Scientists' OPEN LETTER *on* CRYONICS

To whom it may concern,

Cryonics is a legitimate science-based endeavor that seeks to preserve human beings, especially the human brain, by the best technology available. Future technologies for resuscitation can be envisioned that involve molecular repair by nanomedicine, highly advanced computation, detailed control of cell growth, and tissue regeneration.

With a view toward these developments, there is a credible possibility that cryonics performed under the best conditions achievable today can preserve sufficient neurological information to permit eventual restoration of a person to full health.

The rights of people who choose cryonics are important, and should be respected.

Sincerely (61 Signatories)

Signatories encompass all disciplines relevant to cryonics, including Biology, Cryobiology, Neuroscience, Physical Science, Nanotechnology and Computing, Ethics and Theology. [Signature date in brackets]

Gregory Benford, Ph.D.
(Physics, UC San Diego) Professor of Physics; University of California; Irvine, CA [3/24/04]

Alaxander Bolonkin, Ph.D.
(Leningrad Politechnic University) Professor, Moscow Aviation Institute; Senior Research Associate NASA Dryden Flight Research Center; Lecturer, New Jersey Institute of Technology, Newark, NJ [3/24/04]

Nick Bostrom, Ph.D.
Research Fellow; University of Oxford; Oxford, United Kingdom [3/25/04]

Kevin Q. Brown, Ph.D.
(Computer Science, Carnegie-Mellon) Member of Technical Staff; Lucent Bell Laboratories (retired); Stanhope, NJ [3/23/04]

Professor Manfred Clynes, Ph.D.
Lombardi Cancer Center; Department of Oncology and Department of Physiology and Biophysics, Georgetown University; Washington, DC [3/28/04]

L. Stephen Coles, M.D., PhD
(RPI, Columbia, Carnegie Mellon University) Director, Supercentenarian Research Foundation Inglewood, California [10/7/06]

Daniel Crevier, Ph.D.
(MIT) President, Ophthalmos Systems Inc., Longueuil, Qc, Canada; Professor of Electrical Engineering (ret.), McGill University & École de Technologie Supérieure, Montreal, Canada. [4/7/05]

Antonei B. Csoka, Ph.D.
Assistant Professor of Obstetrics, Gynecology and Reproductive Sciences, University of Pittsburgh School of Medicine Pittsburgh Development Center, Magee-Womens Research Institute [9/14/05]

Aubrey D.N.J. de Grey, Ph.D.
Research Associate; University of Cambridge; Cambridge, United Kingdom [3/19/04]

Wesley M. Du Charme, Ph.D.
(Experimental Psychology, University of Michigan) author of Becoming Immortal, Rathdrum, Idaho [11/23/05]

João Pedro de Magalhães, Ph.D.
University of Namur; Namur, Belgium [3/22/04]

Thomas Donaldson, Ph.D.
Editor, Periastron; Founder, Institute for Neural Cryobiology; Canberra, Australia [3/22/04]

Christopher J. Dougherty, Ph.D.
Chief Scientist; Suspended Animation Inc; Boca Raton, FL [3/19/04]

K. Eric Drexler, Ph.D.
Chairman of Foresight Institute; Palo Alto, CA [3/19/04]

Robert A. Freitas Jr., J.D.
Author, Nanomedicine Vols. I & II; Research Fellow, Institute for Molecular Manufacturing, Palo Alto, CA [3/27/04]

Mark Galecki, Ph.D.
(Mathematics, Univ of Tennessee), M.S. (Computer Science, Rutgers Univ), Senior System Software Engineer, SBS Technologies [11/23/05]

D. B. Ghare, Ph.D.
Principle Research Scientist, Indian Institute of Science, Bangalore, India [5/24/04]

Ben Goertzel, Ph.D.
(Mathematics, Temple) Chief Scientific Officer, Biomind LLC; Columbia, MD [3/19/04]

Peter Gouras, M.D.
Professor of Ophthalmology, Columbia University; New York City, NY [3/19/04]

Amara L. Graps, Ph.D.
Researcher, Astrophysics; Adjunct Professor of Astronomy; Institute of Physics of the Interplanetary Space; American University of Rome (Italy) [3/22/04]

Raphael Haftka, Ph.D.
(UC San Diego) Distinguished Prof. U. of Florida; Dept. of Mechanical & Aerospace Engineering, Gainesville, FL [3/22/04]

David A. Hall, M.D.
Dean of Education, World Health Medical School [11/23/05]

J. Storrs Hall, Ph.D.
Research Fellow, Institute for Molecular Manufacturing, Los Altos, CA
Fellow, Molecular Engineering Research Institute, Laporte, PA [3/26/04]

Robin Hanson, Ph.D.
(Social Science, Caltech) Assistant Professor (of Economics); George Mason University; Fairfax, VA [3/19/04]

Steven B. Harris, M.D.
President and Director of Research; Critical Care Research, Inc; Rancho Cucamonga, CA [3/19/04]

