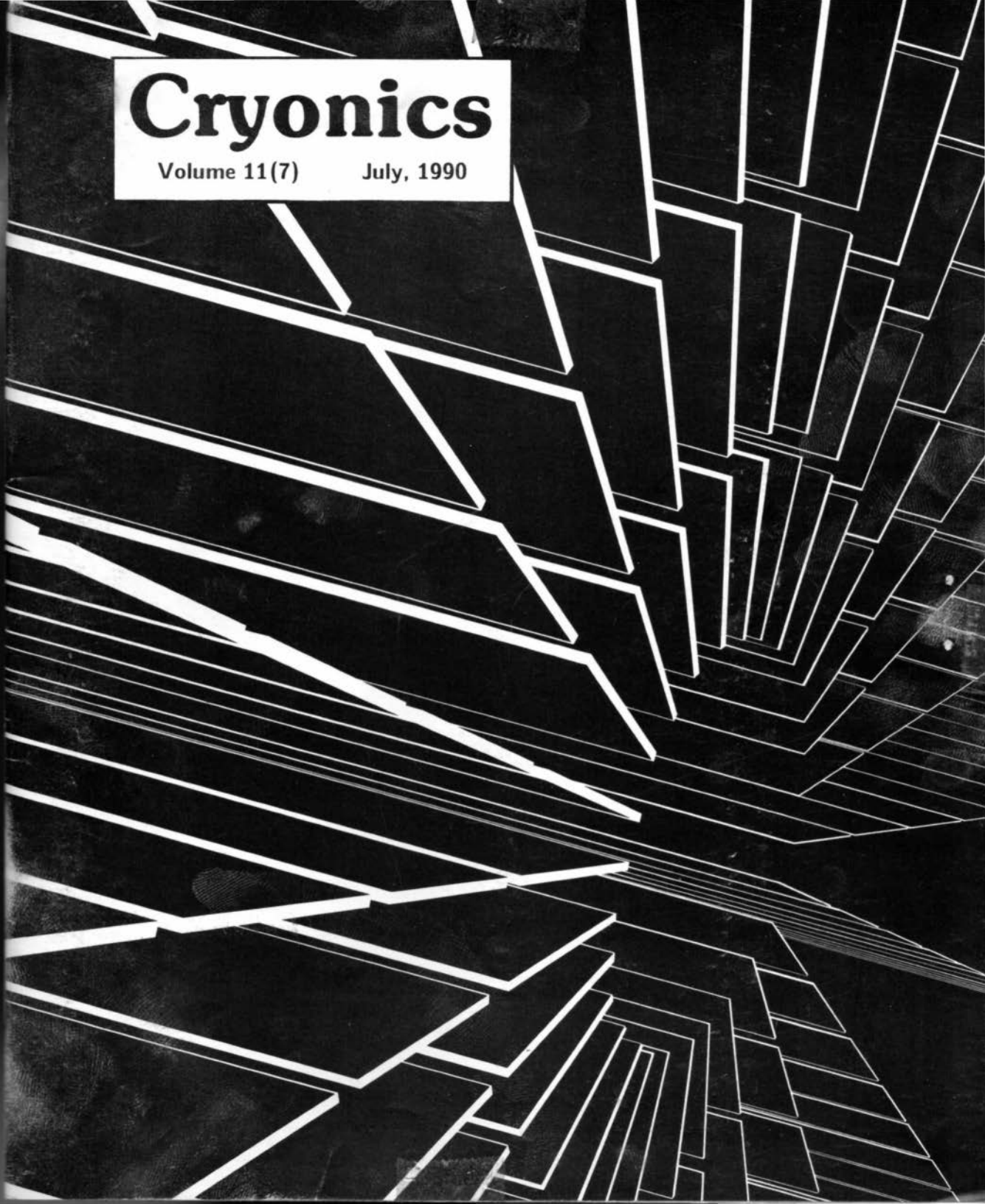
Cryonics

Volume 11(7) July, 1990



CRYONICS ■ Volume 11(7) ■ July, 1990 ■ Issue 120

CRYONICS is the newsletter of the Alcor Life Extension Foundation, Inc. Mike Darwin (Federowicz) and Hugh Hixon, Editors. Published monthly. Individual subscriptions: $25 per year in the US; $35 per year in Canada and Mexico; $40 per year all others. Back issues are $2.50 each in the US, Canada, and Mexico; $3.50 each all others.

Please address all editorial correspondence to ALCOR, 12327 Doherty Street, Riverside, CA 92503 or phone (800) 367-2228 or (714) 736-1703. FAX #: (714) 736-6917.

Contents copyright 1990 by the Alcor Life Extension Foundation, Inc., except where otherwise noted. All rights reserved. The opinions expressed herein are not necessarily those of the Alcor Life Extension Foundation or its Board of Directors or management.

A MESSAGE FROM THE EDITORS OF CRYONICS

by Mike Darwin with Hugh Hixon

Cryonics magazine has been published continuously since March of 1981. In nine more months we will celebrate our 10th anniversary of continuous publication. During all of that time I have been co-editor of *Cryonics* and during six years of it, Hugh Hixon has served as co-editor. It has been a very satisfying 9+ years. It has also been a very *long* nine years! It is hard to do anything for nearly a decade and still stay "fresh" at it. Editing *Cryonics* is no exception.

Some Background

The point of this editorial is to tell you a little about our past, a lot more about the present situation we confront, and a little on where we plan to go with the magazine, or at least where we'd *like* to go. We need to do this because if there is anything that our years of putting out this magazine have taught us, it's that *we can't go there alone.* We need you, our readers and contributors.

First, a little history. *Cryonics* started out as a four-page newsletter put out by the *Institute for Advanced Biological Studies* in Indianapolis, Indiana. It was put out with the objective in mind of replacing *Long Life* magazine, which had folded after becoming more and more irregular and experiencing a big drop-off in production values and content. Steve Bridge and I were the first editors and uppermost in our minds was the production of a successful newsletter that would ultimately grow to be the standard of the industry; i.e., the largest and the best. We aimed to do this by doing two things: first, be extremely *reliable* about a production schedule and second, consistently deliver honest, accurate, and no-holds-barred coverage of all issues of relevance to cryonics and cryonicists.

I believe we have succeeded in our goals. With nearly 700 subscribers we are undoubtedly the largest publication, and I think there is little doubt we are also the best. This is a very satisfying position to be in; maybe even *too* satisfying a position....

Alcor's suspension membership has also grown since 1981, from fewer than 30 to over 170. While it would be foolish to try to pin this growth on any one "big fix" or "major event", it would also be foolish to ignore some of the key factors that have fueled it. Those factors are the quality of services that we offer across the board, the consistency with which we offer them, and the fairness and honesty with which we treat all with whom we deal. *Cryonics* magazine has been *the* major vehicle with which we have communicated those things to our members. In its pages they have been able to see us keep our promises and break a few, chart our progress and our setbacks, and above all see our commitment to both quality and consistency in the pages of our magazine.

The Situation Today

The last two years have seen that consistency (if not quality) marred. We have not been able to keep *Cryonics* on a regular production schedule and there can be no doubt that our members' (and prospective members') confidence in us has suffered. It is an irony in cryonics that the "customer" doesn't get the primary "service" from us he is paying for until he is no longer able to evaluate/appreciate it. In other words, you have to be unconscious and without heartbeat and breathing before you get what we ultimately exist to deliver: cryonic suspension.

That means that our members evaluate us only is by the other things we do. If we can't get a magazine out on time, how good are we going to be at being there when you need us? And believe me, that is a valid concern, and the two things *are* related.

Cryonics has been late getting to you because of a complex mix of things which I'll now summarize:

1) We are incredibly busy. Even though paid staff has risen dramatically (five full-time and one part-time employee), the demands on our time have risen even more dramatically. Most of our members can see this just in the increased media attention we are receiving. This, coupled with our expanded marketing program, has resulted both in new members and a truly dramatic surge in last-minute suspensions.

2) Communications overload. We (the editors of *Cryonics*) and other core Alcor staff now spend an inordinate amount of our time *communicating*: we take several tour groups per week through the facility, handle dozens of communications-intensive phone calls a day, and deal with 1 - 3 film crews a week! This has the effect of leaving us "drained" and burned out for other kinds of communication.

One of the things I've learned from talk show hosts is not to "pre-interview" immediately before the show. Dialogue between host and guest should be kept to the

minimum immediately before air time or you "blow it" by giving your freshest and best performance in the green room, and not on the air. Much to my dismay, I have discovered that the same kind of thing applies to other areas of life as well. After I have given two interviews to media, given a lecture to a group of libertarians in Ventura, spent four hours on the phone counseling terminal patients, *and* taken two guests through the facility, I'm just about communicated-out. And I am not alone.

3) The pace of things. Writing and telling people about what is happening requires time off, at least for me and most of the rest of us around here. It requires a reserve of energy and a tranquil time to reflect and write in. After 10-12 frantic, often crisis-ridden hours at Alcor, I want *go home and watch television.* Period.

4) Shifting priorities. As the work load goes up, things which are critical to delivering good service do get done. If they are to get done, something has to give, and what gives has been getting out the magazine.

5) Proliferation of publications/dilution of effort. The past three years have seen the growth of splinter organizations/publications which have, inevitably, "drained off" energy and articles for *Cryonics*. While much of what appears in these publications would not be suitable for publication in *Cryonics*, it nevertheless has had the effect of "tapping out" some of our best and brightest former authors. It is inevitable that if you are writing what you want to write for your own publication, you will have less energy left to write for others.

I well know the truth of this myself: you rarely see articles by Mike Darwin appearing in places other than in *Cryonics*. Much to my dismay I am now finding that regular contributors to *Cryonics* are telling me "I'm sorry, I can't do that article for you... I've promised an article to ...."

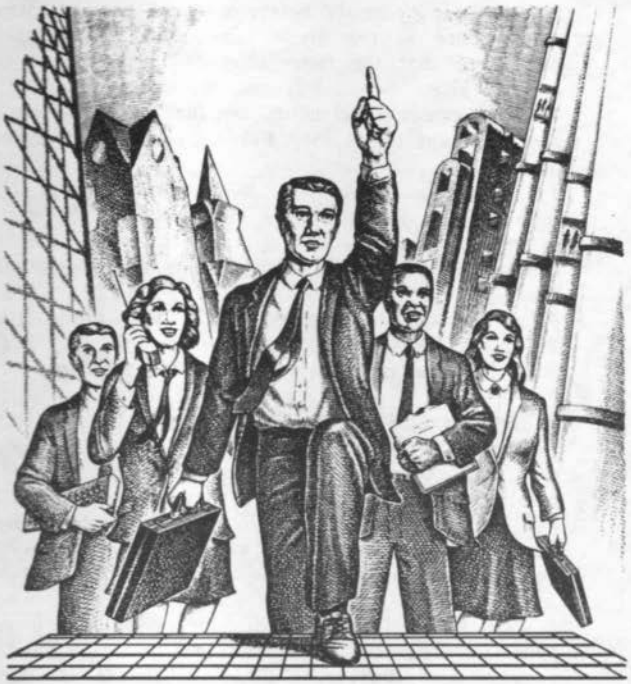
I can't help but find this insidious, because the kind of articles I want and need for *Cryonics* are not EASY to write. They require time, energy, and thought. It is hard for *Cryonics* to compete with other publications that deal with issues in a more relaxed and less structured way.

Well, all of the above are what constitute reasons, or what some might call excuses. Both are probably on the money, because there is a reason that is NOT listed above but should be. Boredom and lack of discipline. Yes, boredom. It is a paradox that now, when more exciting things are happening than ever before, I -- and I think it fair to say, most others here -- are less interested than ever in telling you about them. After nine years of editing *Cryonics* I don't find it as exciting a job as I did on Day One, largely because so much else exciting is happening. This, to some extent, must also be impacting on the quality of the magazine and its punctuality.

Unfortunately, this situation cannot be allowed to persist without serious consequences to both *Cryonics* and to Alcor. It is a fact that *Cryonics* is THE major tool we have used to convert subscribers/associate members into Suspension Members. As many of our current Suspension Members will attest, it is a great tool for doing that.

