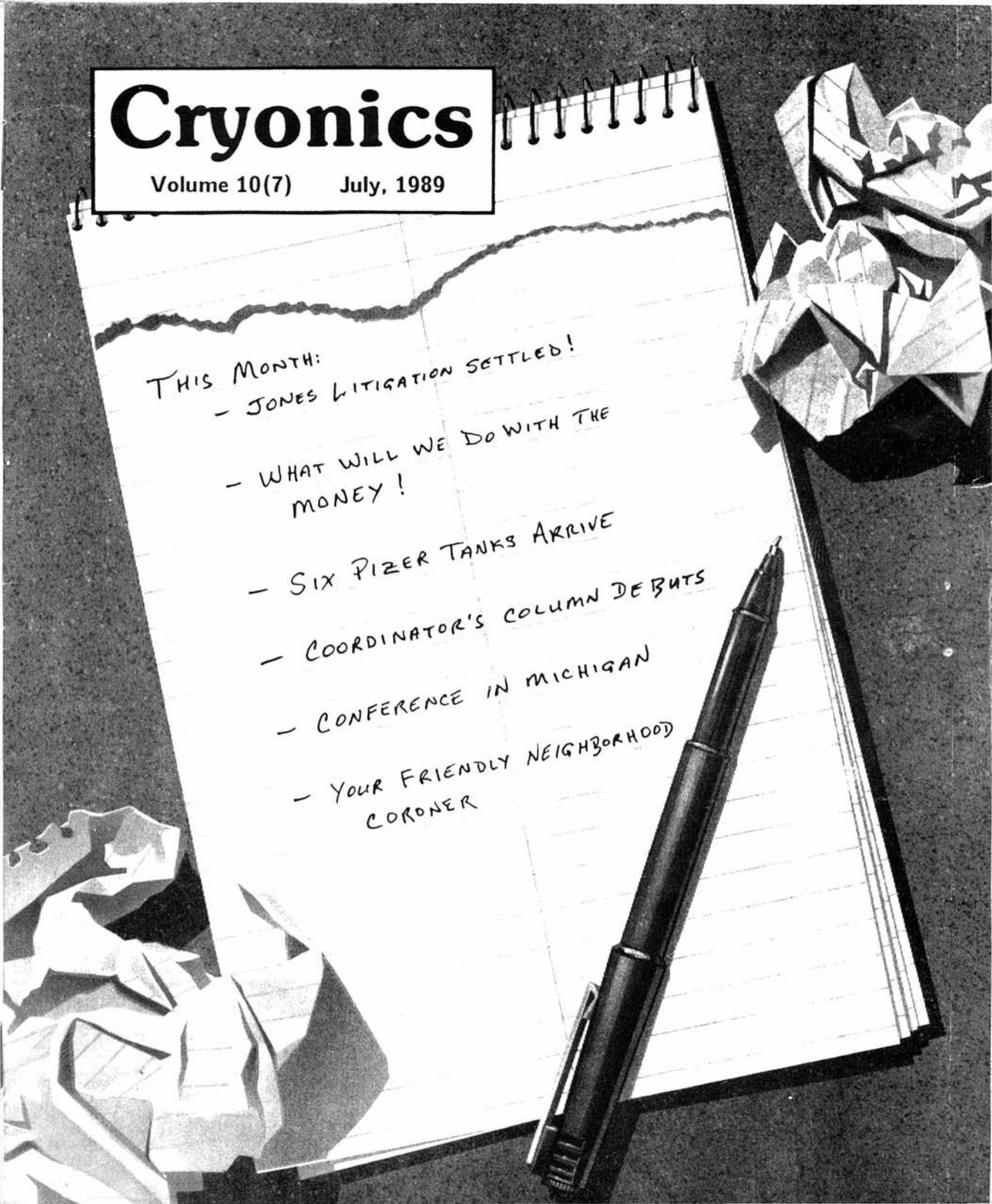
Cryonics

Volume 10(7) July, 1989



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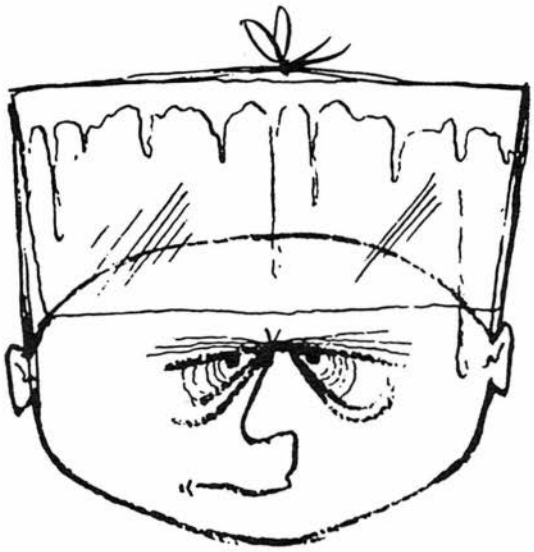


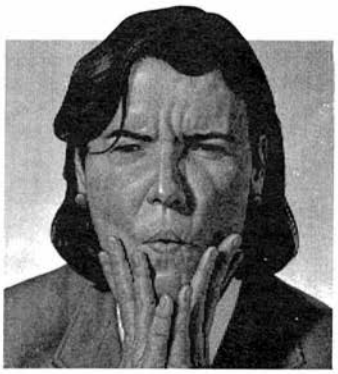
EDITORIAL MATTERS

As is announced elsewhere in this issue, the litigation over the estate and control of the cryonic suspension of Alcor member Dick Jones has been settled. The workload and emotional burden associated with the settlement has been enormous. The report of the settlement contained in this issue is only the briefest sketch of what was a long, complex battle. There are many important lessons to be learned from this case and we intend to report on them in greater detail and from a number of different perspectives in the future. Bear with us, give us some time to reflect, and stay tuned.

Errata

Due to the language barrier, Mike Darwin mistakenly attributed some statements to Klaus Reinhard in his article "Alice Goes to Wonderland, Or How Europe Took Mike Darwin By Storm" which he did not make. In particular Klaus does not believe that freezing whole bodies is "irrational", as incorrectly reported, only "too expensive for most people". Klaus also notes that his impressions that American cryonics organizations were commercial ventures designed only to get people's money and that they had let people thaw out and thus were not very serious, was only his view before coming into direct contact with American cryonics groups. Mike Darwin had intended to convey this distinction in his article, but may have failed to adequately do so. Our apologies, and Mike's too.

The June issue of *Cryonics* contains at least two errors, one of which is especially embarrassing. Several people have asked what the tie in with the binary *statues* on the cover was with the binary *statutes* of Steve Harris' article inside the magazine was? The tie in is with the mis-spelling of statutes on the cover. Our apologies for the confusion. A second mis-spelling dogged the Harris article itself: Edmund Burke's name as *Berke*. For those who may have tried to find out who Burke was and were frustrated, again, our apologies.



All of this just goes to prove Thomas Donaldson's point about new technologies: spell checkers can't *think* check! Only we can do that. We'll try to do a better job in the future.

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SURVEY SERVE-UP

Almost a year ago Alcor member Max O'Connor conducted a survey of the Alcor membership. How smart are we? How educated are we? How rich or poor are we? What do we

read and what do we eat? All of these questions and more were (hopefully) answered. Next month we will start to bring you answers to these questions since Max has completed the mammoth task of reducing the data and writing up the article. (Thanks Max!) We appreciate the patience of the survey respondents and we apologize for being unable to bring you the results of our efforts sooner.

Hopefully, the results will have been worth the wait!

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PLEASE READ, VERY IMPORTANT!!!!

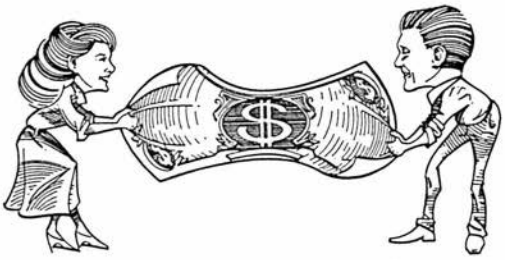
The February edition of *Cryonics* contained what proved to be a premature and incorrect report stating that due to our inability to provide state-certified copies of death certificates to insurance companies, payment of death benefits on the lives of California cryonicists would be impossible. This statement was made with particular reference to Dick Jones' suspension funding.

Not so!!

We were able to secure payment from Northwestern Mutual Life of Madison, Wisconsin for the policy on the life of Dick Jones. The company was very understanding of our circumstances, and only asked that we include a copy of a newspaper obituary with our claim. A check was received only eight days after the company received our claim.

Please accept our apologies for not having made this correction earlier. The insurance company paid in March, but the litigation over the Jones estate forced us to delay announcing the fact.

MAGAZINE RATE INCREASE



Our costs just keep rising, and unfortunately that means that yours do too. Paper, printing, phone bills, and mailing costs have steadily escalated over the last few years. We've tried to hold our costs down by seeking out more efficient suppliers and providing labor in-house wherever possible. This has allowed us to hold our subscription rates steady for three years. Unfortunately, we are now starting to fall behind the power curve and actually *lose* money (rather than just break even) on production costs. That means its time to raise the rates, so, effective September 1, 1989, the subscription price for *Cryonics* will be increased to $25.00/year in the United States, $35.00/year in Canada and Mexico, and $40.00/year overseas. Back issues will be $2.50 each in the U.S., Canada, and Mexico, and $3.00 each overseas.

We think you'll agree that *Cryonics* is worth it, even at the increased rate.

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LITIGATION OVER DICK JONES ESTATE SETTLED

by Carlos Mondragón, President

On the morning of June 20th, I carried out the most distasteful duty I have had to perform as president of Alcor: Standing before a judge, I voiced approval of the agreement described below and minutes later, signed my name to several copies of the document.

The events and circumstances which led up to this settlement are a messy weave of greed, deception, legal maneuvering, and judicial deficiency. A history of the case will be presented here beginning in the September issue. Here, I intend only to describe the final result.

A BRIEF RECAP:

Just 56 hours before he was pronounced legally dead, Dick Jones signed a new will and an amendment to his existing trusts which had the effect of splitting his estate between Alcor and his family. The new documents also gave control of his cryonic suspension to Jenna McMahon, his business partner and the newly named trustee and executrix. Having seen him a few hours before these signatures were obtained, this layman's opinion is that Dick was as disoriented as any man can be while still conscious. Because he believed that the medical record plainly showed that Dick had no capacity to make decisions of any kind, Saul Kent -- a successor trustee and executor under Dick's August 1987 estate plan -- initiated legal action seeking to invalidate the new documents. Alcor did not participate in the litigation.

The Settlement

On May 8th, 1989 in the Superior Court of the State of California, County of Los Angeles, Judge Miriam Vogel delivered the *coup de grace* in a series of decisions overtly designed to force a settlement. Shortly thereafter, Alcor's Board of Directors met with our attorneys to establish the terms which we would would find acceptable.

Samuel Ingham, a specialist in estate and trust administration, and Carol Reichstetter, an estate litigator, had advised Alcor as we sat on the legal sidelines from December through early May. They would approach attorneys for the "family beneficiaries" (Dick's sister and his ten nieces and nephews) to hammer out a settlement. We made it very clear to them that any acceptable agreement would have to include a provision returning absolute control of Dick's cryonic suspension to Alcor. This point was NON-NEGOTIABLE! Insofar as economic issues were concerned, Carol and Sam were given broad latitude.

The last of the family beneficiaries (he lives in Japan) put his signature on the sixth and final draft of the settlement agreement on June 26th (actually June 27th in Tokyo). Key provisions of the settlement are as follows:

- Control of Dick's cryonic suspension is per the terms of Alcor's *Cryonic Suspension Agreement*, signed by Dick on February 11th, 1986.
- Alcor pays everybody's legal bills (about $650,000.00)
- The Jones estate will not participate in *Roe vs. Mitchell*, the lawsuit against the California Department of Health Services.
- With the exception of four items of personal property to be given to his sister, Alcor will receive all of the assets in existence at the time of Dick's deanimation. This includes his house, car, personal property, and roughly $400,000 in cash or cash equivalents.

- All future income earned by the estate will be divided equally between Alcor and the family beneficiaries as a group. This consists of about $850,000 annually through 1995. Thereafter, the existence of any income is speculative. (Since payments of $825,000 have been made to the estate so far this year, Alcor will receive half of that soon.)

