This is acquired, but there is a more interesting find—"a very fine anatomical specimen"—the preserved body of a French officer of the Napoleonic wars, nearly a half-century before.

Along with the mummy is a "very curious memoir" that tells something of his history. Victor Fougas—the man's name—was entrusted by Napoleon to deliver a secret document to one of his generals. Captured by the Russians, the handsome young colonel is to be executed as a spy. It is November, and in the cold of his unheated cell he is found one evening near death. The physician who examines him is a Professor Meiser who also has an interest in suspended animation and resuscitation. Up to then the main successes in this field had been with tardigrades, rotifers and the like; one should aim for something

Written in 1862, *The Man with the Broken Ear* chronicles a case of suspended animation and explores many of the issues that have been raised in our own times over cryonics.

grander. Realizing the man won't be alive long in any case, the German doctor performs an experiment in which the body is very carefully desiccated at near-freezing temperature, and says afterward that the man just died and the preservation was routine. Instead every precaution is taken to conserve the viability of the tissues, which assume a leathery toughness that protects against further deterioration—cold storage is unnecessary. Upon his request the professor is allowed to keep the body, and its journey begins.

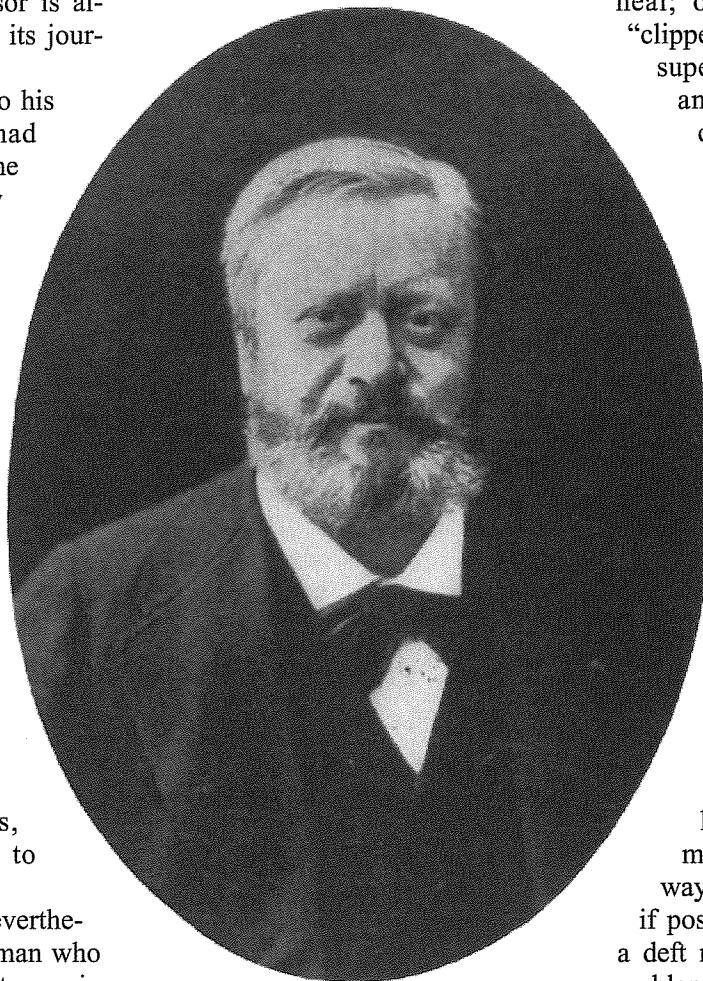
Young Leon explains it to his family. Though the man had been "sacrificed to science" the professor's aims were worthy ones: actually saving a life, since there was a chance of future resuscitation, and shedding light on a question of deepest interest to all.

"The duration of our existence is very much too brief," Leon continues. "... We know that in a hundred years, not one of the nine or ten persons assembled in this house will be living on the face of the earth. Is not this a deplorable fact?" People would like to see the tenth, twentieth or thirtieth generation of their descendants, though "it is useless even to dream" of such a thing.

"One will dream of it, nevertheless, and perhaps there is no man who has not said to himself at least once in his life: 'If I could but come to life again in a couple of centuries!' One would wish to return to earth to seek news of his family; another, of his dynasty. A philosopher is anxious to know if the ideas that he has planted will have borne fruit; a politician, if his party will have obtained the upper hand; a miser, if his heirs will not have dissipated the fortune he has made; a mere land-holder, if the trees in his garden will have grown tall. No one is indifferent to the future destinies of

this world, which we gallop through in a few years, never to return to it again."

The rationale of Professor Meiser in preserving the body was actually a reasonable one. As is explained, the body might be compared to a watch, in which the various parts are interacting to cause the functioning of the whole. Put the mechanism on hold, without any deterioration, and it should



Edmond About

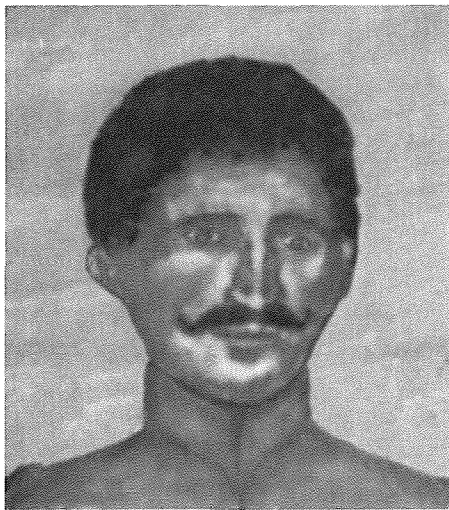
be possible to restart it at a later time. Not only that, but if the wait were long enough, ailments might be cured that originally had no treatment.

On examination, the body of Victor Fougas, though dried and shrunken, shows a remarkable preservation indeed, the handsome face having "a rosy tint which is not ordinarily seen in embalmed corpses." Clementine is strangely attracted, and cries out when

Leon accidentally breaks a piece off the man's ear. Some of this tissue is sent to a local biologist, and the report is most encouraging: there is no real sign of deterioration. So careful has been the preservation that, like the tardigrade, the cells become viable on moistening!

Finally, it's time to try this out on the rest of the body, which is more involved, but—Victor Fougas returns to life! A little dressing helps his ear to heal; otherwise, no damage! (The "clipped ear"—a demonic sign to the superstitious—later helps him in an amusing altercation.) Two complications immediately arise: the revived young officer returns the affection of Clementine, which threatens the impending marriage, and—future shock. Fougas is still a child of the Napoleonic era, his main passion—even more than a marital interest—is soldiering. Fougas remembers that *his* fiancée was also a Clementine and in fact bore a remarkable resemblance to the one now before him—though the former must be old if alive at all. He had been called away to war before the marriage could be performed and learned—just before his demise—that a child was on the way. He sets off to find these two, if possible. The quest culminates in a deft resolution of *Leon's* marriage problem—he and Clementine will wed after all—but there is the other problem of what Fougas will now do with his life.

That shouldn't be an issue. He has a military background, and with a bit of effort could adapt to this new era of Napoleon (the third, that is). The problem is, by chronology he's seventy, too old to serve! Never mind that biologically he's only twenty-five! Bureaucracy being what it is, it looks as if the regulations will win, but strings are pulled, all the way to the top. The



Victor Fougas

Emperor agrees to bend the rules a little ...

Here I think would have been a good place to end the story. Instead it goes on for a few paragraphs more, to "tidy up" in a manner common with older imaginative fiction. Life must go on as before, and anything too unusual must disappear or turn back into a pumpkin, so to speak. Scratch poor Fougas, the man out of time, who did what we cryonicists are hoping to do for real. Like many today, people in the 1860s didn't want to be told that "coming back" might be a serious option—except by the hand of God.

But on the whole the book is a light-hearted look at the problem of death and its possible resolution, that doesn't make *too* much light of issues that are important to us. It's remarkable enough that such a tale appeared so long ago, and I think it's well worth a read.

One final issue I'd like to address is that of cryogenic versus above-freezing storage. In the story a viable preservation occurs at ambient temperature—in this case through desiccation, by analogy with such creatures as the tardigrade who naturally desiccate and then revive upon moistening. (Tardigrades, which are tiny arthropods about a millimeter in length, have revived in this way after 100 years' dry storage though they didn't live long, probably due to oxidation that was still occurring in the dried state. This problem, though, could be avoided by storage at lower temperature.) Another possibility for ambient-temperature preservation is chemical fixation. Such methods would be nice—if there were sufficient retention of critical brain structures. You wouldn't have to worry so much about patients warming up or the cost of liquid nitrogen to keep them cold. But as yet there is no evidence of good brain preservation, compared to what

can be obtained through freezing. Most of us in cryonics would much rather be frozen than embalmed or mummified; however, the question of how good non-cryogenic preservation might be, or might become, is still unanswered. Like many other issues, it is a worthwhile topic for research, that awaits the necessary commitment of resources.

Advertisements and Personals

Cryonics magazine reserves the right to accept or reject ads at our own discretion, and assumes no responsibility for their content or the consequences of answering these advertisements. The rate is \$8.00 per line per month (our lines are considered to be 66 columns wide). Tip-in rates per sheet are \$140 (printed one side) or \$180 (printed both sides), from camera-ready copy.

EXTROPY: The Journal of Transhumanist Thought #15

Future Forecasts (Drexler, Benford, et al.), features on digital cash and denationalization of money, Roy Walford Interview, Profile: FM-2030, Bioenhancement: Melatonin, Consciousness and Spontaneous Order, and more. 60pp. \$5; \$18 for one-year sub. (\$22 Canada, \$32/\$24 overseas air/surface) from Extropy Institute, 13428 Maxella Avenue #273, Marina Del Rey, CA 90292. E-mail: exi-info@extropy.org

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Venturist Monthly News promotes immortalist philosophy. For free sample write: The Venturists; 1547 W. Dunlap; Phoenix, AZ 85021.

Do you want to keep up with science and technology bearing on cryonics? *Periastron* is a science newsletter written by and for cryonicists, only \$2.50 per issue. *Periastron*, 80-QN, Cabrillo HWY, #247, Half Moon Bay, CA 94019-2172.

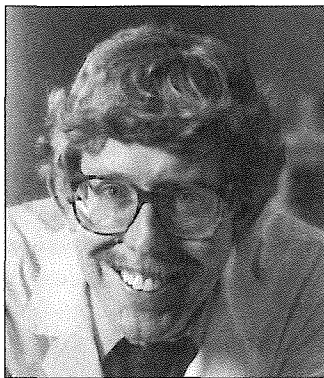
Are you still healthy? Want to delay suspension? A book for users of *Antiaging Drugs* tells the good and bad of each one. Send for free brochure. *Periastron*, 80-QN, Cabrillo HWY, #247, Half Moon Bay, CA

Alcor Cryonics Technology Festival

February 16-18, 1996

The Alcor Foundation is sponsoring a cryonics technology festival next February in Scottsdale, Arizona. Confirmed speakers for the festival include Ralph Merkle, Ph.D. (Report on Fourth Foresight Conference on Molecular Nanotechnology), Mark Voelker, Ph.D. (Alcor Research), "Father of Cryonics" Robert Ettinger (Cryonics Institute Research), Alcor President Stephen Bridge (Alcor current activity and future plans), Ben Best and Thomas Donaldson (Structure and Function of the Human Brain, and its Relevance to Cryonics), Paul Segall, Ph.D. (Normothermic and Hypothermic Blood Substitutes), Hal Sternberg, Ph.D. (Cryogenic Preservation), and Gayle Pergamit (the propagation of futurist memes).

Registration is \$55 before December 1, \$75 after that (including at the door). The registration fee includes some meals and all events, but does not include lodging. For more detailed information and a registration form, contact Alcor at 1-800-367-2228.



The Funding Game

"And now let's welcome our next guest, Charlie Smith! Charlie, for your first question: When you are pronounced legally dead, what will happen to your body?"

"Bob, I've chosen cryonic suspension."

DING!

"Good answer, Charlie! And what cryonics organization did you choose?"

"I chose Alcor."

DING!

"Right again! And what method of funding did you choose?"

"Bob, I placed a certificate of deposit in trust for Alcor."

DING!

"That's one of several possible right answers, Charlie. You are close to winning the jackpot. One more question, Charlie. Is that trust for Alcor revocable or irrevocable?"

"That's 'revocable', Bob!"

"Interesting answer, Charlie. Before we go on, can you tell us why you chose 'revocable?'"

"Well, I didn't want to give up control of my money."

BRZZZZZZZZ!!

"Ohhhh, I'm sorry, Charlie; that was the wrong answer. You ARE dying; you're confused by the medications; your sister just talked you into changing that account to be in trust for her; and Alcor CAN'T FREEZE YOU! You lose the championship and you do not get to return next week, or next century, or ever play another round. Now, Don, tell Charlie what consolation prize we have for our 2nd place finisher!"

"Charlie, for you we have a big, beautiful hole in the ground! And thanks for playing Life or Death, Charlie!"

The Big Game

Welcome to the big game. You're already in it, of course. In fact, you've been playing "Life or Death" since you were born. If you're reading this magazine, you've discovered this game just might be winnable. So why get down to the final minutes (of this round, anyway) and blow it on a technical foul?

Cryonicists have to pay for their

suspensions. You know that of course, because you're intelligent, decisive, and self-motivated. You investigate your options. You know that if you don't provide funding yourself, no one else is going to do it for you. And without that funding, Alcor cannot afford to perform your suspension—at least not without endangering the security of already-suspended patients and the stability of the organization as

a whole. So you know that Alcor cannot accept people as Suspension Members who do not have that funding secured pretty tightly.