It is also fact that we are at a crossroads of an unprecedented nature. An amazing thing has begun to occur. So amazing a thing that I, and many other "old timers" who have been tilling the soil since the 1960's can scarcely believe it is happening: **cryonics is starting to catch on.** Don't kid yourself; we aren't going to be a billion dollar industry tomorrow. And our troubles are far from over. Indeed, the real hairy battles are yet to be fought, I firmly believe. But the inescapable fact is there that, at least for Alcor, cryonics has entered a brand new and unprecedented period in its history.

We are currently adding 20 subscribers a month, our average rate of information requests is now over 100 per month, and we have done three suspensions in just over 30 days. More to the point, we have four potential terminal cases where funding and other considerations seem to indicate a "GO".



No matter how you look at it, we are a long way from the days of the early and mid 1980's, where the two editors of this magazine thought it was great if we got three information requests in a week and a single letter to the editor in a month! We had plenty of time to focus our efforts and our energies on putting out *Cryonics* and there can be no doubt that we lavished an inordinate amount of time and attention on it.

The paradox is that those were the days when we had very few readers and almost no "virgin" subscribers. The situation today is a cruel but inevitable paradox. We are (by our historical standards) deluged with subscribers (read: prospective members) and we are also faced with a critical shortage of time and energy to exploit the tremendous resource those new subscribers represent.

Solutions

What are we to do about this? It is clear that the large and rapidly expanding subscriber base represents an incredible opportunity for growth in membership. But in order to exploit this opportunity we have to return to a regular schedule of publication and begin generating an increasing number of articles in the magazine which introduce new and prospective members to both cryonics and Alcor. We need more self-help articles that tell new readers what they can do reduce their risk of sudden death, increase their chances of being suspended under good conditions, and improve their likelihood of being reintegrated into the world happily and successfully after resuscitation.

This is a tall order, and one which the Editors of *Cryonics* can scarcely carry alone. The part we can do is try very hard to return to a regular production schedule for the magazine. That will not be easy, particularly not with the workload increasing as fantastically as it has and the number of members signing up with terminal conditions.

We will also try to treat our contributors better. We intend to do this by establishing a uniform editorial policy which will include a prompt response to contributors acknowledging their submissions informing them of the status of their submission: accepted, rejected, or under consideration. The full text of this editorial policy will appear in the next issue.

The other part has to be done by *you*, our members and readers. I have heard quite a number of you ask "what you can do" to help Alcor grow. Well, for those of you with writing talents, what you can do is to write. What we need are thoughtful articles on a wide range of topics. Areas of special interest to us are as follows:

- Local Progress: what you are doing and how it has succeeded or failed.
- Personal experiences in telling others about cryonics and persuading others to sign up.
- The history of cryonics; straight reporting or opinion or a mixture of both. Particularly interesting would be an oral history with some of the pioneers of cryonics. Just letting them talk, taping, and transcribing it. Some of these pioneers are nearing suspension age, and this needs to be done before too much more time passes.
- How to avoid sudden death; auto safety, avoiding atherosclerosis, and so on. We could particularly use a detailed article on how NASCAR specifications for crash survivability could be adapted to everyday use in standard passenger vehicles.
- How to live longer; We are looking for a comprehensive article from a credentialed person on possible interventive strategies to extend lifespan. Topics of special interest are the use of L-depreynl, modest antioxidant supplementation, and coenzyme Q10.

- How to prepare/archive video material and printed material for the future. Not just how to sit down before the camera, but how to create indexing systems and control forms that will let others who do not know you know what you are saving and what it all means. We currently have a mini-warehouse full of material from a member that is not in any way indexed or ordered. It will takes us *months* to do this and will cost that member's fund a considerable amount because he didn't do it in advance. Someone (perhaps the Lifepact people?) who generates a simple, easy-to-use, and comprehensive indexing system which also relates items to each other would be VERY helpful.
- The philosophy of cryonics. We are especially interested in thoughtful pieces about re-integrating into the future and providing emotional/psychological care for patients in sus-

pension.

- Survivors' psychology. An especially needed area of work is an in-depth series of interviews with the "surviving" families of members in suspension. We are willing to act as a go-between for someone who we think has the right skills and credentials to write such an in-depth article.

- Cryonics and the bureaucrats. The field of cryonics and bureaucracy is a ripe one for exploitation by an investigative reporter type. It would be fascinating to have someone take the time to try to really get inside the heads of some of these guys and see what they *really* have to say when they are interviewed *60 Minutes* style. Contact the Editors for a list of people we would like to see interviewed. There may even be limited travel money available for this job.

- Controversies within cryonics: neuro vs. whole body, identity, the nature of human beings, and human technology in the intermediate and far future. Good examples here are Thomas Donaldson's *Analog* article "New Matters" and Marc Stiegler's story, "The Gentle Seduction", which also appeared in *Analog*.

- Financial planning: how to structure your estate and trusts to maximize resources available for cryonics. We would love to see a thoughtful article which helps tell people how to provide for dependents, make decisions about how much money they want to leave for suspension, and review the options open to them to do these things.

- Women and cryonics: article(s) *by* women *for* women about the role of women in cryonics and how women can bring their unique insights and skills to bear to further cryonics.

- Alternative Preservation Technologies: a comprehensive, scholarly, and well referenced article on possible alternatives to the use of cryopreservation for biostasis.

- Mechanisms of memory: A comprehensive review which takes existing research and lays out the competing theories for memory storage; and then intelligently speculates about how well or poorly these postulated mechanisms would survive existing freezing techniques (contact us for detailed information on the nature of freezing damage).

- Evaluating cryonics organizations: a checklist of things to look for and look out for when selecting a cryonics organization. This list should be comprehensive and the article should include a list of questions which should be asked over and above the checklisted items. Tips about personal inspection of facilities and general organizational policies should also be present.

  We would be very interested in publishing an article which uses such a checklist to evaluate existing cryonics groups. We'd like to know how we stack up.

- Interviews with prominent people of interest to cryonicists: examples would be Dr. Eric Kandel and Dr. Daniel Alkon, prominent theorists and experimenters on the mechanism of memory; Arthur C. Clarke, science fiction writer; Isaac Asimov, science fiction writer hostile to cryonics; Dr. Gerald LaRue, Hemlock Society President and social gerontologist who is very hostile to cryonics; Dr. James Southard, cryobiologist; Dr. Greg Fahy, cryobiologist... The list goes on and on! NOTE: do not do interviews without first contacting the Editors of *Cryonics* for permission and suggestions on questions to ask.

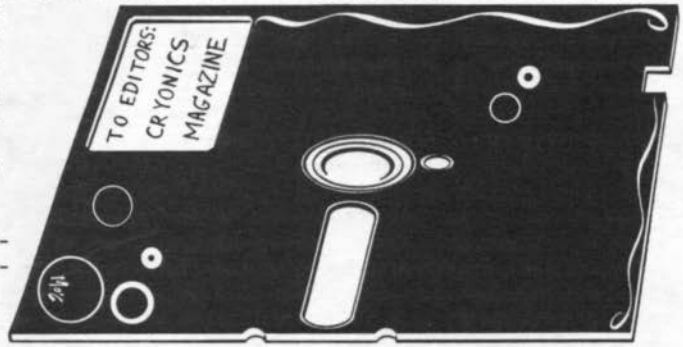
- Euthanasia and cryonics: do we have any common ground with advocates of euthanasia? Contacting the Hemlock Society's Derek Humphry would be a good place to start.

- The future of food and sex: will they still be there when we wake up? Will everyone be a vegetarian? What will sex be like 100 years from now?

The above list should be fertile ground for any of a number of talented writers lurking out there. Some of you, some of our best writers in fact, have become occupied with personal projects. Part of the reason for this may be that we didn't show you the attention you deserved. Part of it may just be the inevitable desire to "do your own thing".

Whatever the reason, we hope you'll give us some thought. We also hope that you'll consider that your opportunity to reach and persuade new people about cryonics has never been richer. Fortunately, it's not much of sacrifice for me to ask that you redirect you efforts a little and do this. Because in doing so, you will *certainly* help Alcor grow, and that means improving your own chances for survival.

We can't think of any better reason with which to persuade you.



* * * * * * * * * * * * * * * * * *

VOLUNTEERING

As Joe Hovey noted in the June issue, we need HELP!!!! After some thought, we decided that getting that help might be more likely if we were a bit more specific about the things we need done, both simple and complex. So herewith is a list, by no means complete, but nevertheless a beginning:

- Patient Records: Urgently needed is someone with a background in data entry. We have reams of lab values and other measurements which must be entered on the computer. Unless you have a good charting program or a Macintosh computer this work will have to be done in-house.

  Also needed is someone to label and order suspension photos. This must be done VERY reliably and we are looking for an organized secretarial type here.

  Patient records also need statistical analysis (after data entry is complete). Any with those skills lurking out there?

- We need a handyman type in the worst way; someone who can run conduit, install lighting fixtures on the upper deck, and just generally do a lot of minor but necessary repair projects such as remounting a sink in the bathroom and doing some painting (walls) in various areas of the facility.

- We need a data entry person to enter information requests and other routine information.

- Electronics Handyman: we need someone to assemble alarm systems for our patient dewars. We have the plans if you have the hands.

- A "mail room" person. Someone who knows (or who can learn) how to handle bulk mailings. This is going to become a more critical requirement as time goes on, as present projections indicate a regular monthly mailing volume of 2,000+ pieces for our marketing program alone, by the end of the year.

- An administrative assistant. Someone with a high degree of organizational skill and good judgment, who can help keep our principal officers "on track" and focused on high-priority items.

Thanks to those who have already volunteered their services. Particularly, Keith Henson, Jerry Searcy, Benjamin Hartwick, and Maureen Genteman.

To volunteer, call Joe Hovey at 800-367-2228.

* * * * * * * * * * * * * * * * * * *

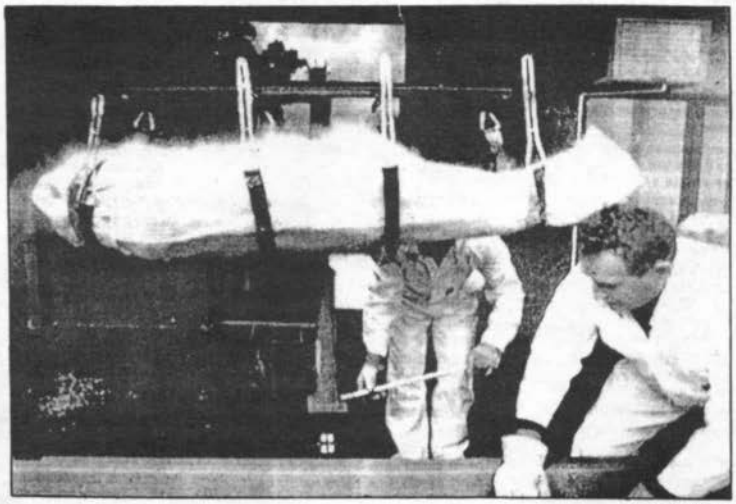
AUSTRALIAN SUSPENDED

by Mike Darwin

On 2 July, 1990 Rocco (Roy) Schiavello arrived at Alcor from Melbourne, Australia after having been placed into suspension and cooled to -79°C (-110°F) by Australian Alcor members and the staff of the Mulqueen Mortuary in Melbourne. Mr. Schiavello is a 30-year-old computer programmer who experienced cardiac arrest after unsuccessful surgery to remove a deep-seated brain tumor.

Roy had long been interested in cryonics, and had extracted a promise from his family to place him into suspension in the event that he did not recover from surgery. The family, at great emotional cost, honored his request, and Roy was placed into long-term liquid nitrogen storage at Alcor on July 11, 1990.

The story of Roy's suspension and the determined and supportive family that made it possible is a remarkable one, and we will bring it to you in the August or September issue



BY ASSOCIATED PRESS

Soul on Ice

The body of Rocco Schiavello, packed in dry ice, was lowered into a special shipping crate yesterday in Melbourne, Australia, for transportation to Los Angeles, where the body will be stored in liquid nitrogen. Schiavello, who died 10 days ago at the age of 30 after surgery for a brain tumor, had asked his family to have his body frozen and stored.

of *Cryonics*.

