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CRYONICS INSTITUTE

NEWSLETTER

Cryonics insights and
information for members
and friends of the
Cryonics Institute



CI BULLETIN



Hello Everyone,

I sincerely hope that you are all currently healthy and safe. I want to start off by saying that I am truly confident that we will make it through these trying times. I believe that we are given two scenarios over and over in life. We are faced with things that we can do something about through intelligence, hard work, and positive action or we are faced with things that we simply have no control over. We are tasked with working on those things we can fix or affect and also with accepting those things we can't. The Coronavirus challenges us in both ways. There are things we can do to prepare and prevent catching the disease and there are those pesky unknowns. Having worked in emergency services for many years, I have learned that there are no perfect solutions but rather only good ones and bad ones. I know it sounds cliché but we have to all just roll up our sleeves and do the best we can to use our common sense and due diligence. It is never a good idea to panic or to let fear overcome your decision making process. There are proven solutions for some things and for others we have to accept that we are doing our best to find those solutions.

That being said, I have been questioned by some cryonics members about reasonable concerns and legitimate fears. Here are the two common questions and here is how I answered them on the CI members forum..

1) What will CI do if we start to receive Corona infected bodies? Can CI handle a larger than normal influx of patients?

I can tell you that two things CI has considered over the last

40+years is how 1. We handle BSI or body substance isolation in relation to any infectious disease or pathogens. and...2. How we would handle an unanticipated jump in patients requiring additional resources.

In the first case, our personnel take precautions to include masks (m95), goggles, and sterile gloves. Hand washing and decontamination is done after all contact with patients and bodily fluids ect. This is just common sense standard procedure. We have had a history of patients that were exposed to deadly pathogens and then of course there is always the unknown factor in which case it is best practice to isolate oneself from any potential pathogen and to sterilize all surfaces after the case.

2) In the second case, CI would set up a basic triage situation and give first priority to patients who are viable for vitrification on a first come first served basis. All straight freeze patients could be held in temporary storage with dry ice or supplemental LN2 supplies which could be scaled up as needed. Ideally CI would have permanent storage in place already but this would cost CI too much and is not likely or even logical to have right now. That being said, an influx of patients would mean an almost equal influx of capital to handle the situation. As more patients died more money and resources would be freed up for additional storage.

It is only fair to say that there is no 100% failsafe plan and while we have gone through many scenarios and brainstormed strategies to deal with them over the last 40 + years, there are many foreseeable situations that we cannot do much about in a practical sense. At least not now with our present resources. Basically there are no perfect guarantees and certainly not when it comes to cryonics. The most important takeaway is that your chances with cryonics is certainly better than without. All you can do is use rational sense and try to plan within reason. I am certain that we will get through this challenge and that most people will survive but I also recommend that we all use common sense and take basic precautions as identified by medical authorities.

I can tell you that we are prepared with good solutions and that we are working hard to fulfill the cryonics mission in good faith to the best of our abilities. I hope you all the very best and that you find comfort in knowing that CI is fully operational and committed to honoring your cryonics wishes. - *Dennis Kowalski, President - Cryonics Institute*

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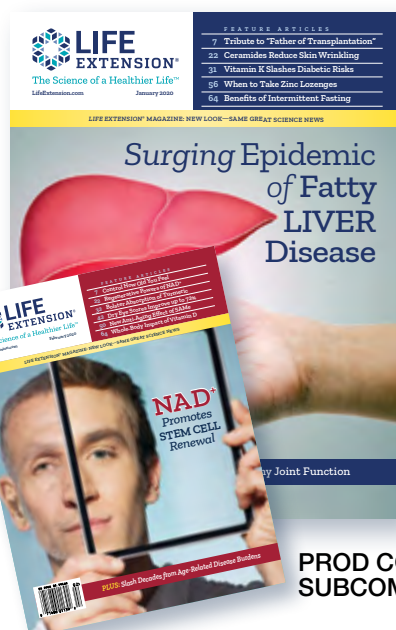
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"The future depends on what you do today."

- Mahatma Gandhi

CRYONICS INSTITUTE MAGAZINE

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ARTICLE SUBMISSIONS

Cryonics Institute or cryonics-related articles are welcome. Submissions: dg@cryonics.org

E-SUBSCRIPTIONS

As a CI member, you are automatically added to our email reminder list. To unsubscribe, please use the "unsubscribe" link at the bottom of your email.

Membership Benefits

Why join the Cryonics Institute?

1) **A Second Chance at Life**

Membership qualifies you to arrange and fund a vitrification (anti-crystallization) perfusion and cooling upon legal death, followed by long-term storage in liquid nitrogen. Instead of certain death, you and your loved ones could have a chance at rejuvenated, healthy physical revival through cryopreservation.

2) **Affordable Cryopreservation**

The Cryonics Institute (CI) offers full-body cryopreservation for as little as \$28,000.

3) **Affordable Membership**

Become a Lifetime Member for a one-time payment of only \$1,250, with no dues to pay. Or join as a Yearly Member with a \$75 initiation fee and dues of just \$120 per year, payable by check, credit card or PayPal.

4) **Lower Prices for Spouses and Children**

The cost of a Lifetime Membership for a spouse of a Lifetime Member is half-price and minor children of a Lifetime Member receive membership free of charge.

5) **Quality of Treatment**

CI employed a Ph.D level cryobiologist to develop CI-VM-1, CI's vitrification mixture which can help prevent crystalline formation at cryogenic temperatures.

6) **Standby Options and Assistance**

CI's use of Locally-Trained Funeral Directors means that our members can get knowledgeable, licensed care. Or members can arrange for professional cryonics standby and transport by subcontracting with [Suspended Animation, Inc](#) or [International Cryomedicine Experts](#) (I.C.E.) CI also offers Standby

Training Materials and Kits for members who choose to perform Local Standby.

7) **Affordable Funding Options**

Cryopreservation with CI can be funded through life insurance policies issued in the USA or other countries. Prepayment and other options for funding are also available to CI members.

8) **Cutting-Edge Cryonics Information**

Members receive a free e-subscription to the Cryonics Institute Newsletter, as well as access to our Facebook page, Twitter feed, YouTube channel and an official members-only forum.

9) **Helpful, Professional Support**

CI's professional staff is available to answer any questions and address any concerns you may have about CI, your membership or Cryopreservation.

10) **Additional Preservation Services**

CI offers a sampling kit, shipping and long-term liquid nitrogen storage of tissues and DNA from members, their families or pets for just \$98.

11) **Support Education and Research**

Membership fees help CI to fund important cryonics research and public outreach, education and information programs to advance the science of cryonics.

12) **Member Ownership and Control**

CI Members are the ultimate authority in the organization and own all CI assets. They elect the Board of Directors, from whom are chosen our officers. CI members also can change the Bylaws of the organization (except for corporate purposes).

The choice is clear: Irreversible physical death, dissolution and decay, or the possibility of a vibrant and joyful renewed life. Don't you want that chance for yourself, your spouse, parents and children?



To get started, contact us at:

(586) 791-5961 • email: info@cryonics.org

Visit us online at www.cryonics.org

Member Readiness Checklist

*You've signed up for cryonics -
what are the next steps?*

Welcome Aboard! You have taken the first critical step in preparing for the future and possibly ensuring your own survival. Now what should you do? People often ask "What can I do to make sure I have an optimal suspension?" Here's a checklist of important steps to consider.

- ☐ Become a fully funded member through [life insurance](#) or easy pre-payments
Some members use term life and invest or pay off the difference at regular intervals. Some use whole life or just prepay the costs outright. You have to decide what is best for you, but it is best to act sooner rather than later as insurance prices tend to rise as you get older and some people become uninsurable because of unforeseen health issues. You may even consider making CI the owner of your life insurance policy.
- ☐ Keep CI informed on a regular basis about your health status or address changes. Make sure your CI paperwork and funding are always up to date. CI cannot help you if we do not know you need help.
- ☐ Keep your family and friends up to date on your wishes to be cryopreserved. Being reclusive about cryonics can be costly and cause catastrophic results.
- ☐ Keep your doctor, lawyer, and funeral director up to date on your wishes to be cryopreserved. The right approach to the right professionals can be an asset.
- ☐ Prepare and execute a Living Will and Power of Attorney for Health Care that reflects your cryonics-related wishes. Make sure that CI is updated at regular intervals as well.
- ☐ Review the [CI Standby Manual](#) and other materials designed to help you with you Standby Planning. Also, consider joining or forming a local standby group to support your cryonics wishes. This may be one of the most important decisions you can make after you are fully funded. As they say-"Failing to plan is planning to fail".
- ☐ Always wear your cryonics bracelet or necklace identifying your wishes should you become incapacitated. Keep a wallet card as well. If you aren't around people who support your wishes and you can't speak for yourself a medical bracelet can help save you.
- ☐ Get involved! If you can, donate time and money. Cryonics is not a turnkey operation. Pay attention and look for further tips and advice to make both your personal arrangements and cryonics as a whole a success. The stronger our organization is, the stronger your chances of success.
- ☐ Keep your records, contact information and contracts up to date. It is recommended you review your relevant information annually at a minimum. One way is to schedule time to review all your materials at the same time you submit your required Annual Proof of Funding to CI. Also, Be especially aware of easy to forget things like a new email, phone number or address. Remember, you can also contact us at any time to ask if you have any outstanding paperwork or other info that needs to be updated.