- Estate taxes will be paid by the family beneficiaries. Should the legal fees prove not to be deductible, Alcor will pay any additional tax.

- Jenna McMahon is confirmed as trustee and executrix.

- The trust document was vastly modified in its administrative provisions, giving Alcor and the family beneficiaries nearly complete control over actions taken by the trustee, and reassigning power to select successor or cotrustees from Ms. McMahon to Alcor and the family.

Title to the house and personal property were transferred to Alcor on June 28th. The first cash payment has been received.

An obvious set of questions might be "why did we settle, why did we end up paying their legal bills, and why were the legal bills so high?" In other words, was it worth it?

Why?

To answer that question you first have to ask yourself "what's important?" To us, the answer to that question is: "Dick is." As was alluded to earlier, the bottom line in this litigation was return of control of Dick's cryonic suspension to Alcor. The new Will and Trust essentially voided the Alcor Cryonic Suspension Agreement and awarded custody of Dick and control of his cryonic suspension to Jenna McMahon. This would be unacceptable under any circumstances. But it is particularly instructive to note that in the seven months that have elapsed since Dick was placed into cryonic suspension our phone has yet to ring with the first call from either Jenna or his sister Claire Martin asking how Dick's suspension went or inquiring after his current status or his future safety (i.e., from state intervention). Ditto for written inquiries.

In fact, so deep has been Jenna's and Claire's concern for Dick's continued suspension that they pulled the estate out of litigation against the California Department

of Health Services to establish the legality of Dick's cryonic suspension and assure its continuation.

This situation left little alternative but to fight the good fight. We were fortunate that Dick's 1987 Trustee and Executor, Saul Kent, had both the willingness and the resources to wage such a fight. Our thanks to Saul for his courage and pugnacity in the face of a tough and unpleasant situation.

The bottom line is that we have control of Dick's suspension free from the interference of uncaring and even hostile outsiders.

Our attorneys tell me that the best settlements are those that leave everyone somewhat unhappy. Certainly this is the case here. Our CPA said it better, "It's better than a poke in the eye!"

True!

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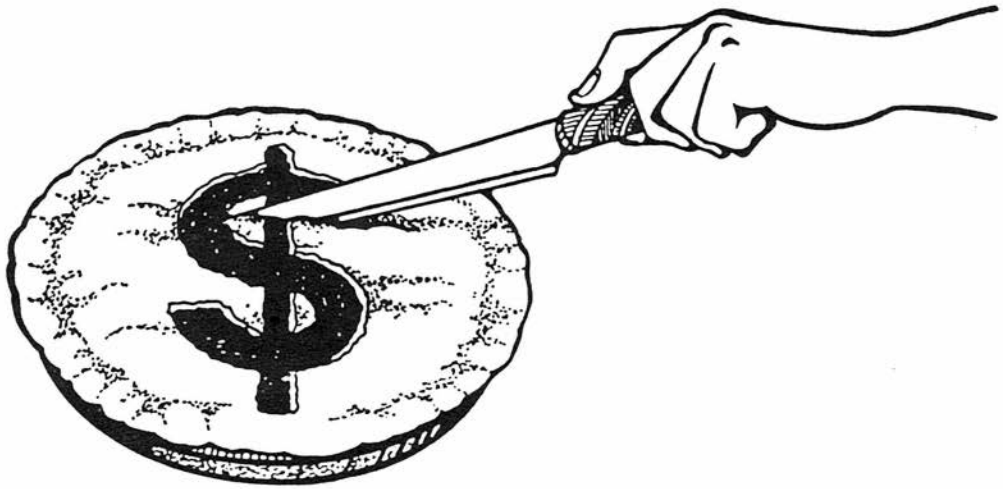
WHAT IS ALCOR GOING TO DO WITH ALL THAT MONEY?

by Carlos Mondragón, President

---you may have asked. I thought long and hard about this question, as did other Alcor directors. At our May meeting a plan was approved by the Board.

At the outset, it is important to note that Dick Jones bequeathed assets to Alcor far in excess of the minimum required suspension funds. *And*, he did so *without restrictions or directions*. It was Dick's hope, and our resolve, that these funds be used to transform Alcor into a financially stable institution, able to amply expand its capabilities, and ready to begin an intensive research program. Had Alcor been the sole beneficiary of the estate, all of this would have been possible.

Given the realities of the final settlement of Dick's estate, we can and will meet the following goals: financial stability, a very modest and gradual enhancement of our capabilities, and the funding of research on a small scale.



Dick Jones
Once and Future

Consistent with Alcor's long-term policy, 10% of all money received from the Jones Estate will be diverted to the Patient Care Fund. By mid-1996, this process will have enriched the Patient Care Fund by about $400,000. Currently, the fund already generates interest income greater than our liquid nitrogen bills.

The Research Fund will receive 20% of the money. Actual spending of these funds on research for the next six years will be quite low -- $10K to $30K per year. By 1996, however, Research Fund capital will have grown to the point where the interest income it produces will be more than the amounts we had been spending.

The balance of the estate will be added to the **Richard Clair Jones Endowment Fund.** The purpose of this Fund is to subsidize Alcor's operating budget, finally eradicating our perpetual deficits which had until now been financed by contributions. Like the Research Fund, only a portion of this money will be spent initially. Invested capital in the Jones Endowment will by 1996 be providing income equal to the amounts spent in preceding years.

Thanks to Dick's generosity, vision, and confidence in Alcor's determination, we can now turn much more of our attention away from organizational survival. Now, we can seriously begin the long journey to making cryonic suspension and resuscitation work.

Future fund raising efforts by Alcor will concentrate on *research*!

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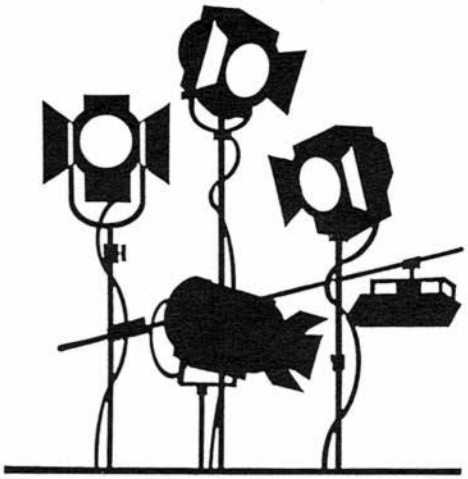
YARD SALE

In clearing out Dick Jones' house, we acquired some furniture and personal effects which are not of use to Alcor. We have scheduled our monthly Board of Directors meeting at the Alcor facility in Riverside for the 1st of October and will hold a "yard sale" after the meeting, in the facility parking lot. Property for sale includes miscellanous items of furniture (lamps, sofa, coffee table, books, pictures) all of which are "garage sale" quality. Proceeds of the sale will go to Alcor's Research Fund. All items sold must be removed within two days.

Video equipment, furnishings, and other household items of use to Alcor have been retained for use in the facility (a small fraction of the household contents). Please be advised that most of the valuable property had been removed from the house, apparently by those previously in control of the estate.

HOW DO YOU FILM A DREAM?

by Hugh Hixon



During the first half of 1989, Alcor cooperated with a student film crew from the Advanced Production course of the USC Film School. No previous effort in cryonics to produce a film explaining ourselves has had this much time and effort devoted to it, either by the cryonics organization or the production company. If Alcor had paid for the effort, $250,000 would not be an unreasonable estimate for the cost. The ostensible purpose of the documentary: explore the scientific basis of cryonics.

Since Alcor didn't pay, and since the goal of the production was to train film students, we didn't see any scripts other than a prospectus that the directors submitted to us before we decided to cooperate. It seemed a reasonable bet. In return for our cooperation, we were getting professional-quality work for free. Based on a screening of the efforts of a similar class last year, the results might well be very good. On the 12th of May, Graduation Day at USC, we got to see the results of their (and our) effort.

I regret to say that the results were completely disappointing and totally unusable.

The film contained scenes from graveyards, graves being dug and filled, a rotting animal at extreme close-up (with an assortment of busy insects), a walk-around of the casket display area at a funeral home, comments by a mortician (including a rather insightful remark about the beneficial effect of a funeral ceremony on the survivors), and in this aspect approached *Faces of Death* for being a representation of all the things we *don't* want to happen to us. The mood the piece set was very much like Diane Keaton's disastrous epic *Heaven*.

Another "highlight" was a series of shots from the Egyptology Museum of the Rosecrucians, at their headquarters in San Jose, along with comments by a curator on the lack of effectiveness of mummification as a means of continuing into the afterlife, and an equally grim extrapolation by this "expert" as to the effectiveness of cryonics. These shots opened the film and the sequence, complete with close-ups of wasted-looking mummies and parts of mummies, nicely set the mood for the gruesome 25 minutes or so that followed.

There was also an assortment of pronouncements by several cryobiologists of some standing, including some damned lies. Thomas Anchordoguy's* explanation of the mechanism of freezing damage had ice crystals initially forming *inside* cells causing them to "explode" (in fact, exactly the opposite occurs: cells are dehydrated by freezing and *shrink* at any cooling rate achievable with any significant mass of tissue).

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* Tom Anchordoguy is a graduate student under cryobiologist Dr. John Crowe of UC Davis. Crowe and Anchordoguy have published a number of significant papers on the dynamics of membrane injury during freezing as a result of dehydration and during drying and freeze drying. Their recent work has explored the role of sugars such as trehalose and sucrose in preventing dehydration associated membrane injury. In short, Mr. Anchordoguy should know very well that cells are not "exploded as a result of ice forming inside them".

And there was some of the usual misleading and by and large irrelevant footage of well-frozen terrestrial frogs warming up and hopping off, no worse for the experience. And Dr. Paul Segall and Miles the Beagle.

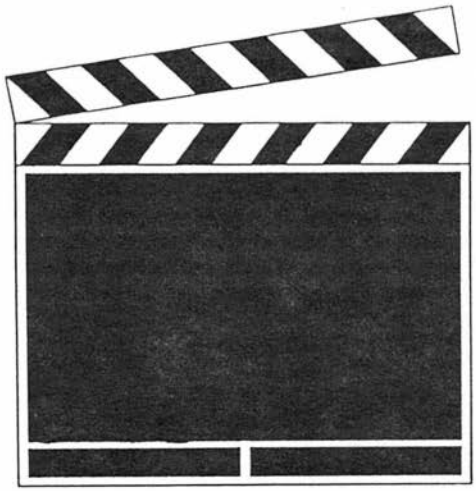
Sadly, there were also lots of shots inside Alcor, including parts of a cryonic suspension, an Alcor meeting, interviews of members, and Mike Darwin trying to explain our hypotheses and dreams.

If there was a direction to the film (it was hard to tell since it was such a montage), it would be that cryonics was a new and novel method of interment. Just like mummification.

Oh, we must not forget about the audience and *their* reaction. The audience of several hundred was a collection of film people, film students and their families. Two other documentaries were shown, one about students at a school for the deaf, and the other about kids in East L.A. gangs. These were received in silence. The cryonics film seemed to be equipped with a snigger-gasp track, but it was only the audience. Particularly disconcerting was the gentleman who sat behind the Alcor group and who punctuated the film at all to appropriate moments with commentary like: "Oh my god!, Jesus!" and "Oh nooo!"

There was one more rather horrible aspect to the whole affair: the film was not made out of malice.

Quite a number of people from Alcor were present at the screening and, much to the horror of most of them, they were identified and asked to stand up in front of the entire audience. One member of the Alcor group summed it up well: "I felt like I had just watched a film documenting a drunken (and *unremembered*) sexual assault on a small child wherein I was the subject, at the end of which I was asked to stand up and take a bow in front of an audience of friends, family, and fellow citizens."



Following the "ceremonies" one of the co-directors strode-up proudly and expectantly asked the Alcor group (who had been invited to attend) "Well, what did you think of it!" To their credit, almost everyone was *very* diplomatic. Except one person whose identity everyone can guess; although to his credit he simply answered with a rather tight-lipped: I didn't like it, and I feel it would be most constructive if I said why in writing, after I've had time to reflect."

Are there any lessons to be learned from this? Probably not. After all, nothing ventured, nothing gained.

DAVE PIZER: ALCOR OUTSTANDING SUPPORT AWARD NOMINEE!