Roy is the 16th patient placed into Alcor's care.

* * * * * * * * * * * * * * * * * *

MEDIA UPDATE

Heavy media coverage of Alcor and cryonics has continued. The *Donahue Show* aired across the U.S. from July 16 through July 23. This show, one of the most positive media events in Alcor history, has resulted in 560 information requests as of this writing.

A radio interview by WABC (New York) with Alcor President Carlos Mondragón resulted in 40 information requests; and the repeated airing of "On Ice", a documentary about Alcor by USC film students Grover Babcock and Andrew Takeuchi on PBS' *Point of View* program resulted in a few additional inquiries and exposure of a TV audience to cryonics that had not previously had an opportunity to hear our message.

Inside Report also aired a segment about Alcor and the Donaldson case which was both generally positive and reasonably fair.

Upcoming national media coverage is a 6 to 8 minute long segment on Alcor and cryonics to air on *48 Hours* sometime in September during rating sweeps.

HOW SECURE IS YOUR SUSPENSION FUNDING

> "If you live in a community-property state and buy a life insurance policy with community property funds, one-half the proceeds are owned by the surviving spouse. This result can be varied by a written agreement between the spouses, in which one spouse transfers all interest in a particular life insurance policy to the other spouse."
>
> -- *Plan Your Estate* by Nolo Press

As the above quote makes clear, if you are married, your cryonics arrangements *could* be in serious trouble. Particularly if your spouse is or becomes hostile to your cryonics arrangements. A good way to guard against this is to execute a *transmutation of community property* wherein your spouse gives up or transfers all claims to life insurance policies set aside for cryonics. Your insurance agent or your attorney can help you with preparing and executing this form.

This thoughtful reminder is brought to you via David Brandt-Erichsen. We wish to echo David and to also point out that **it is your responsibility as a member to see to it that such forms are drafted and executed in order to insure adequate funding.** If you do not have adequate funding you could face the possibility of not being placed into suspension to begin with, being removed from suspension if the spouse wins in a contest over an insurance policy, or being converted from whole body to neurosuspension.

If you are married or if you become so in the future or change spouses, you need to execute such a form. Failure to do so will be your responsibility and yours alone.

* * * * * * * * * * * * * * * * * * *

BIGFOOT REVISITED

by Mike Darwin

Last month we reported on the arrival of our new four-patient storage unit, nicknamed "Bigfoot". This month we have some additional reporting to do, as well as a little clarification about the previous article.

Fortunately, all of the news to report is good news. VERY good news. First, boiloff with the unit running full is lower than reported last month (the figure of 16 liters/day was a calculated use rate based on partial fill operation). Actual use is 12.7 liters/day or 3.2 liters per patient per day (four-patient use).

We have now ordered **three** more of these units from the manufacturer and this resulted in *more* good news: the cost has come down considerably. Because the first unit took a lot

of design time and back-and-forth between the manufacturer and us, the cost was higher. Since the subsequent units will not require extra design time, the cost has come down (also, ordering three helped a lot!). How much has it come down?

The first unit cost $17,550, but this price did not include casters or other add-ons which raised the final cost to about $20,000, or $5,000 per patient. The new units will cost $15,800 *including casters and other add-ons*, for a cost of $3,950 per patient! Additionally, we will be able to save on shipping, since all three units will be on the same truck.

Some clarification is also in order. Two people have asked me why Alcor ever made storage units "in-house and out of fiberglass to begin with..." After re-reading the Bigfoot article in the June issue, I understand why they asked this. In the course of the article I discussed the advantages of Bigfoot over in-house epoxy resin and fiberglass units. I failed to make clear that Alcor does not and has never used such units, but rather that they are manufactured and used by a competing cryonics organization, the Cryonics Institute.

Finally, an overlooked but very important evaluation of the cost reduction available from Bigfoot is its likely impact on *neurosuspension* costs. Yes, neurosuspension costs. Once we have both of our nine-patient neuro units full it becomes economical to bring up a Bigfoot and use that for neurostorage. We already have one nine-patient neuro unit full and are working on a second. Since pets are usually stored in neuro cans, the rate at which the neuro storage unit fills may be faster than might at first be supposed.

Given that we use a Bigfoot for neurostorage the numbers for storing a single neuropatient for a year shake out as follows:

Neuropatient Storage Capacity: 54 patients (using current packaging).

	Bigfoot Unit	**Current Unit**
Liquid Nitrogen Cost:	23.60	70.97
Floor Space Charge (@ 45¢ per sq. ft.):	2.50	2.50
Custodial Labor Cost:	10.00	8.00
Amortization of Dewar/Alarm System:	21.98	59.26
Administrative Charges:	3.00	3.00
Utilities and Other Overhead	5.00	5.00
TOTAL ANNUAL STORAGE COST PER PATIENT	$66.08	$148.73

As can be seen from the above numbers this would result in a 56% reduction in costs for storing neuropatients. The minimum trust fund required to generate $66.08 in income at a 3% rate of interest would be $2202.67. Multiplying this number by a factor of four for safety and to generate positive growth of the fund to cover reanimation costs yields a

total of $8810.67 required for the trust fund.

Numbers for whole body patients are as follows:

Whole Body Storage Capacity: 4 patients

	Bigfoot Unit	Current Unit
Liquid Nitrogen Cost:	298.72	821.50
Floor Space Charge (@ 45¢ per sq. ft.):	33.75	24.30
Custodial Labor Cost:	135.00	270.00
Amortization of Dewar/Alarm System:	296.67	433.33
Administrative Charges:	3.00	3.00
Utilities and Other Overhead	67.50	135.00
TOTAL ANNUAL STORAGE COST PER PATIENT	$834.64	$1,686.80

As the above numbers demonstrate, Bigfoot will result in approximately a 50% decrease in storage costs for whole body patients, resulting in a minimum of $27,821.33 being required (at 3% interest) to generate the annual charge of $834.64. Multiplying this number by four yields a total required in trust of $111,285.33.

Thus it can be seen that particularly where whole body storage is concerned, Bigfoot should help us to hold the line on costs.

* * * * * * * * * * * * * * * * * * *

THE ASSAULT ON AGING -- HUMAN GROWTH HORMONE

by Hugh Hixon and Mike Darwin

If you're an immortalist and have not been living in a cave (the story made the front-page headlines of the Riverside *Press Enterprise*) you undoubtedly took note of all the media attention in early July concerning an experiment in which older men (age range 61-73 years) were treated with Human Growth Hormone (HGH). HGH is a hormone produced in the pituitary gland (at the base of the brain), whose production starts falling off after about age 30. There has long been speculation that the radical decrease in growth hormone production (in many cases its virtual disappearance in measurable amounts after age 45) may be a significant contributor to age-associated deterioration.

When HGH was administered to a small group of elderly men, it reversed a number of the changes associated with aging that were previously considered intractable. Specifically, lean body mass increased (probably due to a general increase in mass of skeletal muscle, internal organs, skin, etc.), fatty tissue weight dropped (probably accompanying a redistribution of fat from the abdomen to the extremities), the density of some bones went up, and skin thickness increased. The details are in an article by Rudman et al, which appeared in the **New England Journal of Medicine, 323(1)**, 1 (July 5, 1990). Additionally, the volunteers interviewed afterward by the media said that the treatment made them look better and feel stronger; and what's more, their wives agreed.

The responsible media were quick to point out a number of *caveats*, such as the very preliminary nature of the work, the selection characteristics of the volunteers, possible bad side effects (both observed and postulated), the cost, and general disclaimers that HGH *was not* the Fountain of Youth. But the take-home lesson clearly is that something can now be done to at least partially reverse changes of aging on a system-wide basis (as

opposed to more local therapies such as *Retin-A* for the skin and *Minoxidil* for baldness) that were previously intractable to any sort of treatment.

So.... Where do we go from here?

The researchers and other medical commentators were quick to point out to the press that a lot more clinical work must be done to find out just what the benefits and hazards are in this application of HGH. Between the pace of research done on people and assorted regulatory impediments, this could be a *long* time.

The New England
Journal of Medicine

©Copyright, 1990, by the Massachusetts Medical Society

Volume 323 JULY 5, 1990 Number 1

EFFECTS OF HUMAN GROWTH HORMONE IN MEN OVER 60 YEARS OLD

DANIEL RUDMAN, M.D., AXEL G. FELLER, M.D., HOSKOTE S. NAGRAJ, M.D., GREGORY A. GERGANS, M.D., PARDEE Y. LALITHA, M.D., ALLEN F. GOLDBERG, D.D.S., ROBERT A. SCHLENKER, PH.D., LESTER COHN, M.D., INGE W. RUDMAN, B.S., AND DALE E. MATTSON, PH.D.

Abstract *Background.* The declining activity of the growth hormone–insulin-like growth factor I (IGF-I) axis with advancing age may contribute to the decrease in lean body mass and the increase in mass of adipose tissue that occur with aging.

Methods. To test this hypothesis, we studied 21 [illegible]thy men from 61 to 81 [illegible]rs old who had plasma [illegible]ncentrations of ler[illegible] 50 U per liter duri[illegible] [illegible] base[illegible] [illegible]ix-month treatment [illegible]ment peri[illegible]1, 12 [illegible]03 m[illegible] bio[illegible]tiv[illegible]

Results. In group 1, the mean plasma IGF-I level rose into the youthful range of 500 to 1500 U per liter during treatment, whereas in group 2 it remained below 350 U per liter. The administration of human growth hormone for six months in group 1 was accompanied by an 8.8 percent increase in lean body mass, a 14.4 percent decrease in adipose-tissue mass, and a 1.6 percent increase in average lumbar vertebral bone density ($P<0.05$ in each instance). Skin thickness increased 7.1 percent ($P = 0.07$). There was no significant change in the bone density of the radius or proximal femur. In group 2 there was no significant change in lean body mass, the mass of adipose tissue, skin thickness, or bone densit[illegible]

Conclusions. Diminished secr[illegible] is respons[illegible] [illegible] the me[illegible]

However,... HGH has been used for quite some time to treat pituitary dwarfism in children. As a result, it already has a respectable clinical track record, and is available by prescription; if you've got the money and can find a cooperative doctor. Its trade name is *Humatrope* (Somatropin, recombinant DNA origin, for injection, manufactured by Eli Lilly and Company).

The estimated cost of HGH treatment for an adult for a year is $13,800. The cost of necessary associated medical monitoring would be extra.

The price, at least, seems amenable to change. The HGH used in the study was produced by genetic engineering in *E. coli*. How much should it ultimately cost?

The dosage for HGH in the study was approximately 1 mg/day. This is *very* approximately the same as the insulin dose required by diabetics. A month's worth of human insulin (*Humulin*, which is also produced by both *E. coli* and Eli Lilly) costs about $10. The molecular weight of HGH is about 3½ times that of insulin, so the price of HGH in a mature competitive market would probably be higher, but by no means insupportable.

Further, given that studies in the next year or two confirm that it really works, there is no question that a market exists. Since it is a natural product, it can't be patented (but modifications and the production method can be), so competitive pressures should come into play fairly quickly. A downside to this is that, in recent experience, drug companies have shown a notable aversion to competitive markets. The whole ethical drug situation is so tangled up with regulation, liability, development costs, health provider strategies, etc. that it's difficult to predict how the drug companies will behave.

Another factor to consider regarding any future price of HGH is a recent shift in ethical drug marketing practices to an "all the traffic will bear" stance. This is reflected in recent medical ads that end "When you've got your health, you've got everything." And people have been willing to pay (or at least their health insurance has) to the extent that medical costs have taken up a remarkable portion of the personal budget in recent years.

Given that reversing some aspects of the aging process is possible, there are some interesting possibilities for improvements. HGH has a rather short half-life in the body (about an hour) Half-life is often regulated genetically, with a process called *spontaneous deamidation*. The basis of spontaneous deamidation is well understood, and it would only take a minor modification of the genetic code patched into the *E. coli* to make a significant modification to the half-life. Unfortunately, such a modified hormone would have to undergo a new FDA certification, and in the face of cheap unmodified HGH, this might well not be economical.