The online [CI Members' Information Form](#) is a great resource for updating your current information on file.



2020 CI RESEARCH UPDATE

Since our last research update, we have completed replicates of the CT imaging experiments, as well as the LDH release experiments. The major conclusions have not changed since our last research update. In addition, we did some pilot experiments using human kidneys that had failed to find a transplant recipient. The human kidneys had been stored for more than 2 days before we received them, and the trends for human kidneys during CPA perfusion did not match our previous results for pig kidneys. The human kidneys did not exhibit a consistent mass change trend and the magnitude of mass changes were much smaller than in pig kidneys. The pig kidneys had been stored for a much shorter time period (<12 h), so we hypothesized that the different response of human kidneys to CPA perfusion could be attributed to damage to the kidneys during prolonged storage. These human kidney experiments led us to re-examine our pig kidney results. Our initial experiments showing kidney mass changes during CPA perfusion were done on kidneys provided by a small slaughterhouse that was able to very quickly remove the kidneys after slaughtering the pig. This led to relatively short warm ischemia times. After we completed these initial experiments, this slaughterhouse closed because the owner retired. We then switched to a larger slaughterhouse that was unable to provide the kidneys so quickly after slaughter, resulting in an increase in warm ischemia time. When we tested kidneys from this slaughterhouse, some kidneys exhibited mass change trends similar to our previous experiments and some did not exhibit much mass change at all. There appears to be a correlation between the warm ischemia time and the magnitude of mass change that occurs during CPA perfusion. These results highlight the importance of collecting the kidneys under consistent and controlled conditions. For

future experiments, we hope to use organs from research pigs that are collected under controlled conditions using methods similar to those used for acquiring human organs for transplant. We will be seeking federal funding to continue this line of research.

Proposed next steps:

Recently we have been investigating the toxicity of CPAs with the goal of developing less toxic CPA mixtures. We are using high throughput screening approaches similar to those used for drug discovery to examine CPA toxicity kinetics. We recently presented a poster on our results at the Cryobiology meeting (see attached). Our results demonstrate the power of using high throughput screening approaches for investigating CPA toxicity. So far, all of our experiments have been done at room temperature. To extend toxicity studies to lower temperatures, we need to integrate temperature control with the robotic liquid handler. A company called Mecour sells a complete system that enables temperature control of well plates on the deck of the robotic liquid handler for \$13,435 (plus shipping). If the Cryonics Institute wishes to make a donation, it would make it possible for us to purchase this system, which will enable us to perform toxicity experiments down to temperatures as low as -20°C. I can provide more detail on all of this if desired.

*Adam Z. Higgins, Associate Professor
President-elect, Society for Cryobiology
Director, Bioengineering Graduate Programs
School of Chemical, Biological and
Environmental Engineering
Oregon State University*



Historic Cryonics Archive Project

Help Preserve the Legacy of Cryonics!

CI is excited to introduce the Historic Cryonics Archive project, intended to preserve legacy photographs, documents and books relevant to cryonics and the Cryonics Institute.

Therefore, we are reaching out to our members to see if we can acquire high resolution images for our archives and for web, display and video applications including the many media requests we receive asking for high quality images of our history.

These are priceless pieces of our history that we can't preserve without the help of our membership, especially those members who have been with us since the beginning.

That said, we are especially interested in photos from the 1970's through early 2000's.

RELEVANT MATERIALS

Our objective is to create an archive of relevant materials that illustrate the history of cryonics and the Cryonics Institute. Suggested subjects would include:

Facility & Equipment

Notable Persons in the Cryonics Community

Events / meetings / speakers

Cryonics Groups or activities

Other

Please note, these materials will be made available to media outlets as well as used for promotional purposes by the Cryonics Institute, so you must have approval from any persons pictured in the photos before submitting them. However, public settings, figures or activities are exempt. As an example, a private group photo of members meeting informally at someone's home would require approval from each person pictured. On the other hand, a group photo

taken at a conference or speech open to the public would not. If you have questions about rights for photographs, please email dg@cryonics.org to discuss further.

If you would like to provide a photo exclusively for the CI archive, but not for the media, please indicate this with your submission, stating "archive only" for any photos you do not want to have publicly available to media outlets or for promotional use by CI.

Other materials of interest would include old hard-copy newsletters, magazines, books or other printed materials. If you would be willing to donate those items to the Cryonics Institute, please contact dg@cryonics.org for review before sending. We have only limited space for archive publications, so would like to avoid receiving multiple copies of items.

SUBMITTING MATERIALS

It is important to note that CI will consider any contributions (and associated scanning, mailing and other costs) as your generous donation to CI. Books, newsletters or other material will not be returned and will become the property of CI.

Photographs

For photographs, please provide any identifying information including people's names, dates, location or other details as best you can. We realize many of these may be very old, so we appreciate whatever context or detail you can provide, even if it is as basic as "CI Facility, 1980's." For photo notes, we would be grateful if you could include those notes as a separate text file included with your uploaded photos.

If you are the photographer and would like to be credited, please include your name as well. Unless a photo credit is specifically requested, photos will simply be credited to "Cryonics Institute."

CI NEWS

What's happening at the Cryonics Institute

DIGITAL FILES PREFERRED

We will not generally be accepting hard copy originals, negatives or prints of photographs except in special cases, so please upload scans and **do not send original prints**. If you have a large collection you would like to donate, please contact us. Otherwise, we ask that you have any original photos you would like to submit scanned and upload the digital files to:

<https://www.dropbox.com/request/OdyaITkeeFBcrdhcWkxE>.

Please scan in color (even for a black and white photo) at a minimum of 300 dpi resolution and save as a JPEG, TIFF or PDF file. If you do not own a scanner, the article below lists a number of businesses that provide scanning services, including national chains like OfficeMax & Staples. Prices can range from about 50¢ for a self-service scan to \$3-\$5 per full service scan. For exact pricing, please contact the local business you're considering using.

<https://firstquarterfinance.com/where-can-i-scan-documents-document-scanning-services/>

These options are relatively inexpensive for a handful of photos, but could become prohibitive if you have a large numbers of pictures you would like to contribute. If you have dozens of photographs, we would suggest a service like everpresent.com, which will scan entire photo albums, loose collections and more. They do charge a \$35 fee to get started, but individual scans are about 50¢ apiece, which makes this a better option for larger collections.

Sincere thanks in advance for any contributions you can make to our archives, and for your willingness to put in the time and effort to track down historic materials and share them with us. Your donation will help preserve the legacy of the Cryonics Institute for future generations, so we are hoping you'll help us with this worthwhile ongoing project!

If you have any questions about submissions, technical questions or the like, please contact dg@cryonics.org and we will be happy to help. We can't do this without you, so thanks again!

New Facility Update

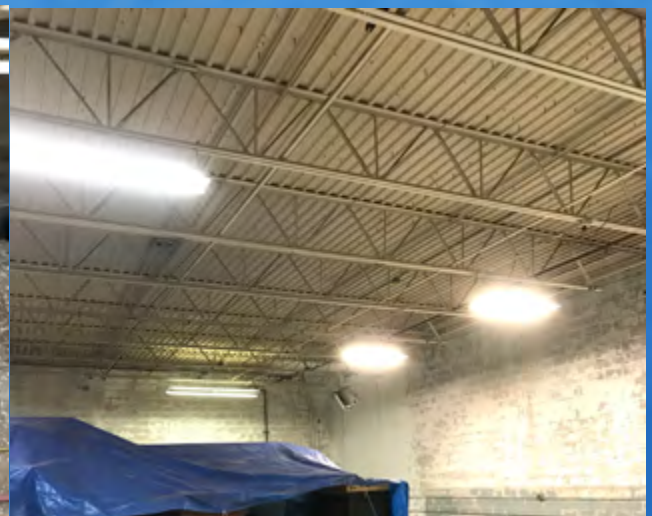
Work continues on the new CI facility. At present, Mike McCauley has been working on removing old outdated items and equipment left behind by the previous business. Mke has also completed prepping the ceiling and has contracted to have it painted. Work is now focused on prepping the walls for painting.



Significant tarnish needed to be removed from the ceiling.



Scraping debris.



A big job, but finally the ceiling is cleaned and ready for painting.

Free Live Online Longevity Series *Longevity 2020 series runs April 27-May 1*

Longevity.Technology is offering a free online course we think may be of interest to our fellow cryonicists.

According to their website, longevity.technology, the organization's goal is to provide information on developments in longevity research with a focus on investment opportunities.

From their site:

We are Longevity.Technology – a team of journalists, researchers and tech commercialisation professionals.

Our mission is to create the #1 destination for news and insights on the technologies that extend life and maintain the quality of that extended life.

If you are a technology or healthcare professional engaged in early-stage investment or business we are your go-to for news, insights and opportunity identification in this emerging Longevity investment category.

Presentations include:

Monday 27 April: Rejuvenation therapies:

What's the latest in: senolytics, gene editing, immunotherapy, mitochondrial restoration, indication expansion, nutraceuticals, peptides, stem cells...

Tuesday 28 April: Longevity: start now

What can you be doing to address your Longevity now: supplements, metformin, mTOR, NAD+, rapamycin, biohacking, fasting, biomarker tracking, monitoring apps...

