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A Publication of the Immortalist Society

LONG LIFE

Longevity Through Technology

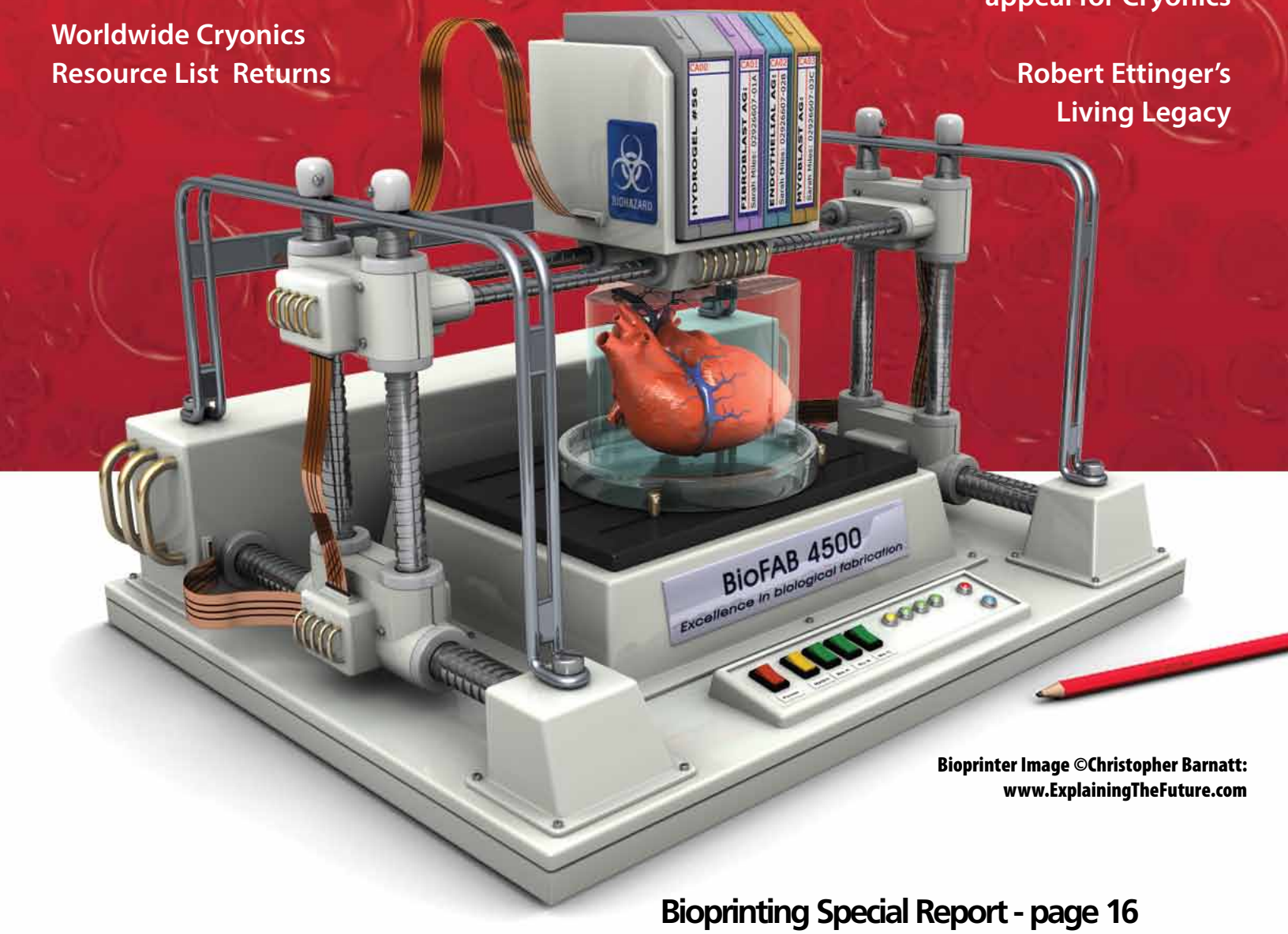
Volume 45 - Number 02

CI getting a makeover

Worldwide Cryonics Resource List Returns

Drupal founder makes an appeal for Cryonics

Robert Ettinger's Living Legacy



Bioprinter Image ©Christopher Barnatt: www.ExplainingTheFuture.com

Bioprinting Special Report - page 16

The Immortality Machine?

Fantastic devices capable of creating new organs might not be as far away as we imagine

www.immortalistsociety.org www.cryonics.org
www. americancryonics.org

CRYONICS INSTITUTE
Technology for Life

Why should You join the Cryonics Institute?

The Cryonics Institute is the world's leading non-profit cryonics organization bringing state of the art cryonic suspensions to the public at the most affordable price. CI was founded by the "father of cryonics," Robert C.W. Ettinger in 1976 as a means to preserve life at liquid nitrogen temperatures. It is hoped that as the future unveils newer and more sophisticated medical nanotechnology, people preserved by CI may be restored to youth and health.

1) Cryonic Preservation

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.

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 inititation 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) Locally-Trained Funeral Directors

CI's use of Locally-Trained Funeral Directors means that our members can get knowledgable, licensed care. Or members can arrange for professional cryonics standby and transport by subcontracting with Suspended Animation, Inc.

7) Funding Programs

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 currently receive a free subscription to Long Life Magazine, as well as access to our exclusive members-only email discussion forum.

9) 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.

10) 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.

11) Member Ownership and Control

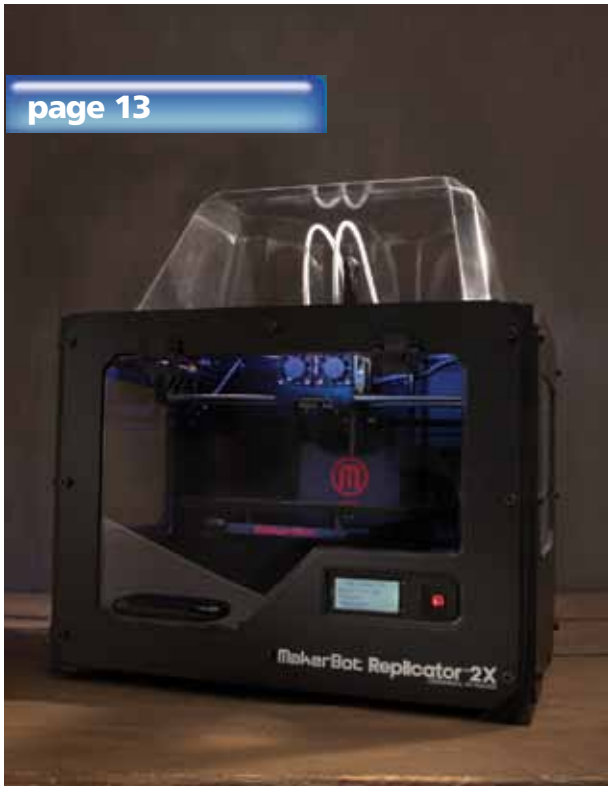
CI Members are the ultimate authority in the organization and own all CI assets. They elect the Board of Directors, from whom are chosen our officers. CI members also can change the Bylaws of the organization (except for corporate purposes).

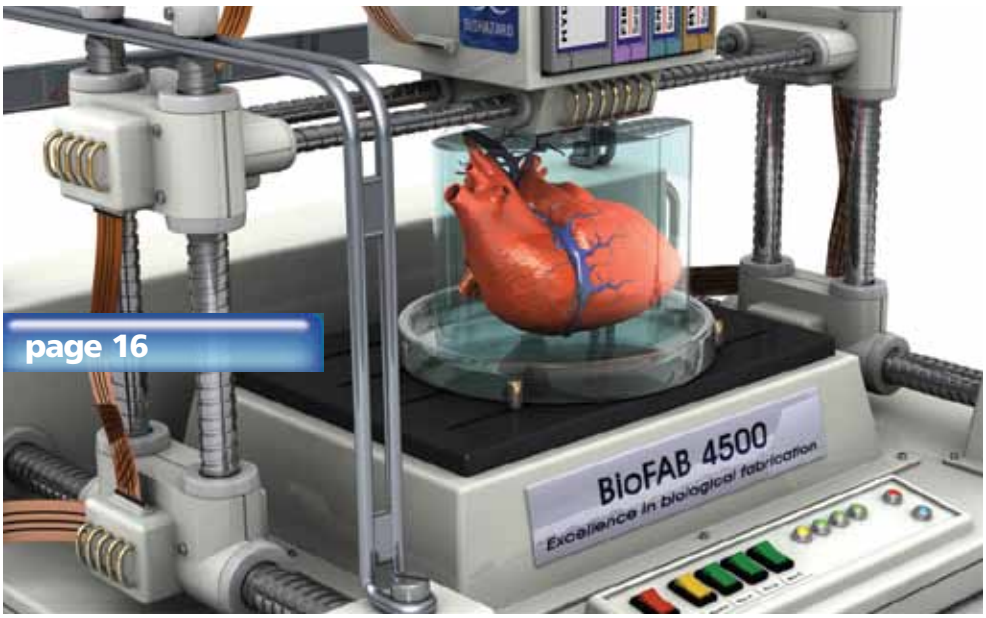
The choice is clear: Irreversible physical death, dissolution and decay, or the possibility of a vibrant and joyful renewed life. Don't you want that chance for yourself, your spouse, parents and children?

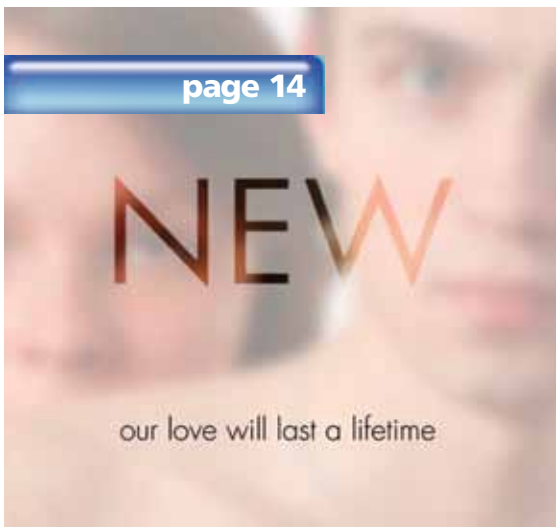
To get started, contact us at:

(586) 791-5961 • email: cihq@aol.com

Visit us online at www.cryonics.org







LONG LIFE MAGAZINE

A PUBLICATION OF THE IMMORTALIST SOCIETY

ORGANIZATION NEWS

FEATURE STORIES

Betting on the Future

Faith in the future is the most basic definition of optimism, whether it's 1,000 years in the future or simple faith in believing that tomorrow is going to be a little bit better than today was.

Today is already a pretty exciting time to be an optimist, as we can see more and more "impossibles" edging closer to becoming "realities" within our own lifetimes. It's even more exciting to be a cryonics enthusiast (an optimist by default) looking forward to an "impossibly" extended lifespan when you can see that dream becoming less *impossible* and more ***inevitable*** with each scientific leap forward.

In this issue of *Long Life* we'll be exploring one of the most exciting new technologies pushing an "impossible" lifespan closer to reality every day.