Perhaps no advance in the care of Alcor suspension patients over the last few years is more important than the one that Dave Pizer has facilitated with his "Pizer Tanks". And what are Pizer tanks you ask? The answer is simple; they are a portable river of ice used to simulate the kind of cooling that happens naturally when people experience cold water "drowning". As almost everyone knows, children have been recovered from as long as 30 minutes without heartbeat or breathing following "drowning" in ice-cold water. Mike Darwin adapted this idea for use in Alcor cryonic transports by designing a portable ice bath that can be used to facilitate rapid reduction of a patient's brain temperature by direct immersion of the patient in an ice/water bath.

The previous technique of using ice in plastic bags was not only logistically difficult but also didn't work very well. It was then up to Dave Pizer to build a prototype, which he did. In fact he moved so quickly after receiving the first drawing from Mike Darwin that the prototype tank was ready to use in the next suspension (which happened less than a month after Dave got the drawings). Not only did Dave make the tank, he contributed some refinements to the design (with the use of PVC pipe in place of steel tubing) which dropped the weight and the cost substantially. And he did it all for free.

But Dave's efforts didn't stop there. A few days ago **six** of the second generation of Pizer tanks rolled in the door (or more accurately into the parking lot -- since we have no indoor space for them) courtesy of Dave Pizer. And these, unlike the prototype, are deluxe models which feature a folding, rigid roller base, a very attractive Naugahyde tank, IV pole, steering gear, and retractable handles!

We estimate that if we were to have contracted to have this work done with an outside vendor our costs would have been over $500 per tank for manufacturing plus another $1,000 to $2,000 in development costs (prototyping, etc). What did it end up costing us? The price of a round trip airline ticket for Mike Darwin from Riverside to Phoenix (about $60.00) and a day's wages for Mike to consult with Dave on finalizing the design.

What will we do with **six Pizer Tanks**? We will put them into the field in our Coordinator's hands. At this time we're doing some last minute installation of hardware in preparation for shipment to the Coordinators. (Coordinators, read the Coordinator's Column elsewhere in this issue for instructions on how to assemble and use the Pizer Tanks you'll soon be receiving.)

Dave Pizer has been an incredible source of support to Alcor and to cryonics over the last few years. He has made so much of a difference in the progress of cryonics and in the care that Alcor patients receive it is hard to put into words. All we can say is: THANK YOU Dave!

Know that you have made a very real difference. Hopefully the proof of that will come when patient's who have benefited from your generosity are able to wake up intact and well due to your efforts, and extend their thanks personally.

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MEMBERSHIP STATUS

Alcor now has 132 Suspension Members, 257 Associate Members, and 12 members in suspension.

COORDINATOR'S COLUMN: External Cooling

The PIB

In the past, external cooling of suspension patients has been undertaken using Zip-Loc plastic bags containing crushed or small cubed ice. This approach had the obvious advantage of being simple, straightforward to implement, and very inexpensive.

Unfortunately, years of actual field experience with this approach have yielded a number of serious drawbacks and problems:

1) Heat exchange is greatly attenuated by both the insulating properties of the plastic layer and the reduction of convective transfer due to containment of the ice water generated as a result of the ice melting.

2) It is difficult to properly and completely pack the patient in ice since the ice bags are constantly falling off the patient/cot and do not stay positioned properly and in good contact with the patient's skin. Keeping ice bags around the head and neck is a particular problem.

3) It is virtually impossible to get ice packs *under* the patient and this means that 35% to 45% of the patient's surface area is unavailable for heat exchange.

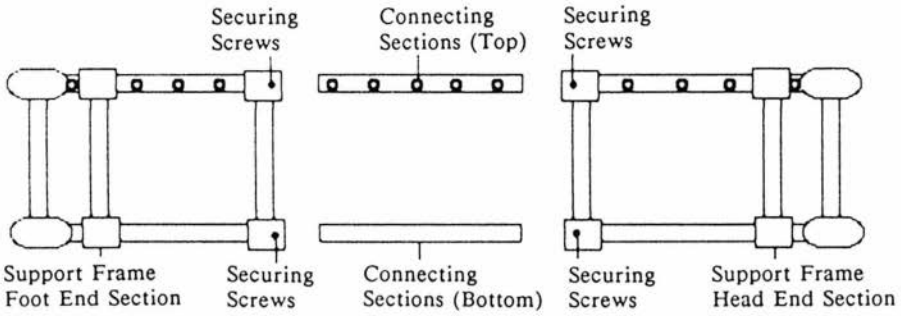
4) Bags leak and sweat, causing water to wet the patient and drip off the cot or gurney during transport. This presents both an immediate safety hazard (creating slippery floors and a potential electrical hazard) *and also serves to contaminate staff and the working environment with potentially infectious fluids.*

For these reasons a lightweight, inexpensive, *Portable Ice Bath* (PIB) was developed. The purpose of the PIB was to simulate the kind of conditions normally encountered in cases of ice water drowning where very high rates of heat exchange are known to occur. *Indeed, in such cases of cold water drowning it is often possible to successfully resuscitate people who have simply been chilled in the absence of any cardiopulmonary support for up to 30 minutes.*

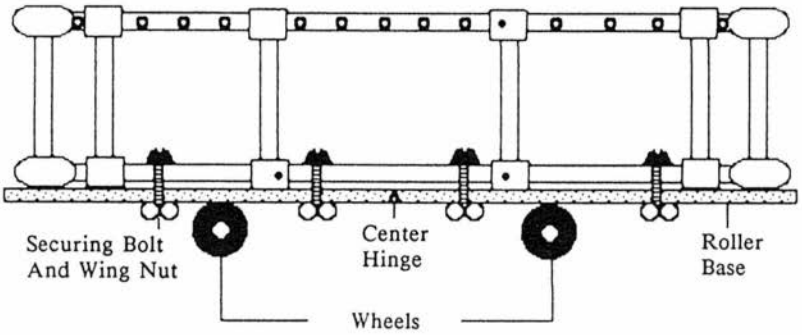
The PIB consists of a waterproof Naugahyde tank which snaps to a rigid frame of 1¼" OD PVC plastic pipe. The PIB may be broken down into easy-to-transport elements: two end sections measuring roughly 25" x 26" x 13"; four connecting sections of pipe, each 21" long; a roller base of heavy plywood; the snap-on Naugahyde tank; and a Naugahyde "privacy cover". The PIB can be rapidly assembled by one man in approximately 10 minutes. The lightweight plastic construction means that it can be easily transported prior to and during its use on the patient. The PIB is designed to be transported independent of an ambulance cot.

Initiation Of External Cooling With The PIB

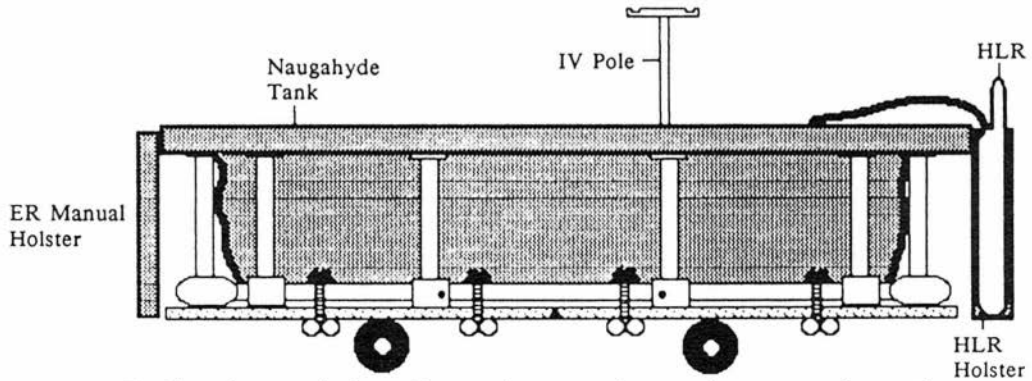
Once cardiopulmonary support has been established, the patient should be cooled externally by packing in ice. The most effective way to do this is to use the PIB, which allows for direct contact of crushed ice with the patient's skin. The PIB may also be used to create an ice/water slush for even more rapid cooling. The PIB using crushed ice in direct contact with the patient's skin *will more than double the rate of cooling that can be achieved with ice contained in plastic bags.* The PIB is many times more effective at reducing patient core temperature than is simple air cooling such as is achieved by placing the patient in a refrigerated morgue or "reefer" unit.



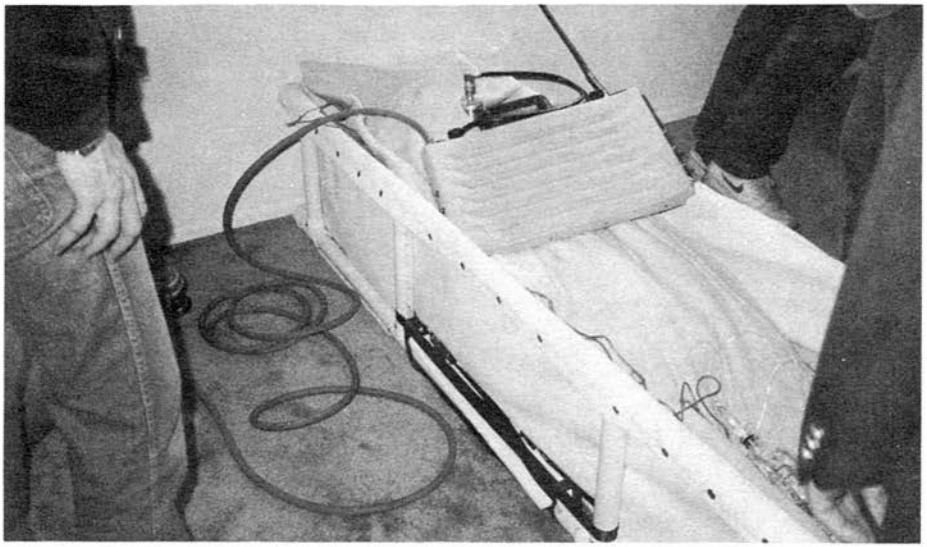
The first step is to assemble the PVC support frame by connecting the two end sections with the four connecting sections. Be sure to secure the connecting sections to the end sections with the thumb screws (not shown on drawing).



The next step is to attach the support frame to the plywood roller base with the eight securing bolts and wing nuts.



Finally, the naugahyde tank may be snapped onto the support frame, the holsters for the HLR and Emergency Response Manual should be attached and the IV pole should be dropped in place in the support frame.



An early model of the Portable Ice Bath during a recent cryonic suspension.

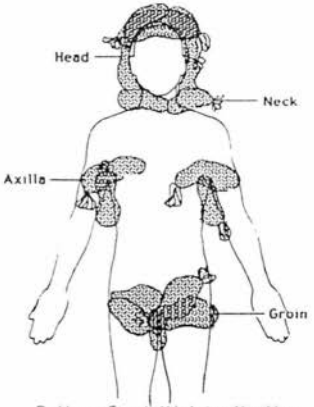
Ideally, as soon as legal death is pronounced the patient should be rapidly connected to the HLR (using a "dummy backboard"), placed in the PIB on a bed of crushed ice, and then completely packed in ice from head to toe. It is recommended that during initial resuscitation, complex and potentially time consuming procedures such intubation and the initiation of IV therapy be delayed until the patient has been positioned in the PIB. Use of a mask with oropharyngeal airway or the EGTA for ventilation is recommended until the patient is in the PIB.

As soon as legal death is pronounced, all clothing should be removed from the patient such as hospital gowns, undergarments, or antiembolism stockings. The most expedient and practical way to remove such clothing is by cutting it off using bandage scissors or the Superscissors contained in the kit. At this point any jewelry on the patient should be removed and placed on the transport technician's person for safe-keeping. Jewelry or other personal effects may be surrendered to the next of kin providing a receipt for them is obtained.

The patient's genitals must remain covered at all times during transport and external cooling. The genitals may be covered with a towel or small disposable drape sheet. This is an important gesture of respect and decent treatment and is not only a courtesy to the patient and personnel who may come in contact with the patient, it is also the law in many states. Failure to offer this respect can result in civil prosecution.