Wednesday 29 April: AI and Longevity

How is AI accelerating Longevity and where: molecule identification, pre-clinical validation, digital health, lifestyle interventions, finance...

Thursday 30 April: Longevity investing

It's all about growing the investment category: risk management, going public, investment platforms, emerging tech: 3D bio-printing, neuroceuticals, organ growth, agatech...

Friday 01 May: Biomarkers of aging

Addressing the need for a baseline: cellular senescence, methylation, telomere length, metabolomics, inflammation, cognition, function, ageotype.

According to their site, it is free to sign up to view all 5 days of presentations live, however the following are not included:

Participation in 'Ask Me Anything' (after-party) session with key speakers • Celebratory Longevity 2020 T-shirt (included in this package) • Complimentary access to 2 follow-on reunion events • Password access to video recordings of all sessions.

If you're interested in learning more about this program or signing up, visit longevity.technology and click the "Longevity 2020" banner or visit the link below to go directly to the program page: If you do decide to sign up, please be aware there is a free and a paid option for the 5-day course, so be careful not to click the paid version.

<https://www.longevity.technology/some-good-news-announcing-longevity2020/>

* *The Cryonics Institute is not affiliated with nor endorses Longevity.Technology. We are providing this information as a public service to our readers and members.*

10 Worst Mistakes in Cryonics

1) Not signing up ahead of time

Becoming a member, having contracts in place, and having paperwork in order should not be a last minute decision. Waiting until the last minute or after death results in an unnecessary delay of care or worse- No suspension at all! Don't wait. Sign up here and be prepared. <https://www.cryonics.org/membership/>

2) Not providing proof of funding

Some people believe that they can worry about funding later or if they have funding, they have put off providing proof of funding to CI. This should be done annually. Failing to provide this can result in a delay of care while the funding clears, which can take weeks. Send your proof of funding to CI now to be prepared.

3) Not telling anyone your plans

Being reclusive or not telling family or friends your wishes is not recommended. You should not be afraid to tell those around you what your wishes are, especially your next of kin. Wearing a bracelet, necklace or having identification or other items in view can speak to your wishes. This is all you have when you can't speak for yourself. Disasters have resulted in the past from not sharing. Talk with your family, close friends and your estate attorney, so you can be prepared.

4) Not planning

Many think cryonics is a turnkey service where you can just sign up and let fate take over. No matter how much you pay for cryonics, you are the only one who can make sure that you will have the best chance by planning. CI has provided a lot of information on our website and in our standby manuals. Those who plan succeed those who don't fail.

For more information visit: <https://www.cryonics.org/resources/ci-standby-kits-and-instructions>

5) Not notifying CI of Emergencies

There is no way that your cryonics provider can help you if they do not know of your emergency. Your family, friends, standby group or next of kin must immediately contact CI when you are having health issues or worse. It is also important for CI to know if you have up and coming surgeries or procedures, including terminal illness. Patients with a diagnosed terminal illness could enter hospice care, which might help your cryonics situation vastly. Any delay in notifying us directly could result in a poor suspension. Those helping you must have simple and clear instructions.

Here are some tips... <https://www.cryonics.org/resources/category/C57/57>

6) Committing suicide

Anyone who commits suicide who is not terminally ill or breaks a local law in doing so is potentially putting both themselves and our organization at great risk. CI will not risk itself for people who engage in behavior that goes against our mission to preserve life. Such activity will likely lead to an autopsy and long delays, rendering the suspension process substandard or impossible to carry out. Do not consider cryonics as a way out of your problems. You are likely to not get suspended under those circumstances. If you do not have a terminal illness and are considering suicide, you should seek mental health advice and treatment as soon as possible. <https://www.mentalhelp.net/articles/depression-hotline/>

10 Worst Mistakes in Cryonics

7) Engaging in Risky or illegal activities

Risky behaviors or associations that lead to the patient dying around suspicious circumstances will also likely lead to mandated autopsies that will also stand in the way of your cryonics wishes. It is best to use common sense and not put yourself in harm's way. Not only could your life be ended, so too could your chances of cryonics suspension or future reanimation. Use common sense and stay safe.

8) Providing financial or legal incentives that encourage your not being suspended.

Leaving all of your insurance or cryonics money to family if you are not suspended is certainly an option at CI, but ironically it does provide financial incentive for hostile family members to block your suspension. As often is the case, people will make sure you are not suspended to get a hold of your money. One suggestion is to leave family and next of kin some separate money from cryonics funding while suggesting that Cryonics funding go to cryonics as a donation no matter if you are buried or suspended. In addition, family or next of kin can be further compelled to cooperate if they will actually lose the money that is allocated to them for not cooperating. It is also suggested that your family be made fully aware of your wishes and stipulations, so they know what the results of their actions will be. You want to make sure you put incentives and disincentives in the correct place, so that your wishes are honored. It is suggested that your will and cryonics documentation reflect this and get reviewed by an attorney. See <https://www.cryonics.org/resources/protect-yourself-from-legal-threats>

9) Not removing a hostile next of kin from rights to your remains and finances

In many states and areas you can legally remove a hostile family member or next of kin from your estate. You can reassign someone who is sympathetic to cryonics and who has the legal authority to disposition of your remains, as well as your assets. In some states and locations there are disposition of remains reassignment documents, as well as powers of attorney, both in regards to financial as well as medical decisions. The executor of your will or anyone involved with making decisions should be sympathetic to your cryonics wishes. It is your responsibility to make your wishes very clear and to remove any doubt or potential legal resistance from family or next of kin. We suggest seeking legal advice to help you in this regard. Some members have even made a video statement of their wishes and given it to both their cryonics organization as well as their attorneys. Not being careful could mean that you don't get suspended, despite your wishes. Many are surprised to learn that they lose their rights upon legal death. See an attorney and prepare.

10) Dying under less than favorable conditions

This seems harder to control than the other situations, but there are some things you can do to make your situation more favorable. You can diet, exercise and follow the latest official medical advice to stay healthy longer. The longer you are alive, the better the technology will probably be for suspending you and the closer we will be to a future that may be able to reverse your condition. You can avoid travel to remote or hostile places where such travel is risky. Some overseas travel can result in long delays both logistically and bureaucratically. In general, dying near your cryonics provider or cryonics standby group helps your chances. Living a healthy lifestyle and staying sociable, while surrounding yourself with people who will act on your behalf is paramount. Building solid, positive relationships with good people is probably one of the most important things you can do to have your wishes honored. Take care of yourself and maintain social connectivity.

CI MEMBERSHIP

APRIL 2020

Members 1,672

Patients.....	187
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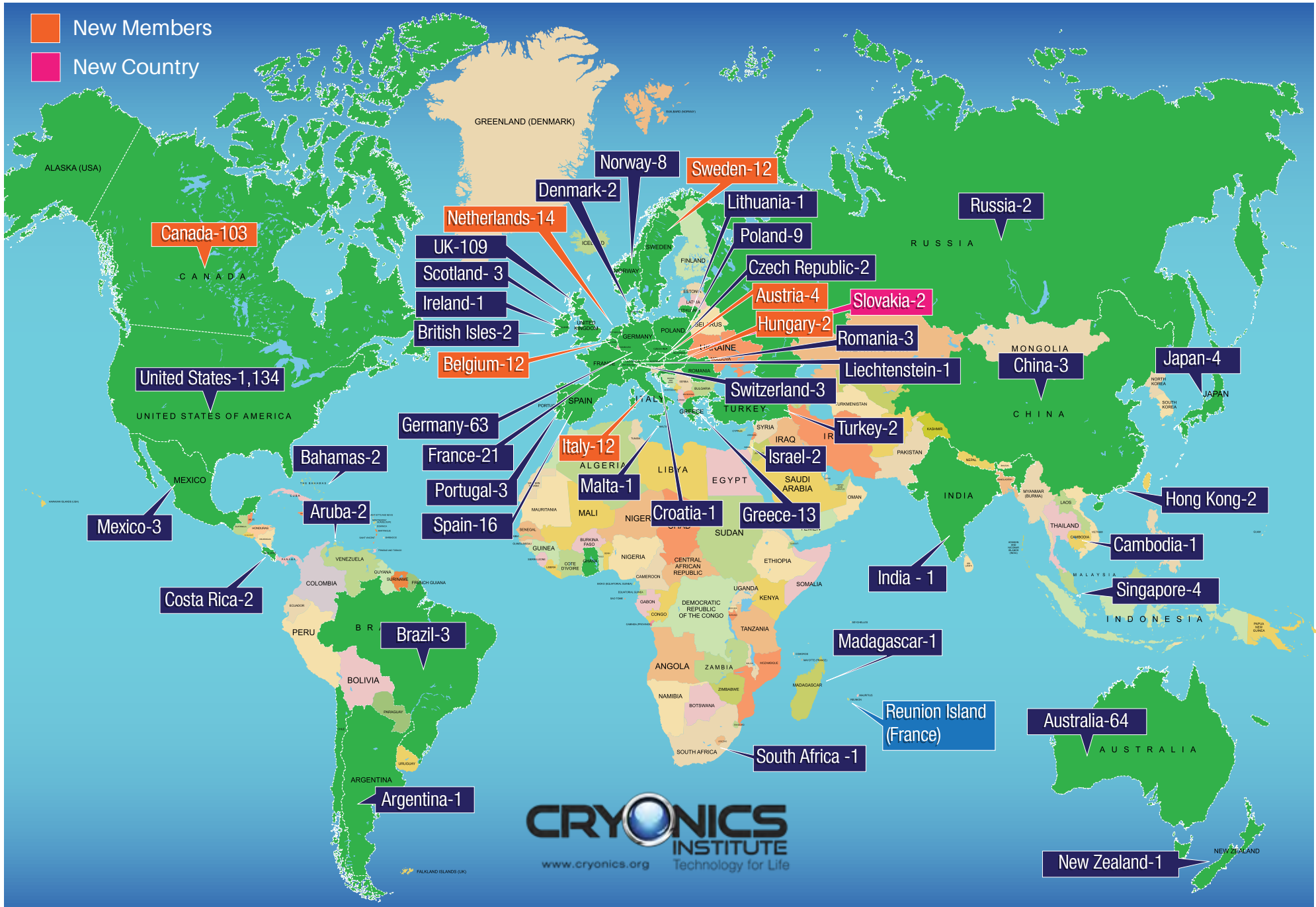
Pets 187

DNA/Tissue 305

SA 269

TOTAL

1,859



Who will be there for YOU?