Our feature topic this issue is Bioprinting, a revoultion in 3D printing technology (which in itself is pretty amazing,) that holds the promise of actually being able to create patient-specific tissues and organs on demand. A number of high-tech companies are already seeing successes, including a skull implant (pg 14) and promising research with kidneys (pg 15.)

We're also excited to feature an exclusive bioprinting story, as well as the cool bioprinter concept art on our front page by futurist and author Christopher Barnatt (ExplainingTheFuture.com.) The story starts on page 16. Supporting the feature story is a great bioprinting infographic that helps explain the process and a short history of the technology, courtesy of the kind folks at ClickInks.com.

There's a lot more in this issue, including new initiatives at CI, a cryonics movie and more that we hope you'll find interesting reading. Here at *Long Life*, we're naturally optimists, and from what we've put together for you in this issue, I'd say there's plenty to be optimistic about.

Enjoy the magazine!

York Porter & the staff at Long Life

LONG LIFE

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President: York Porter • Vice President: John Bull • Secretary: Royse Brown • Treasurer: Rich Medalie

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CI EXECUTIVE REPORT

Dennis Kowalski - President, Cryonics Institute

Hello everyone. I've been busy brainstorming with the many smart and ingenious movers and shakers that make up our membership and we've come to the conclusion that cryonics desperately needs a dedicated focus on local standby efforts. There doesn't seem to be any greater obstacle to a good suspension than a lack of basic planning and prep-work. I've been discussing local efforts with Canadian Standby organizer Christine Gaspar, and we both agree there's a critical need for simplified and easy to implement local standby efforts.

You might ask yourself: why should you form a local standby group? There are three main reasons. First, to facilitate better cryonics suspensions. Second, to form a grassroots movement to educate the public about cryonics. And third, to provide mutual cooperation and camaraderie within the cryonics community.

What we need is a basic template that local groups can follow. There are many extensive and well thought out standby documents already, but what I believe is needed is a streamlined and simplified approach to the most basic aspects of cryonics standby procedures. In conventional emergency medicine, there are literally hundreds of thousands of documents that have been created to assist in the practice of conventional emergency medicine, but long ago medical professionals recognized that there are basic procedures that can and must be performed before the more advanced procedures can be implemented. They also realized that a minimally trained person or even a layperson could have a profound effect on the outcome and survival of those in need. Thanks to this simple wisdom we now have the American Heart Association's basic CPR course which has saved thousands of lives.

Studies have shown that highly trained professionals can often suffer tunnel vision, focusing on advanced procedures but neglecting the foundations or basics. Case in point, seasoned emergency room physicians have been witnessed halting CPR excessively to obtain advance airway placement or to administer IV drugs. In conventional medicine, a "gold standard" advanced airway or IV access are futile to a patient who has no pulse or respiration. In other words, all the advanced procedures and the best doctors in the world can't help you if the basics aren't in play first.

Similarly, we see two ugly problems reoccurring in inferior suspensions everywhere. The first is no planning or standby in place whatsoever. Like all things related to death and cryonics

there is the natural human tendency to put things off and hope for the best. Is it any wonder why few people even consider cryonics, much less fill out a will? Failing to plan is planning to fail. I may have said something similar in the past, but that's a saying that bears repeating. Sure, you might get lucky with a completely unplanned suspension, but your odds of survival greatly improve with only a minimum of planning. The other problem is too much reliance on expensive and often distant centralized standby that must overcome the logistic problems associated with such distance. While I do support remote centralized standby, especially if you have the money and live close to a standby location, I find it somewhat misleading and even dangerous to overly rely on remote standby if you live outside its effective area of support. Even if you are signed up with an organization that mandates centralized support, or have exercised that as an option with CI, it only makes sense to have *some* type of local standby on the front line when and where you'll need it the most.

If you doubt this logic you may want to take a look around. The decentralized approach is the type of emergency response placement that has evolved worldwide. While large population areas have larger and more advanced emergency response, the rest of the world (over 95% of its coverage) uses a basic or simplified approach. Many fire and emergency responders are simply community volunteers.

Apply this logic to the Cryonics Community, which has a scarce density of perhaps 2000 or 3000 members spread out worldwide.

A new look for CI's Facebook page

Clearly, we are spread very, very thin. To succeed with such miniscule human resources, we need to learn from those who have invented and refined the wheel long before we came along. The answer is simple: if you want to have the best chances of cryonics revival you need some local decentralized standby. CI will attempt to simplify standby and show our members how to make a real difference without the extensive advanced procedures that sometimes cause people to just stand back like the proverbial deer in the headlights when their help is most needed. You don't need an MD to do CPR and you don't need it to do good cryonics standby either.

I suggest that standby should be split up into a tiered system to emphasize division of training. CI will eventually offer 3 levels: Basic, Intermediate and Advanced. While it is useful to progress beyond basic it is always wise to start with a solid foundation upon which to build. A written basic guide will be part of the Cryonics Institute's "Cryonics Emergency Standby-Basic" training. I propose that CI members who read our training manual and fulfill the basic requirements are recognized and certified by CI. For those of you who have already began local standby efforts I commend you. I see this as a start that can only get better as we move along. I will continue to write about local standby as we get our training up and running, but in the meantime, here's a taste of some of the other activites that have been going on at CI.

Efforts continue to improve and enhance CI's image and capabilities. Recently Andy Zawacki (CI's Operations Officer) has been working hard on finishing up a complete revamp of our perfusion room.

Ongoing efforts are in place to make sure we continue to have both reliable and affordable services. These efforts include careful planning and negotiations with all vendors which should pay off for CI as we move forward. At CI we take pride in stretching every dollar and making sure all funds work for you, our members.

You may have seen CI's new cryostat logos on Facebook or elsewhere. The logos give a more appealing look to the otherwise plain stark white vessels that hold our patients and loved ones. The cryostats are an obvious focal point to anyone who visits CI. I hope these efforts help to convery an image that we can all be proud of.

New logo decals for the cryostats

CI Facebook membership is up to 633 and more importantly, our membership has increased yet again to 1071 members as of April.

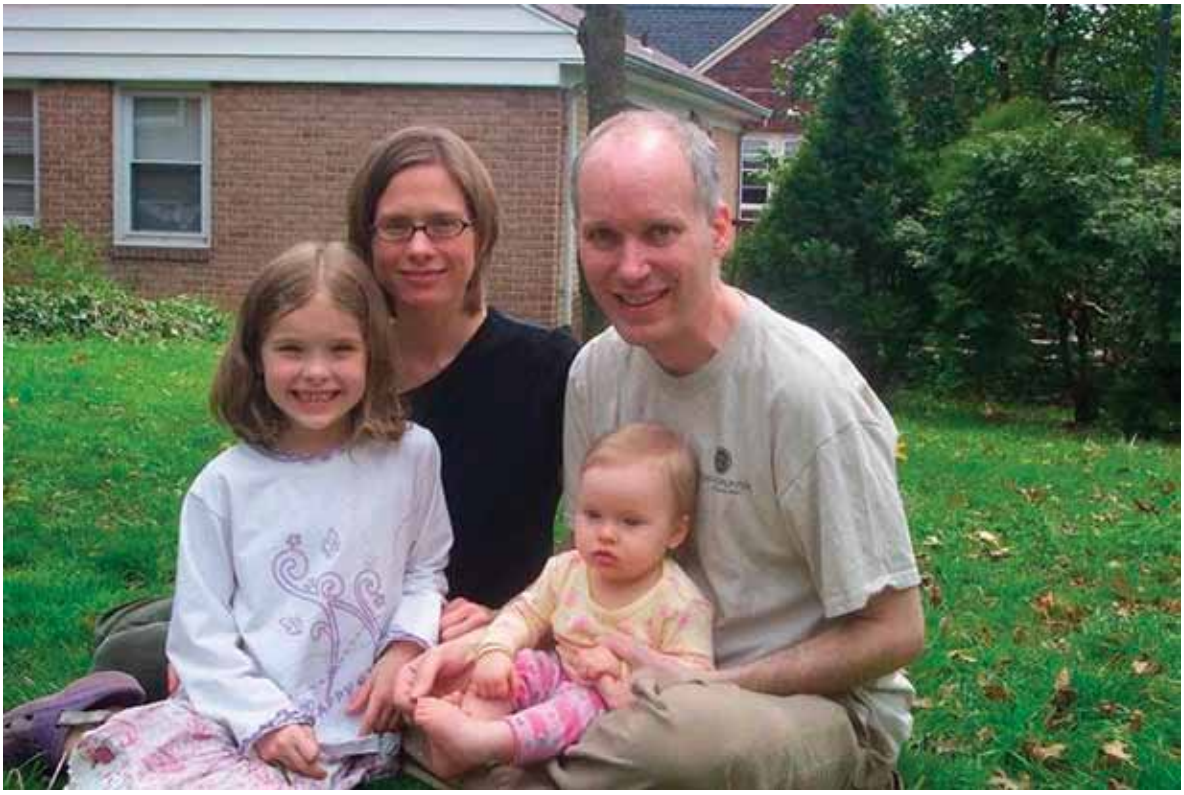
The Teens and Twenties event took place April 5-7th and the Evidence Based Cryonics Conference will be in Portland, Oregon from May 10-12. I look forward to pictures and reports.

Overall our financial report suggests that we are heading in the right direction in terms of expenditures, investments and growth. A lot is getting accomplished and membership is increasing but there is always room for improvement. I look forward to seeing CI grow better and better everyday. Thanks to everyone who is out there working hard changing the cryonics dream into reality.

— Dennis Kowalski - CI President/CEO

Open Letter from Drupal founder Aaron Winborn

by Aaron Winborn



So maybe you've heard about my plight, in which I wrestle Lou Gehrig in this losing battle to stay alive. And I use the phrase "staying alive" loosely, as many would shudder at the thought of becoming locked in with ALS, completely paralyzed, unable to move a muscle other than your eyes.

But that's only half the story. Wait for the punchline.

As if the physical challenges of adapting to new and increasingly debilitating disabilities were not enough, my wife and two young daughters are forced to watch helplessly as the man they knew loses the ability to lift a fork or scratch an itch, who just two years ago was able to lift his infant daughter and run with the 7-year-old. The emotional strain on my family is more than any family should have to bear. Not to mention the financial difficulties, which include big purchases such as a wheelchair van and home modifications, and ultimately round the clock nursing care, all of it exacerbated by the fact that we have had to give up my income both because of the illness and to qualify for disability and Medicaid.

Meet me, Aaron Winborn, software developer and author of Drupal Multimedia, champion of the open source software movement.

Years ago, I worked for the lady of death herself, Elisabeth Kübler-Ross, the author of On Death and Dying. Of course, I knew that one day I would need to confront death, but like most people, I assumed it would be when I was old, not in the prime of my life. Not that I'm complaining; I have lived a full life, from living in a Buddhist monastery to living overseas, from marrying the woman of my dreams to having two wonderful daughters, from teaching in a radical school to building websites for progressive organizations, from running a flight simulator for the US Navy to working as a puppeteer.

I accept the fact of my inevitable death. But accepting death does not, I believe, mean simply rolling over and letting that old dog bite you. Regardless of the prevalent mindset in society that says that people die and so should you, get over it, I believe that the reality we experience of people living only for a few decades is about to be turned upside down.