Michael D. Hartl, Ph.D.
(Physics, Harvard & Caltech) Visitor in Theoretical Astrophysics; California Institute of Technology; Pasadena, CA [3/19/04]

Henry R. Hirsch, Ph. D.
(Massachusetts Institute of Technology, 1960) Professor Emeritus, University of Kentucky College of Medicine [11/29/05]

Tad Hogg, Ph.D.
(Physics, Caltech and Stanford) research staff, HP Labs, Palo Alto, CA [10/10/05]

James J. Hughes, Ph.D.
Public Policy Studies Trinity College; Hartford, CT [3/25/04]

James R. Hughes, M.D., Ph.D.
ER Director of Meadows Regoinal Medical Center; Director of Medical Research & Development, Hilton Head Longevity Center, Savanah, GA [4/05/04]

Ravin Jain, M.D.
(Medicine, Baylor) Assistant Clinical Professor of Neurology, UCLA School of Medicine, Los Angeles, CA [3/31/04]

Subhash C. Kak, Ph.D.
Department of Electrical & Computer Engineering, Louisiana State University, Baton Rouge, LA [3/24/04]

Professor Bart Kosko, Ph.D.
Electrical Engineering Department; University of Southern California [3/19/04]

James B. Lewis, Ph.D.
(Chemistry, Harvard) Senior Research Investigator (retired); Bristol-Myers Squibb Pharmaceutical Research Institute; Seattle, WA [3/19/04]

Marc S. Lewis, Ph.D.
Ph.D. from the University of Cincinnati in Clinical Psychology. Associate Professor at the University of Texas at Austin of Clinical Psychology. [6/12/05]

Brad F. Mellon, STM, Ph.D.
Chair of the Ethics Committee; Frederick Mennonite Community; Frederick, PA [3/25/04]

Ralph C. Merkle, Ph.D.
Distinguished Professor of Computing; Georgia Tech College of Computing; Director, GTISC (GA Tech Information Security Center); VP, Technology Assessment, Foresight Institute [3/19/04]

Marvin Minsky, Ph.D.
(Mathematics, Harvard & Princeton) MIT Media Lab and MIT AI Lab; Toshiba Professor of Media Arts and Sciences; Professor of E.E. and C.S., M.I.T [3/19/04]

John Warwick Montgomery, Ph.D.
(Chicago) D.Théol. (Strasbourg), LL.D. (Cardiff) Professor Emeritus of Law and Humanities, University of Luton, England [3/28/04]

Max More, Ph.D.
Chairman, Extropy Institute, Austin, TX [3/31/04]

Steve Omohundro, Ph.D.
(Physics, University of California at Berkeley) Computer science professor at the University of Illinois at Champaign/Urbana [6/08/04]

Mike O'Neal, Ph.D.
(Computer Science) Assoc. Professor and Computer Science Program Chair; Louisiana Tech Univ.; Ruston, LA [3/19/04]

Yuri Pichugin, Ph.D.
Former Senior Researcher, Institute for Problems of Cryobiology and Cryomedicine; Kharkov, Ukraine [3/19/04]

Peter H. Proctor, M.D., Ph.D.
Independent Physician & Pharmacologist; Houston, Texas [5/02/04]

Martine Rothblatt, Ph.D., J.D., M.B.A.
Responsible for launching several satellite communications companies including Sirius and WorldSpace. Founder and CEO of United Therapeutics. [5/02/04]

Klaus H. Sames, M.D.
University Medical Center Hamburg-Eppendorf, Center of Experimental Medicine (CEM) Institute of Anatomy II: Experimental Morphology; Hamburg, Germany [3/25/04]

Anders Sandberg, Ph.D.
(Computational Neuroscience) Royal Institute of Technology, Stockholm University; Stockholm, Sweden [3/19/04]

Sergey V. Sheleg, M.D., Ph.D.
Senior Research Scientist, Alcor Life Extension Fouancation; Scottsdale, AZ [8/11/05]

Stanley Shostak, Ph.D.
Associate Professor of Biological Sciences; University of Pittsburgh; Pittsburgh, PA [3/19/04]

Rafal Smigrodzki, M.D., Ph.D.
Chief Clinical Officer, Gencia Company; Charlottesville VA [3/19/04]

David S. Stodolsky, Ph.D.
(Univ. of Cal., Irvine) Senior Scientist, Institute for Social Informatics [11/24/05]

Gregory Stock, Ph.D.
Director, Program on Medicine, Technology, and Society UCLA School of Public Health; Los Angeles, CA [3/24/04]

Charles Tandy, Ph.D.
Associate Professor of Humanities and Director Center for Interdisciplinary Philosophic Studies Fooyin University (Kaohsiung, Taiwan) [5/25/05]

Peter Toma, Ph.D.
President, Cosmolingua, Inc. Sioux Falls, South Dakota. Inventor and Founder of SYSTRAN. Director of International Relations, Alcor Life Extension Foundation. Residences in Argentina, Germany, New Zealand, Switzerland and USA [5/24/05]