Don't wait to make your plans. Your life may depend on it.



Suspended Animation fields teams of specially trained cardio-thoracic surgeons, cardiac perfusionists and other medical professionals with state-of-the-art equipment to provide stabilization care for Cryonics Institute members in the continental U.S.

Cryonics Institute members can contract with Suspended Animation for comprehensive standby, stabilization and transport services using life insurance or other payment options.



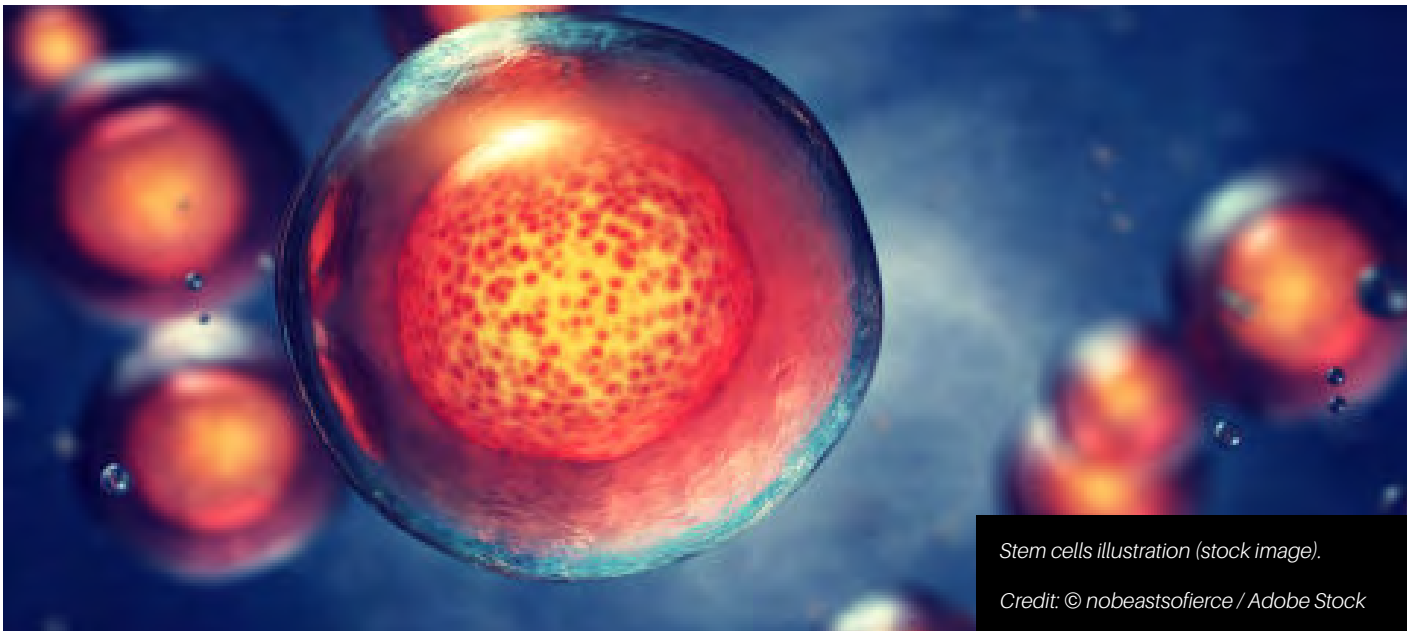
Speak to a nurse today about how to sign up.

..... **Call 1-949-482-2150**

or email tabitha@suspendedanimationinc.com

Old human cells rejuvenated with stem cell technology

Date: March 24, 2020 | Source: Stanford Medicine



Stem cells illustration (stock image).

Credit: © nobeastsofierce / Adobe Stock

Old human cells return to a more youthful and vigorous state after being induced to briefly express a panel of proteins involved in embryonic development, according to a new study by researchers at the Stanford University School of Medicine.

The researchers also found that elderly mice regained youthful strength after their existing muscle stem cells were subjected to the rejuvenating protein treatment and transplanted back into their bodies.

The proteins, known as Yamanaka factors, are commonly used to transform an adult cell into what are known as induced pluripotent stem cells, or iPS cells. Induced pluripotent stem cells can become nearly any type of cell in the body, regardless of the cell from which they originated. They've become important in regenerative medicine and drug discovery.

The study found that inducing old human cells in a lab dish

to briefly express these proteins rewinds many of the molecular hallmarks of aging and renders the treated cells nearly indistinguishable from their younger counterparts.

"When iPS cells are made from adult cells, they become both youthful and pluripotent," said Vittorio Sebastiano, PhD, assistant professor of obstetrics and gynecology and the Woods Family Faculty Scholar in Pediatric Translational Medicine. "We've wondered for some time if it might be possible to simply rewind the aging clock without inducing pluripotency. Now we've found that, by tightly controlling the duration of the exposure to these protein factors, we can promote rejuvenation in multiple human cell types."

Sebastiano is the senior author of the study, which will be published online March 24 in Nature Communications. Former graduate student Tapash Sarkar, PhD, is the lead author of the article.

[ARTICLE CONTINUES AT SCIENCEDAILY.COM](https://www.sciencedaily.com)

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COVID-19: The immune system can fight back

Date: March 17, 2020

Source: University of Melbourne

Melbourne researchers have mapped immune responses from one of Australia's first novel coronavirus (COVID-19) patients, showing the body's ability to fight the virus and recover from the infection.

Researchers at the Peter Doherty Institute for Infection and Immunity (Doherty Institute) -- a joint venture between the University of Melbourne and the Royal Melbourne hospital -- were able to test blood samples at four different time points in an otherwise healthy woman in her 40s, who presented with COVID-19 and had mild-to-moderate symptoms requiring hospital admission.

Published today in *Nature Medicine* is a detailed report of how the patient's immune system responded to the virus. One of the authors on the paper, research fellow Dr Oanh Nguyen said this was the first time that broad immune responses to COVID-19 have been reported.

"We looked at the whole breadth of the immune response in this patient using the knowledge we have built over many years of looking at immune responses in patients hospitalised with influenza," Dr Nguyen said.

"Three days after the patient was admitted, we saw large populations of several immune cells, which are often a tell-tale sign of recovery during seasonal influenza infection, so we predicted that the patient would recover in three days, which is what happened."

The research team was able to do this research so rapidly thanks to SETREP-ID (Sentinel Travellers and Research Preparedness for Emerging Infectious Disease), led by Royal Melbourne Hospital Infectious Diseases Physician Dr Irani Thevarajan at the Doherty Institute.

SETREP-ID is a platform that enables a broad range of

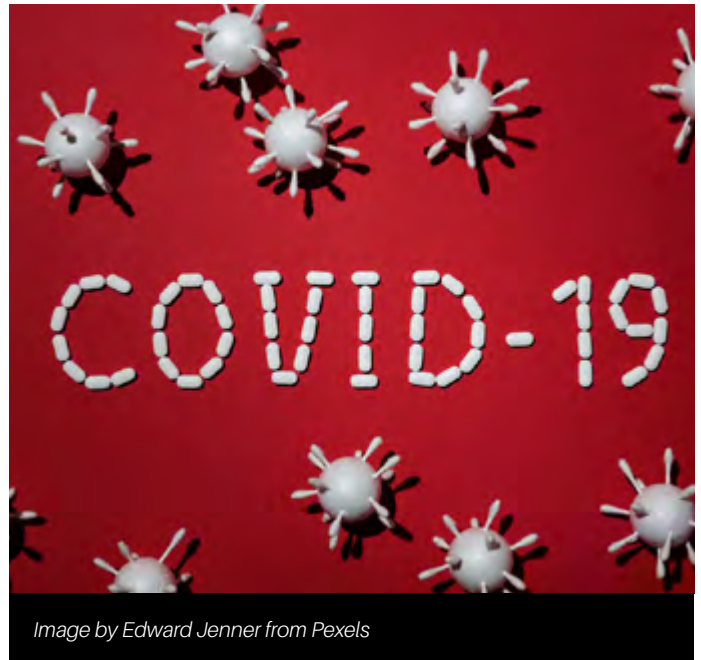


Image by Edward Jenner from Pexels

biological sampling to take place in returned travellers in the event of a new and unexpected infectious disease outbreak, which is exactly how COVID-19 started in Australia.