Ray Kurzweil spells out a coming technological singularity, in which accelerating technologies reach a critical mass and we reach a post-human world. He boldly predicts this will happen by the year 2045. I figured that if I could make it to 2035, my late 60s, that I would be able to take advantage of whatever medical advances were available and ride the wave to a radically extended lifespan.

ALS dictates otherwise. 50% of everyone diagnosed will die within 2 to 3 years of the onset of the disease. 80% will be gone in 5 years. And only 10% go on to survive a decade, most of them locked in, paralyzed completely, similar to Stephen Hawking. Sadly, my scores put me on the fast track of the 50%, and I am coming up quickly on 3 years.

Enter Kim Suozzi.

On June 10 of last year, her birthday, which is coincidentally my own, Kim Suozzi asked a question to the Internet, "Today is my 23rd birthday and probably my last. Anything awesome I should try before I die?" The answer that she received and acted on would probably be surprising to many.

On January 17, 2013, Kim Suozzi died, and as per her dying wish, was cryonically preserved.

She was a brave person, and I hope to meet her someday.

So yes, there we have it. The point that I am making with all this rambling. I hope to freeze my body after I die, in the hope of future medical technologies advancing to the point where they will be able to revive me.

The good news is that in the scheme of things, it is not too terribly expensive to have yourself cryonically preserved. You should look at it yourself; most people will fund it with a $35K-200K life insurance policy.

The bad news for me is that a life insurance policy is out of the question for me; a terminal illness precludes that as an option. Likewise, due to the financial hardships in store for us, self-funding is also out of the question.

When I learned about Kim Suozzi's plight, I reached out to the organization that set up the charity that ultimately funded her cryopreservation. The Society for Venturism, a non-profit that has raised funds for the eventual cryopreservation of terminally ill patients, agreed to take on my case.

Many of you reading this post have already helped out in so many ways. From volunteering your time and effort to our family, to donating money towards my Special Needs Trust to help provide a cushion for the difficult times ahead.

I am so grateful for all of this. It means so much to me and my family to know that there is such a large and generous community supporting us. I hate to ask for anything more, especially for something that may seem like an extravagance.

But is it really an extravagance?

If I were to ask for $100,000 for an experimental stem cell treatment, I doubt that we would even be having this conversation. No one in their right mind would even consider a potentially life-saving procedure to be an extravagance.

And what is cryonics, but a potentially life-saving procedure?

People choose from among many options for their bodies after death. Some choose to be buried, some choose cremation. Some choose to donate their bodies to science. That last is precisely what happens with cryonics: in addition to helping to answer the obvious question of whether future revival from cold storage will be possible, many developments in cryonics help modern medicine with the development of better preservation for organ transplantation and blood volume expanders.

Yes, I admit that the chances of it working are slim, but have you looked at the state of stem cell research for ALS lately? Consider that the only FDA approved medication to treat ALS, Rilutek, will on average add 3 months to one's lifespan, and you might begin to see my desperation.

But you should be happy with the life you've had. Why do you want to live forever?

The only reasonable response to that is to ask why do you want to die?

I love life. Every morning, even now with my body half paralyzed, I awaken with a new sense of purpose, excited to take on the day. There is so much I have yet to do. There are books to write, games to create, songs to sing. If I can get the use of my arms and hands again, there are gardens to plant, houses to build, spaceships to fly. And oh, the people to love.

So please help me to realize this, my dying wish.

http://venturist.info/aaron-winborn-charity.html

"The most beautiful people we have known are those who have known defeat, known suffering, known struggle, known loss, and have found their way out of the depths. These persons have an appreciation, a sensitivity, and an understanding of life that fills them with compassion, gentleness, and a deep loving concern. Beautiful people do not just happen."

- Elisabeth Kübler-Ross

CI developing new marketing and educational materials

Here's a sneak peek at some of the new membership materials being created for the Cryonics Institute. CI President Dennis Kowalksi says, "One of my prime goals is communication - both with our members and with the general public. Little by little we're cleaning up our existing materials and creating new materials to help present a professional, appealing image of our organization and of cryonics in general. This includes the CI facilities, our online presence, contributing materials to *Long Life*, and most of all special educational materials for our members. I firmly believe we have a responsibility to do everything we can to ensure that members have the knowledge and training they need to maximize their chances for a successful suspension."

On the education front, one of Kowalski's primary inititatives is to introduce a complete standby training package with easy to follow instructions, including a video.

CRYONICS INSTITUTE
Technology for Life

You have signed up for Cryonics now what should you do?

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 then 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 cryo-preserved. 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 cryo-preserved. The right approach to the right professionals can be an invaluable asset.
- Prepare and execute a Living Will and Power of Attorney for Health Care that reflect your cryonics-related wishes. Make sure that CI is updated at regular intervals as well.
- 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.

CRYONICS INSTITUTE MEMBERSHIP STATISTICS:

CI membership continues to grow, making us cryonics' leading organization in terms of membership. As of April 2013 we have 1,071 members and 117 patients.

Of the 1,071 Members, 504 have funding and contracts in place for human cryopreservation. Of the 504, 136 have arrangements for Suspended Animation Standby and Transport. There are 94 pet patients, up one from our last report. CI continues to be a cryonics industry leader in terms of both membership and practical affordability for all.

Cryonics Institute Membership by Country:

Meet Phillipe Vitu

To be a cryonics enthusiast, one needs to meet three conditions: love for life, an unswerving faith in technology and an optimistic nature.

Since I meet all the above, Cryonics is a no-brainer to me.

I was vaguely aware of cryonics, but, with competing priorities plaguing my days and nights, I never did much about it. After all, death is a phenomenon that affects others and not me.

I have a morning routine which involves starting my computer before even having breakfast and checking my e-mails in my company inbox and on Yahoo. Last August or September, there was a story on Yahoo about a young 23 year-old girl named Kim Suozzi who was dying from brain cancer and was raising funds to pay for her cryopreservation. This article hit me like a lightning bolt.

Things went very quickly after that. I followed the links and found the Cryonics Institute, the Cryonics Society of Canada and Alcor. I spent all weekend reading the FAQ sections on the two first sites, as well as one from Ben Best's personal web site that really transfigured me. By Christmas, I had become a CI member and was fully funded through appropriate life insurance one month later.

The United States are a breeding ground for invention and innovation that no other nation on earth rivals. Eli Whitney's cotton gin in the early 1820s, a machine that quickly and easily separates cotton fibers from their seeds, allowed for much greater productivity than manual cotton separation, which considerably boosted the economies of the southern states. The telegraph, in the 1840s allowed people separated by hundreds of miles to communicate within seconds, beating the horse, that was, for two thousand years or more, the standard carrier of information and thus changing the way the country was run. The prolific inventor, Thomas Edison, who lived not far from where the Cryonics Institute is seated today, developed the first electrical light bulb and phonograph in the 1880s. The Wright brothers, who, in 1903, successfully flew the first aircraft over the gentle hills of North Carolina, defied predictions that a heavier than air flying machine would never work. Henry Ford, in the early 1910s, invented and implemented mass production, hence revolutionizing industry and making goods more affordable for middle-class people. Closer to us, Americans have set foot on the Moon, successfully landed probes on Mars on a quest to find evidence of past life, drilled rocks and reported results to Earth with high precision. They even flew probes past distant planets on interstellar journeys.

Is it therefore surprising that that the first cryonic society in the world, the American Cryonics Society (founded in 1969) was American?

The innovation and invention record of America is compelling and accelerating exponentially year after year. Closer to our concern, which is prolonging life, women already know, through oocyte freezing and insemination, how to beat the biological clock and bear children well after childbearing age. We are even practicing an early form of cryonics by maintaining sperm banks: widows can be inseminated with the cryopreserved sperm of their deceased husband and bear his child as if he had been alive. We are today familiar with biotechnology through which the pharmaceutical industry produces, at least in principle, better and better medication to cure an increasing number of diseases. We are familiar with bioengineering, through which we can literally create new plants to serve us. Recent advances in nanotechnology will make it theoretically possible to repair, in the not too distant future, the very damage that killed "good" cryonic patients.

With the fast and furious progress in technology, especially in the United States, I am almost certain that we shall try resuscitation on mice in a few years and attempt resuscitation on the most promising cryonics patients in a few decades.

Cryopreservation, at least through CI, is not much more expensive than a good funeral. I see cryonics as a bridge to a possible future life and therefore, refuse to rot in a coffin, which is tantamount to guaranteed annihilation in contrast to the possibility that a future revival affords through cryonics.

Of course, I am aware of the many challenges awaiting us. For starters, I live in Canada, where our organization is embryonic. In Toronto, where I live, we have about a dozen cryonic enthusiasts who meet regularly, but we do not have a lawyer who could represent us, nor a funeral director friendly to our cause. Ontario law mandates that bodies be embalmed if they are to be shipped outside the province. Embalming is a "no-no" to cryonics. Our friends in the UK have been able to secure a coroner's determination that embalming could be dispensed with for the purpose of delivering an Infectious Free Certificate if the body were "cryonized", meaning washed out and applied dry ice to. To

my knowledge, no application for a cryonic exception was made in Ontario yet. We all have our jobs to attend to and therefore, no organized stand-by team. We have a lot of work to do.

Then, let us assume that the Cryonics Institute is a long-tem going concern spanning over centuries in the future, that revival is technologically possible by then and that revival of cryonic patients is not prohibited by legislative action. Then, revival will come with its own set of issues.

- Financial: Where will the money to revive patients come from? The world will be very different from the world we grew up in. Our skills, whatever they may be, will be grossly outdated. We will need to be retooled. Who will pay for our education, our training and, in the meantime, how will we make a living?

- Legal: Legal systems are typically one step behind the evolution of society. It does not formally recognize cryonics (utter the word "cryonics" to a lawyer and watch his eyebrows go up and down) and is certainly not adapted to the idea that persons declared legally dead could one day come back into existence. How will we be able to prove our identity and our citizenship or even our age for that matter? What if the person had a criminal record in his or her previous life? Would that criminal record be carried forward to his or her second life although the person was declared legally dead in the meantime? Would the "born again" carry debts from the previous life? If the law is amended to recognize the "born again" as the same person it declared dead in the past, what would the official age and birthday of that person be? Would that person receive Old Age Security benefits? If a person was born in Europe but revived in the US, would that person be granted US citizenship immediately by way of the fourteenth amendment?

- Religious: I am not a religious person, but I can see a few theological issues: Christian faith states that when one dies after having believed in God and his son Jesus, one will be reunited with God. Then, can we expect from a "born again Christian" (no pun intended) to tell us what God looked like? What about the soul?

- Emotional: Unless cryonics runs in the family and those family members are revived together, the "born again" will feel very lonely. The house or residence of that person will be long gone, the deed just a document examined with curiosity or amusement.

As we can see, issues abound. We did not even scratch the surface. I will have my plate full if and when I am revived. But didn't I say that I was optimistic by nature? This is why I am a cryonic enthusiast. So, I shall deal with those issues when the time comes.

- Philippe Vitu.

Philippe Vitu owns Express International Translations Inc., a language services company that provides a wide range of translation and interpretation services including sign language interpretation, language translations and simultaneous interpretation.