Ice Bag Method

If the PIB is unavailable the patient should be packed in crushed ice contained in high quality Zip-Loc plastic bags (See *Figure*), (those manufactured by the Dow Chemical Company are preferred). Leaking bags present a serious safety hazard in the form of water on the floor and an electrical hazard if the patient is in an electrically operated bed. Special attention should be paid to packing the head, neck, axilla (armpits), and groin in ice, since large vessels which carry a significant fraction of the cardiac output lie close to the skin in these areas and are thus available for heat exchange.



Pattern For Initial Application
Of Ice Packs During External Cooling

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CRYONICS CONFERENCE IN MICHIGAN

On Friday, October 6th, through Sunday, October 8th, the *Immortalist Society*, of Detroit, Michigan will be sponsoring a cryonics conference at the Southfield Hotel and Conference Center in Southfield, Michigan.

The conference will feature a range of speakers, including H. Jackson Zinn from the American Cryonics Society, Fred and Linda Chamberlain of Lifepact, and Robert Ettinger of the Cryonics Institute. Alcor member Ralph Merkle will also be giving a presentation on nanotechnology and cryonics.

At this time plans are being formulated for an Alcor table at the conference and several Alcor members, including Mike Darwin and Brenda Peters from Alcor Southern California (ASC) and Steve Bridge, Alcor's Midwestern Coordinator are planning on being there.

Registration fees and contact phone numbers and addresses for registration and transportation are as follows:

* * *

For the complete conference: one person, $160.00; couple, $220.00.

Saturday only, one person: with meals, $95.00; no meals, $60.00.

The hotel has reserved a block of sleeping rooms at $55.00/night single, and $65.00/night double. To make reservations, call (313) 557-4800.

Limousine service is available from and to the airport. The telephone number is (313) 941-3252.

If additional information is needed, the cryonics telephone numbers are (313) 547-2316 and 548-9549.

CHANGES IN SUSPENSION TRANSPORT PROTOCOL

While we may not have been doing any dramatic high-profile hypothermic dog work, we've nevertheless been busy with research. Due to financial limitations our focus has been on searching the literature and adapting things we've found there to improve the quality of care we deliver to our patients.

Nimodipine
Intravenous

1 mg/ml, 5 ml

Lot# 18F0340 Exp. 7/92
Alcor Pharmaceuticals
Riverside, California

Nimodipine

An example of such work is the addition of the calcium channel blocker **nimodipine** to our transport protocol. In 1985 nimodipine was reported to have facilitated survival of pigtailed monkeys *following 17 minutes of total cerebral ischemia (no blood flow to the brain) at normal body temperature* (Steen, et al, *Anesthesiology*, 62:406-414, 1985). Subsequent work by a wide range of other investigators has established nimodipine as the calcium channel blocker of choice for mitigating cerebral ischemic injury.

Recently nimodipine became commercially available and Alcor obtained some. However, addition of nimodipine to the transport protocol was **not** straightforward. For one thing, nimodipine is about as soluble in water as beeswax! For another, it is about as easily degraded by white light as photographic film! This combination of attributes does not make its use for suspension operations easy.

That's where a lot of bench research by Mike Darwin came into play. After much effort a vehicle solution that would dissolve the drug (and not kill the patient) was developed, and a system for administering the drug in a safe fashion without exposing it to light was developed. Finally, a way to prepare the material in a stable, sterile dose form so that it is ready to administer was also developed: putting it in rubber-stopped vials didn't work since the drug dissolved in the stopper material and vehicle solution dissolved pigment from the stopper into the drug solution!

After much effort a "ready to use" form of the drug has been developed and will be deployed into the field over the next few months (the New York group already has the drug).

Diltiazem

Similarly, we have overcome packaging difficulties with the calcium channel blocker **diltiazem** and are placing it in the field to be used as a back-up to nimodipine in areas where training to use nimodipine is not possible or practical.

Sodium Citrate

In a two pronged assault on calcium-mediated injury we have decided to add **sodium citrate** to the transport protocol. Unlike calcium entry blockers, citrate works by chelating calcium; chemically combining with it in a way that renders it inactive. The citrate thus effectively *reduces* the blood concentration of calcium and diminishes its entry into the patient's cells. This drug is also prepared in a sterile-dose form in-house.

Calcium and Ischemia

In recent years it has become increasingly apparent that a major cause of injury to brain and other body cells during ischemia (interruption of blood flow) is calcium influx into the cell. Normally the concentration of calcium inside the cell is 10,000 times lower than that outside. This 10,000:1 ratio of calcium is maintained by calcium pumps in the cell membrane.

The calcium pumps require energy to operate and when the cell experiences exhaustion of its energy reserves during ischemia, calcium rapidly moves into the cell. Unfortunately, calcium entry into the cell triggers the activation of cell membrane destroying enzymes called phospholipases.

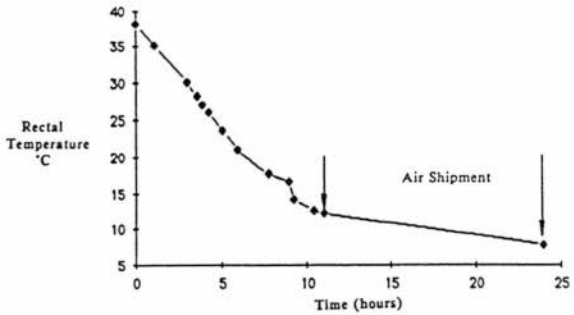
The influx of calcium also poisons the mitochondria, which are the "powerhouses" of the cell, preventing them from resuming function. Needless to say, without energy the cell cannot recover its calcium balance (or act to repair itself or even carry on normal metabolism). Calcium channel blocking drugs help to mitigate ischemic injury by blocking the damaging influx of calcium into the cell.

Chloropromazine and Methylprednisolone

We have added chloropromazine (CPZ) and methylprednisolone (MP) to the transport protocol to help stabilize cell membranes and reduce calcium mediated damage to them. CPZ and MP also help reduce injury to cell membranes during cold ischemia (i.e., air shipment of the patient after blood washout or during ice chilled transport of the patient) for reasons which are not fully understood. The utility of CPZ and MP in preventing cold ischemic injury has been repeatedly demonstrated over the past few years. In fact, CPZ and MP pretreatment are essential to the success of UW solution in preserving livers for transplant. Without CPZ and MP pretreatment livers experience significant cell membrane damage, marked release of enzymes, and failure to function on transplantation (J. Southard, personal communication).

Gentamicin and Bactrim

We have replaced erythromycin as our first-line antibiotic with a combination of gentamicin and Bactrim. We feel this will give us broader antimicrobial coverage during external cooling of patients remote from the ASC facility. As the graph to the right illustrates, it can take upwards of 8 hours for an adult patient to cool to 15°C: plenty of time for overgrowth of micro-organisms.



Cooling curve for 59 kg. patient, using ice bag cooling.

At the end of this article we have reprinted the updated copy of the Alcor patient transport protocol. You may wish to make a photocopy of this to put with your emergency papers at home and/or to provide to your physician if he/she is cooperative.

Mike Darwin has also completed a major revision of the Alcor *Transport Protocol For Cryonic Suspension of Humans* manual. Distribution of the updated manuals to Coordinators is scheduled for late September.

EMERGENCY INSTRUCTIONS FOR STABILIZATION OF ALCOR BIOSTASIS PATIENTS

Introduction

Biostasis is a low temperature preservation process applied to patients after they have exhausted the resources of contemporary medical care and have been pronounced legally dead. The process of placing a patient into biostasis involves prompt "post-mortem" cardiopulmonary support (to minimize ischemic damage) concomitant with induction of hypothermia by surface and/or blood cooling, treatment of the patient with agents to minimize freezing damage, and cooling to ultra low temperature for continued long term care. The ultimate objective of biostasis is the restoration of life and health to the patient at some point in the future when biomedical technology has reached a degree of sophistication equal to reversal of the cause of death as well as the injury which results from the application of current, unperfected preservation techniques.

Stabilization Protocol

If the patient is pronounced dead (i.e., resuscitation efforts have failed or were deemed medically inappropriate), we request that you allow the Alcor Transport Technician to undertake the following steps:

1. **Cardiopulmonary resuscitation (CPR)**: *Immediately* begin administration of 100% oxygen via face mask or (preferably) endotracheal tube using positive pressure ventilation. Begin sternal compression.

   If a mechanical heart-lung resuscitator (such as the Thumper) is available, apply it.

   Continue CPR during the administration of all medications listed below.

   Do not defibrillate the patient.

2. Establish and maintain a patent intravenous line (preferably a subclavian or peripheral cut-down) for administration of all medications. Patency of the IV should be maintained by filling the catheter with heparinized saline (2,500 units of heparin per cc) or maintaining TKO flow of normal saline or other solution *which does not contain dextrose.*

3. Administer **potassium chloride** 1 mEq/kg, IV push to reduce cerebral metabolic demand *or* **sodium pentobarbital** 30 mg/kg IV push.

4. Administer **deferoxamine HCl (Desferal)** 2 g, IV push to scavenge free iron and reduce ischemia-induced free radical damage.

5. Administer **nimodipine** 10 *micro*grams/kg, slow IV push via 0.2 micron filter, followed by continuous IV infusion at a rate of 60 *micro*grams/kg/hour. Instructions for preparation and administration of nimodipine are attached to this protocol.

   As an alternative to nimodipine, **diltiazem HCl** may be given in a dose of 300 *micro*grams/kg, IV push.

   The purpose of both nimodipine and diltiazem is to prevent cerebral vasospasm and protect against intracellular calcium loading and cerebral "no-reflow".

6. Administer **sodium citrate** 120 mg/kg, IV push to chelate serum calcium and reduce cerebral reperfusion injury.

7. Administer **tromethamine (THAM)**, 250 mg/kg, IV (give 200 cc of 0.3 molar THAM rapidly, then set rate of infusion at 30 drops per minute) to combat acidosis.

8. Administer **heparin**, 420 IU/kg, IV push for anticoagulation.

9. Administer **chloropromazine HCl (Thorazine)**, 3 mg/kg IV push to provide membrane stabilization and protection against cold ischemic injury.

10. Administer **methylprednisolone HCl (Solu-Medrol)**, 1 g by slow IV injection to provide membrane stabilization and protection against cold ischemic injury.

11. Administer **mannitol (Osmitrol)**, 2 g/kg, high-flow IV infusion to reduce ischemia-induced free radical injury and prevent cerebral edema.

12. Concomitant with the above begin surface cooling by **packing the patient in crushed or small-cubed ice**. Particular attention should be given to packing the head, neck, axillary, and femoral areas in ice. In situations where the supply of ice is limited, concentrate on cooling the head and neck.

13. Administer **metubine iodide (Metubine)**, 0.07 mg/kg or succinylcholine 0.80 mg/kg, IV push to inhibit any possible shivering.

14. Administer **gentamicin sulfate (Garamycin)** 1 mg/kg IV push and **Bactrim: trimethoprin** 160 mg and **sulfamethoxazole** 800 mg by slow IV infusion to inhibit microbial overgrowth.

Alternatively, **erythromycin (Erythrocin)**, 1 g adults or 500 mg for children under 12, (or if unavailable, Keflex 1 g), IV push may be used.

15. Immediately prior to the administration of **dextran-40**, administer 1.5 g of **dextran-1 (Promit)** IV push to prevent possible anaphylactic reaction to dextran-40. Do not delay the start of the dextran-40 infusion longer than 15 minutes after the Promit has been given.

16. Administer **dextran-40 (Rheomacrodex)** *in normal saline only*, 250-500 cc via high flow IV infusion to minimize capillary sludging and support blood pressure (in volume depleted patients). *Do not use Rheomacrodex solutions containing dextrose.*

17. **Continue CPR for at least 10 minutes** after the injection of the last medication.

18. It is highly desirable to **continue cardiopulmonary support until a pharyngeal temperature of 15°C or a rectal temperature of 25°C has been reached.**

19. If a nasogastric tube is in position it should be used to administer 250 cc of **Maalox, Riopan, or Titralac** in order to neutralize gastric hydrochloric acid and eliminate the risk of erosion of the gastric mucosa and hemorrhage during subsequent cryoprotective perfusion.