HUMATROPE®

(hu 'ma trop)

somatropin (rDNA origin) for injection

DESCRIPTION

Humatrope® (Somatrop.n, rDNA Origin, for Injection, Lilly) is a polypeptide hormone of recombinant DNA origin. Humatrope has 191 amino acid residues and a molecular weight of about 22,125 daltons. The amino acid sequence of the product is identical to that of human growth hormone of pituitary origin. Humatrope is synthesized in a strain of Escherichia coli that has been modified by the addition of the gene for human growth hormone.

Humatrope is a sterile, white, lyophilized powder intended for intramuscular administration after reconstitution. Each vial of Humatrope contains 5 mg somatropin (approximately 13 IU or 225 picomoles); 25 mg mannitol; 5 mg glycine; and 1.13 mg dibasic sodium phosphate. Phosphoric acid and/or sodium hydroxide may have been added at the time of manufacture to adjust the pH. Each vial is supplied in a combination package with an accompany[illegible] 5-mL vial of diluting solution. Each vial contains wat[illegible]ution as the dilu-ent w[illegible]% m-cresol as a pr[illegible]ber[illegible]e time of [illegible]bly

Another route to useful modification would be to characterize the active portion of the hormone, which is probably a rather small surface region, and attempt to duplicate it as either as a shorter peptide or some other chemical. This approach is considerably more technically demanding.

With regard to the problems of administration, HGH is administered as an intramuscular injection. In no respect does this seem to be any more complicated that the daily injection of insulin by hundreds of thousands of diabetics (although it would be more painful). If the benefits are as great as they appear to be, it seems clear that this hurdle would be well worth living with.

Where does all of this leave us with respect to HGH and its use by would-be life extenders? How much will HGH improve the quality of life -- and just as important, how much will it extend the life span?

These are unanswered questions, and the bottom line is, they are likely to remain unanswered questions for the immediate future. It is very important to point out that the Rudman study is a very preliminary one. The gains the treated patient's experienced were modest (14.4% decrease in adipose mass, 1.6% increase in average lumbar vertebrae density, and a 7.1% increase in skin thickness) and the impact on lifespan remains unknown. A particularly important unanswered question is what the benefits would be of beginning growth hormone supplementation long *before* 20 to 40 years of age-associated degeneration due to its absence have occurred. The gains experienced by the patients in this study were modest but significant; however, it needs pointing out that these were by and large elderly patients in very frail condition when the study was started. It will take years -- -maybe even upwards of a decade or more -- to answer that question.

What this means for the life extensionist of today is that if you want access to this treatment in the near future, you'll just have to pay your money and take your chances. And there *are* risks. While HGH supplementation in children has proved innocuous, it is important to point out that such treatments merely restore normal levels of hormone at an appropriate time in the individual's developmental cycle.

One potential problem with "turning up the heat" in the older people is that decreased cell division and reduced rates of cell turnover in the elderly may be a strategy used by nature to minimize the risks of cancer. Since DNA repair isn't perfect, the older you get the more somatic mutations you get and the greater your risk of one them being a cancer-inducing mutation. It has long been understood that there are two phases to cancer: initiation (i.e., the mutagenic insult) and promotion: the increased turnover of cells which further increases the risk of a "catastrophic" mutation. The primary reason that most toxins are "carcinogenic" is that they increase the rate of cell turnover; this is why even mildly irritating things like silicone implants are associated with an increased risk of cancer. Indeed, the reason high fat, low fiber diets promote

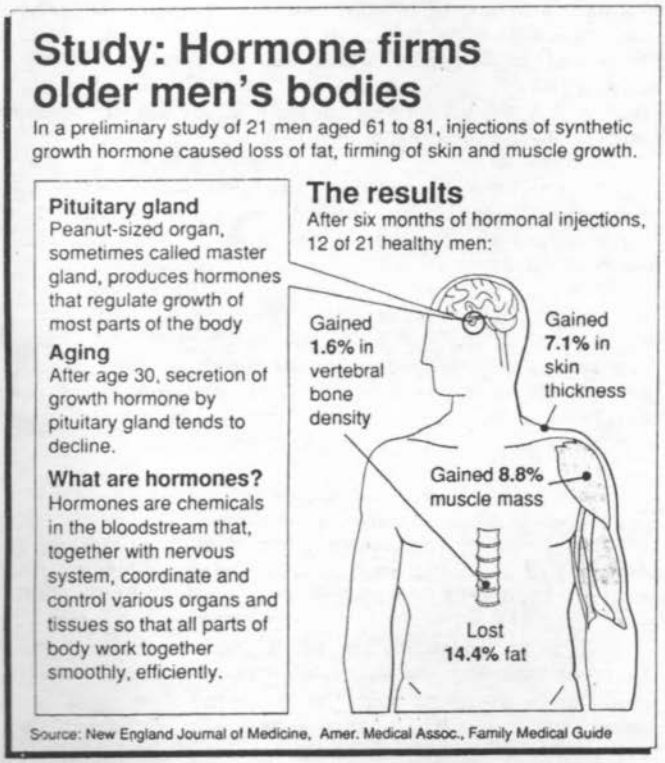
colon cancer is that they cause higher rates of turnover of colon lining cells due to longer fecal dwell times and subsequent longer exposure to irritants in the stool.

A "beneficial" aspect to aging may be the reduced rate of cell turnover (read: lower level of maintenance) which would be protective of cancer. Turning up the rate of cell division may thus expose people to increased risks of cancer.

But there are several up-sides to all of this beyond the obvious ones of a new modality to treat aging and a raised public consciousness that *something can be done.* HGH is only one of many bioregulatory substances which decline or disappear with age and which we can now synthesize. What this undoubtedly means is that in the future a "cocktail replacement" approach to treating aging will probably be used and it will involve a host of bioregulatory and growth control molecules which will be able to "turn on" cell division and tissue remodeling and repair which have been shut down due to aging.

It is impossible to say what the ultimate limits to such a treatment approach might be, but it seems likely that as a minimum many, if not most, of the "wear and tear" aspects of aging like the degenerative joint diseases, skin wrinkling, immune aberrations, and general decline in vitality and "wasting" seen with advanced age should be amenable to treatment. Coupled with good treatment for cancer, we can expect such advances to allow people to look better and live longer, and with greater vigor....

....until some key components which never had any maintenance/repair/cell division capabilities built in fail: such as nondividing cells in the brain, heart, and skeletal muscle. A complete answer to aging seems a long way off. But any help along the way will be greatly appreciated. The Rudman study is definitely some much needed help.



* * * * * * * * * * * * * * * * * *

MEMBERSHIP STATUS

Alcor has 172 Suspension Members, 469 Associate Members, and 16 members in suspension.

THE ASSAULT ON AGING -- A GENE FOR SENESCENCE?

by Hugh Hixon

The 9 February, 1990 *Science* contains two interesting articles with regard to an aging gene. The first, titled "Induction of Cellular Senescence in Immortalized Cells by Human Chromosome 1", appears to make a rather good case that such a gene does in fact exist.

Osamu Sugawara and his collaborators describe their work on inducing senescence in *Science*, **247**, 707 (9 Feb 1990). Their work was carried out at the Laboratory for Molecular Carcinogenesis, National Institute of Environmental Health Sciences, NIH (US), and at the Laboratory of Cytogenetics, Kanagawa Cancer Center Research Institute (Japan).

Briefly, they fused cells of a standard immortal cell line from Syrian hamsters with random assortments of chromosomes from a standard senescing human cell line. The resulting cellular hybrids were cultured up to the point where they began to senesce and karyotyped to determine which human chromosomes were present. The difference between hybrids which retained their original immortality and those in which senescence was induced was the absence or presence of human chromosome 1. This result was confirmed in two other independent experiments.

In one, the immortalized cell line was fused with either of two cell lines in which portions of human chromosome 1 had been translocated to another chromosome. The results also narrowed the location of the gene or gene package for senescence to the long arm of human chromosome 1.

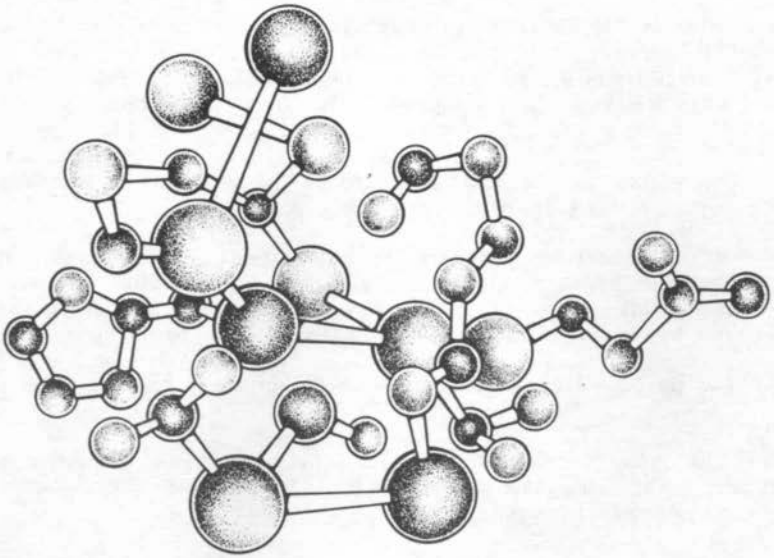
In the other experiment, the original immortal cell line, two other immortalized hamster cell lines, and a normal mouse cell line were fused with one of two cell lines from mice that contained either human chromosome 1 or human chromosome 11. Again, only the hybrid lines containing human chromosome 1 senesced. A few hybrid lines that initially showed senescence but later began dividing at a higher rate again were observed to be progressively losing human chromosome 1.

Two main hypotheses of cellular senescence have been proposed: accumulation of progressive random damage or mutations that result in loss of proliferative capacity; and senescence as a genetically programmed process. Interestingly, the authors, having demonstrated a genetic senescence mechanism, then proceed to invoke the random damage and mutations hypothesis to explain why there should be a need for such a gene.

Their argument is that given the continuous occurrence of random mutational events that lead to a variety of cellular catastrophes, including particularly cancers, where the result is an immortal cell line, a senescence gene is an additional protective mechanism against cancers. That cancers do occur indicates that this protective mechanism fails from time to time; but given the minimalist nature of evolution, this is not surprising.

Unfortunately, this explanation also means that simply identifying and neutralizing the gene would result in a shortened lifespan due to the individual becoming a culture vessel for every form of cancer known, rather as a person whose immune system has been killed by AIDS becomes the host for an improbable variety of microorganisms. There is no question, however, that any practical route to extended lifespan must include knowledge of a gene like this.

Given that we should know more about this gene, how long would such research take? A good example is given elsewhere in that issue of *Science*.



In a remarkable collaboration, described in *Science*, **247**, 624 (9 Feb 1990), six research groups have associated themselves as the Hereditary Disease Foundation Huntington's Disease Collaborative Research Group. Cooperation on this scale and to this degree is almost unheard-of in the research world, where competition for funding by individual researchers is next to matters of life and death. The members of the group not only share data, but have agreed to publish their ultimate findings in the name of the group, with no individual singled out for credit. Their goal, very similar to the location and description of a senescence gene, is to locate and describe the single gene that causes Huntington's disease, "a devastating, uniformly fatal disease, characterized by progressive loss of motor control, personality changes, depression, and dementia".

Here is an abbreviated chronology of their progress:

1968 -- Heriditary Disease Foundation formed. The founder, Milton Wexler, whose wife was diagnosed with Huntington's in that year, is advised to interest the brightest young scientists in the disease ("brains, not bricks"), as opposed to constructing a research facility. The first young postdoctoral researchers are neurobiologists.

1979 -- In the early days of recombinant DNA work, a young molecular biologist, hooked in 1972 at one of the frequent free-wheeling interdisciplinary workshops the Foundation holds, and subsequently promoted to scientific director of the Foundation (in 1978), convinces the Foundation's board that molecular biology could track down the Huntington's gene. A new type of genetic mapping technique is proposed for the hunt.