And yet, some people expect us to overlook that security for *them*. They expect us to *trust* that everything will work out; that Murphy's Law won't apply to their suspension. So they ask us to approve their suspensions based on their *word* that they have plenty of

money, their families will sign it over, their houses are really worth a lot of money, they will never go bankrupt, etc.

Sorry; Alcor has been in this business for twenty-three years and we've learned many hard lessons — Murphy has his own office here. Times change. Some people aren't trustworthy. Some just don't get around to telling us about their financial changes. Some will even lie in order to save their lives. That's understandable, but dangerous for our organization.

The point of suspension funding is not to see how creative you can be or how you can make the same amount of money work three different ways at the same time or how you can keep total control every moment. The point is to make sure that *you get frozen* and that Alcor *gets paid* for it. Playing games with your funding can be as deadly as never signing up at all.

How Not to Make the Hall of Fame

As careful as we are, Alcor has still been burned by some funding situations in the past few years. Several weeks after we performed one neurosuspension, we discovered that the member had lied on his insurance application, which invalidated his life insurance coverage. We didn't get paid. In another case, our Transport Team was on stand-by at a hospital, prepared for a suspension when we discovered the member had changed his funding (an investment account "in-trust" for Alcor) to pay his *mother*, instead. She was *not* intending to pay us. Fortunately, he survived the illness.

In the early 1980s, new President Mike Darwin was reforming Alcor; and in examining the membership funding, he discovered just how dangerous too much trust can be. Several people who claimed to be suspension members and who appeared to be expecting Alcor to freeze them someday, in fact had cancelled their insurance policies and had *no funding at all!*

Incidents like these are why we appear to hassle members over the

security of their funding, and why we sometimes turn down their more "creative" ideas. We can't afford to go broke over one person. Too many other people, both warm and frozen, depend on us.

The Game Clock is Running

Another common problem is that, even in a case where the funding is very secure, it might take a long time before it is *paid* to Alcor. In a typical suspension, we will accumulate from \$20,000 to \$30,000 in expenses in the first three days. We pay some of these expenses as we generate them; most are due within thirty days. Unless we receive the suspension funding within thirty days, the money to pay those bills must come from our regular cash flow or our reserves. If we get two or three suspensions within two months, that can put a very heavy burden on our ability to pay our regular operating expenses, such as salaries, printing, electricity, and telephone.

This is why we do not accept minimum funding which is based on a will. Wills in most cases are not probated for months or, in some contentious cases, years. Also, wills are often challenged, and judges sometimes force changes based on family needs or their own prejudices.

We are currently in a minor conflict over the slowness of payment on a suspension. Irritating bureaucratic requirements in the member's home state (about which neither we nor the member previously knew) have created several months of delay, although not compromising the eventual certainty of payment.

Finding the Winning Strategy

Here are the methods we prefer members choose for their suspension funding. They are listed in the approximate order of Alcor's preference. The criteria are based on which methods 1) give Alcor the fastest access to the funding, 2) make it the most difficult for third parties to prevent Alcor from getting the funding, 3) make it easiest for Alcor employees to confirm the security of the funding, and 4)

are most likely to hold or increase the value of the funding amount.

Prepayment

This is the simplest, most secure funding method. The member simply gives Alcor the \$50,000 or \$120,000 now (or less if he or she was "grandfathered" in at a lower rate).

Alcor's Bylaws require us to invest that money in a government-insured account—typically a bank money market account or a Certificate of Deposit. We cannot use any of the funds until the member is suspended, unless the member gives other instructions. (For instance, one member has instructed us to use the interest generated to pay bills if a stand-by for him is necessary.) We *guarantee* that members who prepay their suspensions will never be subject to an increase in minimum suspension rates, since the donation will continue to grow through earned interest. The money can be returned to the member if he wishes to drop his cryonics arrangements.

The advantages of this for Alcor are obvious: the money can be withdrawn very quickly after the suspension; it cannot come under the control of a hostile relative; it can earn interest so that the total payout may stay ahead of inflation; it cannot be withdrawn or changed in any way without Alcor knowing about it.

These Alcor advantages are also good for the member. In some circumstances, advance payments may save inheritance taxes for the member's family by removing the money from the member's estate and by allowing the member a large charitable deduction at the time of the prepayment. (Caution: taking a tax deduction will create a monumental headache for both Alcor and the member if the member later cancels his suspension arrangements and wants Alcor to refund the payment.) Tax questions like these are very complex, so readers shouldn't rely on this bit of information, but should ask their own attorneys or accountants.

Partial Prepayment

If a member cannot or does not wish to prepay the entire amount, there is still a large advantage to combining a partial prepayment of at least \$25,000 with insurance or other funding for the rest. This still allows Alcor to pay the immediate bills quickly and contributes to our day-to-day stability. Whatever tax advantages there are will still be true for the lower amount.

Pay-on-Death Account

Many banks and investment companies allow investors to label some types of accounts as "pay-on-death to" or "in trust for" some individual or company. This allows the member to continue to gain the earnings of the account while securing it for rapid suspension payment to Alcor. If properly set-up, these accounts can be outside of the estate and not subject to probate. Of course, we require that the member make this designation of Alcor as beneficiary *irrevocable* or otherwise restrict the account so it cannot be changed without Alcor's knowledge. A caution: try to avoid mutual funds or other investments which could lose value below the minimum funding levels. Members who wish to designate such an account as payable to Alcor should start with some over-funding as a cushion against market drops.

Life Insurance

Actually, life insurance and trusts rank about equally. They vary greatly in the detail and in local regulations. Obviously a properly set-up insurance policy is better than a sloppy or improperly funded trust and vice-versa. Either way is acceptable if the member takes care to do it right. A few tips about life insurance:

- Life insurance has one very big advantage: no matter what the monthly premium is nor how long the individual has had the policy, the full death benefit is paid to the beneficiary when the policyholder dies. For people who do not have the full \$50,000 or \$120,000 available in one sum, life insurance may

provide the only way to fund a suspension. A good insurance plan will allow the total amount paid in to be much less than the minimum suspension funding. Insurance may not be the best funding vehicle for retirement income; but it is a very good investment for suspension funding. For more discussion on life insurance, see "Life Insurance Simplified" by Bob Gilmore and Mary Naples in the December, 1991 *Cryonics*. (Free reprints available.)

- Alcor must be the *beneficiary*. Many insurance companies will allow a buyer to apply for a policy which names Alcor as beneficiary from the first. Most other insurance companies will let a buyer apply for the insurance with his estate as beneficiary and then change it to Alcor once the policy is issued. Insurance laws require that the original beneficiary have an "insurable interest" in the person being insured. This was originally understood to mean that the beneficiary had more interest in the insured being alive than in being dead. Over the years, the interpretation on this has varied from company to company. Some insurance companies today take the very reasonable position that Alcor's legal paperwork creates an obligation toward the insured which is an insurable interest. In any case, the concept of insurable interest only applies to the *original* beneficiary. Once the policy is in force, the owner may change the beneficiary to whomever he wants.

Note that no suspension agreement is valid until we *confirm* that Alcor is the beneficiary. If you need to know how to approach a particular insurance company, please call Alcor's Membership Administrator, Brian Shock.

There have been a few companies over the years that have refused to allow Alcor to be a beneficiary under any circumstances. Any member that runs into an impediment like this should notify us immediately and we will refer the member to a more cooperative com-

pany.

- Do not lie on the policy application. Fraudulent answers (such as saying you do not have cancer or AIDS when you do) will allow the insurance company to avoid paying the death benefit, although usually only during the first two years of the policy. To watch for this problem, we require that you send us a copy of both your policy and your application for insurance.

- It is probably not worth the extra expense to get a "double indemnity" clause in case of accidental death. In most states in the United States, insurance companies can demand an autopsy before they pay on the accidental death coverage. Alcor is *not* going to agree to an autopsy merely to get the extra insurance. If your insurance company turns out to be generous and agrees that the evidence we provide is enough, then the extra money would be useful, of course. On the other hand, insurance companies are businesses, not charities, and they don't care whether your suspension works or not.

- All insurance companies allow you to split your policies between several beneficiaries. This is acceptable to Alcor; but it does increase our paperwork load in some cases, and the occasional conflict with other beneficiaries can delay Alcor's payment. If you have a choice, it is simpler for Alcor if you maintain a separate policy for your cryonics coverage.

What type of policy should you choose?

- *Term* insurance is relatively inexpensive when the member is young. However, it gets more expensive or decreases in value every year, which makes it impractical or prohibitive to retain by the time the member reaches age 50. Also, term insurance is typically for a particular "term" of years and so may terminate or no longer be available at the time the member actually needs it for suspension.

If you begin your suspension funding with term insurance, make sure the insurer guarantees it to be convertible to whole life insurance whenever you can afford to pay the higher rate. Some cryonicists have combined a term insurance which decreases in value with another investment vehicle which increases in value. This is fine, but it takes a lot of discipline to maintain. Most people who start this way discover that the automatic insurance payments are simpler to keep up with.

■ **Whole life** insurance is a policy based on the individual paying a set amount over a set period, then retaining coverage for his or her whole life. These premiums are much higher than for a term policy; however, in the long run a whole life policy will turn out to be much less expensive than a term policy in almost every case. The whole life policy's internal earnings usually will reach a point where the policy premiums can be paid from the policy itself. This may allow the insured to coast along with no payments required after the first 10 or 20 years. In most policies the eventual death benefit will begin to grow past the face value of the policy after many years, allowing a possible hedge against increased future costs of suspension.

■ **Universal life** policies may appear similar to whole life policies in an insurance agent's sales pitch; but they are designed differently. In some ways this is like a combination of term insurance and an outside investment account. If the insurance company's investment strategies are sound, the investment part of the policy will eventually outstrip the insurance portion and provide the same advantages of a whole life policy. If the insurance company *doesn't* do so well, the policyholder may be required to make payments many years longer than predicted originally. I have a universal life policy that appears to be doing very well; but some insurance agents have warned me re-

Alcor Transport Training Class

February 19-23, 1996 (after ACT Festival)

The Alcor Foundation is sponsoring a Transport Training Class to be held at the Alcor facility during the week after the ACT Festival (see page 5). Attendance is free, and all course materials will be provided.

We will be covering techniques employed by Alcor to minimize suspension damage during the stabilization and transport of Alcor patients. We'll also be providing hands-on instruction and practice. The course will cover transports from remote areas, with special attention being paid to what members can do before an emergency arises.

This course is simply your best opportunity to increase your awareness of transport techniques and help prepare yourself and others in your area for a cryonic suspension.

Any Alcor member interested in attending should contact Tanya Jones at Alcor by January 1, 1996. Attendance is limited, so reserve your seat soon.

cently that they believe universal life policies tend to be too risky for cryonicists. These agents believe that some of these policies will "collapse" from poor investments before the cryonicist has need of the benefits. We'd be happy to hear other opinions or real evidence from other people on this subject.

Recently, some insurance companies have been offering new combinations of insurance policies and investment accounts for sale. The unique aspect of these policies is that the policyholder controls most of the investment decisions (mutual funds, stocks, bonds, etc.). This may be an advantage for some cryonicists in that it allows a lot of control; with the disadvantage that the policyholder takes the risks of bad decisions.

Guaranteeing your policy

If Alcor is merely the beneficiary, that does not insure that the member won't change it again someday without telling us. It also won't protect Alcor against the member borrowing against the policy so that its death benefit drops below our minimums. Therefore, we also require that members take an additional step to make sure that no important changes can be

made to the policy without notification to Alcor. Insurance companies will rarely guarantee to notify a beneficiary if a policyholder makes changes. However, after some years of experimentation, we have discovered the following three basic ways that make it likely (although none are foolproof) that we can make sure members' policies remain in force. Members have to make their own choice of method depending on their own preferences and on which method the insurance company will accept.

1. Make Alcor the *owner* of the policy. This gives Alcor full control of the policy rights, while keeping the member insured. The member continues to pay the premiums. For some members, this can also have a large financial advantage. If the member owns the policy at legal death, the policy amount is added to the member's estate for the purposes of figuring whether estate taxes must be paid (although the death benefit still passes directly to the beneficiary and does not go through probate). If Alcor owns the policy, the policy amount is completely removed from the member's estate. *Alcor will give the member a guarantee that Alcor will return ownership of the policy to the*

member upon written request.

2. Make Alcor the *irrevocable beneficiary* of the policy. This means the policyholder can never change the beneficiary of the policy without written permission from the beneficiary. This assures us that we will remain the beneficiary until notified by you in writing that you wish to change the beneficiary. *Alcor will provide in advance a written guarantee that we will release all claims or rights as irrevocable beneficiary upon written request from the member.*

3. Give Alcor a *collateral assignment* on the policy. Basically, this gives Alcor a *lien* on the policy, so that the member owes Alcor the money as a debt, as well as beneficiary. Again, Alcor guarantees it will release the lien with written notice from the member.

In many cases, even with these three security methods, Alcor can also guarantee to sign documents allowing you to borrow money against the policy, as long as such a loan does not lower the death benefit below Alcor's minimum required donation level.

Trusts

A trust is an intangible legal entity (like a corporation or a partnership). Many people use a "living trust" (created while the originator—the *grantor*—is alive) to hold everything they own. A living trust allows the grantor to gain the economic and physical benefit of the property until death. Most of these living trusts are revocable, so the grantor can change them while he is alive. After the grantor's death, the trust becomes irrevocable. The trust can then distribute the property to the heirs without wasting the expense and time of probate.

Even after several years of accepting trusts for suspension funding, we do not have a standard form for these; and we haven't dealt with enough of them after suspensions to know what works best. We have seen enough to know that they have their own difficulties.