"When COVID-19 emerged, we already had ethics and protocols in place so we could rapidly start looking at the virus and immune system in great detail," Dr Thevarajan said.

"Already established at a number of Melbourne hospitals, we now plan to roll out SETREP-ID as a national study."

Working together with University of Melbourne Professor Katherine Kedzierska, a laboratory head at the Doherty Institute and a world-leading influenza immunology researcher, the team were able to dissect the immune response leading to successful recovery from COVID-19, which might be the secret to finding an effective vaccine.

"We showed that even though COVID-19 is caused by a new virus, in an otherwise healthy person, a robust immune response across different cell types was associated with clinical recovery, similar to what we see in influenza,"

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*Photo by Chokniti Khongchum from Pexels*

Artificial intelligence finds disease-related genes

*Date: February 13, 2020**Source: Linköping University*

The brain's neural activity -- long implicated in disorders ranging from dementia to epilepsy -- also plays a role in human aging and life span, according to research led by scientists in the Blavatnik Institute at Harvard Medical School.

The study, published Oct. 16 in *Nature*, is based on findings from human brains, mice and worms and suggests that excessive activity in the brain is linked to shorter life spans, while suppressing such overactivity extends life.

The findings offer the first evidence that the activity of the nervous system affects human longevity. Although previous studies had suggested that parts of the nervous system influence aging in animals, the role of neural activity in aging, especially in humans, remained murky.

"An intriguing aspect of our findings is that something as transient as the activity state of neural circuits could have

such far-ranging consequences for physiology and life span," said study senior author Bruce Yankner, professor of genetics at HMS and co-director of the Paul F. Glenn Center for the Biology of Aging.

An artificial neural network can reveal patterns in huge amounts of gene expression data, and discover groups of disease-related genes. This has been shown by a new study led by researchers at Linköping University, published in *Nature Communications*. The scientists hope that the method can eventually be applied within precision medicine and individualised treatment.

It's common when using social media that the platform suggests people whom you may want to add as friends. The suggestion is based on you and the other person having common contacts, which indicates that you may know each other. In a similar manner, scientists are creating maps of biological networks based on how different proteins or genes interact with each other. The researchers behind a new study have used artificial intelligence, AI, to investigate whether it is possible to discover biological networks using deep learning, in which entities known as "artificial neural networks" are trained by experimental data. Since artificial neural networks are excellent at learning how to find patterns in enormous amounts of complex data, they are used in applications such as image recognition. However, this machine learning method has until now seldom been used in biological research.

"We have for the first time used deep learning to find disease-related genes. This is a very powerful method in the analysis of huge amounts of biological information, or 'big data'," says Sanjiv Dwivedi, postdoc in the Department of Physics, Chemistry and Biology (IFM) at Linköping University.

The scientists used a large database with information about the expression patterns of 20,000 genes in a large number of people. The information was "unsorted," in the sense that the researchers did not give the artificial neural network information about which gene expression patterns were from

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Nanoparticle chomps away plaques that cause heart attacks

Date: January 28, 2020

Source: Michigan State University

Michigan State University and Stanford University scientists have invented a nanoparticle that eats away -- from the inside out -- portions of plaques that cause heart attacks.

Bryan Smith, associate professor of biomedical engineering at MSU, and a team of scientists created a "Trojan Horse" nanoparticle that can be directed to eat debris, reducing and stabilizing plaque. The discovery could be a potential treatment for atherosclerosis, a leading cause of death in the United States.

The results, published in the current issue of Nature Nanotechnology, showcases the nanoparticle that homes in on atherosclerotic plaque due to its high selectivity to a particular immune cell type -- monocytes and macrophages. Once inside the macrophages in those plaques, it delivers a drug agent that stimulates the cell to engulf and eat cellular debris. Basically, it removes the diseased/dead cells in the plaque core. By reinvigorating the macrophages, plaque size is reduced and stabilized.

Smith said that future clinical trials on the nanoparticle are expected to reduce the risk of most types of heart attacks, with minimal side effects due to the unprecedented selectivity of the nanodrug.

Smith's studies focus on intercepting the signaling of the receptors in the macrophages and sending a message via small molecules using nano-immunotherapeutic platforms. Previous studies have acted on the surface of the cells, but this new approach works intracellularly and has been effective in stimulating macrophages.



Photo by Anna Shvets from Pexels

"We found we could stimulate the macrophages to selectively eat dead and dying cells -- these inflammatory cells are precursor cells to atherosclerosis -- that are part of the cause of heart attacks," Smith said. "We could deliver a small molecule inside the macrophages to tell them to begin eating again."

This approach also has applications beyond atherosclerosis, he added.

"We were able to marry a groundbreaking finding in atherosclerosis by our collaborators with the state-of-the-art selectivity and delivery capabilities of our advanced nanomaterial platform. We demonstrated the nanomaterials were able to selectively seek out and deliver a message to the very cells needed," Smith said. "It gives a particular energy to our future work, which will include clinical translation of these nanomaterials using large animal models and human tissue tests. We believe it is better than previous methods."

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2020 outlook for Longevity technology

Will 2020 be the year that sees a step change in Longevity? We review technology readiness levels for key Longevity domains.

By Phil Newman for Longevity.Technology — January 6, 2020

Complete Article at: <https://www.longevity.technology/2020-outlook-for-longevity-technology/>

Yep, we have a lot to thank NASA for: freeze-dried food, cochlear implants and TRL scores.

The Technology Readiness Level system was developed by NASA in 1974 to help categorise the stage of a project so that it either wasn't ignored or wasn't taken too seriously, too early.

For a domain that's so wide, it would be very easy to answer both 'yes' and 'no' to the above question depending on your focus. Either way, the sector is coalescing nicely and activity is set to grow significantly over the coming 12 months.



from **LONGEVITY.TECHNOLOGY**

Here's how we've applied TRLs to the Longevity technologies we address:

While we are now getting to grips with the factors that drive aging and the biomarkers that measure age (and if age is being halted or reversed), there is still a long way to go until there is a widely-available therapy that's proven to increase lifespan: 20 years away according to SENS' Dr Aubrey de Grey.

AgeX Therapeutics' Dr Michael West told us last year: "We now know enough about aging that we can design new products that we believe will have an unprecedented impact on aging ... it is now a routine procedure to reverse the aging of human cells in the laboratory dish."

So while we detect a maturing of the argument and a toning-down of the 1000 year lifespan rhetoric, there is growing confidence from both the research and the investment communities into the sciences of lifespan and healthspan.

There are now over 100 companies dedicated to research and product development in the fields of senolytics, telomeres, stem cells, mitochondria and gene editing: These are the domains from where genuine therapies that increase lifespan will emerge.

However, at Longevity.Technology we consider Longevity in a wider context – this is why we're just as interested in technologies such as neural, biocybernetics and nano – these are the technologies that will sustain healthspan and lifespan while anti-aging therapies pass through the clinical pipeline into commercial availability. An app that nudges you to eat more wisely and exercise more often is just as relevant to Longevity as a replacement heart grown in a pig.

So as we enter a new decade, here's our take on the TRLs for each of our key Longevity domains:

Tissue/Organ

Biocybernetics is still emerging as a sector, with pancreatic technologies being the most progressed in terms of closed-loop systems to deliver insulin for type 1 diabetics – artificial

hearts and lungs are expensive, risky and a long way from scalability. Dr Peter Scott-Morgan, who has motor neurone disease is transitioning his body toward a fully cyber version of himself as he loses movement in his body except for his eyes. So with the exception of the pancreas, we score Biocybernetics' Longevity TRL as a 4.

Organ growth as a concept, growing a new heart from personalised stem cells is a long way off, but smaller organs, organoids are gaining traction. Organoids are three-dimensional bundles of cells grown in culture in a lab. Derived from stem cells, the organoid cells possess an incredible ability to organise themselves into tissue structures, meaning researchers have been able to grow a whole range of tissues and mini-organs, including kidney, pancreas, liver, prostate and even brain tissue. LyGenesis' lead program in liver regeneration will begin with a Phase 2a clinical trial for patients with end stage liver disease in 2020. The company recently raised \$4 million in private financing of convertible notes and we're expecting a significant Series B this year. We're excited about organoids' contribution to Longevity but the diverse range of R&D activity scores this TRL as a 3.