(http://www.expressinternationaltranslations.com)

Philippe can be reached by phone at 905-624-0437.

Long Life Photo Gallery

We were pleasantly surprised to find the following photos in our inbox here at *Long Life*, and thought we'd use this space to share them with the rest of our readers. It looks like our first issue was a success, and we can't think of a better endorsement than these photos. (In particular, we think some of you might recognize the gentleman in the center below right.) Sincere thanks to these kind readers for sending in their photos, and we certainly encourage and welcome more photos from our readers! It's great to be able to get to know more of our members across the globe, so feel free to send your pictures to *immsoc@aol.com*

Congressional candidate Gabriel Rothblatt and Linda Chamberlain

Linda Chamberlain, John Bull, and Lori Rhodes at Terasem

Cryonics Support Groups List

The Cryonics movement needs your help! We're looking for your input to update and create a master list of cryonics organizations and resources world-wide. If you know of, or are considering starting a support, standby or other cryonics-related group in your area, please send details to immsoc@aol.com. We'll be using Long Life to list existing groups of interest as well as help spread the word and encourage new organizations.

AUSTRALIA:

The Cryonics Association of Australasia offers support for Australians, or residents of other nearby countries seeking information about cryonics. 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.

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

DENMARK: A Danish support group is online. Contact them at: david.stodolsky@socialinformatics.org

FINLAND: The Finnish Cryonics Society, (KRYOFIN) is a new organization that will be working closely with KrioRus .. They would like to hear from fellow cryonicists. Contact them at: kryoniikka.fi Their President is Antti Peltonen.

FRANCE: Roland Missionnier has formed SOCIETE CRYONICS de FRANCE He would like to hear from cryonicists in Switzerland, Luxembourg and Monte Carlo, CELL: (0033) 6 64 90 98 41, FAX: (0033) 4 77 46 9612 or rolandmissonnier@yahoo.fr

GERMANY: There are a number of cryonicists in Germany. Their homepage is: www.biostase.de (English version in preparation.) if there are further questions, contact Prof. Klaus Sames [sames@uke.unibamburg.de]

GREECE: Greek Cryonics Support Group
Sotiris Dedeloudis is the Administrator.
Find them at: http://www.cryonics.gr/

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

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 mid_hikaru@yahoo.co.jp or http://www.cryonics.jp/ index.html

NEW ZEALAND: Contact Cam Christie, easternhk@hotmail.com_ or go to http:// www.nzcryonicssociety.org.nzl

NETHERLANDS: The Dutch Cryonics Organization is the local standby group and welcomes new enthusiasts (http:// www.cryonisme.nl).Contact Secretary Japie Hoekstra at +31(0)653213893 or email: jb@hoekstramedia.nl

PORTUGAL: Nuno & Diogo Martins with Rui Freitas have formed agroup to aid Alcor members in Portugal.
Contact: nmartins@nmartins.com
www.cryonics.com.pt/

RUSSIA: KrioRus is a new 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 kriorus@mail.ru or daoila.medvedev@mail.ru for additional information or visit http://www.kriorus,ru. Phone: 79057680457

SPAIN: Giulio Prisco is Secretary of the Spanish Cryonics Society. http://www.crionica.org.sec He lives in Madrid and he's a life member of CI and is willing to serve as a contact point for Europeans. He can be contacted at: cell phone (34)610 536144 or giulio@gmail.com

UNITED KINGDOM: Cryonics UK is a nonprofit UK based standby, stabilization, and transport organization whose website is: www.cryonicsuk.com and who can be contacted via David Styles (Organizer) at: +44 7706 149771 or ds@cryonicsuk.com or via Alan Sinclair (President) at +44 1273 587 660 cryoservices@yahoo.co.uk

INTERNATIONAL: The Cryonics Society is a global cryonics advocacy organization.
www.CryonicsSociety.org futurenews
5856431167

Cryonics Film in Development

Short film introduces mainstream audiences to cryonics

An exciting new film project that should pique the interest of cryonicists is being developed in California. Award-winning screenwriter and director John Harden is heading up a team of filmmakers to create an ambitious science fiction film set in the distant future.

The film, entitled simply "NEW" is a sci-fi drama about a present-day elderly couple who choose to be cryonically preserved at the time of their deaths. They are revived from their suspension, centuries later, to face the joys and challenges of a second life in a strange, utopian future. Harden says "*The idea for NEW was sparked by an article about people who make plans to have their bodies cryonically preserved (stored in liquid nitrogen) after death, in the hope that future medical technology will restore them to life. It was a fascinating look into people's beliefs about mortality and identity, their attitudes about their current lives, and their plans to live another.*

There are rules to life, the first of which may be "one to a customer." But imagine if technology were to change that rule, restoring youth and re-defining death. In NEW, this comes to pass. It poses some challenges for our main characters."

The 12-minute short film of NEW will be a stand-alone story, but will also serve as proof-of-concept for the feature-length version Harden is currently writing.

A short teaser video for the project can be viewed at www.NewTheMovie.com.

Patient receives 3D-printed skull implant

Image © Oxford Performance Materials
oxfordpm.com

According to the company Oxford Performance Materials, one of the company's 3D printed implants was used in March of this year to replace 75% of a patient's skull.

The surgery almost immediately follows the company receiving FDA clearance for the device they call "the OsteoFab™ Patient Specific Cranial Device" just one month earlier in February of this year. According to OPM, this FDA clearance marks the first such approval for an additively manufactured (3D Printed) polymer implant, opening the door for future innovations.

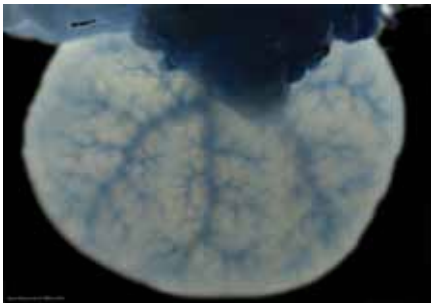
Although the name may be a mouthful, it does explain a critical feature of the implants. Specifically that each implant is custom modelled and shaped to perfectly fit the individual patient's anatomy, replacing exact areas of missing bone caused by trauma or disease..

Scott DeFelice, President and CEO of Oxford Performance Materials, said the new process "is a highly transformative and disruptive technology platform that will substantially impact all sectors of the orthopedic industry."

Regeneration and experimental orthotopic transplantation of a bioengineered kidney

Jeremy J Song, Jacques P Guyette, Sarah E Gilpin,
Gabriel Gonzalez, Joseph P Vacanti & Harald C Ott

Approximately 100,000 individuals in the United States currently await kidney transplantation, and 400,000 individuals live with end-stage kidney disease requiring hemodialysis. The creation of a transplantable graft to permanently replace kidney function would address donor organ shortage and the morbidity associated with immunosuppression. Such a bioengineered graft must have the kidney's architecture and function and permit perfusion, filtration, secretion, absorption and drainage of urine. We decellularized rat, porcine and human kidneys by detergent perfusion, yielding acellular scaffolds with vascular, cortical and medullary architecture, a collecting system and ureters. To regenerate functional tissue, we seeded rat kidney scaffolds with epithelial and endothelial cells and perfused these cell-seeded constructs in a whole-organ bioreactor. The resulting grafts produced rudimentary urine in vitro when perfused through their intrinsic vascular bed. When transplanted in an orthotopic position in rat, the grafts were perfused



by the recipient's circulation and produced urine through the ureteral conduit in vivo.

Abstract and photo reprinted from Nature Medicine - www.nature.com Published online 14 April 2013

3D Printing: Futurisitic technology on your desktop today

Makerbot® company marketing 3D printers for consumers

Brooklyn-based company Makerbot® (www.makerbot.com) is currently offering two desktop 3D printers for sale priced under $3,000. The company calls their Replicator™ 2 Desktop 3D Printer "the company's easiest, fastest, and most affordable tool yet for making professional-quality models." The printer is intended for engineers, researchers, creative professionals and hobbyists, and can create custom objects up to 11.2" L x 6.0"W x 6.1" H from digital 3D files.

Putting this in perspective, the original Macintosh desktop computer sold for $2,500 in 1984, featuring an 8MHz processor and 128K of RAM. 30 years later, today's iMac retails around $1,000 with a 3.3 GHz processor and 4GB of RAM. At approximately $2,100 and $2,700 respectively, Makerbot's 3D printers fall comfortably in the price range for emerging consumer tech and can only get cheaper as the technology and the market matures.

These hobbyist 3D printers use compostable plastic for their models, so obviously they can't print complex tissue or organs, but they do represent an exciting step forward for the technology and a future where what's "amazing" today is commonplace.