A revocable trust that pays the

suspension funding to Alcor makes us a bit nervous, since the member could revoke the trust or change the funding provisions without informing us. However, making the entire trust irrevocable leaves no flexibility for the member to make necessary ongoing changes. Some members have added language to their trusts to the effect that the provisions dealing with the Alcor suspension funding cannot be revoked without notification to Alcor. Even so, this depends somewhat on the good faith of the member and of the member's advisors.

It is also necessary that a trust be completed, not merely started. We have seen one situation where the member completed all of the trust documents and delivered them to us, yet did not complete the various other notifications necessary to place investment accounts into the trust. We were fortunate that the trustee was willing to put in extra effort to solve these problems after the member's suspension.

Real Property

Many of our members own their homes or other property that they won't need after they are in suspension. If they would like to leave real property to Alcor in a will or trust *in addition* to regular funding, this would be a good way to help Alcor. However, real property is not appropriate for initial funding, since it may take months or years after members' suspensions before their homes can be repaired and sold. Real estate is not our business, and even real estate agents don't fly all over the world selling houses. Remember, the problem is not strictly how *much* money Alcor gets. How *fast* it comes in is equally important.

Depending on Relatives

Alcor will not accept funding proposals that depend on generous relatives to pay the bill later. Systems like that put cryonics groups out of business in past decades. It doesn't work.

Getting Creative

We're willing to talk; but Alcor

cannot afford for members to be too creative with their suspension funding. Creativity means complexity and complexity leads to risk.

We will only accept suspension funding that is planned to be reliable and timely. Anything else violates our duty to our current and future patients, and it lessens the security of the "creative" member's own suspension.

Making the All-Star Team

The only way that you win the Funding Game is if you survive. You're more likely to survive if *Alcor* survives. Anything that you can do to make absolutely sure that Alcor gets paid—and gets paid *quickly*—gives you a better chance to win. Remember, this is not "You vs. Alcor." It is "You and Alcor vs. *Death*."

Make sure you win.



Alcor Member Mona Dick Enters Suspension

by Tanya Jones

I met Mona Dick in 1992, when I was assisting the Membership Administrator. Later, when she wanted to complete her cryonics arrangements, I went to her home to help with the paperwork. She was a lonely woman with no close family and few remaining friends. By this time in her life, Mona wanted little more than to be frozen after her death.

Mona had been interested in cryonics since the Seventies, and she had even contacted Fred and Linda Chamberlain about joining Alcor. While she didn't complete those arrangements until 1992, she remained a subscriber to *Cryonics* magazine and an avid follower of cryonics literature throughout.

It was a sudden stroke which convinced Mona it was time to stop simply subscribing and begin making arrangements to be frozen. Within a relatively short period of time, Mona went from a vibrant and active individual to someone who would no longer drive and had trouble getting around. It frustrated her to no end that her mind had been noticeably damaged and that her memory and function were failing. A successful cryonic suspension and reanimation became her only hope for a happy and healthy life, even if it might be hundreds of years before she would see it.

Early this year, Mona was hospitalized briefly. Derek Ryan and I were in the Los Angeles area performing a standby for another Alcor member

who was having surgery. We rushed from that individual's bedside (she was recovering nicely) to the Burbank hospital where Mona lay. We spoke to the emergency room physician and nursing staff about Mona's arrangements and found most of the personnel friendly and curious about cryonics. They filed Alcor literature for future reference, and assured us that they would assist in the prompt



release of the patient, should she be pronounced. Mona was released from the hospital the next day, and she hired a health care worker shortly thereafter.

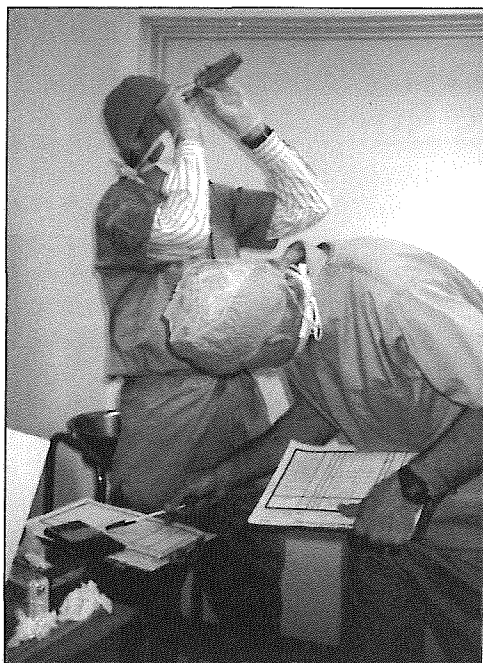
Mona never really recovered from her large stroke in 1992, and she suffered at least one apparent mini-stroke after returning home. And she refused to see a doctor for proper

diagnosis or treatment. This refusal to seek medical care and a desire to die may have both contributed to the circumstances under which she was ultimately suspended.

On August 8th, 1995, Mona Dick's healthcare aide entered her Burbank, California apartment to find her lying on the floor in a corner, seemingly the victim of yet another stroke. Her pulse was very slow, her breathing shallow, and she was unresponsive. Because Mona had stressed the importance of her cryonics arrangements, the aide called Alcor and the paramedics, who took her to a nearby hospital. She was pronounced legally dead at 12:21pm (local time).

The hospital personnel remembered Mona, and her unusual desire to be cryonically suspended upon her death. The same emergency room physician with whom I'd spoken months before called Alcor (using the number from Mona's medical identification bracelet) for instructions on how to proceed. At our request, he administered heparin and sodium bicarbonate, provided cardiopulmonary support to circulate the medications, and packed her head in ice.

Local transport team members were notified, and Regina Pancake delivered the local emergency response kit to the hospital and packed the rest of the body in ice, but was unable to stay longer due to a conflicting (and very busy) schedule. A delivery service picked up the patient



Mike Perry (background) checks glycerol concentrations, while Fred Chamberlain records the results.



Dr. Nancy McEachern (left) performs the open-heart surgery, assisted by Rhonda Iaccuzo and Hugh Hixon.

and the kit and delivered them to the mortuary.

Hugh Hixon and I flew to Los Angeles to perform the blood replacement. We tried using a "gravity flush" washout system that Hugh had been working on, which consists of a simplified circuit and reservoirs. The idea behind it was that a flush could be accomplished quickly and effectively with less equipment than is currently used. Gravity could provide sufficient pressure to perform the washout. It was the first field application of this system. We found that we couldn't raise the reservoir high enough to achieve an adequate pressure, so we discontinued our attempt and implemented the standard field washout protocol using a pump. We completed the washout late that evening.

Bureaucratic delays prevented us from transporting the patient until the following morning. (The Department of Health Services was closed during the evening. They issue the Transit Permits for human remains, without which no commercial airline would accept the shipment.) We had never encountered this particular problem before, and we are searching for a way to prevent it from happening

again. As it was, Mona didn't arrive at the Alcor facility until the following afternoon.

The suspension team was assembled when she arrived, and the surgery began almost immediately. During the open-heart surgery, Dr. McEachern found that Mona's vessels were severely atherosclerotic. This caused the surgical team to take great care when placing the cannula, as the walls were brittle and could rupture unexpectedly. Fortunately, the cannulation proceeded smoothly and the perfusion was started at 8:08pm (local time).

Her cryoprotective perfusion was uneventful, and the final Molar glycerol concentrations were high (5.49M burrhole sample taken 15 minutes before the end of perfusion, 7.51M arterial, and 6.01M venous) The cooldown to liquid nitrogen temperature was also without incident.

Mona is the 30th patient, and the 19th neurosuspension patient, being cared for by Alcor.

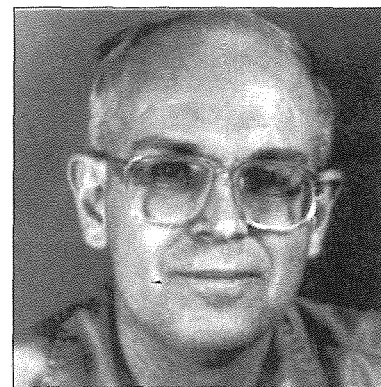


I'd like to thank the following individuals for their assistance with this suspension:

Dr. Nancy McEachern
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 Hugh Hixon
 Rhonda Iaccuzo
 Derek Ryan
 Fred Chamberlain
 Linda Chamberlain
 Judy Muhlestein
 Dr. Michael Perry
 Scott Herman
 Brian Shock
 David Handley
 Lisa Ferrington
 Matthew Sullivan
 David Pizer
 Joe Hovey

Progress in Assessing Cryonics Effectiveness

by Hugh Hixon, with Brian Shock



How well does any given cryonic suspension procedure preserve brain tissue? This question has bothered cryonicists from the very beginning, but answers to it have always been scarce and uncertain.

Alcor Life Extension Foundation was started in 1972, primarily to provide a cryonic suspension for Colonel Frederick Rockwell Chamberlain, Jr., father of Fred Chamberlain, III, half of Alcor's founding couple. As ill as Colonel Chamberlain was, he managed to hold on until 1976, when he became Alcor's first suspension patient. Neither Fred and Linda Chamberlain nor their team had ever performed a cryonic suspension. They knew what any cryobiologist knew at the time, that replacement of the water in living tissue with some type of cryoprotective chemical might prevent serious freezing damage. They hoped that perfusing glycerol through Colonel Chamberlain's circulatory system would offer his entire body similar protection to what cryobiologists had observed on a small scale. But Alcor's first suspension team could only hope—they had little hard evidence to support their educated guess.

Then, around 1978, the Chamberlains met Jerry Leaf, a UCLA researcher who had privately worked on the problems associated with cryonics for several years. Leaf agreed to use his knowledge of surgical technique to help Alcor test the efficacy of its first suspension. Over the next few years,

Jerry Leaf and others associated with his company, Cryovita, performed a number of experiments reproducing Alcor's methods on dogs: perfusing the animals with glycerol, freezing them, and then examining the preservation of the frozen tissue on a microscopic level. While Leaf's work seemed to indicate that bodies treated in this way fared better than non-cryoprotected bodies, the evidence was still flimsy.

At this point, the work of Leaf and others branched away from preservation as criterion for success, and began to focus on resuscitation models. Since suspended animation was (and continues to be) the ultimate goal of cryonics research, it only made sense to focus on techniques for cooling and resuscitating experimental subjects. Then too, resuscitation provided a dramatic test for the biological safety of suspension procedures, though it applied only to the sequence of procedures prior to freezing. Most cryonics experimentation during the 1980s followed this lead, with unfortunately little progress.

In 1993 Mike Darwin (a friend and coworker of Jerry Leaf, and owner of the cryonic services company BioPreservation) returned to the basic question of preservation in cryonic suspensions—how well did current protocols preserve microscopic brain structures that presumably encoded memory? To test this, Darwin performed suspensions on three dogs

using current techniques [1] shared by BioPreservation and Alcor. Notably, each of these animals was subjected to five minutes of warm ischemia after cardiac arrest, simulating what often constituted the minimum time lag between clinical death and the moment a cryonics remote standby team could actually begin treatment. Darwin cooled the experimental animals to -90°C . and maintained them at that temperature for eighteen months before taking tissue samples for analysis. Tissue samples from two control animals were also prepared, one before cryoprotective perfusion and the other afterward (neither control was cooled).

While Darwin's experimental animals rested in suspension, Robert Ettinger of Cryonics Institute was working in conjunction with Drs. Yuri Pichugin and Gennadi Zhegunov of Kharkov University in Ukraine to evaluate the effectiveness of CI's simpler protocols for suspension.

Following Ettinger's instructions, Pichugin and Zhegunov perfused sheep heads with glycerol, cooled them slowly to -196°C , and then thawed them within forty-eight hours for analysis [2].

Later experiments also used sheep brain sections of varying freshness (that is, different intervals after the time of the animal's death) soaked in graduated solutions of glycerol and

Concluded on page 19

The Prophet of Immortality

Part II

*Derek Ryan concludes his interview with cryonics pioneer
Robert Ettinger*



Bob: Of course, we could talk for a long time about how well the funeral directors can provide the actual physical services [for cryonic suspensions]. I won't go on and on about that. I'll just say very briefly, as I've said before, that in my opinion, regardless of how complex our procedures become, (and I'm willing to grant that very likely they will become more complex), funeral directors are capable of performing any specific procedure that an MD surgeon can, and do it a whole lot more economically. We think that's going to be the way to go, and there are other obvious advantages. You have a virtually infinite network of local, available people. You don't have to depend on anyone flying from distant parts of the country or distant parts of the world to do the work.

Cryonics: *Clearly that's one of the disadvantages of having a specialized team that has to come out, rather than having a generalized procedure that could be dictated over the phone more or less.*

Bob: I'm not talking necessarily about a procedure that can be dictated over the phone. I'm talking about one that might require considerable advance training beyond the usual mortician's training, and might require a little

more equipment than the mortician has on hand. That equipment can be put in place, that training can be provided. Once it's in place, it will be enormously more economical on the one hand than having MD's do it, and on the other hand having traveling specialist teams do it.

Aside from the economy, it's extremely important to save the time. In our sheep head work, we've found that the promptness of the perfusion was even more important than the exact composition of the perfusate.

Cryonics: *Can you elaborate on that?*

Bob: Well, I don't have any numbers in my head, but as a qualitative statement, it's a clear consequence of our observations that within pretty broad limits, it's more important to do the washout and perfusion promptly than to stick to any percentage of cryoprotectant in the perfusate or whatever.