20. The **eyelids should be closed** with tape to prevent corneal dehydration.

21. Clamp but **do not remove any drainage tubes, catheters, or IV lines** in the patient.

22. Completely pack the patient in **water ice** for transport to our facilities.

23. **It is of critical importance that the patient not be subjected to freezing temperatures (i.e., those below 0°C (32°F)).** This includes, but is not limited to storage in a hospital morgue "cooler" at a temperature below 4°C (34°F), temporary storage in an unheated ambulance, hearse, or aircraft during transport when the ambient temperature is below freezing, or the use of refrigerants such as dry ice or water ice/salt mixtures for cooling or transport. If there is any question about the accuracy or reliability of mechanical refrigeration equipment, it should be checked frequently on a manual basis with an accurate thermometer.

24. If you need further information call the emergency number listed below and ask to be connected with the Emergency Rescue Technician on call.

EMERGENCY PHONE #: (714) 736-1703

Thank you for your cooperation.

EMERINST 8/89

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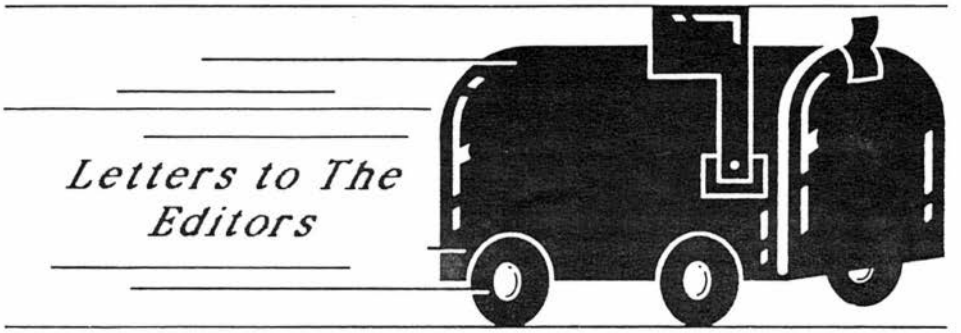

Dear Editors:

I just received volume 10(5) (May, 1989) issue of Cryonics, and as always, read your articles with great interest.

However, I would like to add a small correction to your "A suspension in Deroit" article. A much as I appreciate your giving me photo credit for the photos I shot during the suspension of Dr. Nally, you also gave me credit for a photo I did not shoot -- the top photo on page 33 of Cindy Nally cleaning up the instruments. I believe the proper credit for that photo should rightly go to Jim and Cindy Nally.

Thank you for the opportunity to observe and photograph a suspension in progress. The Alcor staff's boundless dedication, close team-work, and all-out effort are truly impressive.

Sincerely,
Elleda Wilson
Van Nuys, CA

To the Editors:

I read with much interest the article Mike Darwin wrote about his recent excursion through Europe. Mike should be congratulated on making this eye-opening and long overdue trip. We cryonicists should keep in touch with our European counterparts in order to share ideas and help each other.

Mike may have tended to generalize somewhat in his story; however, we should not ignore his message. One thing he mentioned was that the "U.S. seems to be moving in the direction of greater socialization and bureaucracy..." This should be of paramount concern to all American cryonicists. In my opinion, the ever-increasing size and power of our government probably poses the highest risk to cryonics. We only need to look at the Dora Kent case to see how some government henchmen can abuse their power.

I have been a member of the Libertarian Party for over 10 years. The Libertarian Party is the *only* political party in the U.S. which would recognize the right of a cryonicist to have his or her body frozen. The LP also stands for the limiting of government power in both our economic and private lives. While I am sure that there are a few Democratic and Republican politicians who may sympathize with cryonics, both parties are basically hostile to such a concept. It is the Democrats and Republicans who have set up the myriad of regulations governing the disposal of human remains that have made the preparation for suspension so taxing. Within reason, an individual should be able to make whatever arrangements he or she wishes concerning treatment of his or her remains.

If cryonics is to survive, we, the People, must begin to pull back on the reins of government.

Thomas Hazard,
Montour Falls, New York

* * *

Dear Cryonics,

I'm curious, as I'm sure a great many of the readership are, about what Alcor's plans are for accommodating increased patient storage. How much longer will it take for the patient storage bay at the Riverside facility to fill at the present rate? The thing that particularly worries me is that a statistical universe as small as Alcor's membership just isn't very well behaved. Not at all unreasonable events, such as car accidents, could drop a couple of years' worth of cases in your lap at one time. At the very least, I suggest we avoid car-pooling.

I did some very preliminary calculations regarding trade-offs between liquid nitrogen consumption and investment in insulation for large facilities, and the results surprised me. The financial optimum for foam insulation occurred at about three meters! (Using retail prices and neglecting other construction costs -- these estimates were very preliminary!) This suggests that such a facility would have very large scaling-up advantages up to a several hundred whole-body capacity. Naturally, we couldn't build such a facility until the current legal turmoil is ended. It wouldn't make much sense to spend half a million dollars or more on such an immobile investment.

On another subject, I'm hoping to see some familiar faces at the cryonics convention that the Immortalist Society will be holding this fall in Michigan. Given some of the names I've seen in the program, I'm surprised there hasn't been more mention of it in *Cryonics*.

Brett Paul Bellmore
Capac, Michigan

Brett,

I'll try to answer your questions in order of simplest to most complex. First, the reason that you didn't see an earlier mention of the IS conference is that we were not given any advance notice of it. We learned of it probably at the same time you did: by opening our bulk mailed copy of The Immortalist *and reading the brochure that fell out. Since we are behind in our production of* Cryonics *(nearly two months behind!!!!) this is the first issue we have put out since we received the IS brochure. As to how many "familiar faces will be at the conference" that will depend upon whether booth space will be made available to Alcor per the statement in the IS brochure to the effect that "Tables will be provided in the conference room for those wishing to display cryonics related materials." If the answer is "yes", than an Alcor Southern California contingent will probably be there, including this editor.*

As to your questions about space for patients. That's more complex. Right now we can easily accommodate nine more neuropatients and probably about twelve more whole body patients without changing our technology (i.e., using existing space and style of cryogenic dewars). However, as you suggest, if we start to accumulate a large number of patients we would probably modify our storage technology to go to a so-called "multiple storage unit" (MSU). Robert Ettinger of the Cryonics Institute *and we have both looked at foam. Unfortunately, numbers can be misleading. Thick slabs of foam with enormous temperature differentials* crack. *Our analyses indicate that for storage units in the 100+ patient range, a soft vacuum type system is probably the best approach.*

While Alcor has been placing patients into suspension at about the rate of one every four months for the last two years or so, as you point out, in a statistical universe as small as ours it is nearly impossible to predict whether or not this will continue. The current mix of members is about two neuros to each whole body. Even at that rate, the existing facility can accommodate storage for at least three to five more years. If we relocate our ambulance elsewhere, we can effectively double our storage space. If we go to a single, large MSU we can probably accommodate many times the above estimate.

In the long run though we want to relocate storage to more secure quarters and split it off from the rest of our operations. We also want to get out of the earthquake risk zone we are currently in. All such moves must of course await the outcome of legal matters, as you rightly posit in your letter.

In short, storage space is not likely to be a major problem for us soon. At least not patient storage space. A much more pressing problem is the fact that we are badly overcrowded in other areas of our operation such as research, administration, and rescue. What will we do about that? Well, thankfully that's a question you didn't *ask and which, for the moment, I can't answer. --MD*

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RESPONSIBILITY, PROBABILITY, AND DURABILITY

by Thomas Donaldson

Recently Steve Harris and Mike Perry have discussed estimates of the probability of our revival. Their discussions have been very useful not as numerical estimates but as discussions of the issues involved. After all, few readers would attach exactly the same numbers to each issue.

But there is an assumption lying behind both of these estimates which deserves examination. Some of the factors Steve and Mike raise we can easily think of as appropriate issues to which to apply the notion of probability. Others, however, are far too bound up with our own actions. It's reasonable to ask, first of all, whether the idea of probability means anything at all in that context.

Here is an example of the problem I'm raising, with the issues raised to an absurd level just for clarity. A new gambling house sets up in Reno. The owner undertakes to bet with everyone about whether or not he, the owner, will do his laundry tomorrow. Bets are made today and close at 6 PM. (Perhaps gambling houses already operate this way?). Do we, then, expect a rush of clients?

The problem with this bet is that he, the owner, has some control over whether or not he does his laundry. Not only are the dice loaded, but he gets to pick, after all bets are laid, which loaded die to use. Computing probabilities only makes sense when the events bet upon are known to be random. For Mike and Steve, this means that our actions can have NO effect upon the outcome. I don't mean "only a very little". NO means none at all, zilch, zero. Why zero? Because our actions now are seeds, not just "observational errors" which lead nowhere. Once we admit that our actions can influence these events, how do we predict by how much and when?

Within a very wide range, what happens to us is our responsibility. We are not passive bettors on the outcome of events. I mean this both in the narrow sense of I, me, myself, and in the broader one of cryonicists generally. How can I (myself) affect my frozen fate 100 years from now? Well, for one thing I can choose my cryonics society. I can try to make its officers not only honest and competent as individuals, but operating within a constitution which keeps them honest and competent or throws them out of office. And I can provide enough resources so that evasive action is possible when any threat appears. Third, I can try to arrange that equipment, supplies, and competent people will be available when I'm declared legally dead. And of course last of all I can try to create other cryonicists.

But of course someday I will be frozen. What control do I have then? Not directly, but through other cryonicists who succeed me. We have all joined together for a journey across time. If anyone is revived 50 years from now, even with technology far in advance of ours and in another country, it will strengthen my chances. I believe the important part to remember about Mike and Steve's social catastrophes is that every one of us is putting out effort to see that they do not occur *to us*.

That qualification gets to the gist of my point in this article. It is wrong for us either individually, or as a class of people (cryonicists) to take occurrence of world-wide or even Solar System-wide events as necessarily our own personal fate. It is wrong and far worse than wrong. Habits of mind which identify ourselves with the general fate of humanity assume an abdication of that exact responsibility we must take over our own fate. Putting our fate into a model of passive probability assumes our own passivity.

Some people made money hand over fist during the Depression. They did so not by

preying on others but by providing needed services, just as people do today. Many German Jews escaped Hitler, by an agility of mind which told them that *now* was the time to leave a place where their family had lived for centuries. We want to choose a cryonics society agile enough that when the mobs come to loot the facility, they find only empty dewars and bare offices; when the nanotech beasties come for us, we meet them with a nanotechnological immune system which consumes them. We very much should not identify our own fate with that of "society" or "mankind" or even the Earth (cryonics societies should found offices off the Earth as soon as that becomes possible). Didn't we become cryonicists because we proposed to escape that which all the philosophers said was the common fate of all mankind? Floods, earthquakes, meteor impact, major war, mobs searching for us in every cranny, how could we be fazed by such trivialities having once adopted our major goal?

It is, after all, not as if we have only five minutes to prepare for such events. Haven't you noticed that cryonics is a *very* long term project? Every year we should all look up from our local cryonics tasks and think about dangers over the longer term. No cryonics society, for instance, has a constitution which satisfies me completely. There are other issues too. Part of our responsibility consists exactly of foreseeing problems which now look far away. To be immortal means to be farseeing.

Finally, since both Mike and Steve discuss the Fermi problem as an indicator of our future, I have a few words about that. One scientist closely involved with the search for ETI summed the matter up: the fact that we don't see anyone else says something unknown about the existence *or the intentions* of an advanced society.

Currently we live in an apocalyptic age, when myths of total worldwide destruction lie on everyone's mind. Before nanotechnology, it was nuclear war. Before then (a long time!) it was poison gas. That's a highly biased view of the facts: what about the *other* possibility? Children can look on adults and wonder how they can eat asparagus and forego so much candy. We don't really know what we will grow into, either as individuals or as a member of humanity. We can't even estimate probabilities for events we haven't ever imagined. That's one of the most fascinating parts of cryonic suspension. Whatever we become in 1000 years it's certain that every one of us would surprise ourselves if we could see it now.

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YOUR FRIENDLY NEIGHBORHOOD CORONER

by Arel Lucas

> The police--"You're playing god!"
> Dr. Hfuhruhurr--"Somebody has to!"
>
> *--The Man With Two Brains*

* * *

Despite the fact that you and I feel the necessity and rightness of what we are doing as cryonicists, there are obviously those who feel otherwise -- and some of them are law-enforcement agents. Steve Martin got away with patching one brain into another body in the movie I've cited above, and the way he did it was by knowing his friendly neighborhood serial killer. *Your* ability to get away with a second chance, with your intact brain in a healthy body, may depend on getting to know your local coroner, since he or she can claim to have absolute legal control of your body following your "final" cardiac arrest. Given

Alcor's problems with the Riverside coroner, you may be thinking that it would be less distasteful to get to know a serial killer.