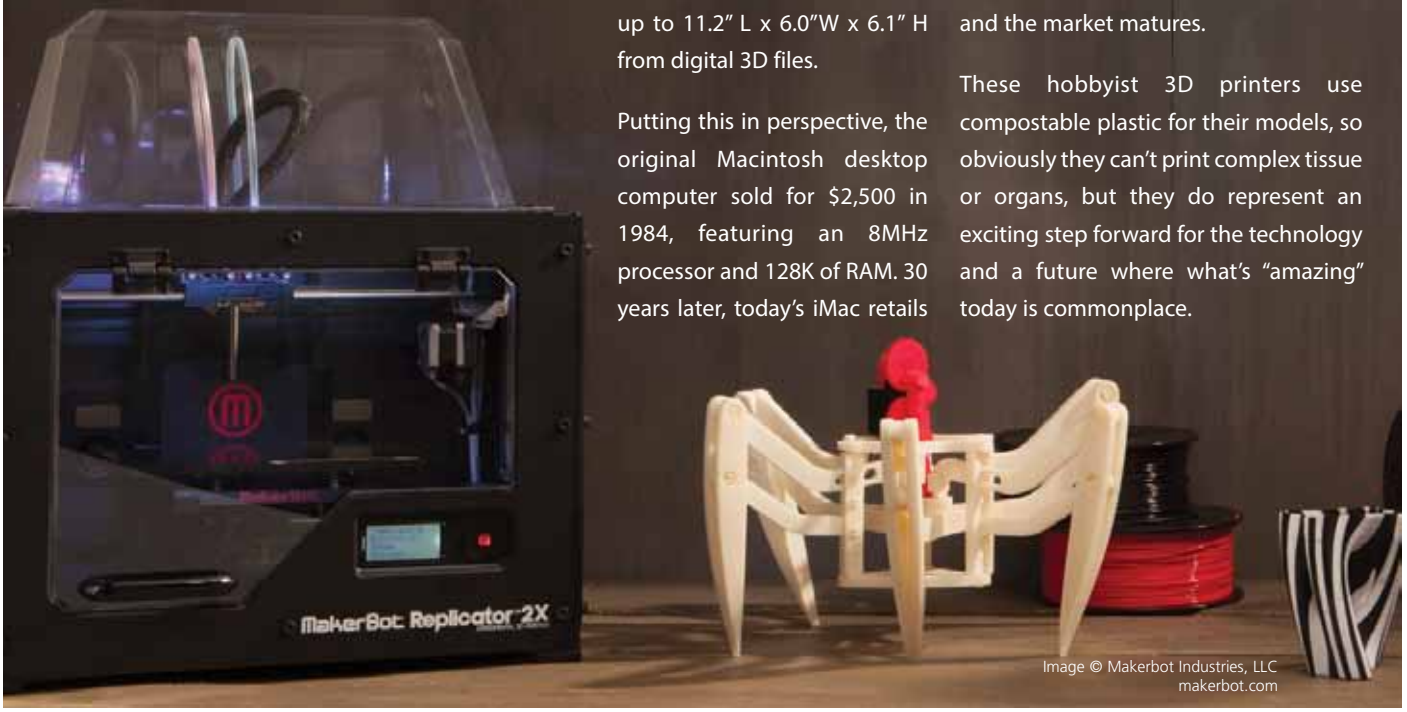
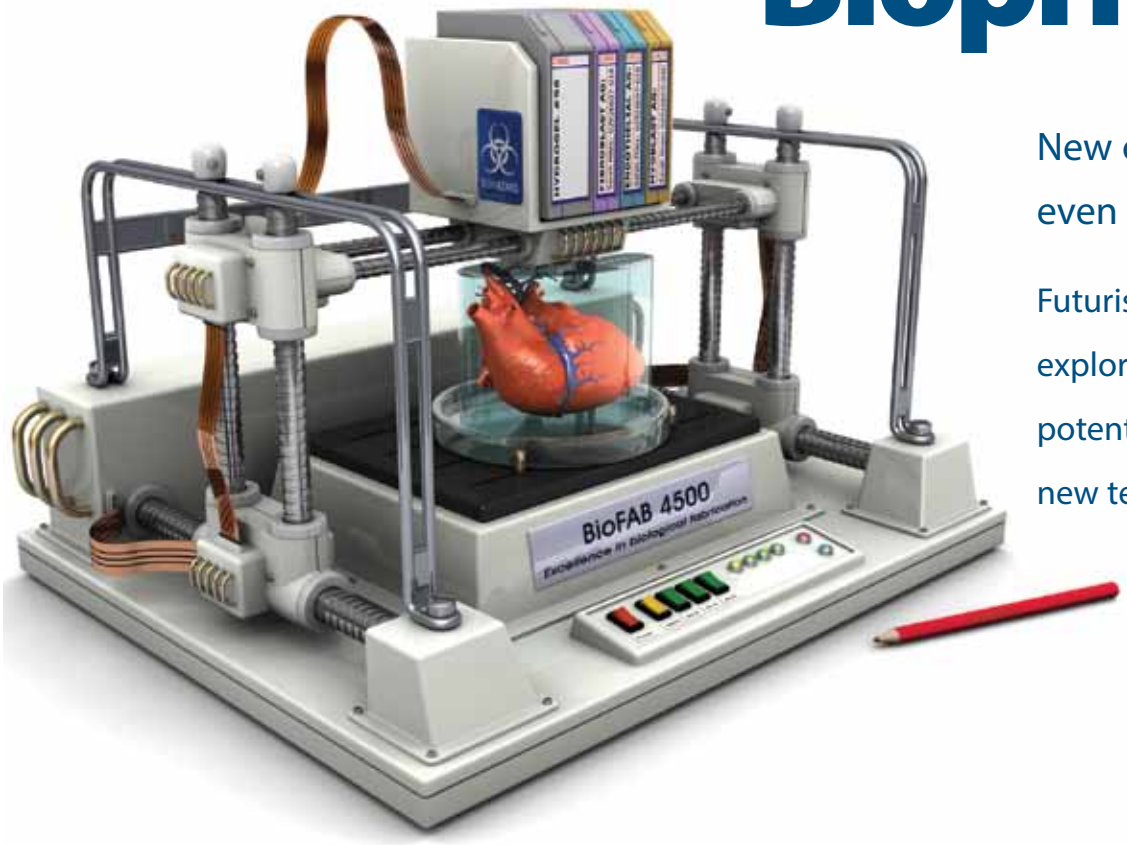


Image © Makerbot Industries, LLC
makerbot.com

Bioprinting



New organs, tissues or even *bodies* on demand?

Futurist Christopher Barnatt explores the awesome potential of this stunning new technology.

by Christopher Barnatt

for Long Life Magazine

As the population ages, organ failure is increasingly common, with more patients in need of transplant surgery. Unfortunately, there is a shortage of available organs, with up to 100,000 people in the United States alone always on a waiting list. This number is also roughly doubling every decade, with an increasing percentage of those in need of a transplant likely to die waiting. If human life expectancy is going to increase, an alternative to the transplantation of donated human organs therefore needs to be found.

Rising to the challenge, several research teams are now developing specialist 3D printers – or 'bioprinters' – that may in the future fabricate replacement human organs by building them up in layers from a culture of a patient's own cells. Many now believe that we stand on the brink of a New Industrial Revolution in which 3D printers will permit almost anything to be fabricated-on-demand one layer at a time. Even today, 3D printers can digitally manufacture prototypes, factory tooling and end-use parts in over 200 different materials including plastics, metals and ceramics. 3D printing is also already a multi-billion dollar industry experiencing double-digit growth. While 3D printing technologies have existed for nearly 30 years, the opportunity to develop them for medical application has never been greater.

From Photo Printer to Bioprinter

The droplets of ink sprayed out by a standard inkjet printer are about the same size as human cells. Several bioprinting pioneers have therefore commenced their research by modifying off-the-shelf hardware. For example, in 2002 Professor Makoto Nakamura from the University of Toyoma began bioprinting experiments using an Epson photo printer.

Initially Professor Nakamura's printer just clogged up. But with some technical support from Epson, a year later he managed to successfully output cells that survived the inkjet printing process. This was achieved by encasing the cells in sodium alginate to stop them from drying out, and by jetting them into a calcium-chloride solution. By 2008, a team led by Professor Nakamura at the Kanagawa Academy of Science and Technology had built an experimental bioprinter that was capable of creating bio-tubing similar to a human blood vessel.

Today, one of the companies at the forefront of bioprinting is

Organovo. With a mission to deliver "breakthrough three-dimensional biology capabilities to create tissue on demand for research and surgical applications." Organovo was set up by a group from the University of Missouri led by Professor Gabor Forgacs, and is currently one of only a handful of 3D printing companies to be publicly traded. Back in March 2008, Organovo managed to bioprint functional blood vessels and cardiac tissue using cells cultured from a chicken.

By 2010 Organovo had partnered with Invetech to develop a commercial bioprinter called the NovoGen MMX. This builds up living tissue using 'bio-ink spheroids' that each contain tens of thousands of cells. Initially, the NovoGen outputs a single layer of a water-based 'bio-paper' made from gelatin, collagen or another hydrogel. A needle-like print head then injects bio-ink spheroids into this supportive material. As illustrated in figure 1, additional layers are added to build up a three dimensional tissue structure. Amazingly, nature then takes over and the bio-ink spheroids slowly fuse together. As this occurs the bio-paper dissolves away or is otherwise removed.

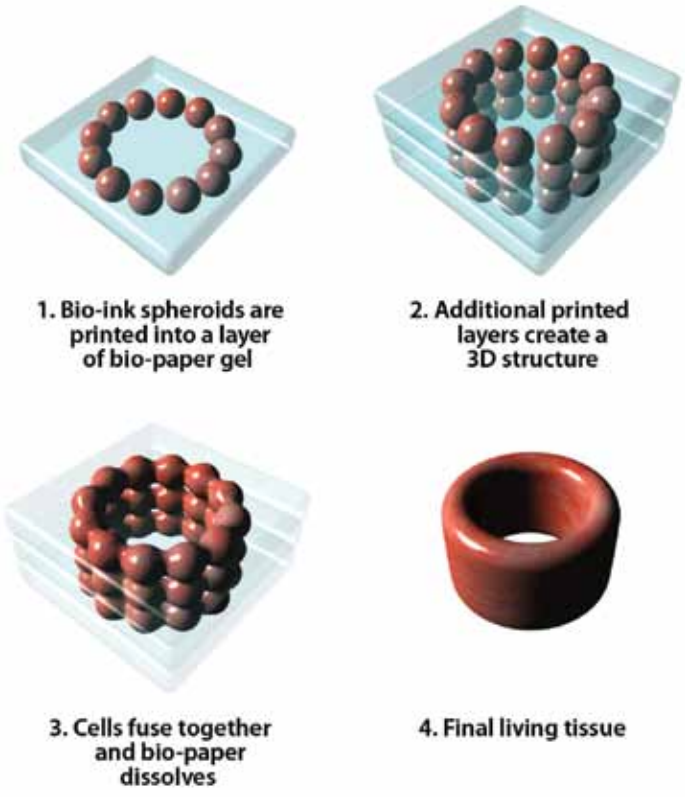


Figure 1: The Organovo bioprinting process.

Organovo's bioprinting process first requires a sample of cells to be sourced from a patient biopsy. These are then grown in the lab using standard biotech methods, before being cultured in a growth medium to create the required final volume of cells. In December 2010, Organovo bioprinted the first blood vessels synthetically created with cells cultured from a single human being, while in April 2013 it reported the successful printout of liver tissue. The company has already successfully implanted bioprinted nerve grafts into rats, and anticipates human trials of bioprinted tissues this decade. Before this occurs, Organovo plans to bioprint human tissues for use in medical research. To this end, in January 2013 it formed a collaboration with the Knight Cancer Institute at Oregon Health & Science University to develop bioprinted cancer tissues for use in drug testing.

The most intriguing aspect of Organovo's bioprinting process is the role played by nature. This allows the bio-ink spheroids output by a NovoGen MMX to be an aggregate of many different types of cells. So, for example, when a blood vessel is created, the bio-ink spheroids contain a mixture of fibroblast, endothelial and smooth muscle cells. However, after printout – and with no further technological intervention – the fibroblast cells slowly migrate to the outside of the bioprinted blood vessel, the smooth muscle cells move to the middle, and the endothelial cells shift to the inside.

In more complex bioprinted outputs, intricate capillaries and other internal structures also naturally form once the initial bioprinting process is completed. While this may sound almost magical, it is no different than the cells in an embryo knowing how to rearrange into complicated organs. Mother Nature has been evolving this extraordinary capability for millions of years. As Professor Forgacs himself has put it, appropriate cell types somehow just 'know what to do'.

In December 2012 Organovo announced a partnership with Autodesk to create the first 3D design software for bioprinting. In time, this is intended to open up the technology to a far wider range of users. Or as Organovo chairman Keith Murphy explained, the relationship with Autodesk will offer 'the potential long-term ability for customers to design their own 3D tissues for production by Organovo'. When it comes to human transplant, initially such tissues are likely to be arterial or nerve grafts. But sometime in the 2020s a bioprinted replacement kidney is a possibility.

Other bioprinting research teams include the Advanced Tissue Biofabrication Center at the Medical University of South Carolina where the Palmetto bioprinter and the DynaGen Bioreactor have been created. The latter is in effect an exercise machine that mechanically stimulates artificially created tissues. As we all know, muscles are strengthened via exercise, and bioprinted muscle is no different. Any future bioprinted heart will therefore have to be given a significant workout in the lab before it is strong enough to pump blood around a human body.