Cryonics: *Can you tell me a little bit more about this? Of course you've published in The Immortalist what's been done so far on your sheep head work. You've gotten some interesting results. Can you briefly summarize that, and maybe give a little view as to where you're going with this and what your future hopes are for research with the Ukrainians?*

Bob: Well, the work that Andy Zawacki and I did a couple years ago on the sheep heads was pretty crude in some respects, but mainly we wanted to try some of the ideas that had been suggested in the literature and see which ones actually seemed to work for us. We had found that the reports in the literature were not particularly reliable and one could not necessarily expect to get the same results that others said they got. We wanted, like any responsible people would, to see what would happen when we did it ourselves. On that basis, we tried a lot of different concentrations of glycer-

ine and tried a whole lot of different additives, some of those recommended by Mike Darwin and other people. Some of them, we found, did not make any perceptible difference or were worse, or provided negative results rather than positive. So partly on the basis of simplicity and partly on the basis of our empirical observations, we arrived at a certain procedure. It was also restrained to some extent by our capabilities, because there was a limit that our equipment and training would allow us to do.

We got relatively no cracking, and we got good reperfusion after the brains had been frozen in liquid nitrogen and then thawed to room temperature. We were able to get visible reperfusion of the blood vessels of the brain. This was on a naked-eye level. Then we wanted to get our results on a microscopic level, which we were not equipped or qualified to do. So we engaged Dr. Pichugin his colleagues in the Ukraine to do that for us. They got a series of electron micrographs, and we shared those with Greg Fahy Mike Darwin, Thomas Donaldson, and Paul Segall, if I remember correctly. Mike and Greg did not think our results looked anywhere near as good, generally speaking, on the electron micrograph level, as some of their work did, although they agreed that there was no cracking. There are still a great many ambiguities in the interpretation of those things. Everyone agrees that it's very difficult to tell when the defects really occurred and what caused them, whether it was the type of perfusion, the rate of cooling, the type of rewarming, or the nature of the attempted washout. All of those things can produce the differences.

Then again the question in each case was, is there a real difference or was it an artifact of the method of preparation or study? So those things remain to be sorted out but the good part of it is of course that in the past couple of years, at least, cooperation has improved between the various organizations and Cryonics Institute.

We are perfectly willing to share our results with anybody and we do so. For example, with the Ukrainian work, we publish everything they give us verbatim without omitting anything. We have also supplied the original color photographs to some of the people who wanted to see them, including Alcor and Biopreservation and Greg Fahy. I'm not sure whether I sent them to Paul Segall and BioTime. I have heard them say they got some good results with hamsters recently, cooling down to liquid nitrogen temperature with good reperfusion and no cracking. I haven't actually seen any details, but I think there is currently a report by Hal Sternberg and *The Trans Times* which was posted on CryoNet and they have some interesting things to say.

But getting back to the main point. Number one, as I say, the cooperation is improving; Mike Darwin has sent us copies of a bunch of photos he generated, and as I said, we're willing to share our work with anybody. Of course the Ukrainians have agreed to discuss or share their work and publish it anytime they choose. The most recent Ukrainian work has been with rabbit brains and they got apparently some pretty interesting results in both spontaneous and evoked bioelectric activity. Integrated activity (that is, activity integrated among many neurons) was observed after cryoprotected specimens were rewarmed from liquid nitrogen temperature. There was a failure of such activity without cryoprotective perfusion, even after freezing to as high a temperature as 10 degrees below zero, Centigrade. This appears to extend and broaden the work of Suda, Akito, and Udachi in the '70's. This will continue, and they intend also to apply their instruments to human brain slices, to which they have access. They're going to go on from there and recommend procedures they think will improve results.

As time goes on, and as the interpretation of the actual facts moves closer to consensus, we intend to adopt

the procedures that the evidence shows will reduce risk or will improve the probability of revival. If these procedures turn out to be too expensive to fit our current Cryonics Institute suspension fee of \$28,000, then we will obviously have to offer these more elaborate procedures as a more expensive option. This again will raise questions which could be debated endlessly. Alcor's position, of course, as I understand it, is that you must offer the procedure within your capabilities which you think will reduce damage, regardless of cost, and that's all there is to it. On the other hand, one could take the point of view that if there is a second or third best proce-

cedure that still offers some chance of revival, although perhaps with a lower probability, both business and moral-ity dictate it should also be offered.

Cryonics: *It's certainly a complex question: whether we should be offering a range of procedures separated according to cost and sophistication, or whether it's better to choose to specialize in one kind of procedure. It does seem quite possible that current and future research will eventually lead to more complicated procedures, and that these procedures will cost more, maybe even more than Alcor's current minimums.*

mies, I note that CI has never raised its suspension prices. Alcor's current minimum for whole body is \$120,000. The suspension procedure itself runs somewhere between \$25,000 and \$35,000, and the minimum placed into the Patient Care Fund to cover long term storage costs (with suspensions funded at the \$120,000 rate) is \$70,000. Could you briefly explain why you feel that CI's \$28,000 fee is enough to pay the ongoing costs of keeping a person in suspension?

Bob: Before explaining that, I need to preface it with the reminder that our minimum fee is just that — a minimum. It's not the average fee. When, for example, a Ford dealer wants to sell an Escort or a Taurus or a Crown Victoria, he loses money on the Escort but he makes money on the Crown Victoria. But he still keeps selling the Escort. A whole lot of people, even if they could get by with an Escort, would nevertheless choose the Crown Victoria. A great many people will prefer the higher-priced model even if they don't need it. They like it because either they're willing to pay a premium for that extra little bit of luxury or else they like the prestige or whatever reason. It's not extremely hard for the dealer to jawbone the customer into a higher-priced model.

By the same token, it's not extremely hard for a cryonics organization to jawbone the customer into a higher priced-model (if there are higher priced models; I'll get back to that in a moment) or persuade the member that he should fund his suspension at a level above the minimum. All organizations in fact do that. Alcor certainly recommends that the member fund at a higher level than the minimum because they point out that they don't know what costs are going to be in the future. CryoCare advocates that members fund at a higher than minimum level for the same reason: they don't know what costs are going to be in the future. We recommend funding above the minimum level because

Bob: If some billionaire wanted to right now, he could gather a team of a few hundred surgeons and a couple dozen cryobiologists, and say, "Go review the cryobiological literature (and do whatever research is necessary) and find the best methods for freezing separate types of tissues and cells. When I die, you're going to dissect me into ten thousand parts and each team will take a part and apply the procedure that is optimal for that type of tissue. Then in the future all those parts will be viable and all you have to do is wait for the time that I can be reassembled, and not for the time that freezing damage can be reversed, because the freezing damage is already reversible." However, there aren't too many billionaires, and those that are around aren't too interested anyway. So that's all meaningless.

Cryonics: *While on the topic of cost and econo-*

Membership Status

Alcor has 373 Suspension Members, 573 Associate Members (includes 65 in the process of becoming Suspension Members), and 30 patients in suspension. These numbers are broken down by country below.



Country	Members	Applicants	Subscribers
Argentina	1	0	1
Austria	2	0	0
Australia	12	1	7
Canada	11	2	37
Costa Rica	0	0	1
Denmark	0	0	1
Estonia	0	0	1
Finland	0	0	1
France	0	0	2
Germany	1	2	1
Holland	0	0	2
Ireland	2	1	0
Israel	0	0	1
Italy	0	2	2
Japan	0	0	3
Lithuania	0	0	2
New Zealand	0	0	2
Russia	0	0	5
Spain	6	0	0
Sri Lanka	0	0	1
Sweden	0	0	1
Switzerland	0	0	1
Taiwan	0	1	0
U.K.	17	4	12
U.S.A.	321	52	423
Ukraine	0	0	1
TOTALS	373	65	508

we're not certain what costs are going to be in the future either, and because it improves everyone's chances if the organization has more money. Of course it's a perfectly honest position and a lot of people buy into it. Several of our patients have funded far above the minimum, and my wife and I have even *prepaid* our suspension fees at slightly above the minimum. (In addition to that, CI will get virtually everything we have out of our estate after we're both suspended.)

But then getting back to the minimum suspension fee, how do we break that down? Well, back in 1976 we figured that it would cost about \$8,000 to prepare a patient: \$5,000 for a cryostat or his share of a cryostat, and about \$3,000 for the funeral director and the cost of the materials involved in the perfusion. Then \$20,000 would be available, and at 5% interest that would provide about \$1,000 a year which would be enough to buy liquid nitrogen. And for our other costs, in addition to liquid nitrogen, those would be covered by the relatives.

Obviously in the very earliest years we did not expect that all overhead would be covered, even though our overhead was extremely low in comparison to other organizations. A lot of our services are supplied gratis by officers and directors. Alcor's are too. [Dave] Pizer works for nothing and a lot of your people work for nothing or much less than they could get elsewhere. Of course I work for nothing and Pat Heller our treasurer, who is a CPA, works for nothing, and so on. We have only one full-time paid employee, and in a crunch we could get by with no paid employees. We don't pay any rent; we own our properties free and clear. Our overhead, which is already very low, could become even lower. So we knew that basic fee would keep the organization and its overhead going, but we anticipated there would be some time required for growth.

We never had a negative cash flow because someone always made up the

money, same as happened with Alcor, same as happened with other organizations (except Bob Nelson's, of course, which conked out). But for most of the organizations, somebody always supplied the money needed. Alcor has repeatedly asked for donations and repeatedly gotten them. CI has not asked for donations so frequently and has not been so successful in getting them when it has asked for them, but we have had donations.

"It would be wonderful if we could have some discussion among all the various organizations that are doing research, so that we could plan together to some degree, set priorities for research to be done, and have some agreement on the particular aspects of procedures. Then we could move more quickly toward consensus on what the facts are regarding the effects of various cryonics protocols."

There were years when my son and daughter in law were donating \$10-15,000 a year to keep things going. Mae and I have donated money over the years on a more or less continuous basis. Other people have too.

Now as far as the coverage of expenses by our basic minimum fee, at the present time and in the future when we have some additional patients, we think that will work out all right. There are some economies of

scale. We have 14 whole-body patients at present, plus two dogs and two cats. It's interesting to note that our original estimates of costs have held up well over the years. In 1976 we figured \$5,000 per patient capital cost for the cryostat. That still holds up. Our most recent cryostat was built for 12 people, and at the same approximate cost, \$5,000 per patient. In fact I understand that's roughly at the cost of the Alcor Bigfoot [dewars], roughly \$5,000 per patient. The cost of liquid nitrogen has remained about the same in spite of inflation. Now, as I said, we're building bigger cryostats that are going to give us bigger economies of scale and as soon as we get more patients we will not need more personnel in caring for those patients. Our existing personnel will be able to care for scores of patients. Of course if we get hundreds, we might need one or two more people, maybe, but our present building is 7000 square feet and we can accommodate hundreds of patients.

Now, incidentally we are in the process of testing a new kind of insulation. I don't know if you recall this, but there's been talk over the years of using rigid open-celled foam for insulation. The advantage of rigid open-celled foam is that the insulation, when evacuated, is about the same, but it will support a one-atmosphere load. Now at the present time, using Perlite, we have to either make our cryostats cylindrical to withstand the one-atmosphere pressure when the annular space is evacuated, or we make them rectangular, which we've done with the last two or three, and we have to use heavy external or internal bracing. With our first two rectangular ones, we used internal bracing, which of course compromises the insulation quality. With our last one, we did not use internal bracing but we used heavy external bracing. Of course that heavy external bracing adds to the cost.

The new open-cell foam we are looking at is from Japan. A fellow from Canada, Douglas Skrecky, put

us onto an article in a technical journal about this foam and we got in touch with these people—Akeda was the company. They sent us samples of the foam and we're in the process of preparing a unit to test that. We should have results in two or three weeks, I imagine. If that turns out to work well, we might use it to reduce our costs even more, if it can be obtained at a reasonable price—that's a crucial point of course—either by getting it shipped from Japan, or by getting a license (if there is a patent) to manufacture it here ourselves.

Cryonics: *You're fond of bringing up that CI has the most whole-body patients, and so perhaps the most patients in some sense (since most of Alcor's patients are neurosuspensions). This brings up the question of neurosuspensions. My understanding is that at first you were against neurosuspension and that over time perhaps your position has softened on that. Can you give me a little perspective?*

Bob: I don't think I was ever against it. I was against it as a matter of CI policy because in the first place prices are so low already that from a practical standpoint it wouldn't matter much on a price basis whether we offered it or not. But I thought originally and I still think it represents a public relations negative. As you're well aware, a great many people, even though it's totally illogical, think of cryonics as being somewhat macabre and revolting and so on. Obviously you can walk into any hospital on any day of the year and see a thousand sights much more revolting and macabre than a cryonics patient, either in suspension or being prepared. But nevertheless, regardless of logic, a lot of people do think that the whole idea is somewhat repellent. When you talk about neuro, you multiply that by a thousand in their minds. As far as I know, Alcor has not suffered particularly from it being known that they do

neurosuspensions, but nevertheless we didn't think it was necessarily desirable for CI to offer them and we still don't. If it turns out that we want or need to adopt much more expensive procedures, at that time it may be necessary for us to offer the neuro option in order to keep it affordable. We also have an agreement with CryoCare whereby we are willing to accept their neuropatients for suspension under appropriate circumstances. But we don't offer it as a CI option per se.

Cryonics: *On the whole, I certainly agree with you that it is a public relations negative. But I think I could make a reasonable argument that one of the reasons Dora Kent's case became so public was that she was a neurosuspension. It certainly contributed to the sensationalism—the tabloid nature—of the story that it was a frozen head and not simply a frozen body. Of course much of the publicity we got was negative, and yet it seems to be true that even that negative publicity ended up helping Alcor by generating an unprecedented volume of info requests and follow-up stories—some of which were not negative—by other media.*

Bob: That's quite right, of course, and it's extremely difficult to predict psychological effects. If there was any person in the world who could reliably predict what would sell and what wouldn't, he'd rule the world, or he'd be the richest person in the world at any rate. These things are extremely hard to judge. Of course, we prefer to be a little bit conservative. Sometimes negative publicity helps, but on the other hand if you go too far in that direction you get a Trygve Bauge position: "Just spell my name right and I don't care what you say about me." We don't subscribe to that. We think that negative publicity by and large is to be avoided. In fact, I would not be too unhappy with no publicity at all, just work through word of mouth

and the funeral directors and so on. I wouldn't care much if there weren't any more newspaper stories or television broadcasts or whatever.