Xenotransplantation is the use of animal tissue and organs in humans – the technique requires the marrying gene editing techniques with superior transplant protocols. A burns unit at Massachusetts General Hospital recently became the first ever to use pathogen-free swine tissue to close the wound of a burns patient; the "skin" used in the successful transplantation was Xeno-Skin, the first product from XenoTherapeutics, a Boston-based regenerative medicine company. So after a series of failures in the early 2000s Xenotransplantation is fighting back with some big clinical and financial swings: Scientists in Beijing have created pig-monkey chimeras that looked like regular piglets but inside they contained monkey cells and are particularly significant as it is the first time that monkey-pig chimeras have been brought to full term. The gene editing technology company eGenesis, announced it has raised \$100 million towards advancing its xenotransplantation into clinical testing

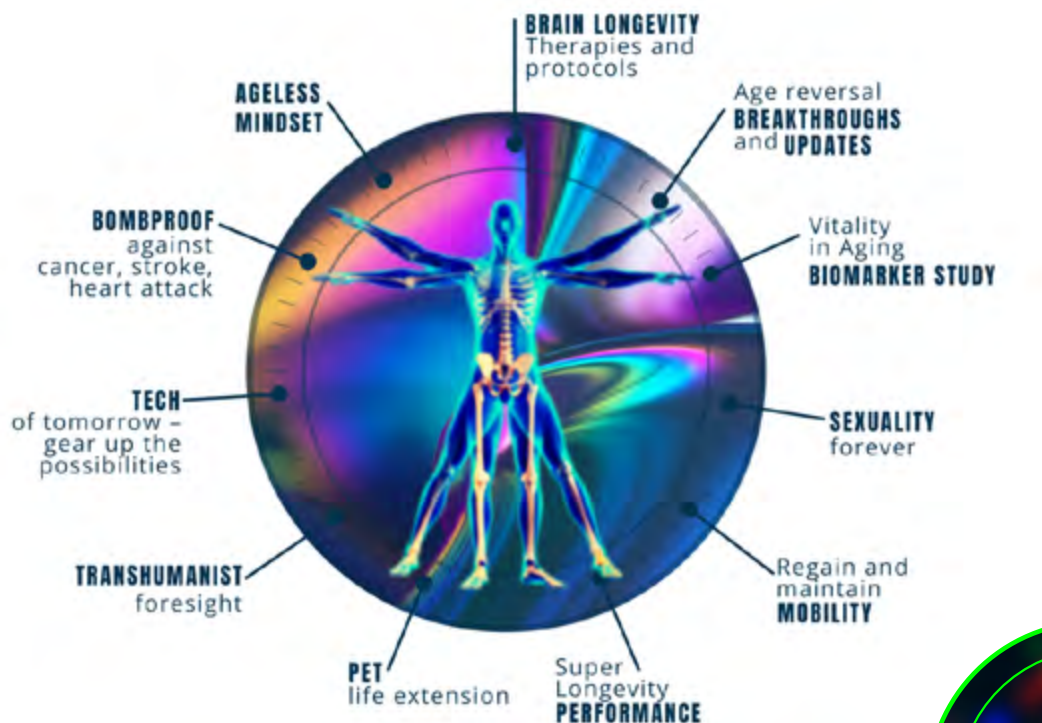
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Worldwide Cryonics Groups

AUSTRALIA: The Cryonics Association of Australasia offers support and information for Australia & nearby countries. caalist@prix.pricom.com.au. Their Public Relations Officer is Philip Rhoades. phil@pricom.com.au GPO Box 3411, Sydney, NSW 2001 Australia. Phone: +6128001 6204 (office) or +61 2 99226979 (home).

BELGIUM: Cryonics Belgium is an organisation that exists to inform interested parties and, if desired, can assist with handling the paperwork for a cryonic suspension. The website can be found at www.cryonicsbelgium.com. To get in touch, please send an email to info@cryonicsbelgium.com.

BHUTAN: Can help Cryonics Institute Members who need help for the transport & hospital explanation about the cryonics procedure to the Dr and authorities in Thimphu & Paro. Contacts : Jamyang Palden & Tenzin Rabgay / Emails : palde002@umn.edu or jamgarnett@hotmail.co Phones : Jamyang / 975-2-32-66-50 & Tenzin / 975-2-77-21-01-87

CANADA: This is a very active group that participated in Toronto's first cryopreservation. President, Christine Gaspar; Vice President, Gary Tripp. Visit them at: <http://www.cryocdn.org/>. There is a subgroup called the Toronto Local Group. Meeting dates and other conversations are held via the Yahoo group. This is a closed group. To join write: csc4@cryocdn.org

QUEBEC: Contact: Stephan Beauregard, C.I. Director & Official Administrator of the Cryonics Institute Facebook Page. Information about Cryonics & perfusion services in Montreal for all cryonicists. Services available in French & English: stephan@cryonics.org

CHILE: Community oriented to provide reliable information on human cryopreservation, as far as technical scientific as well as other practical aspects. Dissemination, awareness and education on issues related to the extension of life in general and cryonics in particular. Contact José Luis Galdames via galdamesjoseluis@gmail.com or via Facebook at [Cronica Chile](#).

FINLAND: The Finnish Cryonics Society, (KRYOFIN) was established in 2008 and is an organization collaborating with all nearby groups and organizations. Contact them at: kryoniikka.fi Their President is Ville Salmensuu ville@salmensuu.fi

FRANCE: SOCIETE CRYONICS DE FRANCE is a non profit French organization working closely with European cryonics groups. For more information: J.Roland Missionnier: phone: 33 (0) 6 64 90 98 41 or email: cryonicsnews.inpi@yahoo.fr • [Facebook group](#)

GERMANY: DGAB There are a number of Cryonicists in Germany. Their Organization is called "Deutsche Gesellschaft für Angewandte Biostase e.V.", or short "DGAB". More information on their homepage at www.biostase.de. If there are further questions, contact their Board at vorstand@biostase.de

GERMANY: CRYONICS-GERMANY is an active group providing cryonics support, including a special 8-member Standby Response Team. Members from Germany or Internationally are welcome to join. at <http://cryonics-germany.org>. Direct inquiries to contact@cryonics-germany.org.

INDIA: Can help Cryonics Institute Members who need help for the transport & hospital explication about the cryonics procedure to the Dr and authority in Bangalore & Vellore Area. Contacts : Br Sankeerth & Bioster Vignesh / Email : vicky23101994@gmail.com Phones : Bioster / 918148049058 & Br Sankeerth / 917795115939

ITALY: The Italian Cryonics Group (inside the Life Extension Research Group (LIFEXT Research Group)) www.lifext.org and relative forum: forum.lifext.org. The founder is Bruno Lenzi, contact him at brunolenzi88@gmail.com or Giovanni Ranzo at: giovanni1410@gmail.com

Kriorus Italy: Representative Filippo Polistena, email: filippopolistena45@gmail.com. phone: +39 334 298 9378

JAPAN: Hikaru Midorikawa is President Japan Cryonics Association. Formed in 1998, our goals are to disseminate cryonics information in Japan, to provide cryonics services in Japan, and eventually, to allow cryonics to take root in the Japanese society. Contact mid_hikaru@yahoo.co.jp or <http://www.cryonics.jp/>

NEPAL: Can help Cryonics Institute Members who need help for the transport & hospital explanation about the cryonics procedure to the Dr and authorities in Kathmandu. Contact : Suresh K. Shrestha / Email : toursuresh@gmail.com Phone : 977-985-1071364 / PO Box 14480 Kathmandu.

THE NETHERLANDS: Dutch Cryonics Organization is the local support group since 2002 and able to provide advice, standby, perfusion and shipment 24/7, in case of need. We are an active group utilizing the latest equipment. New members from The Netherlands welcome.

E-mail: info@cryonisme.nl
website: <http://www.cryonisme.nl>

NORWAY : Can help Cryonics Institute Members who need help for the transport & hospital explication about the cryonics procedure to the Dr, funeral home and authority at Sandvika. Contacts : Gunnar Hammersmark Sandvika Begegravelsesbyrå / Phones : 011-47-2279-7736

RUSSIA: KrioRus is a Russian cryonics organization operating in Russia, CIS and Eastern Europe that exists to help arrange cryopreservation and longterm suspension locally, or with CI or Alcor. Please contact krorius@gmail.com for additional information or visit <http://www.krorius.ru>. Phone: +7 962 947-50-79

SWEDEN: www.kryonik.se or Facebook: Svenska Kryonikföreningen. Initially, the society will focus on providing information and assistance to those who wish to sign up for cryonics. Eventually, we also hope to provide practical assistance in cases, possibly in collaboration with other European groups.

SWITZERLAND: www.cryosuisse.ch

CRYOSUISSE The Swiss Society for Cryonics is an active group with over 30 members. To join, email info@cryosuisse.ch

UNITED KINGDOM: Cryonics UK is a nonprofit UK based standby group. www.cryonics-uk.org Cryonics UK can be contacted via the following people: Tim Gibson: phone: 07905 371495, email: tim.gibson@cryonics-uk.org. Victoria Stevens: phone: 01287 669201, email: vicstevens@hotmail.co.uk. Graham Hipkiss: phone: 0115 8492179 / 07752 251 564, email: ghipkiss@hotmail.com. Alan Sinclair: phone: 01273 587 660 / 07719 820715, email: cryoservices@yahoo.co.uk

Can help Cryonics Institute Members who need help, funeral home, transport at London. Contact : F.A. Albin & Sons / Arthur Stanley House Phone : 020-7237-3637

INTERNATIONAL: The Cryonics Society is a global cryonics advocacy organization. www.CryonicsSociety.org. They publish an e-newsletter *FutureNews*. Phone: 1-585-643-1167.

HELP US STAY UP-TO-DATE!

Please send any corrections or changes to the address below. If you know of, or are considering starting a support, standby or other cryonics-related group in your area, please send details to

dg@cryonics.org.



Please note, this list is provided as an information resource only. Inclusion on the list does not constitute an endorsement by the Cryonics Institute or our affiliated organizations. We urge our readers to use this list as a starting point to research groups that may meet their own individual needs. We further note that readers should always use their own informed judgment and a reasonable amount of caution in dealing with any organization and/or individual listed.