Another centre of excellence is the Biomanufacturing Laboratory at

the University of Iowa. Here Dr. Ibrahim Ozbolat is working toward future pancreatic bioprinting, and is particularly focused on the challenges presented by thick-tissue fabrication. The main problem is that large organs will not survive printout without an internal system for supplying them with nutrients, growth factors and oxygen as well as a system for extracting waste. Dr. Ozbolat hopes to overcome the thick tissue fabrication challenge by bioprinting microfluidic channels to temporarily take on the function of a natural vascular network. To achieve this, he is developing a multiple-arm robot that allows microfluidic channels to be bioprinted in tandem with the build-up of bio-ink tissue spheroids and bio-paper.

In Situ Repairs

While the bioprinting of replacement arteries, nerves, kidneys, livers, pancreases and hearts may in the next few decades extend the lives of millions, the bioprinting revolution is likely to progress beyond the creation of transplantable tissue in the lab. In fact, some pioneers are already developing in situ bioprinting techniques that add cells directly to damaged parts of the body. Most notably, a team led by Anthony Atala of the Wake Forest Institute for Regenerative Medicine in North Carolina is planning on treating future burn victims by bioprinting replacement cells directly onto their wounds.

Atala's team has used a scanner to generate 3D maps of test injuries inflicted on a number of mice. This scan data has then been used to direct bioprint heads that have sprayed skin cells, a coagulant and collagen directly onto the wounds. The results have been very promising, with the injuries on the mice treated with the bioprinter healing in just two or three weeks compared to the five to six weeks required in a control group that was left to heal naturally. Funding

Figure 2: Concept illustration of a future skin printer by Christopher Barnatt.

for this work is coming in part from the US military, which is keen to develop bioprinting to help heal wounds on the battlefield. Although experiments are currently in a pre-clinical phase, the first trials with human burn victims could be as little as five years away. Figure 2 illustrates a potential future skin printer in operation.

In the future, new cells may even be bioprinted inside the body. For example, one day keyhole bioprinters may be developed with tiny heads that will enter the body, scan damaged organs, burn away

Figure 3: Concept illustration of a future face printer by Christopher Barnatt.

redundant tissue, and replace it with fresh cells. Such robotic, surgical bioprinting technology may even be able to heal its own incision site on its exit from the body. Patients would probably still have to recuperate for a few days as freshly bioprinted cells fused into robust living tissue. However, recovery from major surgery may take only a week.

Cosmetic Bioprinting

Many technologies created for one purpose end up being used for another. For example, plastic surgery techniques developed to help those with horrific injuries are now widely used for cosmetic purposes. As the technology develops, this may also be the case with bioprinting. In particular, once in situ bioprinting is perfected, it may become possible to 3D scan any part of the body, manipulate the data to individual preference, remove existing tissue with a laser evaporator, and apply a remodelled substitute one cell or bio-ink spheroid at a time.

In time, bioprinting technology may even allow face printers to be created. People could therefore decide exactly what they want to look like and spend an afternoon in a local bioprinting bureau having a new face applied. The design could be one of their own making, a scan of their own face from a decade earlier, or even the likeness of a celebrity downloaded from the web. A potential future face printer is illustrated in figure 3.

To most people the idea of using a bioprinter to change their face may seem horrific. Yet some people already undergo surgery to achieve far less dramatic changes in their appearance. As bioprinting

is developed for life-and-death medical purposes, so cosmetic applications of the technology will almost inevitably also emerge.

The Rise of Digital Biology

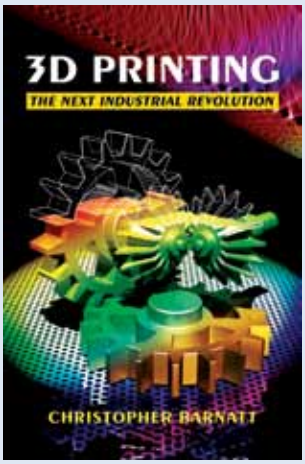
The 3D printing of plastic and metal parts is now starting to enter the mainstream, and is already becoming widely used in dentistry. In contrast, bioprinting is a highly experimental technology that is still fighting to emerge from the lab. This said, a bioprinting research community is now strongly established, with the specialist academic journal Biofabrication launched in 2009, and the International Society for Biofabrication (ISBF) founded in 2010. As bioprinting pioneers Vladimir Mironov, Makoto Nakamura and Fabian Guillemot pronounced in their editorial in the second edition of Biofabrication, it is therefore already 'safe to state that bioprinting technology is coming of age'.

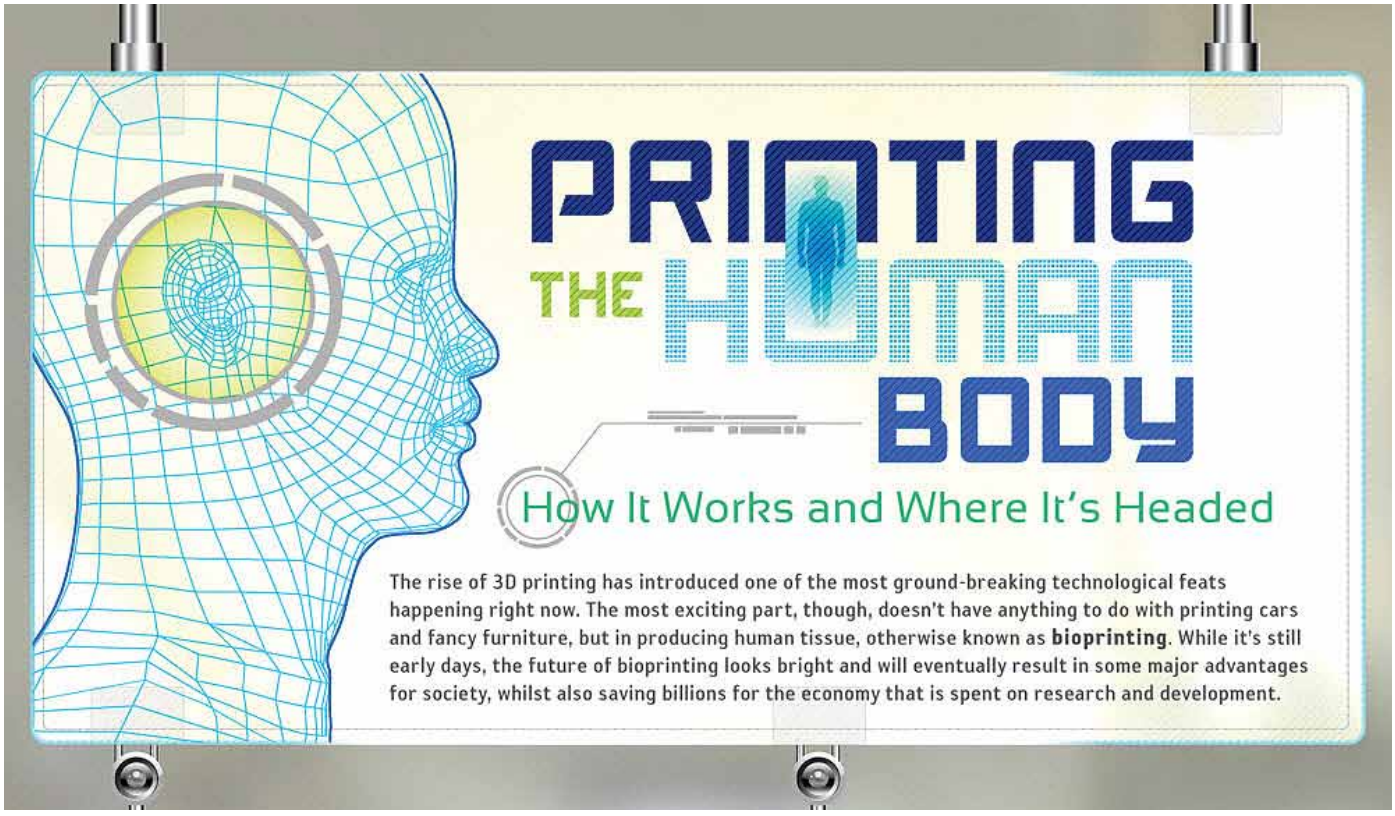
The opportunities for life extension presented by future bioprinting are clearly very great indeed. Not least, transplant waiting lists could be cut to zero. Transplanted bioprinted organs ought also to have a minimal chance of rejection as they will, in most instances, be created from a culture of a patient's own cells.

As (and if) we manage to perfect in situ bioprinting, all forms of surgery may also become less invasive and less traumatic, with large incisions and mass tissue removal and replacement exchanged for internal bioprinting at close to the cellular level. The labours of those now pioneering the new science of bioprinting may therefore in the decades ahead deliver a startling revolution in healthcare techniques, and in turn an increase in the length and quality of a great many lives.

About the Author

Christopher Barnatt is a professional futurist, and Associate Professor of Computing & Future Studies in Nottingham University Business School. He runs the website ExplainingTheFuture.com and its associated YouTube channel, and has written nine books. These include *3D Printing: The Next Industrial Revolution* (2013) and *25 Things You Need to Know About the Future* (2012), both of which delve into the world of bioprinting. You can follow him online at twitter.com/chrisbarnatt.





Biprinting Infographic reprinted courtesy of ClickInks.com

Evolution of Tissue Engineering and Bioprinting

1984 **Charles Hull** invented stereolithography, which enabled a tangible 3D object to be created from digital data. The technology was used to create a 3D model from a picture and enabled testing the design before investing in a larger manufacturing program.

1996 **Dr. Gabor Forgacs** (ONVO founder) and colleagues made the observation that cells stick together during embryonic development and move together in clumps with liquid-like properties. manufacturing program.

Circa 2000 **The first human patients** underwent urinary bladder augmentation using a synthetic scaffold seeded with the patients' own cells (engineered, not printed).

2003 **Thomas Boland's** lab at Clemson modified an inkjet printer to accommodate and dispense cells in scaffolds.

2004 **Dr. Forgacs** developed new technology to engineer 3D tissue with only cells, no scaffolds.

2009 **Organovo** creates the NovoGen MMX Bioprinter using Forgacs technology.

2009 -2010 **Organovo** prints the first human blood vessel without the use of scaffolds.

2011 **Organovo** develops multiple drug discovery platforms, 3D bioprinted disease models made from human cells.

Today
small-scale tissues for drug discovery and toxicity testing

Tomorrow
simple tissues for implant, (e.g. cardiac patches or segments of tubes, like blood vessels)

Future
lobes or pieces of organs*

**For example, a patient who needs a liver transplant has lost about 80-90 % of their liver function, so a full liver is not needed to make a therapeutic impact.*

Very Future
full organs

Welcome
Let's begin:
HOW IT WORKS

Main Components:

Cells + Hydrogel + NovoGen MMX bioprinter

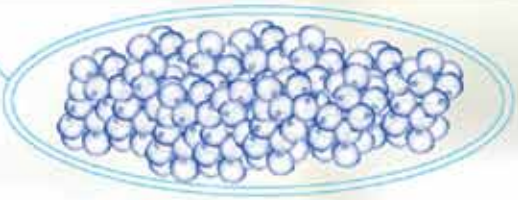
Creating the BioInk

1 Cells

Sourced from patient biopsies or stem cells, and grown using standard methods and techniques.

2 Cultured

Cells are cultured in a growth medium, enabling cells to multiply and grow.