Cryonics: *You don't think that those stories bring us new members?*

Bob: I think they probably do, yes, to some extent, but it's not clear to what extent. The people who have been exposed to television and radio and print journalism are in the hundreds of millions, whereas the number of inquiries is at most only in the tens of thousands, and the number of members is less than a thousand. So, to what extent it has an impact is difficult to say.

Cryonics: *I can give you a little bit of perspective from our own numbers. We seem to be seeing more people signing up who are just out there on their own, who have never met a cryonicist, never been to a cryonics meeting, who read about it in Omni or whatever. This is the thing they were looking for, and they finally saw it in a news magazine or on TV, and finally decide to contact us and sign up.*

Bob: Yes, the publicity certainly is useful from that point of view. You have to think about the gestation period. There are a great many cryonicists today who had some exposure to cryonics many, many years ago, formed a favorable opinion or a tentatively favorable opinion, but for the usual reasons didn't do anything about it until they eventually had their memories jarred (by some media piece) and decided it was time to do something about it. We have a number of people like that, people who joined CI after a hiatus of many years. In fact we have people who joined CI in just recent years who say they read *Prospect* fully thirty years ago, thought it was a good idea, always intended to do something about it, but never did until some little bit of publicity or some accident of one kind or another jarred their

memories and spurred their activity. So from that point of view alone it's certainly a useful thing.

Cryonics: *You were saying you wouldn't be all that unhappy...*

Bob: We're obviously going to do anything we can to get any kind of favorable publicity, but if for any reason the broadcast and print publicity were to dwindle, that wouldn't worry me too much.

Cryonics: *One last thing I want you to talk about: your impending move to Phoenix (in September) to retire.*

Bob: We're looking forward to moving out there. As I mentioned, I will remain involved in CI's day to day affairs, coordinating the overall policies of CI and the research. But we think we'll like it there and we'll be glad to have you people available. I expect we'll get together quite often.

In fact, I know there are at least two or three functions already planned in the coming months that we plan to attend. The main thing I'm hoping for in terms of inter-organizational cooperation after we get out there is that we'll be able to work together to a much greater extent in coordinating research and sharing results and possibly even planning research in such a way as to avoid too much overlap and duplication of expense. It would be wonderful if we could have some discussion among all the various organizations that are doing research, so that we could plan together to some degree, set priorities for research to be done, and have some agreement on the particular aspects of procedures. Then we could move more quickly toward consensus on what the facts are (regarding the effects of various cryonics protocols), and the individual organizations as well as their members would be able to make reasonable decisions on a cost/benefit basis. But

for now, and in the coming months (and for the next year or two) my main hope is that we'll be able to coordinate research efforts so as to make them more effective and to make our progress more rapid.



Continued from page 11:

frozen as before [3]. Light microscopy examination showed little evidence of the tissue "cracking" so prevalent in most cryonics research up to that time. Electron microscopy was inconclusive regarding cellular level preservation. After seeing these results, cryonicists from a number of organizations expressed doubt about penetration of glycerol into the tissue samples. They suggested that perhaps cracking failed to appear because unprotected tissue had filled with masses of tiny destructive ice crystals rather than forming large frozen blocks. Nevertheless, minimizing warm ischemic time for the tissue did seem to improve preservation in general.

Thawing and electron microscope study of Darwin's long-frozen experimental subjects in 1995 yielded a less equivocal outcome. Darwin noted a "striking difference" between his work and previous brain cryopreservation

studies—an "overall recognizability, inferrability, and even 'normality.'" Cellular structure of glycerolized frozen neurons appeared "almost indistinguishable" from cellular structure of non-glycerolized, non-frozen neurons, and "virtually indistinguishable" from cellular structure of glycerolized non-frozen neurons. (Cracking was not an issue, since it rarely had been observed at temperatures of -90°C and above.)

Although Darwin's experiments were cause for optimism, they were hardly conclusive. Many cryonics patients have undergone periods of warm ischemia far longer than five minutes, and almost all have been stored at a much lower temperature of -196°C. Still, the prognosis for Colonel Chamberlain and dozens of others in his situation looks progressively more hopeful. Alcor continues its own research program, now in cooperation with the for-profit CryoSearch

company. With luck, courage, and hard work, it may be possible not only to confirm the preservation of current cryonics patients, but also to improve the suspensions of future ones.

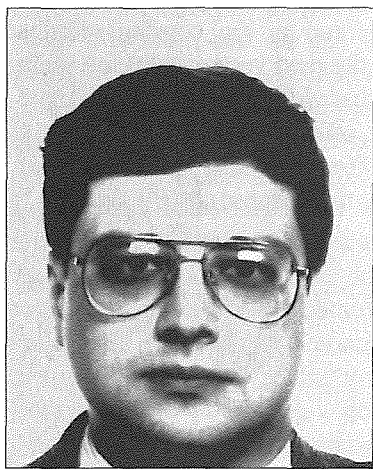
Footnotes:

(1) CryoNet message #4468, SCI.CRYONICS BPI Tech Brief 16: Canine Brain Cryopreservation

(1/2), "Human CryoPreservation Protocol on the Ultrastructure of the Canine Brain," by Michael Darwin, Sandra Russell, Larry Wood, and Candy Wood.

(2) The Immortalist, August 1994, "The Influence of Glycerol Perfusion and Reperfusion on the Structure of Sheep Head Brain Tissue," by Dr. Yuri Pichugin & Dr. Gennadi Zhegunov.

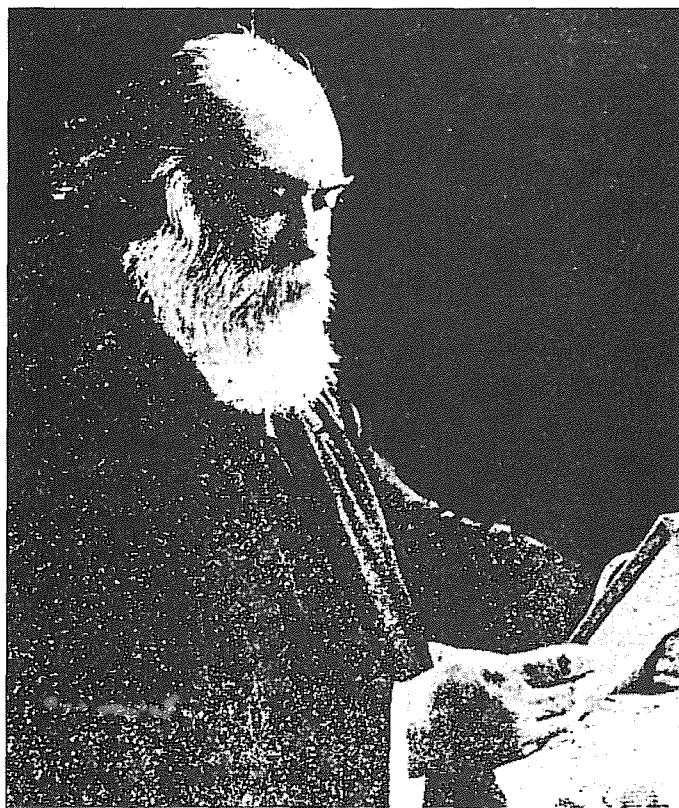
(3) The Immortalist, September 1995, "Histological Evaluation of Cryopreserved Brain Pieces of a Sheep," by Dr. Yuri Pichugin.



The "Russian Trace" in the History of Cryonics

by Michael V. Soloviov

Porfiry Bakhmetiev (1860-1913) was a Russian physicist and amateur entomologist. In 1901 his article "A recipe to live until the 21st century," was published in the Russian popular scientific and instructional magazine, *Natural Science and Geography*[1]. At the end of the 19th century Bakhmetiev taught in Sofia University in Bulgaria as a physics professor. On the side he experimented with freezing and thawing of



Porfiry Bakhmetiev

butterflies, and published several scientific papers on the subject. He concluded that there is some measurable time interval between being frozen and being dead. He thought this interval should exist in the higher animals, too: using appropriate techniques it might be possible to freeze and thaw them safely. In his article he proposed a program of research for this purpose, and also wrote that an advanced freezing technique could be applied to humans to put them in "anabiosis" for the purpose of life extension. Finally, in 1912, he got money for such research, and started with bats and rabbits. But this promising beginning was cut short by his untimely death the following year[2].

Later Peter Schmidt would become the most famous Russian anabiosis researcher. In the first (1923) edition of his book *Anabiosis* [3] (where Bakhmetiev's portrait is on the first page), Schmidt notes that Bakhmetiev's ideas were well known in Russia, that Bakhmetiev himself had aided their propagation significantly. Schmidt's verdict was that Bakhmetiev's anabiosis was not a proven idea, but could work in principle.

Comment: In the Russian scientific literature the term "anabiosis" (proposed in 1873 by W.Peyer [4, p.5]) is used instead of "biostasis". Schmidt [3] wrote that, in Greek, "ana" means "up", "bios" means "life"—thus the exact translation gives "reviving". He subtitled the first edition of *Anabiosis*, "The phenomenon of reviving." I even found the term "cryoanabiosis" [4]. Goldovsky in his 1981 book [4,

p.99] also mentioned Robert Ettinger's "The prospect of immortality"—but as a fantastic idea. Especially he was amazed that Ettinger discussed the economic problems of human freezing. The best-known advocate of immortality in the '60s (a botanist, and even he was referred to as a cosmist [5]), was the late chairman of the Byelorussian Academy of Science, Vasily Kuprevich. But when he mentioned Bedford's freezing, he considered the idea absurd [6]. Also, a modern Russian immortality philosopher, Igor Vishev, ironically mentioned Bedford's freezing [7, p.188].

Schmidt also connected Bakhmetiev's ideas and those of the eighteenth-century English scientist and surgeon, John Hunter. Schmidt wrote that, using some advanced, sophisticated freezing technique (based on Bakhmetiev's proposals or other developments) it would be possible to realize Hunter's dream of life prolongation through freezing. He quoted Hunter as follows (I took this from the English-language source [8, p.84], where the reference to the original work [9] is given; and abridged it to conform to the quotation given in Schmidt's book):

I had imagined that it might be possible to prolong life to any period by freezing a person in the frigid zone, as I thought all action and waste would cease until the body was thawed. I thought that if a man would give up the last ten years of his life to this kind of alternate oblivion and action, it might be prolonged to a thousand years: and by getting himself thawed every hundred years, he might learn what had happened during his frozen condition.

Thus Schmidt's realistic, scientific style and his reference to Hunter (people usually trust old ideas more than new ones) made Bakhmetiev's ideas more credible and, I think, more popular.

Also (and to my mind, especially) Bakhmetiev's ideas were well known among the poets of the day. Back then, poetry in Russia meant even more than rock 'n roll in the West in the '60s and '70s. All ages and classes were involved—it was the core of

cultural life.

There was also a "biocosmism" movement in Russia in the '20s—rather small and spread mainly among poets. Biocosmism was founded in 1921 in Moscow; in early 1922 the biocosmists published their manifesto in the official government newspaper *Izvestia* [10]. Their then-current goals were: (1) cosmic (space) flight; (2) personal immortality; (3) resurrection of the dead. Definitely, they were influenced by the philosophy named "Russian cosmism" or simply "Cosmism." Semenova [5] even considered them the most radical of the cosmists.

Comment: Cosmism is a Russian philosophy (however close to the ideas of Henri Bergson and Pierre Teilhard de Chardin). Though united in one philosophical stream, the cosmist authors were only labeled as such by historians much later, in the '60s [5]. The best known cosmists were Nikolai Fedorov, Konstantin Tsiolkovsky, and Vladimir Vernadsky. The basic idea of cosmism is active evolution—aimed mainly to reach personal immortality and to colonize cosmic space. The cosmists however did not have the goal of practical immortality to be implemented now—only in the far future. In addition, the main idea of Nikolai Fedorov's philosophy is the resurrection of the dead to be carried out by some advanced human (or *posthuman*, in more modern thinking) civilization. This idea of resurrection now has a modern scientific rationale, in the work of Frank Tipler [11]. Many cosmists (and biocosmists—as I think) were imprisoned and killed in the '30s and '40s.

There were two main groups of biocosmists, one in Moscow, headed by Alexander Agienko (penname: Svyatogor), the other in St.Petersburg, headed by Alexander Yaroslavsky. Their publications include the two newsletters "Biocosmist" (Moscow, 4 issues) and "Immortality" (St. Peters-



Vladimir Mayakovsky

burg, 1 issue only, subtitled "The Organ of the Northern Group of Biocosmists (Immortalists) and the Committee of Biocosmist Poetry"). In addition there are several issues of collected works under the heading "Biocosmism," and many small booklets of poetry. The biocosmists had the goal of personal immortality, physically and scientifically, and (contrasting with the cosmists) looked for methods to implement it right now. They considered Bakhmetiev's low temperature anabiosis as the most promising approach. A planned lecture and article by Korovin, an assistant of Professor Bakhmetiev, were announced in "Immortality" [12]. One of Yaroslavsky's poems was the "Poem of anabiosis" [13] about the biocosmist revolution to come—I translate several strophes from different parts as follows:

*The threat of blue heaven fails to spill
the power that we hold.
Anabiosis's host will
tomorrow freeze the world.*



Nikolai Federov

*Everyone is a saint who lives,
ugly, pretty, stupid, clever—
freedom-loved eternity gives
a warrant to live forever.*

*The state hand won't touch the close and
far countries in North and South—
Philistine's Congress is frozen
in Washington in the White House.*

The biocosmists in their poetic ideals were close to the futurists. Futurism also was an avant-garde poetic movement—one of the most powerful of that time. One of the most famous futurists was Victor (Velimir) Khlebnikov—the greatest experimenter with the Russian poetic language. However the biocosmists considered him one of their own—mainly because of his poems, as Khlebnikov died in 1922, when the biocosmists had just gotten started. Also Khlebnikov's poems were regarded as versifying Fedorov's ("Russian cosmism's") philosophy. Many other futurists were also influenced by Fedorov [14]. Boris Pasternak, one of the best Russian poets and a Nobel laureate, was also among the futurists of this time.