1983 -- After slowly assembling a set of genetic markers for the technique, a young researcher almost immediately locates the gene, on chromosome 4. Concurrently, the Foundation has been mapping the spread of the gene in several families, including one in Venezuela with over 1,000 members at risk, and collecting blood samples for the genetic marker work. However, the location of the marker on chromosome 4 is not known, nor is its distance from the gene.

1984 -- A new collaboration between molecular biologists and cell geneticists is proposed, and the Collaborative Research Group begins to take shape. Each group in the

collaboration will get $30,000/year to support a postdoctoral researcher and for other purposes. (This amount will later be increased.) The core groups are at: MIT, Massachusetts General Hospital, UC Irvine, UC Berkeley, Lawrence Berkeley Laboratory, and the Imperial Cancer Research Fund (London). The grand collaboration will not be without frictions.

1986 -- The marker (not the gene) is located on the short arm of chromosome 4, within 5-10 million base pairs of the gene itself. But which direction?

1986 -- A marker developed outside the group seems to point toward the tip of the chromosome arm, and appears very near the gene. Considerable friction arises as the separate groups consider bolting from the collaboration, but this is finally ironed out, helped considerably by the lack of success in what was expected to be the home stretch.

1989 -- The tip of the chromosome is reached, but the gene isn't there. Confusion in the data.

1990 -- The group has agreed to split its efforts in an exhaustive search of the chromosomal arm. The groups are settling in for what may be a long campaign. Perhaps several years more just to find the gene.

Okay. On the scale of the Huntington's gene effort you go looking for a senescence gene located on the long arm of chromosome 1. The first problem is bait. Say $300,000-500,000 per year of it, committed for at least five years into the future. Second: interest hungry, competent researchers in the problem. Don't bother looking for them in the gerontology community: it is, politely, severely sclerosed. Note that the demonstration of the location of the senescence gene was done by cancer researchers. That's where the big money and the good post-docs have been going since the "War On Cancer" started. Third, talk them into a collaboration. Think of it as about as difficult as doing the research on the Moon. The person who has done this for the Huntington's Group, Nancy Wexler, is the founder's daughter, at risk for the disease herself, and a psychologist. Holding a hand this strong, it still hasn't been easy for her to keep things together. This is all the down side.

The up side is, first, the chromosomal location of the senescence gene is known. Second, the marker technology is reasonably well developed, and sets of markers for all the chromosomes are being developed as a continuing side-benefit of the human genome mapping project. Third, it just might turn out to be easy. Sugawara's paper points to a reference where immortal cell lines may be induced by simian virus 40 (SV40), which *may* mean that SV40 binds directly to the senescence gene and modifies it.

Thus, a rough timetable: given the money, 2-3 years to recruit and establish a collaboration; 2-5 years to locate the gene; 2-3 years to characterize it and figure out what it does. And maybe it will mean something useful.

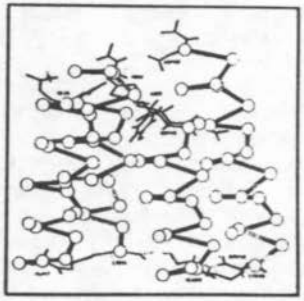
* * * * * * * * * * * * * * * * * * *

BUT ONLY GOD CAN MAKE AN ENZYME....

by Mike Darwin

A little over a year ago after a lecture on cryonics I had the experience of having a biochemist come up to me, shake his head in total disgust and lecture me on how not only would biorepair such as I had postulated never be possible, but that even figuring out the

rules of how proteins fold would take many decades and probably even several hundred years. Specifically, he told me that in his opinion we would probably never figure out the complex rules underlying protein folding to *de novo* design and synthesize an enzyme. His argument could be summarized by paraphrasing Ogden Nash's remarks about trees: "...but only God can make an enzyme."

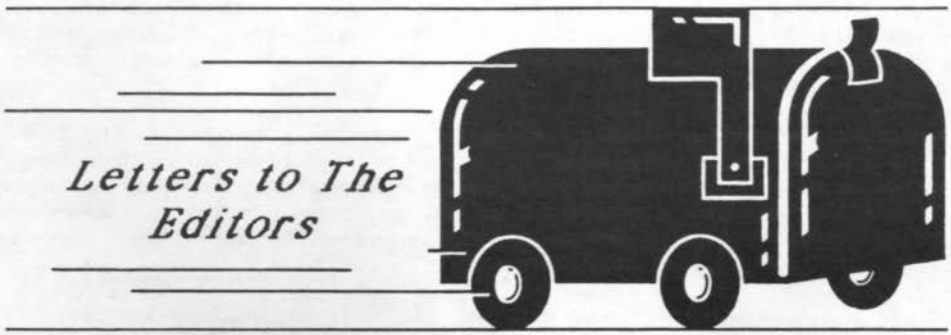

Stewart et al.

Well, no longer. Biochemist John M. Stewart and his colleagues at the University of Colorado Medical School have designed a synthetic enzyme which they have christened CHZ-1, built it, and demonstrated that it performs as predicted. The 73 amino acid protein was designed as a chymotrypsin analogue and was designed over a two-year period, amino acid by amino acid, using computer-aided design programs.

Such work is incredibly important, as it goes a long way to build confidence in the theoretical underpinnings of protein design and folding behavior which will guide all future efforts. A next major step will be to automate the design process so that much of the complex reasoning using first principles which goes into to *de novo* design can be done rapidly, in parallel and by machines which don't need to sleep, eat, or take vacations.

In any event, I have the satisfaction of knowing that out there somewhere is a pretty surprised biochemist. Will it change his opinion about cryonics and nanotechnology? Don't count on it. He's probably telling someone right now (and with complete assurance) "Yes, but they will *never* succeed in designing an enzyme much more complicated than CHZ-1 because of the enormous complexity of...."

* * * * * * * * * * * * * * * * * * *



TO: Editors, Cryonics
From: Jerry D. Leaf
RE: "Ischemia"

The word "ischemia" has often appeared in *Cryonics* magazine, mostly referring to "absence of blood flow" as seen in cardiac arrest. This is an appropriate use of the word in the context usually given. However, "absence of blood flow" is not a definition of "ischemia" as the word is commonly used in medicine today. To restrict the meaning of ischemia to mean only "absence of blood flow" is an error. This definition occurred in *Cryonics*, Vol.2(5), May, 1990, page 27. Medical usage of the term "ischemia" refers to "inadequacy" of blood flow, which means not enough blood flow to meet the energy demands

of the area affected. Ischemia is a supply/demand concept which defines a condition in which supply of blood is inadequate relative to the metabolic demands of the tissue. (1)(2)

Restrictions of blood flow may have many causes and may be regional, affecting a single organ or part of an organ, or an entire organism, as in cardiac arrest. Let's examine some examples of ischemia that will illustrate how the concept relates to "inadequacy" rather than just some particular quantity of blood flow or its absence. The conditions or context of flow can be definitive in establishing inadequacy.

We have a suspension member who is dying of congestive heart failure at a local hospital. His total blood flow requirement is 4 liters per minute, at rest, and his heart is just able to pump this blood flow with the added stimulus of medications. The Alcor transport team is standing by, equipped with circulatory support equipment. The patient's lungs begin to deteriorate, causing his heart to pump harder, which increases the energy requirements and blood flow needed by the heart. The heart cannot meet this new demand, so the blood flow to the heart is inadequate and the heart is ischemic. The heart begins to fail and the total blood flow begins to decrease. Sixty minutes later the patient has a cardiac arrest, the blood flow is zero, and the entire patient is ischemic.

The patient is pronounced clinically dead by the attending physician and the transport team initiates CPR and achieves a total blood flow of 2 liters per minute. The blood flow supplied is only 50% of requirements, so the patient is still ischemic. Surface cooling is initiated in the Pizer Tank by covering the patient with ice. Standard pharmaceutical protocol is followed during the ambulance transport to the facility. Upon arrival, the patient's temperature is 27°C. We know from the Q-10 Rule that each 10°C reduction in temperature will reduce metabolic requirements by 50%. Now that we have reduced the patient's temperature from 37°C (normal) to 27°C, the blood flow requirement is reduced from 4 liters per minute (normal) to 2 liters per minute, by virtue of hypothermia. The patient is no longer ischemic because the blood flow is adequate, supply equals demand. Note that the blood flow remained constant during CPR, but we altered the conditions that determined the blood flow requirements of the patient's body. Our patient is not ischemic, even though his blood flow is 50% less than it was before he died in the hospital.

The patient is brought into the operating room and connected to the heart-lung machine. The patient's blood is substantially replaced with perfusate so that only 1% of the circulating fluid contains red blood cells. At the same time, the body temperature is reduced to 7°C. Perfusate/blood flow is 1.5 liters per minute and still adequate even though 99% of the blood is removed. At 7°C even aqueous perfusate that is oxygenated can meet requirements. The patient is not ischemic.

When cryoprotective perfusion is complete, the heart-lung machine is turned off and the patient is disconnected in preparation for cooling to liquid nitrogen storage temperature. At the moment the heart-lung machine is turned off, zero flow, the patient becomes ischemic again as he did previously after cardiac arrest. However, the patient is cold and subsequently the effects of ischemia are much reduced as a direct result of the temperature, but not eliminated. There is inadequate flow and the patient is ischemic.

As the temperature of the patient is lowered, metabolic requirements continue to become less. At cryogenic temperatures any semblance of metabolism has ceased to take place. Question: Is the patient ischemic? We have entered a new condition that is not commonly found in clinical medicine, therefore, we cannot expect a medical community standard answer to this question. Let us retain the standard functional criteria of "inadequacy of blood flow" to mean ischemia. If we do, then our patient is no longer

ischemic, even though there is zero blood flow. The total body metabolic requirements at -196°C are zero, therefore, the blood flow requirements are zero. Supply equals demand, there is not an inadequate flow, therefore, there is no ischemia.

However, as the clinician will be quick to point out, dead biological systems do not have metabolism and therefore, the concept of ischemia and consequent injury are irrelevant. Alas, we have come once again back to the arguments we continue to have with clinical medicine today about the difference between "clinical death" and "biological death". We will meet them half-way. If the viability of a biological system is preserved, then the system can metabolize when the conditions of supply and demand are sufficiently restored. The concept of ischemia, as illustrated above, then applies. If a biological system is "biologically dead", i.e., irreversibly injured, non-viable, then the concept of ischemia is non-applicable.

I hope this discussion has brought a more thorough understanding of the concept of "ischemia" as it is used today and perhaps will be used tomorrow.

Sincerely,
Jerry D. Leaf

* * * * * * * * * * * * * * * * * * *

THE CASE FOR WHOLE BODY SUSPENSION

by Micheal B. O'Neal

Introduction

This article presents several reasons for preferring whole body suspensions over neurosuspensions. For those of you who are new to cryonics, a whole body suspension, as the name implies, involves the perfusion and long term storage of the entire patient. Neurosuspensions are similar to whole body, with the exception that only the patient's brain (encased within the cranium) is placed in long term storage.

The intent of this article is not to dispute the validity of neurosuspensions or to object to the Alcor policy of emergency conversion to the neuro option under dire circumstances. I believe a neurosuspension is certainly preferable to no suspension at all and I fully support Alcor's policy of a conversion to neurosuspension in emergency situations.

I am disturbed, however, by the ease with which many Alcor members seem to reach the conclusion that a full body suspension is simply a waste of liquid nitrogen. According to a recent *Cryonics* article, about 2/3 of Alcor members have chosen the neuro option [1]. Even allowing for the economics of the situation, I find this figure surprisingly high.

Each of us must decide for ourself whether the additional cost of a full body suspension is justified by the perceived benefits. Any informed decision can only be made after careful consideration of the benefits and costs of each option. The Alcor publication: "Neuropreservation: Advantages and Disadvantages" [2] attempts to do just this. That article, however, seems to be unfairly biased in favor of the neuro option. As evidence of this conclusion I would point out that of the 17 paragraphs in the document only 4 seem to present advantages of the whole body approach (paragraphs: 1, 9, 14, 17). To be fair, articles have appeared in this and other publications [3] which favor the whole body approach. Even Mike Darwin's excellent pro-neurosuspension article, "But What Will the Neighbors Think?!" [4], devotes substantial space to a balanced treatment of the questions surrounding neurosuspension.