3 Collected

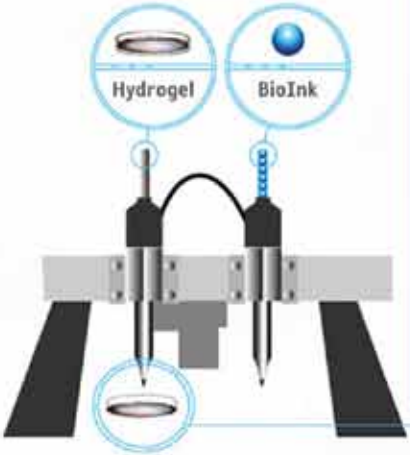
When enough cells are produced, they are collected to make BioInk.

CELLS ARE THEN

- formed into spheroids or other shapes
- loaded into a cartridge to create the BioInk

Printing Process

NovoGen MMX bioprinter



NovoGen MMX bioprinter is used to:

print a layer of hydrogel (an inert water based gel), which functions as a space holder for the printed tissue

deposit bioink spheroids into the layer of hydrogel

Hydrogel/spheroid print process is repeated

As layers are built upon, the spheroids naturally fuse together

Maturation

Printed tissue is left in the growth medium for several weeks to grow and mature. During which time, the hydrogel is removed.

Use

Printed tissues can then be used in medical research to discover and test new drugs and investigate causes of human diseases. And, in the future, as therapies.

PRINTING THE HUMAN BODY

What Has Been Achieved So Far

Nerve guides - 2009
Blood vessel - 2010
Cardiac sheet or patch - 2011
Lung tissue - 2012

PRINTING A LIVER

The eventual, longterm goals for bioprinting are to produce full organs. Using today's technology, an average sized liver (1,200cc) and liver lobe (120cc) would take 10 days to print. As technology improves the speed at which human tissue and, eventually, full organs can be printed will vastly improve.

It would take **1,690,912,929,600** hours to print a liver for every member of the human race using today's processes.

ORGAN TRANSPLANTATION BY THE NUMBERS

Every year, the number of people on the waiting list for an organ transplant increases, yet the amount of donors and available organs remains at a low.

More than **114,300** (waiting list candidates)

More than **73,000** (active waiting list candidates)

1 Month *(Between January - February 2012)*

4,494 transplants took place

2,218 available donors

✓ Approved | for: Liver transplant

17,000 adults and children have been medically approved for liver transplants and are waiting for donated livers to become available.

In 2005, 1,848 patients died waiting for a donated liver to become available.

DRUG INDUSTRY PROBLEM

Each year, the industry spends more than $50billion on research and development, and approximately 20 new drugs are approved by the FDA.

$50 BILLION = 20 NEW DRUGS

A new drug, on average, costs **$1.2billion** and takes **12 years** to develop

3D bioprinting technology has the potential to significantly impact the speed, predictiability and consequently the cost of successful drug discovery.

RESOURCES

Thanks to Organovo for their extensive help and research. organovo

http://www.organovo.com
http://www.unos.org
http://www.liverfoundation.org
http://www.wired.com
http://www.explainingthefuture.com

Keeping the Legacy Alive

Thoughts from Robert Ettinger, the Father of Cryonics

Robert Ettinger, pictured above from his days as a teacher of college students, was, in addition to being a prolific thinker, also a prolific writer. His words, some of them decades old at this point, still "ring true" even in the light of the passing years. From time to time, we will reprint writings of his that are still valuable in the concept of cryonics. This one is from July of 1992.

- York W. Porter, President, Immortalist Society.

Criteria for Criteria:

More Ruminations on Self and Survival

by Robert Ettinger

Let's look at the "identity" question from a slightly different angle. Instead of starting right out with proposed criteria of identity (or selfhood, or survival), let's ask instead, what are the criteria for these criteria? In other words, how do we know when we have enunciated an appropriate criterion??

Downfalls of Definition

In too many cases, we make quick and careless assumptions about appropriate criteria of definition.

As one minor example, consider the class of "mammals". Biologists at first regarded mammary glads as the prime qualification for an animal in this class. Later they downgraded this a bit, and put the presence of hair in first place. A placenta is also important, although marsupials don't have any. Etc.

What about fish? In biblical times a fish was apparently anything that lived in the water; Jonah's whale was a "fish". In modern times, one of the formal criteria is a true bony skeleton--which means that a shark is not a fish. (It's an elasmobrach, with a cartilaginous skeleton). So far, of course, it could be said we are just quibbling, and nothing really important is at stake.

Closer to home, how do we define life? Most definitions refer to growth and proliferation, homeostasis, etc. But many examples tend to show that these qualities can exist in systems we are reluctant to label "living".

Even more to the point, what about feeding, reproducing, and goal-seeking automata? What about a program, which can feed & reproduce & seek goals & maintain certain kinds of homeostasis if it is in the right hardware environment, more or less as a virus can do these things if it is in an appropriate host cell?

What is truly striking about these examples is that the people who originally offered definitions sometimes had very little idea of what they were talking about, or what traps they were laying for themselves. They were just flying by the seat of their pants. This often works--but when it doesn't, you can be let down hard.

Generality and Consistency of Definition

The main characteristics of an acceptable criterion of definition are generality and consistency. This corresponds to the criteria of an acceptable scientific theory: It should be as broad as possible, fit as neatly as possible into the existing framework or background of knowledge, should avoid creating anomalies, and should therefore avoid vagueness or ambiguities. In simple terms, an appropriate definition is one that works--works perfectly, without fail. Needless to say, we seldom get all this in one package at a particular time---but if we don't, the job is not yet done.

Life and Feeling

My suggestion regarding the definition of life is that feeling must be the prime requisite. This may turn out to imply that the lower forms of "life" (as presently defined) do not qualify. If so, so be it. It seems very plain to me that the presence of feeling--the subjective condition--is the sine qua non of a living being. If it has no feelings, it isn't alive in our sense--regardless of intelligence. (And we must remember that goal seeking and avoidance reactions and so on, although they may remind us of feelings and intentions, do not necessarily imply these; remember Grey Walter's tortoises and similar devices. Remember also that evolution sometimes gives the illusion of "purpose" in "nature").

Admittedly, it is a bit awkward to insist that feeling is the stuff of life, when we don't yet know what feeling is! (That is, we don't know it's biophysical or objective nature). Yet that seems necessarily our starting point.

At any rate, if feeling is the linchpin of life, then could an individual organism, or an indivisible "I", be defined as the smallest system that can feel?

Obvious problems immediately arise. One-celled organisms, and even individual cells in our bodies and brains, display behavior sometimes suggestive of feeling. Perhaps it will turn out that we "should" be regarded as parasites on our own constituents. (In a vaguely similar way, a human society might be considered parasitic on its individual human constituents, ruthlessly ready to sacrifice them).

That aside, we face the theoretical/experimental task of determining the locus or loci of the "self circuit," the seat of feeling or subjectivity. If it turns out that a particular collection of cells (neurons?), with their associated activity, constitutes the self circuit, and that one such collection (and pattern of activity) can represent only one self, then we apparently could define the essential self as that collection of cells or/and that pattern of activity. Our inclination would be to consider the self as potentially present when the activity stops (as in cryostasis), provided there is some reasonable degree of assurance that activity will resume, and with a substantial degree of continuity. (But it is not at all clear why continuity should be considered so important).

Continuity Conundrums

It may be useful at this point briefly to review some of the thought experiments that cast doubt on the validity or applicability of continuity criteria for self and survival.

First, we can compare five hypoterical situations of physical continuity or its lack.

In (1), you maintain ordinary life from moment to moment; despite some psychological/physiological semi-discontinuities in sleep, you continue as the "same" person; this satisfies most of us as indeed constituting sameness and survival. However, it must be remembered that quantum laws seem to require discontinuous or episodic existence of everything, as well as imperfect cause/effect matches between past and future, and some would be disturbed by that.

(2) is the same as (1) except that we look at longer periods, so that the future person is significantly different from the past person. Indeed, if we become immortal and transhuman, the future person may eventually have very little resemblance to the original, and may not even be interested in that earlier person's memories. It becomes difficult to see why the continuity is important. Why should not the earlier person be just as satisfied at the prospect of that future person arising in a different way---which means why should we care whether "we" survive?

In (3), you are frozen after clinical death, then later successfully thawed and revived with memories and personality largely intact. Again, most of us would consider this satisfactory, although it is slightly disturbing that, during the frozen hiatus, you were totally nonfunctional and thus in some sense nonexistent or only potentially existent.

In (4), by some magic of advanced technology (beam-me-up machine), you are suddenly disassembled; at some later time (usually, but not necessarily, a very short time) you are reassembled, although perhaps not with perfect fidelity. If the time lapse were long and the fidelity not so good, many people would be troubled or totally unsatisfied at such a prospect; yet does it really differ much from (2), the "natural" process of development?

In (5) we again use a beam-me-up machine or equivalent, but now we reproduce more than one copy, some with high fidelity and some not. Again, it is hard to see any sound criterion for ruling "survival" either in or out. Yet, as usual, we are extremely reluctant to abandon the search for valid criteria; fatalism is repulsive.

Criteria for What?

We are concerned with characterization or definition of the self (or person) and of survival of the self. There are deep difficulties with both.

Let's look again, at "survival"--not necessarily of a person, but of anything at all. There will be considerable repetition, but this is probably necessary. These ideas are so subtle and slippery that we have to keep reminding ourselves of various facets.

The Meaning of "Survival"

A thing is generally considered to "survive" if it persists or endures or retains its life or functions or being. Sometimes rebirth or re-creation is considered to constitute survival--e.g. in the case of hypothetical human reincarnation. This immediately immerses us in conundrums of continuity, as well as questions of partial or qualified survival. The latter being easier, let's consider them first.

Quantative Aspects of Survival

If a thing has many aspects or characteristics, or if some of these are matters of degree (quantitative), and if there is sufficient continuity, then we may have no real problem; it is just a question of language. Does my car "survive" when it has been extensively repaired and replaced? Nothing is at stake here except convenience of description.

Whether I choose to call the repaired/rebuilt car the "same" or not is unimportant, so long as I recognize the facts. The "survival" of the car is a non-problem.

What about the "survival" of something more abstract, such as a culture? The situation is the same: the culture has parts and aspects, some of which may persist while others changes or disappear. whether we call the successor the "same" culture depends on which aspects we consider important and on how much or little they have changed. Again, basically a non-problem.

If a person, in all his essentials, is divisible or quantifiable, then perhaps this basic question is also a non-problem. Instead of saying Jack survived or didn't, we just matter-of-factly list those aspects and degrees of Jack that persist or reappear, and leave it at that. (For example, if after cryostasis, you have some memory loss and some chage of personality, the perhaps you have survived 85%). For many people this would be profoundly counter-intuitive and uncomfortable--but the universe is not necessarily made from our comfort; it need not be user-friendly.

However, as frequently noted, I am inclined to think the rock-bottom "self" is the "self-cirsuit" or seat or feeling, and that is holistic, indivisible; if a part is missing, the whole thing falls apart or fails to function. If this is correct, there are still serious problems, but not those of quantitative survival.

Continuity Questions

Many people, including many philosophers, believe that continuity is an important feature of survival, and speak of the "closest continuer" as "the" future self.