However, I intend to show you not only the necessity of finding out how your local coroner operates, but also what a coroner is legally, and why the office of medical examiner should be what replaces or augments the traditional office of coroner.

The word "coroner," as you can see from its likeness to the word "coronation," refers to a crown. In England the office was founded by "the crown" or king/queen for the purpose of investigating suspicious deaths independently of local legal authorities. My medical dictionary defines "coroner" as "an officer who holds inquests in regard to violent, sudden, or unexplained deaths." In practice, "inquests," or formal investigative court functions, are rarely held in this country, since the conditions under which autopsies are performed are defined in general terms by statute, and the coroner's report (based either on an autopsy or an inspection) usually suffices to answer questions concerning the circumstances of death. If a coroner suspects that the person involved in an investigation died "by another's hand," he is under obligation, by California state law, and probably by every other state law as well, to notify local law-enforcement officials immediately. Usually, of course, such officials already have their suspicions, and are on the case. Typically they call the coroner, whose report serves then to shed light on the means of death and possibly on the *modus operandi* of the perpetrator.

The coroner is, in the United States, an officer of the county government, though his/her authority typically derives from state law. This law usually specifies the duties of the coroner to be generally the same as in the medical dictionary, and the types of reportable (to the coroner) deaths usually consist of:

1. suspicion of homicide
2. suspicion of suicide
3. accidental
4. no physician can be found who will sign a death certificate.

With luck, none of these conditions will apply to you! However, you cannot prevent all accidents, your physician might be out of town, and the other two depend on the mindset of your coroner. Are you beginning to see why you need to get to know your coroner? For

instance, the fourth circumstance is a little muddy, and typically consists of a case where the patient did not have a physician handling his/her case at the time of death, or where the physician had little familiarity with the patient's condition, and did not feel secure enough with the facts surrounding the patient's death to take the legal responsibility.

In fact, as I understand it, there is little variation from state to state or county to county of the coroner's legal responsibilities.

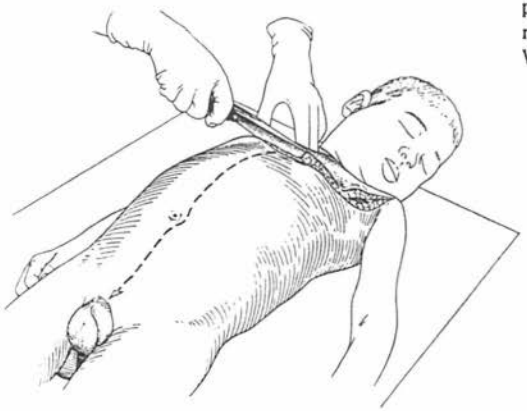
Then why check out your local coroner? Because the widest variations come in professionalism and practice, rather than prescribed duties. The profession of coroner is split into two groups: the politically elected or appointed coroner without medical training, and the hired medical examiner, who may still carry the title "coroner."

These two types of officials have the same legal responsibility, and the same authority. However, in the case of the first, a political office, the coroner is generally not required to have any medical training at all. Typically, if a coroner is not a medical examiner, he's an ex-employee of the county sheriff's department, with little education and a suspicious mindscape. In that case, he can't understand medical or legal fine points, and will rely without qualification on the outside contractors paid by the county, who are too specialized to rule on anything but their own fields, and have neither motivation nor authority to do "Quincy"-style detective work.

The medical examiner, however, has universally strict requirements. He or she must be a medical doctor with a specialty in forensic pathology, a long tradition which would have, had it fictional members, Dr. Watson in its Hall of Fame. Most of the more populous U.S. counties now have medical examiners running their former coroner's offices, and, frankly, all counties should have.

So the first thing for you to find out is whether your county has a medical examiner (understands medical terminology, is a member of an international professional organization, is usually reasonable and curious), or a coroner (with a law enforcement/ political background).

If you have the good fortune to live in a county with a medical examiner, required reading includes both of Thomas Noguchi's books, *Coroner* and *Coroner at Large* (in paperback). Whatever your ME may think of Noguchi (he was the most flamboyant figure in the profession), he at least will realize that you have made an attempt to understand his profession and point of view. Perhaps he can recommend more reading, if he's in the mood. What you need to know from him includes:



1. What are the legal guidelines for autopsies?

2. How does his office interpret those guidelines in practice?

3. Under what conditions will he "inspect" (visually examine, palpate, and possibly take cultures or samples from) a body rather than "autopsy" it (a description of an autopsy follows this article -- don't read it if your stomach is weak)? Typically, a body is inspect-

ed if there is a reasonably good case for a "natural" death -- records in another state, a remote physician's report, existing medical conditions, reports of spouse, friends, etc. A standard autopsy includes inspection, usually with removal and dissection, of all major organs of the body, including the brain, greatly reducing the chances that you can be recovered by future technology.

4. Could he be persuaded to perform a minimal autopsy -- dissecting only such structures as promise to present actual evidence concerning the cause of death?

5. Would he accept evidence from radiologic or computerized scans if Alcor would pay for them, in lieu of at least parts of an autopsy, and tissue samples via biopsy or other less invasive techniques in lieu of dissection or removal of complete organs?

6. Will he let your group into the examining room (morgue) to protect and ice the patient while an inspection or autopsy is being carried out?

7. During what hours can you contact him to oversee a patient's handling (if someone is in an auto accident at 2 AM on Saturday morning, will you have to wait until Monday morning at 8 AM to negotiate with him about the patient)?

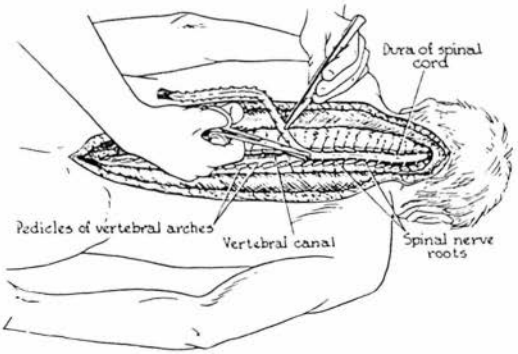
8. What is his attitude on the "Certificate of Religious Belief?" What treatment will he accord a patient with this certificate? (Our Santa Clara County ME has indicated that use of it will equate to waving a red flag in front of a bull.)

9. Finally, what is his basic attitude toward you? Curious, indifferent, hostile? Does he have a sense of humor? Is he religious? Does he regard you as a threat to his domain?

For this list, it doesn't matter whether you have a coroner or a medical examiner -- although a coroner may be less medically and more politically motivated. For either one, your appearance and your attitude will be important for both first impressions and continued negotiation and cooperation.

You personally may feel repelled by the thought of having to deal with someone who makes a living dissecting human bodies, or of going to the morgue. But cryonicists have unusual needs which we have to present if we are going to get consideration and cooperation from these officials -- before a crisis occurs and you find yourself with a patient locked up in a morgue for the weekend!

Whatever you do, don't march in and make demands. Your telephone and in-person presentations must be dignified and diffident rather than obnoxiously aggressive. Remember that this is his territory and his livelihood.



Eventually, in suits and other acceptable garb, armed with Alcor publications and reason, you may be able to cover all your points and even convince your friendly local ME that you are not members of a cult bent on performing barbaric rituals on helpless victims.

The elected or appointed, nonmedical

coroner can be more difficult to negotiate with than a medical examiner. The Riverside Coroner's Office is an example of how far off the beaten track of standard practice a coroner's office can get, and it will be useful to take a look at these nether reaches.

After once working in a real medical examiner's office for three weeks as a Kelly Girl, I found that the more I knew about the Riverside Coroner's Office the more incensed I became. This was clearly a bureaucratic territory which generations of elected officials with unimproved high-school educations had made into a veritable nest of provincial, eccentric practices which netted them a larger relative budget (by almost twice) than the office in which I had worked (Pima County, site of Tucson, the second largest city in Arizona), without having a single professional employee (professional in anything!), with the possible exception of clerical staff. They do twice as many autopsies per 1,000 deaths as my adopted county (Santa Clara, California), and the current coroner (at least when Mrs. Kent was suspended) tries to grab headlines. (You may remember the Liberace case.)

Most medical examiners try to avoid headlines, and stay in the background like good county employees.

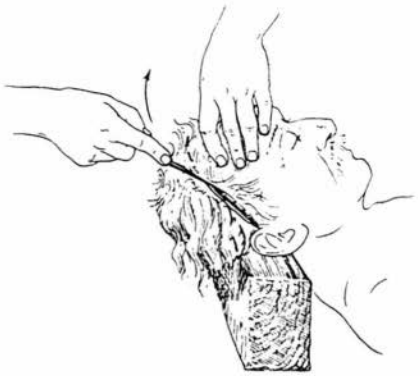
Pictures in the Riverside *Press-Enterprise* depicted the tools of the trade, and lineups of bodies ready for autopsy. The tools consisted of butcher knives and other non-medical instruments on non-medical carts; the lineup consisted of bodies to be autopsied by a contracting embalmer, all their dissected organs being placed on a board laid on the (open) abdomen for inspection by a contracting pathologist. In an ME's office, pathologists -- contracting or county employees -- inspect the work of medical technicians using standard surgical instruments (scalpels, not butcher knives), who have placed dissected portions into standard hospital receptacles. The Riverside coroner's office is also non-standard since it acts as the public administrator (for unprobated estates), a task historically subject to great abuse.

Even how your coroner uses words can be important. Take the Riverside Coroner again ("No, you take him!" -- *pa dum*). His dangerous game of Humpty Dumpty almost cost Alcor a patient. Remember when, in *Through the Looking Glass*, the good ol' boy on the wall says to Alice, "There's glory for you!" When Alice protests that she doesn't know what he means by "glory," Humpty Dumpty replies, in rather a scornful tone, "When I use a word, it means just what I choose it to mean -- neither more or less."

There is a standard word in medical terminology, a simple word, really -- "attending," as in "attending physician." My dictionary, again, defines it (under "physician") as "a physician who attends a hospital at stated times to visit the patients and give directions as to their treatment." As a medical transcriber, I type the words "attending physician" often, since in general practice it refers to a doctor in charge of a patient's care. For instance, at a teaching hospital like Stanford, a resident or intern will often see a patient and write the report concerning a clinic visit, but the report will also be signed by the "attending physician," the medical professional legally responsible for the patient's care. Over the years, somehow Humpty Dumpty has been at work in the Riverside Coroner's Office. It isn't even the current coroner. The tradition has long existed in the county, apparently arising from the ignorance of its elected officials and untrained employees, of treating "attending physician" as though it had the same meaning as "attending a party." In other words, an attending physician has been defined as one physically in attendance at the death of a patient.

Since the state law defining the conditions under which an autopsy should be done uses the words "attending physician" to refer to the doctor who must be the one to sign the death certificate, and since Mrs. Kent's physician was not physically in attendance at

her death, Humpty Dumpty defined her death as one requiring an autopsy, even though her attending physician had signed a legal death certificate!



As Alice said, "The question is whether you can make words mean so many different things." Horrifying but true, Humpty Dumpty even has the Riverside police convinced that his is the standard legal definition.

The fact is, however, that Mrs. Kent's death was legally pronounced (the Santa Clara County ME told me that anyone can pronounce death, but that people usually decline to do so because of the legal liability attached). Her doctor was aware of her terminal state, and had instructed trusted medical technicians at Alcor in her care. Why should they wake him up to drive more than two hours and hold up her suspension in order to look at his watch, since they could use a stethoscope as well as he? Outside Riverside County, the cryonics connection may have made it worth an inquiry, but without Humpty Dumpty the death certificate should have been considered legal, with no autopsy necessary.

The Riverside coroner's ignorance shows in other ways, for instance his blind reliance on pathology reports. The Kent case wasn't the only one in which this has resulted in false conclusions. The Riverside coroner assumed a man to be a suicide because his blood levels of a toxic drug (Darvon) were abnormally high. They did not, however, look into the circumstances of his death, including his current medical pathology. The coroner was overruled by the family, who stood to lose emotionally. They easily proved that their father's high blood levels of the suspicious drug were due to progressive disease of the liver and kidneys, which failed to metabolize and excrete a normal amount of the drug, causing lethal amounts to accumulate. On the other hand, the coroner failed to notice suspicious circumstances surrounding the death of an apparent accident victim -- the wife of a Marine whom the Corps later apprehended and convicted for her murder.