Many of the arguments favoring whole body suspensions over neurosuspensions have been based on aesthetic and social reasons. While these arguments are certainly valid, I do not wish to repeat them here. Instead, I would like to propose two additional technical arguments for favoring whole body suspensions.

Arguments for Whole Body Suspension

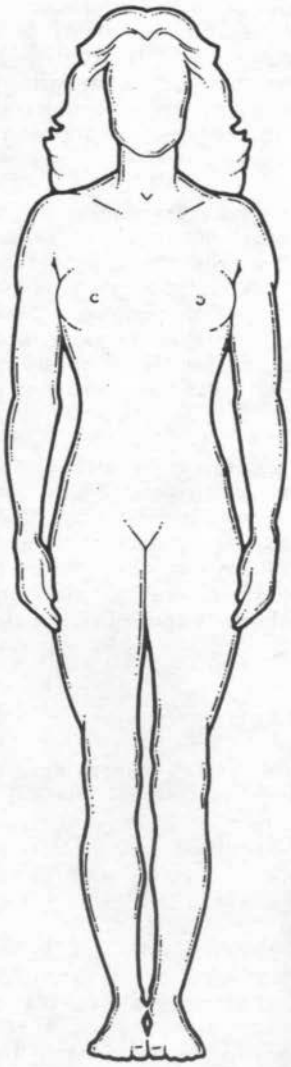
First, in my opinion, it is by no means clear that the body does not contain information critical to the revival of the person. I do not mean by this statement that I reject the fact that the human brain holds a person's mind and personality. What I do mean is that reconstruction of the person may be very difficult, or impossible, without the body.

Most everyone agrees that DNA does not completely specify a person. The argument of those who have selected neurosuspension seems to be that DNA plus the information contained in the brain does completely specify the person. I argue that we can not be sure of this.

Why? Let us consider the case of identical twins. Since they developed from the same original cell, their DNA sequences should be identical. However, twins are not exactly the same. For example, they are not always the same height and they do not have the same fingerprints. Some of these differences, such as height, may be directly attributed to environmental factors such as nutrition and health care. Other characteristics, such as fingerprints, seem less related to environmental factors and suggest that DNA programming may only specify general patterns, with the specifics arrived at in some other, seemingly random, fashion. Regardless of how these differences arise, it should be clear that a person's physical characteristics can not be *fully* determined from DNA alone.

So, "what is the point," you might ask. "Surely all of my memories plus an almost identical body would still be me." Perhaps. But what if the details of the central nervous system are not specified in the DNA programming?

The typical scenario for reviving a person suspended using today's primitive technology involves reconstructing a person using cell by cell (or molecule by molecule) repair techniques. If whole body procedures were used, the person's entire central nervous system would be preserved. This preservation would not be perfect. There would



be damage, perhaps even fractures to the spinal cord. It has been suggested [2, page 3] that because of the likelihood of these fractures there is little reason to prefer a whole body suspension. I would like to point out that repair of a damaged system, even a spinal cord, is likely to be much less complex, and more accurate to the original, than an unguided reconstruction based on DNA.

This leads me to conclude that without the original body to serve as a guide, it may not be possible to "interface" the neuropatient to a clone body. Even if an approximation of the original connections can be designed, the new body may not "feel" right due to the subtle differences that are sure to exist between the original body and its clone.

My second point is that even if revival is possible without a complete body, the existence of the body may make revival easier and help reduce personality and memory loss caused by a less than perfect suspension.

The physical characteristics of our bodies strongly influence who we are. Our actions also strongly influence the condition of our bodies. Hence, we can think of our bodies as a crude physical backup for personality and memory.

Many people in the cryonics movement have pointed out the need to keep records and memorabilia to backup crucial memories. While this is certainly a good idea, it should be pointed out that information of this type cannot entirely replace the information stored in our bodies, since there is always the chance that our bodies contain important information that we are unaware of.

An examination of a well-preserved body can tell an expert much about that person. Present-day anthropologists are able to determine many details of a person's life from an examination of a (poorly preserved) body together with clothing and jewelry. Details such as overall medical condition, age at death, even social standing and, perhaps, occupation can be determined. The person may not have been aware of some of these details, such as an undiagnosed medical condition, even if the impact on his life was great.

One could argue that in the vast majority of cases most information available from an examination of the body would be known to the person and therefore be available in the suspendee's brain. Even if some memories are apparently destroyed by a poor suspension, many traces of them may remain. Surely, during patient reconstruction, these partial memories will be discovered and enhanced.

This argument overlooks the very real possibility that a patient's brain may be repaired without an understanding of the personality and memory information it holds. This is a very important point. Reconstruction and repair of a brain does not imply access to the memories it contains.

Perhaps the best way to understand why this is true is to look at "neural net"

computers. The connectionist machine or neural net is composed of a large number of simple processing elements that are highly interconnected. Each of these elements is modeled after biological neurons, the basic components of the human brain. Information in such systems is not stored in discrete locations, as is the case in conventional computers, but instead is stored as weighted connections between large numbers of processing elements. Machines of this type are often trained to recognize and classify particular patterns.

We can imagine a neural net where the connections between nodes are represented as electrical currents that flow through wires. Our particular machine has been in storage for a long time. When it was being placed into storage some of the wires came loose from their connections. We may repair the machine by reconnecting the wires to their proper connections (assuming we can tell where the loose wires belong). After completing these repairs we should have a fully functioning machine. Of course, we have no idea what patterns it has been trained to memorize. It would, in fact, be very difficult to try to determine what the machine knows without turning it on, since its memories exist only as connections between nodes.

The parallels with repair of a human brain after cryonic suspension are clear. Just because we can fix a brain does not mean we will understand the person contained in that brain. The point of all of this is that it is unreasonable to expect that during repair memory traces from a damaged brain will be automatically detected and enhanced. Instead, the availability of the original body may prove invaluable in helping the person to reconstruct their life, by providing a familiar physical environment to ease the transition into the second life cycle and by providing physical reminders of memories which may have been partially lost.

Conclusions

I have presented two arguments for preferring whole body suspensions to neurosuspensions. The first described a theory that information contained in the brain and DNA is necessarily incomplete and that the information loss incurred from disposal of the majority of the body may be critical. The second argument postulated that in cases of memory loss, the existence of the body might act as a crude type of memory backup and trigger recall of partial memories that might otherwise be lost.

How strongly do I feel about these issues? Strong enough to write this article and select the whole body route for myself. Strong enough to be concerned by the relatively small number of people selecting the whole body option. It seems to me that a conservative stance on this matter is prudent and that the whole body option is the conservative stance. The more information we preserve about ourselves the more likely our chance of rescue. Whole body-suspensions maximize the amount of information retained.

Of course, whole body suspensions are much more expensive than neurosuspensions. Full body patients are also more costly to maintain and less mobile. Currently the need for mobility is high. Had Dora Kent not elected neurosuspension, she would surely be dead now [5]. But, if cryonics gains even a limited acceptance, these advantages of neurosuspension will likely diminish. As our technology improves the advantages of the whole body approach will become more apparent.

In the final analysis each of us must weigh the costs and

benefits of both approaches. For me, the potential benefits of a whole body suspension far outweigh the additional costs.

* * *

Addendum

The above article was written to present some technical reasons for preferring whole body suspensions over neurosuspensions. I purposely omitted social and political reasons for selecting this option, because I feel a good case can be made solely on the technical merits of the two options. Since I drafted this article, however, the Thomas Donaldson case has become public, so I feel a few words concerning the social and political impact of neurosuspensions are now in order.

I saw the initial coverage of the Donaldson story on CNN. Their treatment was somewhat typical. While the taped report seemed balanced and fair, the introduction given to the piece concentrated on the "bizarre" aspects of the situation, emphasizing that Dr. Donaldson chose to have only his head preserved. The intention seemed to be to cast doubt on Dr. Donaldson's mental condition.

Cryonics is a radical concept. I think that we, as a group, would do well to consider the fact that no man, or organization, can survive in isolation. We need the cooperation of others -- doctors, lawyers, pharmaceutical companies, liquid nitrogen suppliers, ... the list is almost endless. Without these people, we are already dead.

The concept of neurosuspension is even more radical than the idea of whole body suspensions. Decapitation has historically been associated with death, not life, and thus can elicit a very strong emotional reaction. This seems to characterize my own family's view of cryonics. Most of my family does not object to the idea of my being frozen at death. In fact, my sister has agreed to be the executor of my estate. Their biggest concern was that I choose the whole body option. They, like most other "reasonable" people, believe that it will never be possible to restore a person from a "frozen head", and find the notion extremely repulsive.

Note that I used the word "believe" in the previous sentence. I have discussed, at length, the scenario envisioned for the restoration of neuropatients, and I have explained to them the necessity of nanotechnology to restore both whole body and neuropatients. They seem to intellectually understand, but they still don't truly "believe" it will ever be possible to revive a patient from neurosuspension.

I think that Dr. Donaldson's case would be taken much more seriously by the media and the public if he were signed up for a full body suspension. It is clear that a legislative test case should be selected with extreme care and all factors should be carefully weighed. When you consider the potential impact of this case on the future of the cryonics movement, and the obvious resistance caused by the neuro option, it would not have been unreasonable for Alcor to encourage Dr. Donaldson to sign up for a full body suspension, perhaps by arranging to absorb the additional cost.

After all, why should we throw another psychological roadblock in front of our path? The issue of paramount concern is the establishment of the right to premortem cryonic suspension, not the right to premortem neurosuspensions. Once the public and the law acknowledge our right to suspension, then recognition of neurosuspensions as a valid option will be much easier.

My personal belief is that Alcor, and the entire cryonics movement, would be better

served if future members were strongly encouraged to consider the advantages of full body suspensions. Neurosuspensions could be presented as an intelligent fallback position, to be used under circumstances that preclude whole body suspensions, rather than as a primary option.

* * *

References

[1] "The Alcor Survey 1988-9 (Part I)" by Max O'Connor and Mike Perry, in *Cryonics*, Vol 10(9), September 1989, page 42.

[2] "Neuropreservation: Advantages and Disadvantages," Alcor publication NEUROPRE 9-88.

[3] "The Neuropreservation Controversy" by Paul Segall, in "The American Cryonics Society Journal" Vol 5(2), March 1988, pages 4-5.

[4] "But What Will the Neighbors Think?!: A Discourse on the History and Rationale of Neurosuspension" by Mike Darwin, in *Cryonics*, Vol 9(10), October 1988, pages 40-55.

[5] "A Timeline on the Events Surrounding the Cryonic Suspension of Dora Kent" in *Cryonics*, 9(1), January 1988, pages 1-7.

* * * * * * * * * * * * * * * * * * *

CONSERVATIVE MEDICINE

by Mike Darwin

> **con • ser • va • tive** *adj.* 1 PRESERVATIVE... **3 a**: tending or disposed to maintaining existing views, conditions, or institutions: TRADITIONAL **b**: MODERATE, CAUTIOUS... (1)
>
> -- *Webster's New Collegiate Dictionary*

Sometimes it's the little things that make all the difference in the world. For as long as I can remember cryonics has been described as a "radical undertaking", as a "long shot gamble", and as something that most "scientists (read "conservative scientists" or "establishment scientists") scoff at" and call "irresponsible".

It's a funny thing, but to a great extent we've been our own worst enemies in trying to promote cryonics because we've allowed the media and the establishment to write our promotional literature (2) and, much worse, *to shape our very thoughts*. I think that we have paid a very high price for this. Just how high we are only now beginning to fully understand.

---

1) I have left out the definitions of conservative which relate to politics.

2) One thing which to my knowledge Alcor has never done, and which used to irritate me when I saw it done by other cryonics organizations, was to use media stories about cryonics as promotional literature. In my 23 years of involvement with cryonics I have yet to see a single media story I would consider suitable for the purpose of telling anyone about either Alcor or cryonics. The media always manages to screw up some key element of what we are about; and all too often they have *all* of them screwed up!