Those who emphasize the role of continuity in survival put much store in the permanence of major features of memory and personality. They appear to think that, if their future brains were changed too much, or too suddenly, then that future person would not share identity with them, and thus they would not really survive. (Arthur C. Clarke is reported to believe that we become different people about every ten years, which is one reason he is cool to cryonics. And you thought all this was just theory or meaningless speculation?) But there are serious problems with this point of view.

For one thing, we can turn this around, as usual, to good effect, and look at it from the other end. What does your present self owe to your past?

Identity, Values, and Time Past

For example, if you have recently grown and improved in important respects, so that you could plausibly be called a different person, do you not value the person you are now--even if that means some degree of psychological abandonment of your past selves? Do you have--or feel you should have--any loyalty to your past faults?

More radically, imagine a recent-creation scenario; somehow you have been put together in the last few minutes (perhaps, let us say, through some complicated malfunction of a beam-me-up machine) complete with memories of events that never occurred, or perhaps that occurred to someone else, or several different people. (Cf, the 1990 Schwarzenegger movie, Total Recall: "If I'm not me, then who the hell am I?"). Your past is illusory. Now, would such an event, or such a possibility, change the way you feel about the relation between past and future persons? If the present cares little about the past, and thus the future will care little about the present, then should the present still care about the future? Do we owe loyalty only to the future?

Some might answer that we owe loyalty to the past, not the future; after all, the past has given us everything we have, and what has the future ever done for us? One rejoinder might be that the past has done very little for us lately, while the future promises everything, but none of these word games sheds much light.

We could say that we owe some loyalty to our past selves simpy as a matter of practical psychology; i.e., to disregard our past values and orientations, or to break with them too rapidly, might destabilize our psyches. We need some sense and some degree of permanence in our characters. This is virtually indisputable, but it does not go the heart of the question, via--how do we fundamentally justify either a past or future orientation?

The Illusion Option

Again, there is an easy answer on a practical basis, and one of overwhelming force--namely, there is apparently nothing else we

can do. Values (at least second-order values) relate to goals, and goals are all in the future. It seems to be true that the subjective present has a non-zero objective duration, and there is a glimmer of something here, but a glimmer much too dim to light our way just yet. If for now we divide time into past and future, with a vanishing thin present between, then we have to face brutal facts

Of these, potentially the most brutal is the illusory nature of self and values. Logic may ultimately dictate that the "person" is just a snapshot and essentially isolated in a tiny region of spacetime, and no one has any power or influence whatsoever, not any hope; if "you" exist only in the here-and now, then past and future history are irrelevant. "You" can't even think about it, because by the time a new thought has formed someone else is thinking it. (But it is obviously much too soon to consider any such notion seriously; we are just exploring).

How to Optimize the Future?

Look at another aspect of the problem. Our most basic goal is to maximize feel-good for our future selves. Now, suppose Plan A will give your future self a long, hard row to hoe, but will leave him very little changed in personality. Plan B will make him much happier much sooner and over all, but will involve rather rapid and extensive psychological changes. What to do?

Some might say we should choose Plan B, producing rapid flower of your future brain, and just hope that future person is indeed still you.

Or some might choose Plan B just on an altruistic basis---help your successor self as much as possible. Besides other difficulties, it becomes hard to distinguish such an orientation from just the traditional view of working for posterity. And if working for posterity is valid, why not working for other people in the present (near future)?

Others might say, choose Plan A, because even a little feel-good for a future you is better than the amount of feel-good for a future someone else.

Still others, conceivably, might say mix them up: you have to attack it quantitatively and embrace the concept of degrees of identity or personhood. Then we need the best over-all balance of feel-good and retention of identity. A thousand points of happiness for someone who is 10% you is equal to 200 points of happiness (if that means anything) for someone who is 50% you...And this path seems to lead to absurdity, possibly because personhood is not finely divisible. Maybe---probably--the "self circuit" is in some sense unitary.

More on Criteria

Has this rambling resolved anything? No--It may have helped clear away some underbrush, only to expose new problems. For example, the tentative criteria for criteria I mentioned near the beginning have obvious weaknesses.

A satisfactory scientific theory has reasonably clear criteria to satisfy, the main one being testability, that its implications are verifiably correct. But if we try to use similar guidelines for satisfactory definitions of "self" and "survival" and the like, we have problems.

Whatever the "self" may be, your most basic need is to benefit that self (to obtain, increase or maximize feel-good over the long term, if there is a long term). This not only creates delicate feedbacks, but also gives rise to the possibility of different "truths" for different people. Perceiving some universal and objective truth is not necessarily in your best interest.

But Don't Go Away Mad

I remain basically an optimist, and my guess is that we will not only solve these problems, but will find the answers to our liking.

And Laugh a Little

There is rich & wry humor in the nearly universal lack of interest in these "esoteric" questions. As in the case of cryonics itself, we are dealing with fundamental matters of existence and survival, purposes and values--yet only a tiny handful even deem these worthy of notice. At least it's worth a chuckle.

Revisiting the Classic: Call for Contributors:

Charles Tandy, Ph.D is planning a new book, *The Prospect of Immortality – Fifty Years Later* revisiting Robert Ettinger's seminal work. Tandy is extending an open call for contributors to help with the project. From Charles Tandy:

BOOK PROPOSAL: ***The Prospect of Immortality - Fifty Years Later***

Tentative Participants: Editor: Charles Tandy, Ph.D, Publisher: Ria University Press, Distributor: Ingram. Tentative Timeline: To be published in 2014 (fifty years after 1964)

CALL FOR CONTRIBUTORS: Please look at my chapter-by-chapter summary of Robert Ettinger's classic, *The Prospect of Immortality* <www.ria.edu/e1964t> or consult the 1964 volume directly. Notice that Ettinger's book consists of eleven chapters devoted to the following eleven topics: Death's Reversibility, Cooling Down, Thawing Out, Today's Choices, Religious Issues, Legal Issues, Economic Issues, Personal Identity, Immortality's Usefulness, Immortality's Ethics, Immortality's Future.

If you are interested in contributing, or know someone who may be interested, please contact Charles Tandy at: cetandy@gmail.com

Final Thoughts

York Porter - Executive Editor

Escaping the Fire....

"I fell in to a burning ring of fire....I went down, down, down as the flames went higher...and it burns, burns, burns, this ring of fire....this ring of fire..." ---Johnny Cash

For those like myself, who consider themselves to be country music fans, or at least traditional country music fans, the above words from an old song by Johnny Cash are pretty familiar. The "ring of fire" of which Cash speaks wasn't the literal kind so the "fall" didn't have any danger associated with it at all, except for one of the proverbial and time worn themes of country music of the danger of a broken heart. In 1949, however, a brave group of "smoke-jumpers", men and women who parachute out of a perfectly good airplane, ran into a situation of great danger, that of a forest fire gone way out of control.

It happened in Mann Gulch, in the Helena National Forest in the state of Montana in the United States. The original fire began by a so-called "Act of God" when lightning struck the earth on a hot August day in 1949. Originally noticed by James "Jim" Harrison, he fought the blaze for four hours before meeting the team that parachuted in to help to try to contain the soon out of control situation. At one point in the initial effort, one could get no closer than one hundred feet to the flames due to the intense heat. At another, the flames roared so strongly that some of the participants described it variously as sounding like "a blowtorch." Others said it sounded like a "freight train", still others said it sounded like a "jet engine". The flames at one point were three stories tall and devoured everything in their path.

Due to the tremendous noise, and no doubt due to the obvious danger they were in, communications were difficult to say the least and at least one time the firefighters misunderstood their foreman's instructions. Finally, when things seemed beyond control, Wagner Dodge, the foreman of the team that had parachuted from the sky, set a fire to try to provide an "escape" from the flames that were rapidly overtaking the area. One estimate said that during 10 minutes of one of the most significant parts of the blaze, an incredible three thousand acres were consumed. Dodge sought refuge in the center of the burned

out area of the "backfire" he had built. In a book he wrote about the event, he stated that the updraft from the all-consuming fire was so great that he was physically lifted off the ground by the tremendous wind forces as he lay in the middle of his "safety zone". When it was over, thirteen firefighters had lost their lives. One firefighter, Eldon E. Diettert, had died on his 19th birthday. Many others were either in their late teens or in their twenties.

Wagner Dodge, however, had survived in the middle of the inferno due to his quick thinking. Though the type of fire he started was not unheard of in history, even being mentioned in the book *The Prairie*, by James Fenimore Cooper, it wasn't useful in the type of fire that smokejumpers normally encountered. In the particular case of Mann Gulch, it appears that Wagner Dodge invented it on the spot as the only way he could think of to try to save his crew. Controversy ensued as this type of fire wasn't one that the Forest Service had considered. Dodge later was quoted as saying that it just "seemed logical" to him, in view of the very deadly and very terrifying circumstances he was presented with. Sadly, due in some measure to the communications problems because of the noise and smoke, none of his crew recognized what he was trying to do and only Dodge was saved.

Also in the 20th Century, another very logical thinker appeared with his own brand of an "escape fire" for himself and his fellow humans. Robert Ettinger's world changing concept was, like Wagner Dodge's quick thinking, a "way out" of what would otherwise be certain oblivion for every man, woman, and child on the planet. Ettinger, in a similar way to Dodge, clung to the dictates of logic in fashioning his concept and continued to bravely and determinedly stick to it no matter what the illogical "naysayers" maintained.

The "escape fire" that Robert Ettinger proposed is identical in intent and purpose to what we do every single day in hospitals and clinics throughout the world. We take an individual who is in need, who is facing a life ending situation and we take action based on logic and reason to make things better. It is all part of that built in tendency that humans have and have shown time and again to simply survive. You should join us and, frankly, try to do the same. It's as simple as Wagner Dodge's "escape fire" and just as useful.

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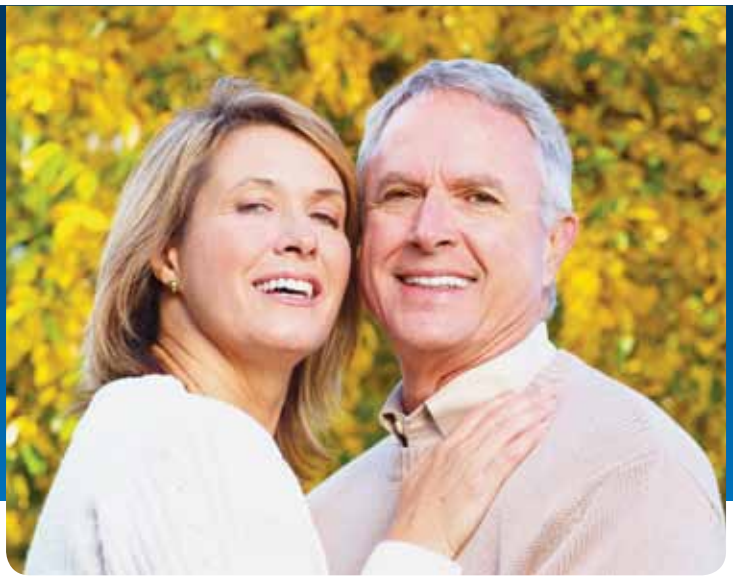

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