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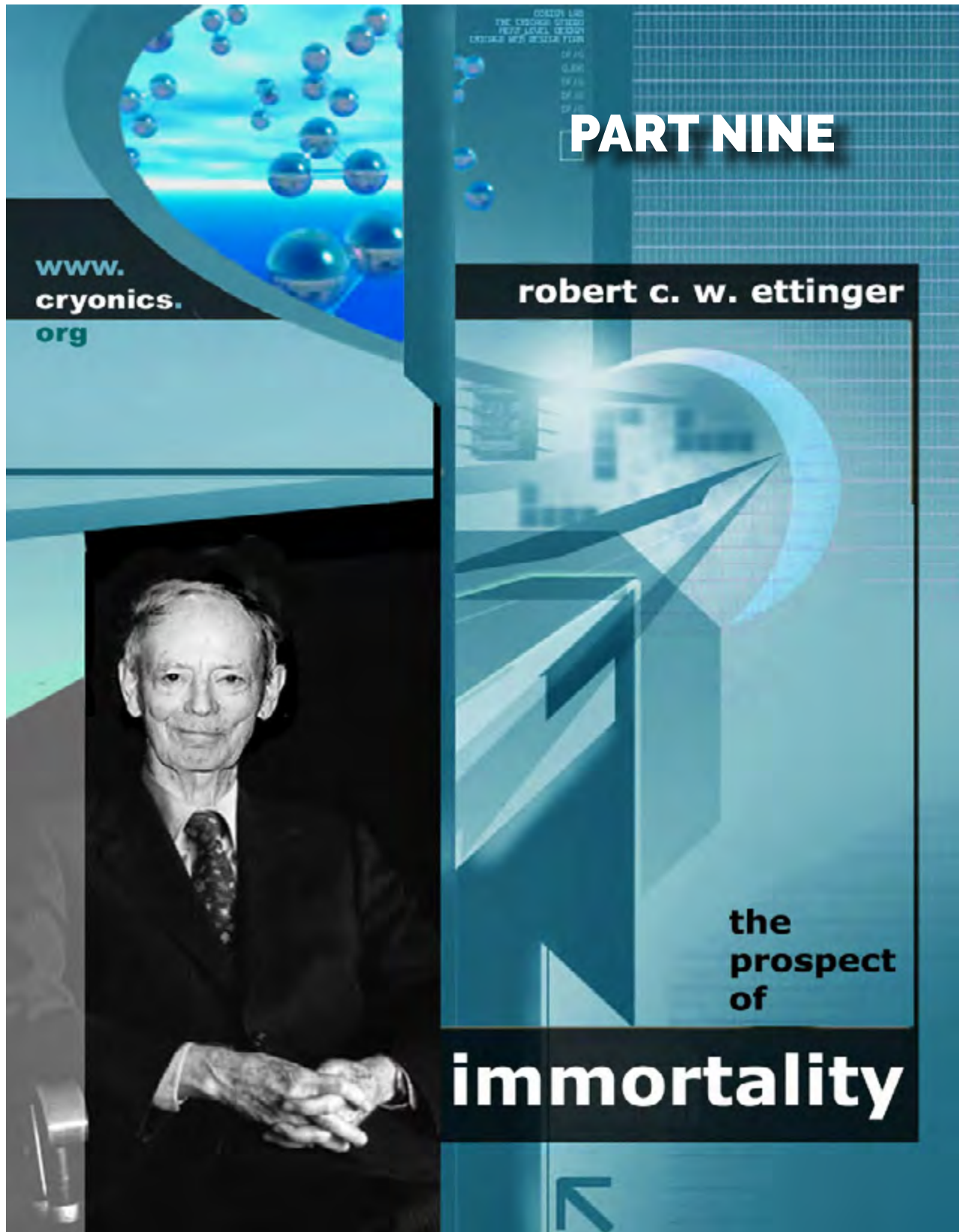
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CHAPTER IX

The Uses of Immortality

When people blithely assert that they "wouldn't want to live forever," it usually means only that they have not really thought about it.

The disclaimers fall perhaps into two main categories. The first concerns alleged moral considerations. "When I'm called, I'm ready to go . . . We have to step aside for our children. We shouldn't impose ourselves on posterity . . . Trying to hang on beyond our natural span is undignified and cowardly . . . Birth, growth, and death form a natural and necessary cycle. . . Fear of death is a sign of immaturity."

As far as "imposing ourselves on posterity" is concerned, some remarks have already been made, and a good deal more will be said in the last chapter. At this point it may be well just to insert a reminder that the freezer program should make everybody less desperate and the world more stable; it may even swing the balance in preventing a nuclear war. If this is true, then without the freezer program there may be no posterity. In that case, our descendants need it as much as we do.

When someone continues to insist that he would not want unlimited life, he is often wearing a mask which can be lifted by putting the question just a little differently. Let us ask first: "In case of a severe infection, would you refuse penicillin to stave off the 'natural' conclusion of death?" He can hardly claim he would. We ask next: "If a serum were to appear on the market, guaranteed to add twenty vigorous years to your life, would you refuse it?" He is not likely to say he would, nor would he refuse a perfected immortality serum.

And now we see his true face: he wants immortality, all right, but he wants it on a silver platter. It is not life he objects to, but effort and risk. Far from being stoic, or resigned, or well-adjusted, or complacent, or mature, or

philosophic, or self effacing, or altruistic, or any of the other dignified things he pretends to be, he is merely myopic and nervous.

A slightly different way to unmask such a person is simply ask him what span of life he would pick, if he could make his own choice merely by wishing. Would he pick exactly his "natural" span, neither more nor less? Would he willingly accommodate himself to whatever accident or ailment would do him in, in the ordinary course of events, seeking neither to shorten nor prolong his life? Merely to ask these questions reveals the absurdity of affirmative answers.

The notion that superior personalities accept death more readily has also been denied, for example, by Dr. C. Knight Aldrich, chairman of the department of psychiatry at the University of Chicago. He writes:

"However, my experience, both clinical and extra-clinical, suggests that it is particularly difficult for the strong, well-integrated personality to accept with equanimity the idea of his own death.

"Strength of personality may help a patient not so much to void depression in anticipation of death as to conceal depression in others. On the other hand, many patients who seem to accept death with real equanimity have depressions that antedate their fatal illnesses or they have lost interest in living as a result of pain or disability. Their appar-

ent realistic courage indicates that they have given up life and are welcoming death. Death can be faced more readily if there is little to lose by leaving life than if there is a great deal to lose." (1)

A few of my friends have expressed fear that the cowards will embrace the freezer program most eagerly, while the brave and the dignified may spurn it. This notion seems to be negated, not only by the theoretical considerations already put forward, but also by observation. Among the many who have talked and written to me, it is by and large the weak and timid who hang back - is it not the nature of the weak and timid to hang back? - while the strong and hold spirits usually seize the concept with delight. Only those embrace death who are half dead already. The ones who surrender are those who are already in retreat.

You, Better than New

Disclaimers in the second category question whether extended life is worthwhile, even to the individual. "I've had a full life. I'm already bored and couldn't endure a second life. I wouldn't like a futuristic world. . . . There would be nothing to do . . . I wouldn't fit in." Etc.

The main difficulty is that few people have the remotest conception of what the future will be like; they think of it dimly as mid-twentieth century, plus maybe sliding sidewalks, family helicopters, and a twenty-hour work week. They fail to understand that the differences will be qualitative as well as quantitative.

In particular, they completely fail to grasp that people will be different, including themselves. Mental qualities, including both intellectual power and personality or character, will be profoundly altered, not only in our descendants but in ourselves, in you and me,

the resuscitees.

That genetic science will enable us, sooner or later, to mould our children as we please seems almost taken for granted by the experts and by all laymen with a spark of imagination. We might for example quote Dr. Philip Siekevitz:

"For I think we are approaching the greatest event in human history, even in the history of life on this earth, and that is the deliberate changing by man of many of the biological processes. ... Already we can very easily produce mutants in bacterial strains; we will soon be able to control these changes; and it is not such a big jump from bacteria to plant, to animals, or to man himself . . . we will be able to plan ahead so that our children will be what we would like them to be - physically and even mentally." (105)

Some of us may suspect that from uncontrolled mutations in bacteria to controlled mutations in man really is a pretty big jump, and it may take quite a while. But time, fortunately, is what we have plenty of. Sooner or later, these achievements will be realized. Professor Hermann J. Muller, Nobel Prize winner in genetics, has said: "I am convinced that he [man] will remake himself [genetically] . . . we may attain to modes of thought and living that today would seem inconceivably god-like." (76)

Such breath-taking predictions are readily accepted by many intelligent laymen - but only as interesting speculations of no direct concern. These notions take on entirely different colors when we realize that we, personally, may be there to witness these titanic events - and that we will have to deal with these supermen.

What will they be like, these genetically planned and engineered descendants of ours?

On the physical side, they will be strong, handsome, and healthy, but beyond this it is impossible yet to say. They may look almost exactly like people today, or they may not; certainly the current human design leaves plenty of room for improvement.