Before I get to the reason for this article, I'd like to talk a little about an example of our failure in this respect which can't be talked about too much. It should serve as an indicator of just how badly we can hurt ourselves by buying into the wrong semantics.

Almost from the start we went wrong. The first mistake was allowing cryonics to be described as the practice of freezing the dead. This was a mistake because dead is *dead*; the dictionary definition of death is the correct one: **death**: *a permanent cessation of all vital functions: the end of life.* It goes without saying that you can't raise the dead. And in fact, we don't claim to be able to do that either, and we never really ever have. What Ettinger said in 1964 and what we've been saying ever since is that there is something *wrong with medicine's definition of death.* It is fundamentally flawed because it defines death not in any absolute sense, but only as a function of medicine's ability or lack thereof to restore *function.* Thus, the medical definition of death as "irreversible cessation of heartbeat/breathing and/or brain function" fails because it doesn't go deep enough; it begs the question. What constitutes *irreversible*? What are the absolute limits to resuscitation in a theoretical sense, as opposed to the practical matter of what a physician can do *right now*? These were issues that were never directly addressed and on which we never challenged our critics.

If we had it to do all over again, those of us who've been around from the beginning (or nearly so) would probably not make the mistake of allowing suspension patients to be called "dead" or "frozen dead" or cryonics to be described as the practice of "cadaver freezing" or "freezing the dead". Had we taken the tack of pointing out the inadequacy and shallowness of existing function-based criteria for pronouncing death, and challenged the medical and cryobiological communities on a fundamental level, things would probably have gone a lot better for us. There would be fewer people who were (and are) frightened or put off at the "ghoulishness" of freezing dead people, and the intense, morbid revulsion some people experience at the very mention of cryonics would certainly not be there nearly as often as it is now. In fact, had we played our cards right, the intense morbid revulsion would be reserved for those who did anything *but* place *terminal* patients into cryonic suspension.

And of course it goes almost without saying that the strong religious objections that have plagued us from the very start of the program could have been completely sidestepped by the simple expedient of pointing out that *suspension patients aren't dead!* And what's more, we agree that it is not possible for people to "resurrect the dead".

I first noticed this difference when discussing my experience with resuscitation cases as a dialysis technician many years ago. When I would talk about an experience in resuscitation I noticed that people were perfectly happy to hear such stories as long as the patient didn't become a cadaver at the end of them (i.e., when the story was about a *success*). In fact, many people I spoke with who were very uncomfortable in talking about *death* were actually reassured in talking about successful *resuscitation.*

From the start, we should have fought tooth and nail the image of cryonics as something done to dead people or to us "after we die". We didn't. I was looking back through my clipping files recently and I came across an article written about me in 1970 entitled "Teen Wants To Be Frozen After Death". I can remember quite well that I was pleased about that article at the time it appeared and that I thought it did a fair job of telling people what we were all about. Indeed, I can remember describing cryonics as something that "would be started as soon as I was pronounced dead...." I was not alone. The file is full of clippings from around the world with similar quotes and headlines. No wonder people think we're crazy. Death is a dreaded word, loaded with finality, irreversibility, and anxiety. In hindsight it is easy to see that portraying cryonics as a post-mortem procedure was in effect putting an impossible barrier in the road to its acceptance.

The above insight has caused me to think deeply about other aspects of our public relations and the way we communicate about cryonics to those around us. I have become very sensitive to the words reporters and hostile scientists use to describe cryonics to the public. In short, I've become very careful not to buy into their oppressive world view of us. About a year ago I was called up by a reporter for some publication or other and during the course of our conversation she quoted me a statement made by a university physician to the effect that cryonics was a radical, unproven treatment which should not be allowed.

I was almost ready to agree with the first half of that statement (i.e., that cryonics *is* radical and unproven) and then go on to defend why radical and unproven things should be allowed when I got to thinking about cryonics in the context of the words "radical", "unproven", and "medicine". I came to a very surprising conclusion which I've used in almost all my public speaking since, and which I think is worth sharing because I have observed the powerful positive effect it has had on the wide range of people I've used it on, and in particular because of the wonderful effect it has had on hostile medical doctors: either silencing them or putting them uncomfortably on the defensive.

The insight is a simple one: cryonics is **conservative** medicine in almost every sense of the word. At first glance this wouldn't seem to be the case at all. Normally we think of *conservative* as being defensive of the status quo, as being preservative of the existing order of things. And in one sense, the political/institutional sense, cryonics is certainly *not* conservative of the status quo. But in a more important sense, in the medical or biological sense of the word, cryonics is truly conservative medicine.

It is often said that the first dictum of medicine is to "do no harm" to the patient.

This does not mean that a physician can literally do no harm; incising a patient's abdomen to remove an inflamed appendix causes some additional harm to the patient in the short term, but it averts long-term disaster. Rather, the dictum means that you should not administer treatments which worsen your patient's overall condition or prognosis. I believe this is a sound dictum and I believe it is universally accepted by competent physicians of good will. It is also a conservative dictum in the truest sense of the word since it seeks to confine treatments to those which conserve the patient's life *and* health.

The issue at the beginning of this article is really the issue of "when is death?". If you are equipped with the right tools, it is easy to demolish the simple-minded function-based criteria used by cryobiologists and many physicians to define death. All of their attempts to do this will *always* have reference to function-based criteria which in turn are always related to current technical limits. With the right examples it is easy to destroy these arguments. One such example points up the *relative* and *changing* nature of function-based criteria: 50 years ago anyone whose heart stopped beating from a heart attack or electric shock was pronounced dead; today many of those people are resuscitated. Were people who "died" of heart attacks 50 years ago *really* dead if they could be resuscitated today?

There are other, even better analogies that can be used and I think it is worthwhile to digress a bit and discuss them. The difference between our definition of death and their definition is simple. We define death in the following way: **death**: *irreversible loss of the critical structural information which encodes identity.* By this definition you are only dead when *it is no longer possible to deduce your functional state from your nonfunctional state.* Try using few simple analogies to make this point:

A photograph or a printed document has a function, which is to communicate information (people have functions too: blood circulation, reproduction, thinking, happiness...). If we tear a photo or a page of text into several pieces it is no longer *functional* and thus by current medical criteria it is "dead" (it helps to actually do this to a piece of paper while explaining). But here's the catch: the *pieces* or the *"debris"*, if you will, completely describe the functional state. Thus, if you have some tape and a little time you can restore the document or the photo to a functional state. With better tools you could perfectly restore it.

On the other hand, if you burn the document or the photo and you stir the ashes, then you experience *an irreversible transition* and, given what we know of physical law, it is impossible to restore the debris to the functional state. I have found this example a very powerful one to use, because it can be easily understood by almost everyone and because it forces our critics to deal with the issue of remaining structure after legal death and freezing. This is something they are ill-equipped to do, and at which they invariably fail at doing because we know much more about those issues than they do and what's more, *the facts support our position better than they do theirs!*

The point is, once you destroy their function-based definition of death and shift it to a structure or information-based definition, you put the critics in a very difficult position. That position is simply that at the very least, patients in cryonic suspension *may* not be dead.

Indeed, the most intellectually honest of our critics will always, when pressed, say something like "Well, it's not possible to say *absolutely* that cryonics won't work, but *in my opinion* the odds are so small that it is a waste of time...."

And with that remark our critics have conceded the argument.

Why is this so, you may ask? Well, lets look at the issue of cryonics as conservative medicine again. A physician, when faced with a situation where a patient has experienced a cessation of vital functions such as heartbeat and breathing which he either cannot reverse or more often chooses not to reverse (as in the case of "no-code" or "do not resuscitate" patients), is faced with two choices:

1) He can assert that the nature of the patient's malfunction is such that no technology, present or future, could *ever* reverse that malfunction. Here he is asserting in effect that the skills of contemporary medicine as embodied in his practice of it can *never* be improved upon, or at best cannot be improved upon sufficiently to rescue this patient. He can thus abandon his patient and allow him to be incinerated or used as food for soil organisms.

2) He can take a course of action wherein he uses the best available technology to prevent the patient's condition from deteriorating further, (accepting added damage from the preservation process) thus allowing the patient to continue forward movement in time to a point in the future where medical knowledge may be more sophisticated and the patient may be considered rescueable.

Which of the above two alternatives is conservative and cautious and which is radical and irresponsible?

Human beings consist of a unique pattern of atoms. That pattern does not disintegrate all at once upon cessation of heartbeat and breathing. At what point in the dissolution process of that pattern of atoms human identity is lost *we simply do not know at this point*. It is a radical, arrogant, and unconscionable act of intellectual chauvinism for a physician to abandon his patient and allow him to be destroyed before he can answer the question of *when* in the dying process identity is lost and *what* constitutes irreversible injury.

The logical, rational, and above all the *conservative* thing to do is to preserve as much of the patient as possible and defer any decision to abandon the patient and *destroy* him until it is possible to determine with a high degree of certainty that the patient truly has experienced an *irreversible* loss of the critical structural information which encodes his identity (i.e., has died).

I think it is very important that we stop allowing ourselves to be cast as the radicals, as the people who are taking unreasonable and unreasoned "risks" and/or as people who are engaged in "far out", "extreme", or "irresponsible" behavior. The facts are otherwise. WE are the CONSERVATIVES. We are the people who are being cautious, who are saying "look, we cannot be sure this patient is really not going to be salvageable in the long run, so the only reasonable thing to do is to get him into a stable, unchanging state in the least injurious way we know how and continue working on the problem in the meantime. *That's conservative medicine.*.

I have used this strategy many times now and it is incredibly effective at putting our critics on the defensive and destroying their authoritarian credibility. I think cryonics can profit a great deal from a wider application of this tactic. I urge each and every one of you to give careful consideration to adopting this strategy when you talk about cryonics in the future because it is nothing more or less than the honest truth.

After all, it never hurts to tell the truth.

Especially when you're right.

IDENTIFYING RESISTANCES

by David Rath

To make a sale, one must first identify the resistances of the potential customer. Once identified these resistances can be refuted, their influence can be acknowledged but diminished, or the problem can be designed around. Following is a list of those potential resistances which might keep a late 20th-century human of an industrialized culture from pursuing a chance at a greatly lengthened lifespan through cryonics or some other form of post-mortem tissue/information preservation. Following the description of each social, spiritual, or practical concern are some possible strategies which might lessen the effect of these barriers to an individual, organization, or movement trying to "sell" preservation services.

Socially Based

1) Money Needed Elsewhere -- Late 1980's prices for cryonic preservation of the head only was about $35,000, including the endowment necessary for indefinite maintenance costs (monitoring, energy input, etc.). Even in the leading technologic nations only a small elite (<10%) has accumulated sufficient wealth that such an investment would not result in a perceived diminishment of daily comfort or foregone enjoyment of a specific, coveted life-enriching experience. Some portion of the elite would experience debilitating guilt that such resources didn't go to the truly needy.

- Focus marketing (direct mail, display ads) to economic elite in nations or regions which have concentrations of such elite.

- Support social change projects that work towards planetary minimum standards of comfort and safety so that guilt over self-preservation expenditures is unnecessary.

- Bring down costs of current processes through economies of scale (greater number of preservations) and research leading to engineering efficiencies.

- Explore and encourage development of new tissue or information preservation techniques which involve smaller inputs of initial and on-going maintenance resources (digital representation of neural networks, chemical tissue fixation, permafrost burial, etc.) Have greater faith in the future to overcome lower initial investment.

- Develop legal documentation and organizational flexibility so that 100% of the costs of preservation can be shifted to the estate of the deceased and thus have no impact on the finances of the living.

2) Resentment Of Potential Beneficiaries -- Financial competition for preservation funds can be removed from the period of one's life when there are so many attractive alternatives to the time after death when the funds are presumably of no more value to the deceased. Allowing 100% post-mortem preservation financing through will or partial post-mortem financing through life insurance could still "cost" the living customer through the real or imagined resentment of children, spouse, sibling, or potential charitable donees who would rather that the portion of the estate allocated to the deceased's preservation go instead to them. Such a fear by the potential customer could either lead to not contracting for preservation services or to contracting in secret (which loses the publicity/acceptability benefits of each new enrollee).