But the top-ranking futurist of them

all was Vladimir Mayakovsky, born in 1893. By popular opinion (and almost officially) he was also the leading poet of the Soviet Communist Republic (soon to become Empire) in the '20s and '30s. His verses were published in *Izvestia* [15], when the biocosmists were also publishing their manifesto, and he must have known Alexander Yaroslavsky [16, p.391]. Mayakovsky shot himself in 1930.

He was a very good poet, one of the all-time best.

Mayakovsky knew Fedorov's ideas and was influenced by them [17, p.159]. In 1920 Mayakovsky said about the future in a private talk: "I'm absolutely sure there will be no death. The dead will be resurrected."

[17, p.154]. And in early 1923 Mayakovsky finished his poem "About this" [18], where he mentioned the idea of human-made resurrection:

*Not for me
to query on which and what.
I see,
I see it clearly,
to a dot!
Air on air,
as if it's stone on stone,
impervious
to crumbling and rust,
it towers beyond the ages,
all aglow,
the workshop for reviving human dust.
Here he is,
the chemist,
silent,
lofty-browed,
wrinkling his nose,
a new experiment contriving.
Through the World Who's Who
he leafs
and thinks aloud:
"20th century.
Let's look who's worth reviving.
Mayakovsky...
surely not among the brightest.
Decidely,
his face is far too plain."
Then from today's worn page
I'll holler to the scientist,
Stop turning over pages!*

*Make me live again!
Put a heart in me,
knock thought into my
skull,
pump blood into my veins —
give me new birth.
I had no chance of loving,
living to the full.
Believe,
I didn't get
my earthly share on earth.*

In 1928 Mayakovsky wrote a short, satiric play, "The Bedbug" [19]. A fire disrupts the 1929 marriage of Prisypkin (Pierre Skripkin) who, in the winter cold and the confusion of the fire-dowsing, is frozen in the cellar. Fifty years later—still frozen—he is found, thawed and revived by the Institute for Human Resurrection. (A professor of the Institute notes that Prisypkin is in a state of anabiosis.) Prisypkin is placed in a zoo, along with the bedbug who lunched on him and was also frozen with him and thawed. Indeed, the play is named for this insect which symbolizes the philistines and petty bourgeoisie (the "bedbug" on the "body" of the proletariat). Prisypkin was an extremely stupid and negative character—and it's possible Mayakovsky "revived" such a person to emphasize that every living human (and even the bedbug!) must be resurrected in the future. In 1931 "The Bedbug" was staged in New York. The speech that the Chairman of the Institute makes during voting on the resurrection of Prisypkin is of interest:

*Hello! Hello! This is the Chairman
of the Institute for Human Resurrection speaking. The motion has been circulated by telegram and discussed. It is clear and simple. At the junction of 62nd Street and 17th Avenue in the former city of Tambov a brigade digging a foundation has discovered an ice-filled cellar at a depth of seven meters underground. A frozen human figure can be seen through the ice. The Institute thinks it is possible to resurrect this individual who froze to death fifty years ago. ... The Institute considers that every worker's life*

should be utilised up to the last second. ... Let me remind you that after the wars which swept over the world, the civil wars which created the World Federation, human life was made inviolable by a decree of November 7, 1965. ... Fully aware of my responsibility I put the motion to the vote. Remember, comrades, remember and once again remember: We are voting for a human life!

About a year before this, Mayakovsky wrote a scenario, "Forget a fire-place" [20], where essentially the same plot is described at greater length. A hero falls out the window during a fire in winter. He lands on a sledge, horses drag it across a vacant field, and he falls again—into somebody's ice-cellar, which is equipped to store ice even in summer. Frozen and forgotten for twenty-five years, he is finally found and resurrected. This plot is similar to a story from Bakhmetiev's article [1], about a man who is frozen accidentally in a field and then is found and resuscitated.

Definitely, Mayakovsky had to know Bakhmetiev's ideas. It was no mere chance that he used the device of freezing with later revival to transport Prisyupkin into the future.

Evan Cooper, one of the founders of the cryonics movement in America in the '60s, knew about "The Bedbug" and was influenced by the idea to transport people into the future by freezing [21]. He wrote [22, p.13]:

The germ suggestion has occurred perhaps many times in imaginative literature, later to be reinforced by scientific research. One location is in Mayakovsky's "The Bedbug." A proletarian lout on a binge with some of his friends is frozen to death by his own carelessness in a Moscow suburb for some fifty years until he is revived by a scientific resuscitation group. The resuscitation is rather crude, reminding one of some Frankenstein movie, but is meant to be a comedy with serious overtones, and the outline of the method is there.

Similarly the outline can be used by the rest of mankind until such time

as automata and the scientists figure out a perhaps superior way of maintaining life. Just as the body in the comedy is frozen, so it would appear, in lieu of any better suggestions, that this would be the best way for us to proceed. Present scientific research seems to indicate this would be the best way, in general, to store the body until techniques of resuscitation and the postponing of death are perfected. This method of freezing is then a possibility for eventually defeating death.

Thus Bakhmetiev's ideas bore fruit in America some 60 years after they were first proposed.

Two questions arise: (1) Why was Cooper interested in Mayakovsky (did he or his parents emigrate from Russia)? And (2) who influenced Neil R. Jones, author of "The Jameson Satellite," a 1931 tale of resuscitation that inspired the young Robert Ettinger?

Acknowledgement

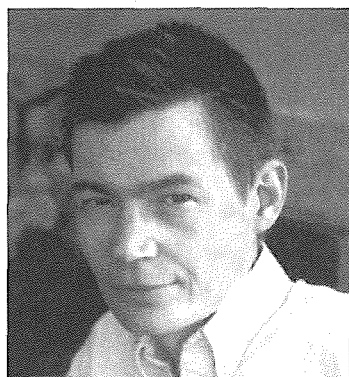
I am very grateful to Mike Perry for his help in preparation, editing and publication of this article. Indeed his article [21] encouraged me in this small investigation.

About the Author (by the Author)

I am a biophysicist, life extension researcher, and immortalist from St.Petersburg, Russia. I realized in childhood that I wanted to be immortal. To reach immortality I decided to become a scientist—to search the possibilities for this goal. I researched several possible approaches to life extension and in 1993 concluded that in the next 20-30 years there will be no viable methods but cryonics. Since then I've promoted cryonics in St.Petersburg with help from the American cryonics organizations. In May 1995 I and several other interested people created the VITA LONGA Society (for cryonics promotion). To contact me and VITA LONGA you may (1) mail to: P.O.Pox 301, St.Petersburg 196244, Russia; (2) call: +7 812 2991625; (3) e-mail to: binran@glas.apc.org (for M. Soloviov).

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Postmortem Brain Changes: A New Controversy

A drama has been playing itself out over the past several weeks. It started September 14, when a posting of Doug Skrecky [1] appeared on CryoNet (the electronic cryonics news service maintained by Kevin Q. Brown, kqb@cryonet.org). In it Skrecky says, "Lowering temperature is an ineffective means for preserving bodily structures. After death brain structures in particular are rapidly degraded. Even at 4°C after blood flow is interrupted to the brain almost 50% of dendrite spines are destroyed within 4 hours. After 24 hours this figure rises to 74%. Fortunately only 4% are lost over the first 45 minutes post mortem—probably because it takes a while for brain cells to die." [2] Needless to say all this, if substantiated, would signal major worries for cryonics. Patients often are stored for many hours at near-freezing temperature, before freezing can start.

Dendritic spines are tiny outgrowths of the dendrites of a neuron in the brain that form synaptic junctions with axons. The axons in turn carry signals from other neurons, so the synapses are the vital communication link between the neurons that enable the brain to function. Loss of dendritic spines has been observed in senile dementias such as Alzheimer's disease [3] and appears to be a factor in the substantial loss of memory and other mental deterioration that is seen.

On first reading, the reference cited

by Skrecky [2] appears to confirm that substantial degradation of dendritic spines was occurring, over 4 hours or less, at near-ice temperature. (The study was done with guinea-pigs stored for intervals ranging from 5 min. up to 24 hrs. postmortem. Brain tissue was then removed and prepared for microscopic examination, through fixation and staining, using one of the standard techniques.) I wrote an article, originally posted to CryoNet, which has now appeared elsewhere in different versions, raising doubts as to whether today's cryonics patients could be reanimated [4]. There has been a flurry of responses, the general consensus being that research into better cryonic techniques must continue, though we should not give up hope even for today's (and yesterday's) patients.

Since then I've reviewed other literature which offers a rather different and more optimistic picture. It appears that the particular technique used to look at the tiny structures of the brain is crucially important in deciding which changes are occurring and in what amounts. The contention that "dendrite spines are destroyed" under the conditions and in the percentages recounted by Skrecky, is not warranted by the evidence that is presented. Instead it appears that the apparent degradation can be attributed to the preparation technique that was used, which is known as the rapid

Golgi method. (This does not mean that destruction of the spines or other structures is precluded, just that the spine counts do not give a reliable indicator of how much retention and loss is actually occurring.) An alternative technique, the Golgi-Cox method (despite the similarity of names it is very different!) gives generally much better results. (The rapid Golgi method is advantageous in certain circumstances, e.g. unlike the Golgi-Cox method it works with formalin fixation, which is very widely used. Under good conditions it also is better at showing dendritic spines.) A study has been done comparing the two methods [5]. I quote the abstract.

"Comparisons were made between the results of applying the Golgi-Cox and rapid Golgi techniques to human brain tissue obtained at autopsy. Adjacent blocks of hippocampal formation and precentral gyrus [a brain convolution] from nine cases were prepared by the two methods. The cases ranged in age from 39 to 99 years, had postmortem times for sampling ranging from 6 to 28 hours (h) and included cases of dementia of the Alzheimer type. Without exception, the methods produced very different results. The Golgi-Cox method resulted in impregnation of many neurons with rich dendritic plexuses and normal overall appearance. Occasional cells appeared grossly atrophic with irregular somata and apparent

loss of apical and basilar dendritic segments. With the rapid Golgi method, the vast majority of impregnated neurons exhibited such grossly atrophic appearances while few, if any, impregnated neurons had rich dendritic plexuses or were otherwise normal in appearance. Thus, the rapid Golgi method appears to be highly sensitive to postmortem delay or other factors which accompany studies involving human brain tissues obtained at autopsy. The Golgi-Cox method appears to be relatively insensitive to such factors."

It's important to keep in mind that the two methods were applied to tissue from the same subject, taken under the same conditions (e.g. postmortem delay), and as nearly as possible identical. (The staining techniques, being irreversible, preclude using the same piece of tissue for both methods, but very similar, adjacent tissues were used.) When one method consistently shows preservation of a structure, even if, as here, the other shows degradation, it means *the structure must have been present* before either method was applied. These results are consistent with other findings such as the recent study by Mike Darwin et al. which reported good preservation of neuronal structures, including dendritic spines, with postmortem metabolic support and high-glycerol perfusion prior to freezing [6]. So—good news for cryonics, though we must not become complacent. We don't know, for example, how memory is stored in the brain or just *how* delicate the relevant structures are. The results with the rapid Golgi method show that *some* postmortem changes are occurring. The results with the Golgi-Cox method suggest this may not be a problem from the cryonics standpoint—we can be hopeful, in the face of our uncertainty.

But we must bear in mind that, after all, cryonics may *not* work or, at any rate, may not work as well as we'd like. We'll have to keep this in mind until either a lot more is known about important personality elements such as memory in the brain, and how it is

affected by the suspension protocols in use, or until reversible suspended animation is achieved.

On the other hand, the findings about dendritic spines could be quite important in another way. The rapid Golgi method could furnish a useful indicator of early postmortem changes, and thus, of how good our preservative techniques are (i.e. how much they deviate from the ideal in which there would be *no* postmortem changes.) More specifically, dendritic spine counts could furnish a *quantitative* measure of the efficacy of our preservation, though naturally such a result would have to be used with caution.

Another point worth making is that a technique for looking at brain tissue that does not rely on fixation would be desirable. One such technique is MRI, which is capable of resolving structure at the cellular level, though probably it would have to be developed further before the finer neuronal structures could be seen. (MRI should have the advantage too, that the *same* piece of tissue could be examined repeatedly to chart its specific postmortem history, which is impossible with fixation-based methods.)

In any case, research *must* move forward, both to add to our knowledge and, most importantly, to find ways of resolving whatever problems exist. (Other incentives, for those able to support research, is that it could have medical or other beneficial applications and possibly generate sizable income.) Meanwhile I would advocate taking more seriously the idea of storing documentary information about yourself, to assist in reanimation if the brain preservation isn't good enough.