So you need to know how ignorant your coroner is, and what his practices are like. Who could have foreseen that Humpty Dumpty would have changed the meaning of a standard medicolegal phrase, or that ignorant reliance on a pathologist's report of lethal levels of a drug used for brain preservation (tissue levels sampled after post-mortem circulation, thus showing the presence of the drugs and their metabolic by-products in the urine) would have cost Alcor tens of thousands of dollars in legal defense and years of time recuperating from unofficial charges of homicide?

You can prevent such problems only if you find out what kind of an egg your friendly neighborhood coroner is. If you find that your county doesn't have a medical examiner, you may discover legal means to replace your coroner with one (the county board of supervisors may have such power). Please feed back information about your local situation to Alcor as you get it.

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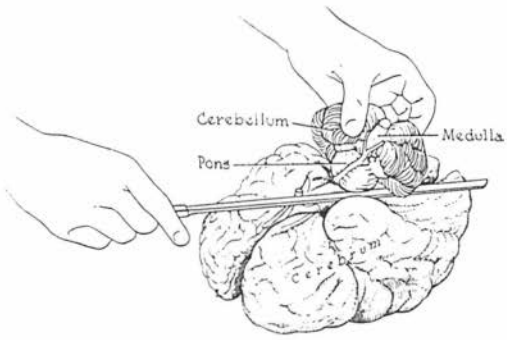
* * *

AUTOPSY REPORT SUMMARY:

(Based on standard autopsies I have transcribed, this short outline may help you negotiate with your coroner, especially if you familiarize yourself with stabilization protocol and suspension protocol enough to know what will truly endanger a patient.)

Cause of death cited: disease or condition, antecedent causes (morbid condition due to up to two causes); other conditions. An anatomic diagnosis summary listing main findings (violence, disease conditions), followed by the main autopsy report with a case number. The body may be photographed, taking special care to photograph evidence of trauma. Conditions of rigor mortis or lividity and locations noted. External examination including hair, eyes, incisions, wounds, birthmarks, needle marks, swellings, bruises, other trauma, general condition of body, appearance. Identification tags or bracelets, etc. noted. Diagrams may be used to indicate locations of marks, wounds, abrasions, etc., and descriptions in detail. Evidences of treatment and surgery are noted (bodies are usually brought in with all IV lines and other disposable hospital equipment, including endotracheal tubes, nasogastric tubes, catheters, etc., attached). Endotracheal and nasogastric tubes are examined for correct placement. A Y-shaped abdominal incision is made to expose the chest and abdomen for internal examination. The fat is measured, ribs examined, fluid in the chest measured, fluid in the abdomen measured and described, pelvis examined for fractures, bladder examined. Each organ is then inspected and often dissected in turn. The pericardial sac is opened, and fluid removed and measured. The general condition of the heart (enlargement, infarction, etc.) is noted, and measurements taken of wall thickness and valve circumference. The myocardium is examined, and tissue samples may be taken. The heart may be removed and weighed. The lungs are removed and weighed separately, with fluid noted and measured, as well as described. The great vessels are examined for aneurysm, athero- or arteriosclerosis, or thrombosis. The lungs are also examined for thrombosis. The lymph nodes are examined, and may be sampled. If aspiration pneumonia is suspected, the tongue and neck organs are removed *en bloc* and kept as a tissue sample. Otherwise, they are inspected. The liver is removed and weighed, and evidence of gallstones in the bladder or ducts noted. The spleen is removed and weighed, and the pancreas is inspected for pathology. The organs of the gastrointestinal system are opened, stomach contents described and sometimes removed, and the presence or absence of the appendix noted. The adrenals are noted, the kidneys removed and weighed individually. The scalp is reflected, the skull drilled and a piece removed. The brain is usually removed and weighed. It is often dissected into coronal sections, the vessels inspected for plaque, and the ventricles examined for hydrocephalus. Tissue samples may be preserved in formalin and kept.



Science Updates

by Thomas Donaldson

Human Test Of Genetically Altered Cells

We all know how many people grow quite paranoid at the thought of altering the genetics of our own cells for any medical purpose. Of course cryonicists don't share these feelings at all, but still we must contend with a world which tries to forbid this (actually quite innocent) conduct. Many cryonicists, again, will know that eventually all of these prohibitions will break down. They must, since fundamentally there is no reason for them and great benefit attainable by abandoning them. Still, they cause a delay and complicate our lives.

But slowly genetic modification seeps through. Recently in *Science*, (**241**, 419 (1988)) Leslie Roberts, one of *Science's* reporters, told the story of how two NIH researchers have finally come down to proposing to insert a genetically altered cell into human beings (shock! horror! dismay!). The scientists involved are W. French Anderson of the Heart Institute and Steven A. Rosenberg of the Cancer Institute. To insert this gene Anderson and Rosenberg must go through a long series of requests and applications. The entire process will take over a year, so we'll all be able to watch.

Unfortunately the procedure won't really help treat any illness. Its aim is to keep watch on how well another therapy for cancer is working.

This therapy is one of the new immune therapies. Cancer cells are removed from the patient. The patient's own white blood cells, which are fighting the tumor, are then multiplied in vitro by factors of billions. We then inject them into the patient.

So far, only very advanced, essentially terminal patients receive this kind of therapy. Sometimes this method works. The tumor shrinks and the patient lives longer. Unfortunately, though, this only happens in about 50% of cases. Rosenberg and Anderson want to know why.

Up to now they have used one simple method, radioactive labeling of the white blood cells, to follow what happens to them. But the labeling wears off quickly. They aim to permanently alter the white blood cells by putting into them a gene for resistance to neomycin, the antibiotic. They can then see if treatment fails because the white blood cells disappear or for some other reason.

Since regulations and law are matters of precedent, the most important fact about this application isn't its purpose but the fact that it is being done at all. A successful application would open the doors to other genetic modifications much more directly therapeutic.

Rosenberg and Anderson made their initial application to the NIH Institutional Biosafety Committee, which approved it on 13 July 1988. It has now proceeded to the Human Gene Therapy Subcommittee of the NIH Recombinant DNA Advisory Committee (or RAC). On 29 July the RAC decided that it wanted some more data, asking for some mouse experiments to be done. According to the account in *Science*, the RAC didn't actually feel that these experiments would give any new data. The RAC felt they were needed for "procedural" reasons.

Of course someday all of these hesitations and fears will seem very silly. They may be the real reason why medical progress creeps along so slowly. And from reading Paul deKruif (*The Microbe Hunters*) it's clear that medicine and science have lost a lot of

courage over the last 100 years. It is an important trend too little remarked. Especially as cryonicists we need to know why this has happened.

Protein Synthesized

Ordinarily the synthesis of proteins would hardly make news, since we all do it constantly, together with all the plants and animals we see. What is noteworthy is that *this* protein was synthesized to a *planned design* by human beings. That means, of course, a new stage in our ability to manipulate matter on a small scale.

The article in *Science*, (**241**, 976-978 (1988)) doesn't really discuss the methods used in design in much detail. What its authors do is to describe how their synthesized protein successfully passed all their tests for fitting their design (since we operate on a molecular scale here, just exactly how we find out if our design worked isn't simple at all). The scientists involved, L. Regan and W.F. Degrado, both work for Du Pont de Nemours.

Briefly, Regan and Degrado worked out a sequence of amino acids which should produce a tightly packed helical shape. Their choice of helical shape was determined more by the ease of verifying it than by any aspect of their design methods. It turns out that the spectrum of the protein, once made, will leave the most characteristic traces when it is helical. Since this was after all a first effort, they didn't want to get involved in debates about whether or not they had actually made what they said they made.

This was a synthesis entirely from first principles. The authors worked out the entire amino acid sequence of the planned protein. They then made a gene which would produce that amino acid sequence. They inserted this gene into the bacteria *Escherischia coli*, right near a promoter sequence in one on the *E. coli* plasmids (plasmids are circular rings of DNA. We don't have them but bacteria do. They are very useful for genetic engineering and transmission of drug resistance).

The treated *E. coli* expressed the gene easily. Regan and Degrado could therefore make large amounts of this helical protein to analyze and study.

Most of their article is a description of the technical steps they used to verify that their method did indeed work: that is, that the protein they made did have the structure they planned for it.

The composition of the protein was exactly as planned. Its molecular weight was as planned. Their chemical tests also indicated that it adopted the very compact helical shape in water solution, just exactly the one designed. Finally, it was stable against denaturation by the chemical guanidine hydrochloride, again as planned.

This work is only a start, of course. But if we seriously expect to manipulate matter on a molecular scale, we need to know how to put it together so that it will adopt the proper shape. Many years ago Feynman pointed out (in *There's Plenty Of Room At The Bottom*) that operating on molecular scales will force us to learn a new physics between the quantum and the macroscopic realm. That is exactly what Regan and Degrado have done with this work: made a step toward learning the required new physics. It's likely, in fact, that the road to nanotechnology will have far more twists, turns, and complications than many of its exponents yet imagine. That there is a road, and where it is going, is very clear.

Clues To Understanding Brain Memory

As we come closer and closer to understanding nerve memory (that is, how individual nerves learn), we also need to understand brain memory (that is, how the brain learns). Since our conscious memories stem not from memory in some particular neuron but from memory in many neurons spread in a network throughout our brain, it's important to understand this type of memory too. Indeed, it's even more important. Ischemia may destroy individual neurons without destroying the brain memory. It's brain memory, not neuron memory, which lies underneath our individuality.

To understand brain memory we need experiments which tie events in single neurons up to learning at the scale of the brain. A recent experiment reported in *Nature* (**335**, 817-820 (1988)) by Yasushi Miyashita at the University of Tokyo may give us the beginnings of a way to do this.

Many experimenters have shown that particular nerve cells are sensitive to special kinds of objects. For instance, some cells respond especially to faces (E.T. Rolls and G.C. Baylis, *Brain Research*, 65, 38-48 (1986)). But these responses aren't directly correlated to learning. What Miyashita has done is important because he studies particular brain cells for their direct connection to learning.

He looked at particular neurons in the temporal cortex of monkeys. First, he recorded the normal activity of the neuron. Then he systematically trained his monkeys to recognize 97 different randomly generated color patterns. (He used fractals to generate these patterns, so they had a similar overall "appearance"). Then, he presented the monkeys with 97 new color patterns, and also the original 97 they had learned. The idea here, of course, was to see if the neuron could learn to react to these patterns, and afterwards clearly distinguish them from 97 other new ones.

Since our brain does not carry memories in single neurons, we wouldn't expect that the monkey's neurons would individually learn to respond to all 97 patterns. But Miyashita did find that a particular individual neuron would acquire a response to a few of the 97 patterns. It would not repeat this response when presented with other patterns which were different, but similar. That is, the direct brain memory for the patterns corresponded to the response of the neurons. This response was also a clearly learned response, not just a generalized "reflex" response to shapes of the same general sort.

Particularly in the computer science community, tremendous interest has blown up recently about neural nets. These are computers, but designed in a way which vaguely resembles nervous systems rather than normal computers. They can learn to recognize faces, for instance, in much the same way people do. That ability is very striking because efforts to teach ordinary computers to recognize anything have failed badly.

This work is worthwhile, but needs to be tied to the actual working of real brains. Miyashita has begun to do this.

Insane Notions?

Recently, both cryonicists and scientists outside of cryonics have started to use broad general physical estimates to gauge the capacity of our brains. "Capacity" here includes both memory and computational capacity. For instance, Ralph Merkle has calculated the computational capacity of our brains, using only general thermodynamic ideas. Others have estimated human memory capacity.

I would like to make clear here that I think these estimates are extremely valuable. They are among the first attempts to do what certainly needs doing, both for cryonics and other purposes. Without having any specific criticisms, however, I feel that we are far too early in this effort for us to attach great weight to these estimates. It would be particularly wrong to make decisions on cryonics matters using them.

The fundamental problem is that our understanding of brains is itself at a very low level. Microelectronics pioneer Carver Mead himself has summed up some common attitudes: "There is this insane notion going around that the nervous system is some inept implementation and that we can do better."