For example, Professor Muller has pointed out the absurdity a multi-purpose mouth. "[An alien] would find it most remarkable that we had an organ combining the requirements of breathing, ingesting, tasting, chewing, biting, and on occasion fighting, helping to thread needles, yelling, whistling, lecturing, and grimacing. He might well have separate organs for all these purposes, located in diverse parts of his body, and would consider as awkward and primitive our imperfect separation of these functions." (78)

While Dr. Muller may have stretched it a little -- not all of us want to separate our yelling from our lecturing, and a special organ to thread needles will find few buyers even in a ladies' sewing circle-the point is surely well taken. Imagine the incalculable benefit in teen-age happiness alone, if one could eat, chew gum, and talk on the telephone, all at the same time - without the danger of strangling!

But the great changes will be those in intellect and personality. And if our descendants are all super-duper whiz kids, even if they are kind and good, how can we compete? How can we live? The problem is real, but there are solutions.

One solution, of course, is to refuse to breed supermen. Such issues will be hotly debated in all the parliaments of earth, with unpredictable results. But probably the issue will fade, for several reasons.

In the first place, we will not necessarily be re-

suscitated the moment it becomes technically feasible, unless we insist. If it should happen that at this time genetic improvement is far advanced but individuals cannot yet be much improved, then resuscitation may be delayed, conceivably.

Second, even if for a time we have to live with superior descendants, a *modus vivendi* may be found. There will be means for reducing envy on the one hand and arrogance on the other, and for enabling the individual to enjoy what he has; more will be said about this shortly. It is also important to remember that no disadvantage need be permanent; we can no doubt summon considerable patience when we know that we only have to wait a while, and science will improve us further.

Third, we shall probably be supermen ourselves shortly after resuscitation. Somatic improvement may stay abreast of, or get ahead of, genetic improvement. Designing a new model will not necessarily be easier than overhauling the old. It should become possible to perform extensive improvement in living individuals by various biological techniques, for example, using regeneration together with somatic mutation, microsurgery, and psychosurgery.

Besides biological changes, there is also vast potential in the use of prostheses, mental as well as physical - for example, by coupling a human mind to an electronic computer. Some different suggestions, but in the same general direction, have been made by Dr. R. M. Page, Director of Research, U. S. Naval Research Laboratory, Washington; he envisages ultra-rapid communication between man and machine by a sort of electronic mindreading, and thinks it might be achieved in fifty years. (85) Thus all the resources of a huge computer may some day be in the direct service of a man's mind; it might even be said to be part of his mind, when hooked in on either a

temporary or permanent basis. The man-machine combination may well be far superior to any purely biological superman, in which case we shall be immediately equal to our descendants.

The best advice for success in life has always been to choose your parents wisely; and now, in effect, this will become possible. Collectively, if not individually, we can expect to design ourselves, selecting the desired traits and abilities. Of course, the alarmists will protest that there may be unforeseen consequences, and such presumption is dangerous. And we must agree; that it is. But we can only choose between dangers, and not escape them. Doing nothing also constitutes a choice, and often a poor one. (Stock market players often forget that every day they hold a stock they have, in effect, except for overhead, made a new decision to buy that stock in preference to all others.)

Living has always been dangerous; and now, for the first time, dying will be dangerous too. But most of us will prefer the danger of our activities after resuscitation to the safety of no activity at all.

Just what our activities may be in the world of the future is not easy to picture. At least for a considerable period, there will still be economically productive work in the form of scientific investigation, administration, education, and many kinds of artistic endeavor. There will be many activities involving human relations which, although perhaps not economically productive, will give that "needed" and "useful" feeling; for example, taking an interest in your children's or parents' troubles, or participating in politics. Certain simple pleasures are likely to wear quite well - things like exercising the muscles and glands, playing with the children or great-grandchildren, enjoying the lakes and forests.

This may seem rather thin at first. For instance, how many people can be painters, or writers, or composers, or sculptors? The answer is, maybe everybody! Nobody will be stupid - not by today's standards, and probably not by tomorrow's, since there is likely to be more homogeneity. There will simply be more artists and smaller average audiences. I'll buy your painting, and you'll buy my music; and each will enjoy doing his own work, and each will appreciate the other's.

If this still sounds unconvincing, we can help make our point with a wellknown and venerable story. A communist was exhorting an audience of laborers: "Comes the Revolution, you'll eat strawberries and cream." One worker objected, "But I don't like strawberries and cream." The agitator glared at him. "Comes the Revolution, you'll like strawberries and cream!"

The skeptics must be continually reminded that not only will the world be changed, but themselves also both their ability to perform and their capacity to appreciate and enjoy. There are already many forerunners of these developments.

There is now considerable use - sometimes excessive use - of tranquilizers on the one hand and "psychic energizers" on the other. Mood is known to be related to hormone and enzyme balance. Depression and anxiety can often be relieved by such drugs as epinephrine and adrenochrome, and many other drugs are known to affect personality. Furthermore, many common mental disorders may be at least partly chemical in nature; e.g., schizophrenia seems to be related to the production of a substance called taraxein. (43)

Some of the future potentialities have been indicated by Dr. A. Hoffer and Dr. R. Humphrey Osmond, Canadian psychiatric researchers: "Psychopharmacology may help us

learn how to think clearly however distracting personal and other calls may be, without however preventing us from indulging, when we need it, in the boldest imaginings. Such capacities developed in an increasing number of our species would be as effective as a beneficial mutation and we think, far more easily achieved." (43)

Elsewhere, in discussing experiments with "psychedelic" or "mindmanifesting" drugs, Dr. Hoffer writes: "Thought becomes creative, one's horizons are widened, and the world and its problems are seen with a fresh eye . . . Over half of our patients who achieve a psychedelic experience are subsequently much better people. For example, out of more than half of a series of sixty alcoholics treated in this way over one-half are now sober and good citizens and certainly much happier than they were before. Volunteers who have experienced this type of reaction find to their surprise and pleasure that they are more mature, more tolerant, and have a broader outlook on life." (42)

Some progress has been made in tracing motivation, as well as sensation, to local centers in the brain, according to Dr. James Olds, physiologist at U.C.L.A. It appears that rats can be made to gratify the drives of hunger, thirst, digestion, excretion, and sex by self-stimulation of their brains with electricity. (The rats were allowed to manipulate controls which turned on the current, the electrodes being inserted in suitable regions in the brain; the technique is called ESB, for Electronic Stimulation of the Brain.) The report

says that "Some of the animals have been seen to stimulate themselves for twenty-four hours without rest and as often as 5,000 times an hour." (84)

This is in some ways an obscene experiment, with sinister overtones. (The same may be

said of many biological experiments.) But it underscores the possibility of finding "happiness" partly by working on oneself, rather than by working on the environment.

Professor Rostand has also emphasized the possibilities in improving individuals. ". . . intelligence . . . also character can be affected by chemical dosing . . . The future may bring the use of medicines that would favor social behavior, kindness and devotion . . . the possibility cannot be excluded that there may come into being a psychosurgery whose aim would be to raise the individual above himself . . ." (95)

I would go further than the cautious optimism of these scientists and say that, given enough time, these dazzling developments and many others have a high degree of probability.

But even if one grants all this, there remain the questions of long-range goals, of fundamental values and motivations, of the nature of happiness. If we dare face immortality, must we not also face the profoundest problems of man and the universe?

The Purpose of Life

It is possible we shall never be able to find "ultimate" values or "ultimate" goals. It is also possible that there are built-in conflicts or paradoxes in the human mind on the deepest level, so that in the end tragedy cannot be avoided. Not every problem has a solution.

At present, however, such speculations seem all but futile. We are too raw even to frame proper questions, let alone understand the answers. The very structure of our brains may need improvement before we can apprehend the secrets of the cosmos.

Eventually, most "philosophical" problems

may turn out to be biological. Dr. Jonas Salk has written, "If we can study CNS [central nervous system] phenomena according to those biological principles that have been shown to be applicable to other systems, a basis for reconsidering behaviour in biologically meaningful terms may emerge, which then by empirical means may expand further our understanding of the CNS of man and all that flows therefrom: behavior, creative activity, motivation, values, responsibility, and the intangible qualities of personality reflected in reactions, choices, aptitudes, and attitudes." (96)

When a humane, progressive, cooperative society has been achieved, the purpose of life will be learning and growth - the disclosure and then the attainment of ever more advanced intermediate goals, until either the final goal (if any) is revealed, or some catastrophe overtakes us.

During this grand unfolding, "happiness" in private and peripheral affairs will no doubt rest on a compromise between internal and external satisfactions. Few of us would want the contentment of a narcotic stupor, or an ESB jag, on a permanent basis. Likewise,

ignorance may be bliss, but who would want the "happiness" of a cow - or even of a bull? Yet, judiciously used, chemistry and surgery can exert a beneficial stabilizing influence. On the external side, there will be an ever-widening range of activities, including some we have not yet thought about.

To some, this may appear remote and gray. Actually, the canvas of the future shows blinding color and riotous excitement. Remember, once again, you and I will not be the same, but enlarged and enriched, equipped fully to appreciate these words of Thomas Huxley: "If there is anything I thank the Gods for (I am not sure there is, for as the old woman said when reminded of the goodness of Providence - 'Ah but he takes it out of me in the corns') it is a wide diversity of tastes. . . No one who has lived in the world as long as you and I have can entertain the pious delusion that it is engineered upon principles of benevolence. . . But for all that, the Cosmos remains always beautiful and profoundly interesting in every corner - and if I had as many lives as a cat I would leave no corner unexplored." (45)

NEXT ISSUE:

Chapter X: Manners, Modes, and Morals of Tomorrow