The dendritic spine study appeared in 1983, and the study comparing the two preparation methods a year earlier. It is remarkable that over ten years has elapsed without more notice being taken of the possible implications for cryonics. There is, apparently, a great deal of other mainstream scientific literature with potential rel-

evance. (A Medline search under "postmortem brain" showed over a thousand titles for the last three years alone. "Neuroprotective" produced over 700 entries for the same period.) More literature searching on our part is called for. We can't expect others to inform us, even if there are critics who would also be glad to know about scientific problems with cryonics. Science is pretty compartmentalized, and the number who take seriously what we are interested in (survival beyond the biological limits) is still astoundingly small.

I thank Hugh Hixon, Thomas Donaldson, and Joe Hovey for their assistance in preparing this article.



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Immortalism

Readers who have been with Cryonics for some time will know of Alan Harrington's book, *The Immortalist*. Harrington even devoted a chapter to cryonics, though he was pessimistic about its success. In later editions of *The Prospect of Immortality* Ettinger even denigrated Harrington, not for talking openly about immortality but for concluding that it was something for our descendants rather than ourselves. Yet as an exploration of human responses to death Harrington's book still deserves attention. In some ways he looks more deeply than Ettinger into those responses, and how they appear in literally everything human beings (even cryonicists) do. For a while, it even gave its name to a movement (and we still see this in the title of the Cryonics Association magazine). As a book, *The Immortalist* was also the statement of a credo, and an effective one. Regardless of anything else he says later, Harrington's book begins with a statement which still rings out: "Death is an imposition upon the human race, and no longer acceptable."

It's now almost 30 years since Harrington published *The Immortalist*. Since then, some interesting things have happened. The first of them came with the attempt to invent words for our goal which might not be quite so all-encompassing: "emortalism," "life-extension," "anti-aging," and others. The argument for such words based itself on two claims: first, that true immortality was impossible, and sec-

ond that our aim might be more publicly successful if we did not talk of immortality but of something less extreme. To these claims I note first that logical arguments have shown that literal immortality is *not* impossible in the sense of contradicting any firmly established principles of physics or biology; and second, that despite all these pleas that a more modest statement may attract more to cryonics, I note that despite all such modesty cryonics remains one of most minority of minority movements.

I am an immortalist. And I agree with Harrington when he says that death is an imposition upon the human race, and no longer to be accepted. Yet that isn't really the end of the matter. We can view immortalism from two sides: the moral side, and the realist side.

If I say that death is no longer acceptable, I do not make a statement about what we can do *now*. In the sense that death still occurs all around us, we must accept its presence or deny reality. Yet it remains terribly deeply wrong, no matter to whom or what the cause may be. It should be the aim of medicine to keep all human beings in good health *forever*. That is, *all* human beings, not just those who are especially virtuous or bright, deserve to live forever. And by forever I do not mean centuries, or millenia, or geological ages, but *forever*. And to the extent that they do not work towards such a goal, doctors fail in their trust.

Immortalism is a moral position. It is not a statement about what is or is

not practical now. Aims are not the same as Reality. Anyone who argues that we should work, say, towards "life extension" because it is closer and more attainable as a practical achievement mistakes the basis of immortalism. The kind of cryonic suspension we have now takes us only a few steps towards our ultimate goal. Life extension takes us a few steps more. Reversible freezing (or vitrification) is only another step. As immortalists we work toward such achievements not as final goals but because we exist now in a world in which we can take such steps, and know they will take us forward. They are only small steps towards our forever. Total abolition of aging will be only one more step. Even a means to store copies of ourselves elsewhere, an idea from many old myths, will still be only a step. And as we walk along this road, we'll find many other steps, not yet imagined, exist beyond these, too. That comes directly from our aim.

And finally, yes, many people alive now will never get that life towards which we are working, even though they deserve it as much as us. Our immortalism does not ask us to give up our chances at life so that some other person might replace us: we all deserve life equally, no one more than another. Even many cryonicists may well not attain that life. Everyone living now deserves food, but some will starve. That is reality, too. And reality is often hard.

A Guide to Anti-Aging Drugs

By Thomas Donaldson, Ph.D.

Periastron Books, 1994

Reviewed by Russell Cheney

A Watershed

This book is a vastly important watershed for longevists.

This succinct volume marks the first comprehensive, objective analysis of all drugs and nutritional supplements (prescription and non-prescription) having, and purporting to have, a beneficial effect on human aging. Donaldson identifies, in his unique cutting informal prose, the significant known benefits and drawbacks of each drug and nutrient, based on reviews of well over 150 scientific journals and books.

There is no sales hype here; there are no marketing gimmicks. Drugs and nutrients that are highly touted in the popular press are given no mercy from Donaldson's objective scrutiny. As a consequence, be prepared for some provocative surprises!

Because of Donaldson's scientific background, he is able to shine a penetrating objective light on which drugs and nutrients may indeed help you in the long-run, which probably will have no lasting effect, and which may actually cause you harm.

The Approach

A Guide to AntiAging Drugs discusses each selected drug and nutrient individually, in sufficient detail on the most-promising, to assist the reader in determining whether that specific item is of possible consideration for their own circumstance. Similar drugs and nutrients are compared and contrasted. Additional sources of information on each drug and nutrient are provided, facilitating one's own decision-making process.

The book is oriented to practical application, including discussion of appropriate dosage, the best sources, and analysis of possible side-effects. The volume itself is bound as a loose-leaf notebook, with each chapter-page num-

bered independently, to facilitate the updating process. Appendix 1 is a helpful layperson's discussion of pertinent biochemistry.

Donaldson offers an updating service for \$5, to "inform you of any new developments about the drugs discussed as new discoveries may be made." Donaldson uses "drug" to include nutrients. This reviewer highly recommends the update service.

Quotables

We Must Do It Ourselves:

"No [antiaging] drug will get anything close to proof of effectiveness until years after we ourselves have reached old age, and many of us have died." (Chapter 7, page 1.)

Personal Criteria

"For my own personal choice, I have set three criteria which a drug must meet before I will consider it at all:

1. There must be a substantial case that prolonged intake of the drug will not cause harm at dosages which will be theoretically effective on aging. 2. The drug must have been shown to increase lifespan of some *mammal* in a controlled experiment. 3. The drug must be obtainable without great expense or a need to manufacture it myself." (Chapter 7, page 1.)

Biochemical Interference

"It is simply untrue that we can maximize our chances of longevity by taking large doses of all known drugs, since many of these may interfere with one another." (Chapter 5, page 4.)

"If we try to hold off aging by taking many drugs, all of which show some ability to delay aging, we may lose lifespan instead of gaining it." (Appendix 1, page 6.)

Donaldson's book addresses this interference dilemma.

Health

This book was described as a vastly important watershed for longevists. It is. It is an equally important keystone for those interested in long-term health. The reason is that all of the drugs and nutrients that extend life do so through a process that most of us would describe as healthy: some form of disease reduction. One can get into philosophical discussions about whether a specific drug or nutrient achieves its life-extension benefits by affecting "true" metabolic aging mechanisms, but the bottom line for the individual is that for these drugs and nutrients to be effective, they have demonstrated disease-reduction.

In other words, whether you live longer because your maximum healthy life-span is increased, or you live longer because of specific disease-reduction, you have benefited either way.

Testing

Where appropriate, Donaldson discusses what drugs and nutrients could be tested further under what circumstances for the benefit of further clarifying the action, dosage, side-affects, and ability to shed light on fundamental aging mechanisms. Taken as a whole, these suggestions comprise a valuable guide to highly-beneficial future research, especially to the longevist community.

Index

The current edition of the book does not come with an index. An index would be quite helpful to provide complete references for all discussion of a particular drug, nutrient, disease, etc. This reviewer made a nine-page index for his own use. The index is available free to anyone sending a self addressed stamped envelope to:

AntiAging Index
Russell Cheney
5618 Ruby Place
Torrance, CA 90503

Avoiding Dementia

*Russell Cheney reviews a presentation
by Professor Carl Cotman, Ph.D.*

This article contains insight into the avoidance of certain aging diseases.

Of interest to both the cryonicists and non-cryonicists are observations on cardiovascular-disease reduction, to help increase the quality of life as well as to extend it. In addition, there

are a number of insights into recent research relating to dementia-avoidance which will be of interest not only to those seeking a longer and healthier life, but also to those desiring to bring into the future the healthiest-possible brain.

This article is a review of Carl

Cotman's June 1, 1995 presentation "Alzheimer's Disease: A Research Update," given to the Alzheimer's Association of Orange County. Professor Cotman, Ph.D. is the Chair of the University of California at Irvine's Medical and Scientific Advisory Board, and is a world-renowned neuroscientist.

See the lexicon below for brief definitions of related terms.

Lexicon of Dementia

AD: Alzheimer's Disease

Alzheimer's Disease: A progressive degenerative disease of the brain that ultimately results in mental deterioration. AD is usually seen in older people (in fact, the disease was originally called "senile dementia"), but it may begin in middle age. Victims of AD exhibit wide-spread cognitive deficits, including memory loss (particularly for recent events), short attention span, and loss of orientation to their environment. AD is one form of dementia.

Dementia: Personality-changing loss of memory that may progress to devastating reduction of judgment, motor skills, and emotional control, generally believed to be caused by brain neuron damage. Major forms include Alzheimer's Disease and multi-infarct dementia (numerous tiny/small strokes).

Growth factor: Nerve growth factor; a protein naturally secreted by certain cells of the developing embryo in the neuron maturing process.

Microglia: Nerve-supporting cells with relatively long processes (arms). Microglia help protect nerve cells by engulfing invading microorganisms and dead neural tissue.

PCD: Programmed Cell Death

Critical Summary

Recent research has demonstrated an increasingly strong commonality among factors decreasing the risk of both cardiovascular-disease and dementia, including exercise and the use of anti-oxidants and anti-inflammatories.

Presentation Review

It is estimated that currently in the United States 12% of the 65-year-old population has dementia, and over 50% of the 85-year-olds, primarily Alzheimer's Disease (AD). About \$100 billion is spent annually on health care for AD patients, and \$350 million for AD research. That's less than one half of one percent for research. Wouldn't it make more sense to apply

a larger percentage of the resources to solving the root of the problem? Research is now a resource-limited solution.

With aging, beta-amyloid peptide protein accumulates inside and outside the cells, notably in certain critical portions of the brain. The amyloid has been thought to be inert. The results of a quite recent experiment at UCI have shown this amyloid to be deadly to nerve tissue.

Aging's accumulation of beta-amyloid peptide, and oxidative damage, appear to drive apoptosis, an active process termed Programmed Cell Death (PCD), versus passive cell death which is termed "necrosis." It has been recently found that the PCD process has a number of check points, similar to trashing a file on a home computer, where you are given a series of opportunities to prevent the loss of the file prior to its ultimate deletion. In PCD, these check points represent potential target intervention opportunities to slow down the cell death process.

Microglia cells help protect nerve cells by engulfing invading microorganisms and dead neural tissue; they also attack nerve cells that are beginning to show signs of break-up. Recent research has demonstrated that anti-inflammatory drugs appear to slow microglia's role in undesired PCD.

Medical science's ability to identify people with a high probability of developing AD later in life has recently improved markedly. "Risk factors" have been discovered which may be used soon to help identify the potential for AD after age 60. The risk factors relate to apolipoprotein E4 and the human chromosome-14.

A computerized logic-flow is presently under development to assist practicing medical professionals in the positive diagnoses of AD in their cur-

rent patients.

An as-yet unpublished study has demonstrated a statistically significant correlation between exercise and a reduction in the decline of cognitive function. Rats self-selecting substantial exercise have been shown to retain better critical brain functions. Interestingly, some of the rats in the study consistently choose to run up to eight miles per night.

How does the exercise affect the brain? One possible explanation has to do with the fact that with exercise, additional quantities of growth factor are produced. It is a demonstrated fact that this class of biochemical helps protect mature nerve cells, which are more damage-resistant and generally healthier after exposure to growth factor. The measurable quantities of growth factor in critical brain areas of exercising rats increase enormously for at least the first seven days after exercise begins.

From an ongoing study at Leisure World, it would appear that the best regimen for humans includes a combination of significant amounts of both physical exercise and mental stimulation (such as playing bridge).

Reviews of the literature demonstrate the widespread and continuing-to-increase support for the daily use of anti-oxidants, such as Vitamin E, Vitamin C, and Vitamin A.

Factors reducing the risk of dementia are quite similar to those reducing the risk of cardiovascular disease: consistent use of certain anti-oxidants and anti-inflammatories, persistent exercise, low-fat diet, and maintenance of reasonable blood pressure and stress levels.

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Q & A

Cotman concluded his presentation with a question and answer session.

Q: *What anti-inflammatories should we consider for use?*

Cotman: Buffered aspirin, Motrin, or Ibuprofen.

Q: *How would the beneficial exercise in the rat experiment translate to humans?*

Cotman: The workout would correspond in humans to a minimum of two to three times a week, sufficient in effort and duration to work up a sweat.

Q: *What daily quantity of vitamins is the literature showing as most likely to be effective as an anti-oxidant?*

Cotman: 400 I.U. Vitamin E, ½-gram Vitamin C, and a small amount of Vitamin A. Within a year, research results are expected to provide more exact quantification.

Q: *Is AD sex- or race-related?*

Cotman: Statistically, AD is somewhat more prevalent in women and blacks, but it shows no respect for men or any race.

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BECOMING IMMORTAL

Nanotechnology, You, and the Demise of Death

By Wesley Du Charme, Ph.D.

Blue Creek Ventures, 1995

Reviewed by Thomas Donaldson

The author of this book has his heart in the right place, and from reading it I would say that he has taken up the flag of Nanotechnology with no other aim than to explain its implications for our future lives. Moreover, unlike any other author since Bob Ettinger himself, he does try to deal not only with the technical issues involved in cryonics but with the emotional and social and emotional issues too. For anyone seriously considering whether or not to sign up for suspension, those social and emotional issues are very important.