A recent article in *Nature* (335 (1988) 779-784) by Rolf Landauer reviews the current state of thermodynamic estimates of computing and communication. It also raises questions about the assumptions and meaning of current estimates about the brain.

Thermodynamic estimates of computing encountered a surprise when E. Fredkin and T. Toffoli showed (*Int J Theoretical Physics*, **21**, 219-253 (1982)) that there was *no* lower limit to the energy required for computation so long as its speed could be arbitrarily slow. Fredkin and Toffoli thereby disproved a folk theorem about the energy needed for computing. This folk theorem was widely believed by many eminent thinkers, including Brillouin, Gabor, and others.

As they stand, these estimates have little obvious relation to the capacity of our brains. The computers given as examples don't correspond in any obvious way with brains or even small nervous circuits. But Fredkin and Toffoli have raised a very interesting biological point. Computational speed isn't free. The fact that we only think as fast as we do doesn't necessarily mean that biological systems, made of much the same materials as our brains, could not think far faster. We may well think with our present speed because there was no good evolutionary reason in our environments why we should think faster.

And speed of thinking isn't a free good. Even if there is no difference in energy output, the materials chosen for computing involve varying amounts of energy to synthesize.

If we translate this into the question of our future brains and environments, it raises a question (not an answer!) about whether we will think faster. This is especially so since we control our own environment. Of course, it's still very much unknown whether the computers considered by Fredkin, Toffoli, and their successors bear any relation whatever to human brains.

The issue of our memory capacity, again, deserves some caution. The latest estimate of human memory capacity by Thomas Landauer (*Cognitive Science*, **10**, 477-493 (1986), reported by *Foresight Update No. 4*) concludes that we remember about 2 bits per second long-term. Landauer concludes that this memory could be held in a hard disc of a few hundred megabytes.

The first comment about this estimate is that it is an estimate of our *intake rate* rather than our *storage capacity*. For cryonics, that question is important because it tells us how soon we will need *more* capacity. (Making an "imitation human computer program" doesn't encounter this problem!). We still lack very firm estimates on the upper limit of our storage capacity.

The second comment is that the *mapping* between our nervous systems and the world is very different from those of computers. Our brains are neural nets. They store information as an activation pattern in *all* their neurons through *all* the brain. This

means that even learning to answer a question as "yes" or "no" involves a change in this *pattern*, extending through many neurons. When we learn to answer a question as "yes" rather than "no", does this mean that we have learned one bit, or many millions?

It may well be that Landauer's estimate is off by only a factor of 10. Then again, it may be off by 100 million. Without examining the *mapping* issue, we have no way of knowing.

Furthermore, it does not follow that evolution has provided us with only that storage capacity which we need in a normal lifespan. Our brains do not store our memories in RAM chips, but in a distributed system. We do not know the memory capacity of individual nerve cells. Nerve cells can synapse with thousands of others, and these synapses may change. If we were computers, evolution would no doubt have limited the number of our RAM chips, but we are not. The memory capacity of our brains may derive indirectly from their structure and metabolism, so that evolution can't directly adjust a "memory parameter".

One striking new result in Rolf Landauer's *Nature* review is that there is also no lower limit to the energy required to transmit information.

(Since our thinking involves transmission of information between many nerve cells, this point raises biological questions too).

There is yet again another way in which this work on computing and communication may someday become deeply important to us. Freeman Dyson has looked at the far future of the universe. He found that energy (albeit in increasingly small rates per second) will always be available. While he didn't seriously look at how life forms could survive indefinitely, he clearly believed that they could. The way they could do so would be to slow down. This work of Fredkin, Landauer, and others gives us a hint (only a hint, but hints are valuable) of how to make ourselves into such life forms: thinking long slow thoughts over millions of years, and communicating also slowly over millions of years.

Once we do understand our brains, we will certainly make improvements. But now we understand very little. Understanding is important because many proposals for improvement may (in ways we don't now clearly perceive) make assumptions about how the different features of our brains relate which will turn out to be false. Even increasing intelligence runs afoul of the fact that we don't yet understand the biochemical and anatomical nature of intelligence. The concept may be wrong-headed from the beginning. Attempts to improve it would be like attempts to increase our phlogiston level.

To understand our brains, both from a broad energetic viewpoint (as Ralph Merkle and Thomas Landauer are attempting) and from a biological, anatomical, and chemical viewpoint, is a very important enterprise. First steps are always important. Often they are more important than later steps, even (or especially!) if they are wrong. But it is very early days, now.

Molecules And Cell Memory

Readers of *Cryonics* (and my science column!) will already know of some of the work done by neuroscientists in the last few years to discover how our nerve cells remember. It was only a few years ago that they discovered *long term potentiation* (LTP). This is a tendency of many (probably all) brain neurons to respond to repeated stimulation by a persistent and increased ability to respond to the same stimulation. A good deal of work has gone into finding out how LTP happens.

LTP is so important because it is the only major candidate for means by which our neurons remember. The current state of play is that the neurotransmitter glutamate must active one receptor (the NMDA receptor) in the nerve cell synapse. This receptor releases calcium into the synapse. Activating the NMDA receptor, however, isn't the only event which must happen. The other events involve changes at the synapse receiving the message. Their character isn't well known.

But recent experiments have gone far towards explaining how LTP occurs.

A recent article by Roberto Malinow and others at the Yale University School of Medicine (*Nature* 335 (1988) 820-824) present more information about just what happens to make LTP. They looked only at events caused by activating the NMDA receptor. Their experiments, at the broadest level, consisted of examining how particular chemicals could enhance or interfere with LTP.

They examined response to two different chemicals, *sphingosine* and *H-7*. These chemicals work by affecting enzymes involved in producing LTP. Currently there are three different theories, all of which share an essential similarity. The essential similarity is that some special chemicals are changed by attachment of phosphate to them. Enzymes doing this are called kinases. Attaching phosphate to these chemicals (often enzymes themselves) is a way to modify their activity. The kinases work exactly as if they were throwing a switch. Although Malinow and his colleagues could suggest several chemicals (CaMKII, GAP-43) they reported no work on which chemicals were involved (that's the next stage).

Using sphingosine and H-7 is important because they act differently on the kinases (which add phosphate). The chemical H-7 actually suppressed LTP for as long as it was present in the cell. When it was removed, LTP returned. Since H-7 inhibits several kinases, this tells us immediately that LTP depends on presence of kinases. It also tells us that memory doesn't depend on a stable substance already changed by attaching phosphate. The kinases must operate constantly.

Sphingosine, however, would prevent LTP if given before the first nerve impulse. This means that some enzyme sensitive to sphingosine must be involved in creating LTP, but not in continuing it. Sphingosine is known to work against one kinase, PKC. One interesting side comment the authors make is that this effect of sphingosine on learning may explain some kinds of mental retardation.

This work doesn't solve memory nor was it intended to do so. What it does is to clarify just what happens at some stages of memory's storage. A lot more work is needed to discover the mechanisms, at every stage, of memory storage. The difference from many other papers on memory is that this one actually provides hard data we can compare to various hypotheses of nerve cell memory. Their data, for instance, argues against a scheme in which a kinase keeps itself active by attaching phosphate to *itself* (autophosphorylation). They also prove that kinases are involved in memory.

We can analyze LTP by taking other paths too. A recent paper in *Science* (R.C. Malenka, R.A. Nicoll, et al, **242**, 81-84 (1988)) proves that calcium increases within the synapse are sufficient to cause LTP. Their experiments show that a rise in calcium is *the* crucial event in the sequence of events causing LTP. (Of course, other chemical changes must occur to make LTP itself, particularly to make it last. But they are touched off by a rise in calcium, and only that).

Nicoll, Malenka, and their colleagues used a clever technique. They used a chemical which released calcium when exposed to ultraviolet (UV) light. They could inject this

chemical into synapses of cells from the hippocampus. Nothing would happen. When they shined a beam of UV onto a synapse, *voilá!*, there was LTP. They could also use chemicals to buffer the calcium. These would prevent LTP. Finally, if they prevented entry of calcium into the synapse, no LTP could happen. The magic chemical which releases calcium in UV light is *nitr-5*. It normally acts to bind calcium, but the molecular "arms" holding the calcium ion release it in UV light. (This makes it one more nanomachine.)

Another paper in the same issue of *Science* (S. Williams and D. Johnston, **242**, 84-87 (1988)) looks at chemical development of LTP in yet another way. One issue in understanding memory is that different synapses use different neurotransmitters. Some cells in the hippocampus have one set of synapses which responds to glutamate and another set responding to acetylcholine. Furthermore, Malinow (above) has pointed out that some additional neurotransmitter seems needed for LTP.

Williams and Johnston looked at LTP in one kind of synapse, the synapse between the *mossy fiber cells* and the *CA3 pyramidal cells* (two cell types in the hippocampus). They could show that very low doses of muscarine (a drug which acts against acetylcholine) could prevent LTP at this synapse, even when normal synaptic transmission continued. This shows that acetylcholine, the nerve transmitter, is involved in at least some kinds of LTP. It's likely that its involvement depends on the synapse, but much more work needs doing on this question.

One researcher, Charles Stevens of Yale, predicts that the complete molecular workings of LTP in the hippocampus will be understood in no more than a year. We look forward to more work of this kind. Even if one year is optimistic, it's clear that we will understand LTP soon.

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PERSONALS

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Needing a home: Dixie, who took part in a total body washout several years ago, and her sister Slinky, are in need of a home. They are spayed female shepherd-collie mixes, about 6 years old, and make very gentle and loving pets. They have been hard to place because they seem to depend a great deal on each other, and we are reluctant to separate them; thus we hope that someone will be willing to accept them both. They have been lab pets for several years but with all the construction in our area it is becoming increasingly difficult to find places for their daily walks. If you or someone you know would like two nice pets, let us know. We can arrange their transportation to your area (within the U.S.).

Cryonicists WELCOME to stop by on their way through IOWA on I-80. Doctor, funeral, rescue personnel have agreed to help me in an emergency. Call ahead please to Charlie Hartman, (515) 523-1116 at 514 NW in Stuart, IA 50250.

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Meeting Schedules

Alcor business meetings are usually held on the first Sunday of the month. Guests are welcome. Unless otherwise noted, meetings start at 1 PM. For meeting directions, or if you get lost, call Alcor at (714) 736-1703 and page the technician on call.

ALCOR

The SEPTEMBER meeting will be held at the home of:

(SUN, 3 SEP, 1989) Marcelon Johnson
8081 Yorktown
Huntington Beach, CA

The OCTOBER meeting will be held at the Alcor facility:

(SUN, 1 OCT, 1989) Alcor Life Extension Foundation
12327 Doherty St.
Riverside, CA

There will be a YARD SALE of furniture and things from Dick Jones' house.

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Alcor members in the San Francisco Bay area have formed an Alcor chapter, and are aggressively pursuing an improved rescue and suspension capability in that area. Meetings are generally held on the second Sunday of the month, at 4 PM. Meeting locations can be obtained by calling the chapter's Secretary-Treasurer, Thomas Donaldson, at (408) 732-4234 (home), or at work, (415) 593-3200 (ask for Thomas Donaldson).

The AUGUST meeting will be held at the home of:

(SUN, 13 AUG, 1989) Roger Gregory and Naomi Reynolds
2040 Columbia St.
Palo Alto, CA

The SEPTEMBER meeting will be held at the home of:

(SUN, 10 SEP, 1989) Leonard Zubkoff
3078 Sulphur Spring Court
San Jose, CA

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The New York Cryonics Discussion Group of Alcor meets on the the third Saturday of each month at 6:30 PM, at 72nd Street Studios. The address is 131 West 72nd Street (New York), between Columbus and Broadway. Ask for the Alcor group. Subway stop: 72nd Street, on the 1, 2, or 3 trains.

The meeting dates are as follows:

AUGUST 19 SEPTEMBER 16 OCTOBER 21 NOVEMBER 18

If you live in the New York, Philadelphia, New Jersey, or Boston areas and would like to participate in the rebirth of New York cryonics please contact one or more of the following people:

Gerard Arthus	(516) 273-3201
Al Roca	(201) 352-5268
Curtis Henderson	(516) 589-4256

ALCOR LIFE EXTENSION FOUNDATION
12327 Doherty Street
Riverside, CA 92503

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ADDRESS CORRECTION REQUESTED

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