- Marketing, social change, and cost-reduction strategies listed above also mitigate this effect.

- A process to encourage issue exploration between wealth holders and potential estate beneficiaries may expose the fears to be groundless or capable of being overcome through role-playing, outside facilitation/arbitration, and personal values meditation by all parties.

- Legally establish and publicize that preservation services are a funeral expense deductible from the measure of an estate for tax purposes. Thus up to 55% of

preservation costs for those in the highest brackets (3M+) would have otherwise gone to the government rather than inheritors.

3) **Typecast By Friends** -- The popular culture and media has long portrayed those who operate outside conventional practice as oddballs who lack the social skills to accept the given comforts which the status quo affords, and this is reinforced by a tendency for the discontented to be social revolutionaries. These stereotypes are particularly acute in the areas of technology (the "mad" scientist) and death practices (voodoo, witchcraft, etc.) Those interested in preservation must face their fears of social ostracizm, behind-the-back derision, and public ridicule from friends, family, and co-workers.

- Orient marketing and public relations efforts toward accentuating the values of courage, discipline, experimental rigor, curiosity, and openness also inherent in socio/technological pioneering. Offer historical models of the once-laughed-at and the now-considered-heroic.

- Develop an international network of preservationist groups which not only advance the economic and technologic tasks but which also meet a full range of social support needs, so that the perceived decline of relationships may be compensated from a pool of the intellectually sympathetic.

4) **Population Ethics** -- The argument is that if human life spans are greatly extended then the resources of the planet would soon be exhausted leading to degraded quality of life for all and eventual mass die-offs through war or environmental upset. Living on into our distant descendants' timeframes would in effect crowd them and be ultimately unsustainable if they practiced it also.

- Support efforts of population control, lessen 3rd World economic insecurity (the major motivation for rapid growth rates), encourage simple and non-consumptive life styles (less population impact), and lobby for the dream of human space travel and migration.

- Encourage visionary science fiction treatments of the problem such as Earth as a time-share development where periods of awareness (life) are punctuated by long eras of suspended animation.

- Acknowledge the ethical dilemma as real but argue that the crisis point (absolute limit) is distant given possible technologic and social distribution improvements. Work with well-intentioned antagonists for joint resolution.

Spiritually Based

5) **Barrier To What's Next** -- Many people believe intuitively that there is a natural, pre-ordained order to existence, and that there is at least a possibility of a next stage even if there is no way to even get a clue as to what it consists of. Although this next place is usually believed to have a non-physical basis, there is a fear that somehow physical manipulation or processing of the remnants from this reality (the body) will prohibit travelling there. Being stuck in "limbo", neither here nor there, and thus having created a personal "hell" is the worst case scenario.

- Encourage discussion and study of the various historical projections as to the qualities of this next place as presented by theologians, mystics, and tribal cultures. Demonstrate lack of logical connection between treatment of this life's biologic vessel and non-physical "admission standards" of their postulated future soul evolvements. Develop a preservation philosophy which does not need to threaten any other metaphysical system.

6) **"God Doesn't Want It"** -- Somewhat similar to the above, but more the resistance of the more rigid and less intellectually open thinker, is the feeling that for some reason the omnicient, omnipotent Creator of all would be angry at an individual who pursued a course of preservation. Opportunistic religious leaders often benefit from opposing anything new, and they would tend to project their jealousy about a competing

value system onto the God who created death.

- An individual heavily invested in irrational or pathology-based belief systems is difficult to move and not a good allocation of scarce time and attention. Encourage strict church/state separation and religions with a still-evolving and compassionate God.

7) Poor Self Esteem -- For a person to even desire a prolonged life they must believe they are worth it. This can take the form that their contribution to evolution is helpful or significant, or that the learnings, challenges, and sporadic pleasures of existence are inherently more valuable than the accompanying uncertainty, loss, and pain which inevitably tag along. For the chronically guilty or self-deprecating, or for those whose life experience has tragically been negative, the choice to willingly embrace non-awareness may seem personally appropriate.

- Support social change programs which lessen human misery (medical and social) and provide self-image protection for developing children.

- Encourage therapeutic self-help ("mortalists anonymous") and public assistance to the troubled and insecure.

- Develop self-awareness of phenomenon and design programs of change if desired.

- Encourage artistic and inventive creativity which celebrates intrinsic human worthiness.

8) Confronting Emptiness -- Desiring a longer life presupposes the possibility that the alternative is the great void of eternal non-awareness and emptiness. If that possibility exists then also does the possibility, probability, or certainty of sometime reaching that state even if the best preservationist strategies are pursued. This is a potentially fearful thing to contemplate, sometimes for the stomach and sometimes for the brain, and a potential preservationist is subject to the same avoidance of imaging total termination which keeps wills from being written, doctors from being consulted at first symptom, corpses from being displayed without cosmetic treatment, and funerals from being pre-planned.

- Encourage personal growth programs, educational curricula, and religious rituals which allow supported contemplation of non-existence. Emphasize awareness of void possibility as pre-condition for successful values clarification regarding life-style choices.

- Support hospice and other programs which resist the "hiding" of death through professionalism and institutionalization. Assist efforts to examine it through literature or popular culture. Applaud diversity of funeral practices for the questions which they raise.

Practically Based

9) Fear Of Image -- This classifies as a spiritual fear or resistance because it concerns one's state during a period when there is presumably no awareness. It involves our images of the processing or storage indignities which our corpse would endure and which trigger an irrational, emotional reaction based on the revulsion we would experience should they happen during our awareness. For example, imaging the current cryonics practice of storage in a cylinder full of liquid nitrogen brings us face to face with our fears of cold, being trapped, isolation, quiet, boredom, and drowning.

- Acknowledge that fears can be both irrational and real. Diffuse with humor, indulge personal idiosyncrasies, and design "humane" environments and hardware.

10) Inability To Focus -- Many individuals are unable to successfully pull off any major project which demands long-range planning, difficult choices, and repeated acts of commitment. These individuals will tend to remain stuck in unrewarding jobs, abusive

relationships, or unhealthy behavior patterns because they are unable to marshall the multi-level responses necessary for accomplishing major life change, and this limitation will apply to the organizing necessary in arranging one's post-mortem care even if desire is present.

- Sophisticated design and packaging of preservation services will allow their contracting with a minimum of confusion and customer initiative beyond what is necessary to insure clear, informed consent. Market "turn-key" offerings where all you need to do is choose, die, and pay.

- Seek legal clarifications which allow "deathbed" or guardian choices to contract for preservation, since maximum motivation and ability to change often accompanies realization of mortality.

11) Lack Of Organizational Faith -- Whether due to distrust of the specific preservationist groups now available or generalized poor expectation about the long-range performance of any human cooperative endeavor, many would doubt that the group of individuals (organization) to whom they might entrust their body or money will maintain the integrity, economic resources, and motivation necessary to provide storage and revival services over the long time periods which may be required. Scenarios of mismanagement or embezzlement, fatal schism, physical or economic destruction of endowment assets, government repression, or simple abandonment all threaten the successful completion of a task which may take centuries.

- Study cross-cultural and cross-temporal models of long-term organizational survival and failure. Identify structuring and practices that combine continual commitment to goals with flexible adaptation to changing cultural environments.

- Design preservation techniques which demand minimal follow-up attention such as chemical stabilization of tissue. Such preservation artifacts could conceivably be protected in a non-degrading environment (buried), forgotten, and then later discovered by future cultures technologically capable of revival, thus removing the need for unbroken organizational continuity.

- Encourage a diversity of preservation organizations and usage of redundant storage sites so that isolated organizational failure will not totally destroy the whole movement.

- Establish preservationist trade groups that adopt enforceable (through trademark protection) codes of ethics so that incompetent or dishonest operators to not undermine public perception of the industry.

12) Imperfect Restoration -- The probability that technology will never find a way to repair the damage which originally caused death or the additional tissue degradation caused by processing and long-term storage is conceptually no worse than not trying at all -- either way you are permanently not-alive. A more frightening scenario is that one's revival is attempted during the experimental stage before technique perfection, and that one is brought back with gross mental or physical imperfections and limitations (retarded, immobile, etc.)

- Couple the legal development of preservation contracting with the equivalent of a "living will" which would allow one to issue instructions as to minimal standards of comfort and competence -- otherwise a revival attempt would need to be terminated or reversed.

- Begin preliminary debate about the ethics of revival -- who decides when and how, acceptable levels of risk and experimentation, etc.

13) Inhospitable Environment -- This resistance involves the fear that revival in a potentially very distant future is successful, but that the revivee's quality of life will be poor -- they will be fish out of water. They might be totally without family or friends if none had chosen a similar course, the revival costs might easily have consumed the storage endowment leaving them destitute, they might lack the technologic know-how or

shared cultural assumptions which would allow them to competently function in the future, and future society might have a population, belief system, or government openly hostile to immigrants from the past.

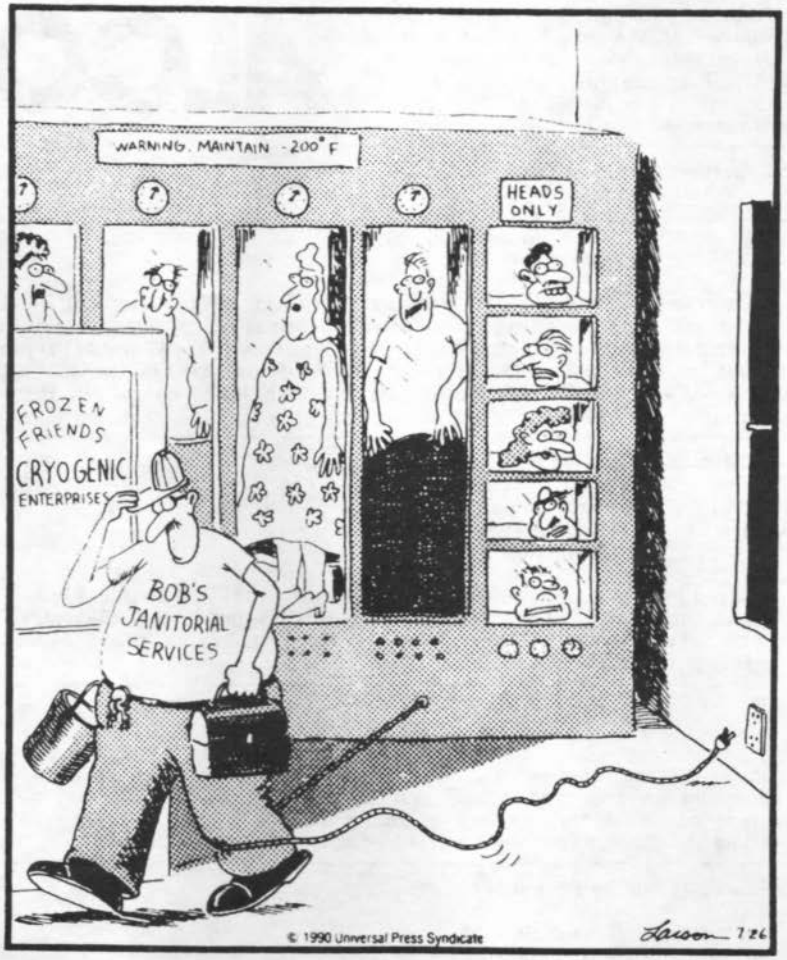
- Encourage family-wide survival plans and social relationships between the preservation inclined.

- Explore exceptions to the legal Rule Against Perpetuities which currently forbids the indefinite ownership of wealth after death.

- Accompany preliminary speculations about revival techniques with preliminary projections about re-enculturation curricula.

* * * * * * * * * * * * * * * * * * * *

The Far Side **By Gary Larson**



ALCOR LIFE EXTENSION FOUNDATION
12327 Doherty Street
Riverside, CA 92503

FORWARDING AND RETURN POSTAGE GUARANTEED
ADDRESS CORRECTION REQUESTED

For information on cryonics call Alcor toll-free 1(800) 367-2228