Du Charme devotes an entire section of his book, "Arguments against Immortality," almost half his book, to stating and refuting the many arguments *against* immortality that various people have put up. That's both good and important. And he has salted his book with some very good quotations, too.

However even here there are bugs in his program, bugs of which he seems quite oblivious. For it is in this section that he shrugs off many of the questions ("Won't the Earth become too crowded?") with paeans to Nanotechnology. I would actually say that if we removed the "nano-" prefix, then it would read just like things we've been hearing for decades before Nanotechnology raised its head. "Technology can solve this problem, technology can solve that problem, technology can solve almost any problem you can name" I will even say that (with lots of caveats) I agree to such an emended version; though I would also say that often the real problem is not with technology but

with the refusal of human beings to use it appropriately. (To offend some, I'll be specific here: the refusal to use nuclear energy has greatly worsened the CO₂ problem worldwide. And please don't raise the issue of future technologies such as widespread solar power. The problem is *now*.)

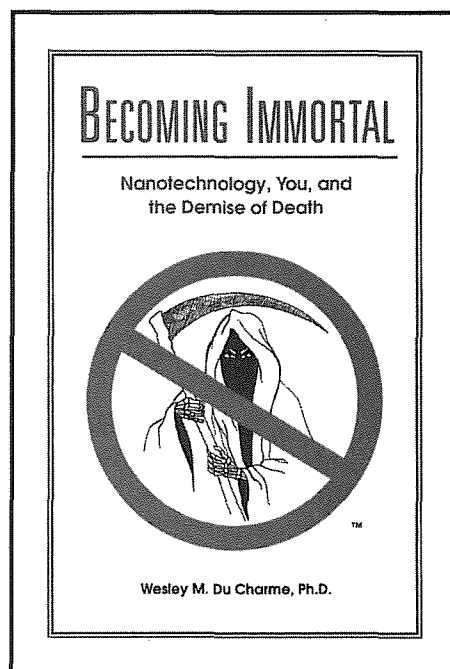
Moreover, these questions are real and do bother people. I doubt very

what has happened, and how the empowerment and education of women has affected birthrates, too. (Yes, that would have taken more work on his part, much more than simply to refer us to Drexler, but his arguments would become far stronger in the end). I say these things not because I fundamentally disagree, but because the arguments Du Charme produces look very weak. Weak arguments hurt our case because of those who are turned off by them; the fact that we fundamentally agree with the case argued can blind us to that weakness.

In his second part, "Getting from here to there," Du Charme then goes on to discuss cryonics itself. On the question of whether or not it will work, surprise! he once more alludes to Nanotechnology. He gives very little other hard data at all, a total of 4 articles: 2 articles from *Scientific American*, one article on the time course in which biosynthesis ceases from *Bull Experimental Biology and Medicine* (114(11)(1992) 1706-1709), and another on the effect of hypothermia and cardiac arrest in children (*Journal of Pediatrics* 117(2-1)(1990) 179-183). Of course he cites 5 different works by Drexler, also.

He quotes Alkon, the author of the *Scientific American* article he cites on memory, as saying that our memories "appear to involve a sequence of molecular changes at specific locations in systems of neurons" and that it is "represented and stored by a physical pattern of branching and synaptic contacts." We have now completed our discussion of memory and can go on to Nanotechnology.

The problem with these arguments for cryonics (or, for that matter, any-



much that anyone bothered by, say, the issue of overpopulation, will be satisfied simply by a shrug and a reference to the wonders of Nanotechnology. That's just not the way people work. His arguments here would be far stronger if made quite specific: cite the studies showing that as countries become more prosperous their birthrates decline, for instance. Discuss birthrates in Europe and North American over the last 100 years, and

thing else) comes precisely from their generality. If technology (or Nanotechnology) can do all things, then we need only shrug and allude to it. End of argument. Anyone who then comes forward with Problems can then be easily ignored. If technology can do all things, it can certainly solve these Problems, too. However we cannot be surprised if the person who has just brought up a Problem leaves the discussion soon afterwards. Their Problem hasn't really been answered, just brushed off. Answers involve Details and Unknowns, neither of which fit well with the overarching idea of Nanotechnology.

Throughout this book, that bright future of Nanotechnology presents itself as a very sharp transition, reminiscent of the Millennium, the arrival of God in all his Glory, etc. If anything, that would put off questioners even more (though to be fair, Du Charmé does spend a few words on what we would do in this approaching Heaven—unlike the religious case, in which very little is said about what we'd do). This, too, would likely put off anyone not already convinced.

For these advocates of Nanotechnology, I have a bit of news: nanotechnology has already arrived. It arrived at least 20 years ago and arguably even longer ago. It arrived when we started modifying viruses to serve our own purposes, when we started using bacteria for all kinds of different aims, when chemists began seriously thinking about macromolecular chemistry and materials scientists started making new materials rather than accepting the old ones, etc etc. Such work has continued not only to grow but to increase in sophistication and control. Not only that, but all of chemistry consists of finding cleverer and cleverer ways to manipulate molecules into what we want, and chemistry is much older.

Certainly this form of nanotechnology isn't the one promoted by Eric Drexler. *That* nanotechnology, in the words of Drexler himself, is a form of Theoretical Applied Science. I have no problems with this so far as it goes,

but, as with any form of theory, we should never forget that that it involves not Reality but events in our own heads only. Not only that, but chemistry and biochemistry *do* deal with reality, and they tell us important things about how we can manipulate matter. It's simply not true that, in any *literal* sense, we can place atoms anywhere we want. Chemists don't simply play tinkertoys; chemical combinations are stable or not depending on many different factors. Nor, for that matter, can we expect *any* nanotechnological device to work in all circumstances. As a combination of chemicals, however constructed, they too will break down in many environments. Not only that, but even the technical book which Drexler has produced (*Nanosystems*) only presents computations for nanomachine *parts*. To establish the case for an entire machine, we need the kind of computations only available on large parallel machines.

Not only that, but even if we accept the notion that Nanotechnology can place atoms wherever we want them, that solves only half the problem. If we want to build any new device, perhaps a device (or set of them) to repair a suspended human being, then we must also work out just what we want that device to do (where we want to put those atoms). That's harder than it looks, because our repairs may forthwith destroy themselves by normal physiology unless we plan it all very carefully.

I am not saying here that the sophistication of our nanotechnological devices cannot increase. I fully expect them to increase orders of magnitude beyond what we can now make. What I doubt is whether or not the Nanotechnologists, relying solely on Drexler's ideas, will turn out to have the keys to our revival. We would all do well to search (and think) much more broadly: to materials science, macromolecular chemistry, genetic engineering, bacteriology, all the areas in which scientists or engineers make nanotechnological devices *right now*. Moreover, Du Charmé simply does

not discuss the darker possibility that we have destroyed some, or even all, of current suspendees with our present techniques, which simply may not be good enough to preserve the basis of memory. Nanotechnology cannot do *everything* we ever want. No technology can.

Finally I must say that, from one angle, Du Charmé makes a noble effort. One problem with cryonics comes from the fact that until Drexler appeared, we had no good way to explain our ideas at all to those who simply weren't willing to read the relevant scientific papers and understand their ideas. In his book Drexler himself points out that cryonicists had developed their own repair ideas before the word "nanotechnology" ever appeared: but yet again, those ideas could not be easily explained to anyone *not* interested in the science.

So: if I say that we should not depend on hand-waving about nanotechnology, then what do I propose in its place? First, I would point out that all through history people have not wanted to die, that they care intensely about this problem even without admitting that to themselves; nor is the problem logically or physically impossible. And so we know that someday we will solve that problem. As for cryonics I would argue that we will have the very same feelings. (More needs saying here, but for now I won't.)

And second, rather than paeans to a technology that will never fully arrive (*complete* control over *anything* will never come), I would instead point out just how much we *don't* know about the universe and our own working, and how odd it is that in most talk about aging and death, those speaking assume that they understand them well enough to say that *no* advances at all can happen to reverse both, not for *hundreds of years into the future*. What ignorant arrogance! If you want to live, it's far better to do what you can in the context of our present understanding than to listen to ignorami who believe your efforts must fail.

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About the Alcor Foundation

The Alcor Life Extension Foundation is a non-profit tax-exempt scientific and educational organization dedicated to advancing the science of cryonics and promoting it as a rational option. Alcor currently cares for 31 patients in cryonic suspension, and has hundreds of signed up Members. 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 and 365 days a year.

Alcor's Emergency Response capability includes equipment and trained technicians in Arizona, New York, Indiana, Northern California, Southern California, and England, and a cool-down and perfusion facility in Florida. Alcor's Arizona facility includes a full-time staff with employees present 24 hours a day. The facility also has a fully equipped research laboratory, an ambulance for local response, an operating room, and a patient care facility using state-of-the-art storage vessels.

Meetings

Board of Directors Meetings

Alcor business meetings are held on the first Sunday of every other month: January, March, May, July, September, and November. (The July and September meetings are on the second Sunday.) Guests are welcome. Meetings start at 1 PM. For more information, call Alcor at (602) 922-9013.

Sunday, September 10, 1995:

ALCOR
7895 East Acoma Dr., #110
Scottsdale, AZ 85260

Directions: Take the 10 to the 17 Northbound, exit Thunderbird Road heading East. Thunderbird will turn into Cactus St, stay on Cactus until you turn left on Tatum, and then right on Thunderbird (which will turn into Redfield in about 3 miles), then (after a quarter mile on Redfield) left on 76th Place. 76th Place turns into Acoma Drive; Alcor is on the right at 7895 Acoma Dr., Suite 110.

Southern California

The Southern California chapter of Alcor meets every month in an informal setting in one of our member's homes. Meetings are on the fourth Sunday of the month. For more information, call Michael Riskin at (714) 879-3994.

Boston

There is a cryonics discussion group in the Boston area meeting on the second Sunday each month. Further information may be obtained by contacting Tony Reno at (508) 433-5574 (home), (617) 345-2625 (work), 90 Harbor St., Pepperell, MA 01463, or reno@tfn.com (email). Information can also be obtained from David Greenstein at (508) 879-3234 or (617) 323-3338 or 71774.741@compuserve.com (email).

District of Columbia

Life Extension Society, Inc. is a new cryonics and life extension group with members from Washington, D.C., Virginia, and Maryland. Meetings are held monthly. The remaining 1994 meeting is scheduled for December 11. Call Mark Mugler at (703) 534-7277 (home), or write him at 990 N. Powhatan St.; Arlington, VA 22205.

Bay Area

Alcor Northern California meetings: Potluck suppers to meet and socialize are held the second Sunday of the month beginning at 6:00 PM. All members and guests are welcome to attend. There is a business meeting before the potluck at 4:00. For meeting information, call Alcor at 1-602-922-9013

England

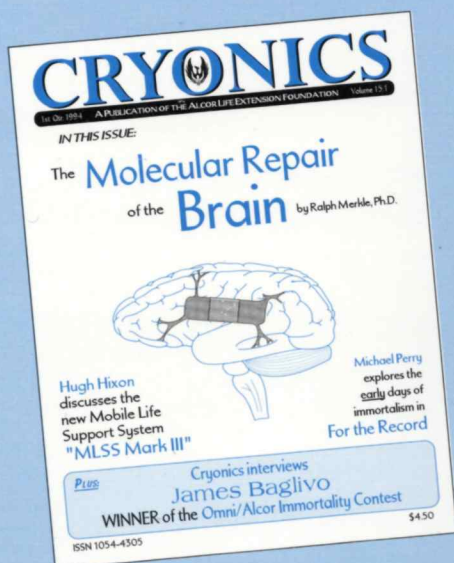
There is an Alcor chapter in England, with a full suspension and laboratory facility south of London. Its members are working aggressively to build a solid emergency response, transport, and suspension capability. Meetings are held on the first Sunday of the month at the Alcor UK facility, and may include classes and tours. The meeting commences at 11:00 A.M., and ends late afternoon. The address of the facility is:

Alcor UK
18 Potts Marsh Estate
Westham
East Sussex
Tel: 01323 460257

Directions: From Victoria Station, catch a train for Pevensy Westham railway station. When you arrive at Pevensy Westham turn left as you leave the station and the road crosses the railway track. Carry on down the road for a couple of hundred yards and Alcor UK is on the trading estate on your right.

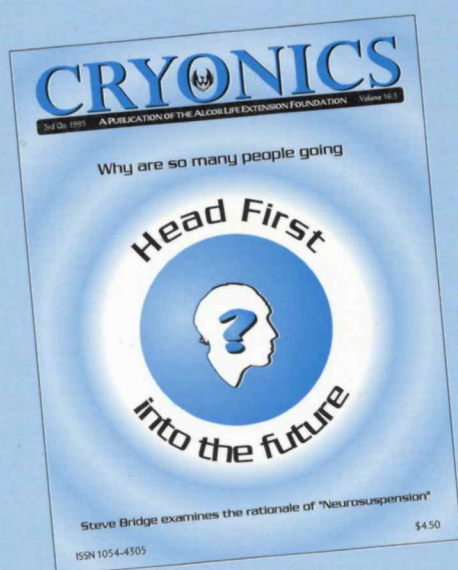
People coming for AUK meetings must phone ahead—or else you're on your own, the meeting may have been cancelled, moved, etc., etc. For this information, call Alan Sinclair at 01273 818558. Near metropolitan London, contact Garret Smyth at 0181 789 1045 or Garret@destiny.demon.co.uk, or Mike Price at 0181 845 0203 or price@price.demon.co.uk.

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