Mark A. Voelker, Ph.D.
(Optical Sciences, U. Arizona) Director of Bioengineering; BioTime, Inc.; Berkeley, CA [3/19/04]

Roy L. Walford, M.D.
Professor of Pathology, emeritus; UCLA School of Medicine; Los Angeles, CA [3/19/04]

Mark Walker, Ph.D.
Research Associate, Philosophy; Trinity College; University of Toronto (Canada) [3/19/04]

Michael D. West, Ph.D.
President, Chairman & Chief Executive Office; Advanced Cell Technology, Inc.; Worcester, MA [3/19/04]

Ronald F. White, Ph.D.
Professor of Philosophy; College of Mount St. Joseph; Cincinnati, OH [3/19/04]

James Wilsdon, Ph.D.
(Oxford University) Head of Strategy for Demos, an independent think-tank; London, England [5/04/04]

Brian Wowk, Ph.D.
Senior Scientist 21st Century Medicine, Inc.; Rancho Cucamonga, CA [3/19/04]

Selected Journal Articles Supporting Cryonics:

- **First paper showing recovery of brain electrical activity after freezing to -20°C.** Suda I, Kito K, Adachi C, in: Nature (1966, vol. 212), "Viability of long term frozen cat brain in vitro," pg. 268-270

- **First paper to propose cryonics by neuropreservation:** Martin G, in: Perspectives in Biology and Medicine (1971, vol. 14), "Brief proposal on immortality: an interim solution," pg. 339.

- **First paper showing recovery of a mammalian organ after cooling to -196°C (liquid nitrogen temperature) and subsequent transplantation:** Hamilton R, Holst HI, Lehr HB, in: Journal of Surgical Research (1973, vol 14), "Successful preservation of canine small intestine by freezing," pg. 527-531.

- **First paper showing partial recovery of brain electrical activity after 7 years of frozen storage:** Suda I, Kito K, Adachi C, in: Brain Research (1974, vol. 70), "Bioelectric discharges of isolated cat brain after revival from years of frozen storage," pg. 527-531.

- **First paper suggesting that nanotechnology could reverse freezing injury:** Drexler KE, in: Proceedings of the National Academy of Sciences (1981, vol. 78), "Molecular engineering: An approach to the development of general capabilities for molecular manipulation," pg. 5275-5278.

- **First paper showing that large organs can be cryopreserved without structural damage from ice:** Fahy GM, MacFarlane DR, Angell CA, Meryman HT, in: Cryobiology (1984, vol. 21), "Vitrification as an approach to cryopreservation," pg. 407-426.

- **First paper showing that dogs can be recovered after three hours of total circulatory arrest ("clinical death") at 0°C (32°F). This supports the reversibility of the hypothermic phase of cryonics:** Haneda K, Thomas R, Sands MP, Breazeale DG, Dillard DH, in: Cryobiology (1986, vol. 23), "Whole body protection during three hours of total circulatory arrest: an experimental study," pg. 483-494.

- **First detailed discussion of the application of nanotechnology to reverse human cryopreservation:** Merkle RC, in: Medical Hypotheses (1992, vol. 39), "The technical feasibility of cryonics," pg. 6-16.

- **First successful application of vitrification to a relatively large tissue of medical interest:** Song YC, Khirabadi BS, Lightfoot F, Brockbank KG, Taylor MJ, in: Nature Biotechnology (2000, vol. 18), "Vitreous cryopreservation maintains the function of vascular grafts," pg. 296-299.

- **First report of the consistent survival of transplanted kidneys after cooling to and rewarming from -45°C:** Fahy GM, Wowk B, Wu J, Phan J, Rasch C, Chang A, Zendejas E, in: Cryobiology (2004 vol. 48), "Cryopreservation of organs by vitrification: perspectives and recent advances," pg. 157-78.

- **First paper showing good ultrastructure of vitrified/rewarmed mammalian brains and the reversibility of prolonged warm ischemic injury in dogs without subsequent neurological deficits, and setting forth the present scientific evidence in support of cryonics:** Lemler J, Harris SB, Platt C, Huffman T, in: Annals of the New York Academy of Sciences, (2004 vol. 1019), "The Arrest of Biological Time as a Bridge to Engineered Negligible Senescence," pg. 559-563.

- **First discussion of cryonics in a major medical journal:** Whetstine L, Streat S, Darwin M, Crippen D, in: *Critical Care,* (2005, vol. 9), "Pro/con ethics debate: When is dead really dead?" in press.

- **First demonstration that both the viability and structure of complex neural networks can be well preserved by vitrification:** Pichugin Y, Fahy GM, Morin R, in: *Cryobiology,* (2006, vol. 52), "Cryopreservation of rat hippocampal slices by vitrification," pg. 228-240. PDF here.

- **Rigorous demonstration of memory retention following profound hypothermia, confirming theoretical expectation and clinical experience.** Alam HB, Bowyer MW, Koustova E, Gushchin V, Anderson D, Stanton K, Kreishman P, Cryer CM, Hancock T, Rhee P, in: Surgery (2002, vol. 132), "Learning and memory is preserved after induced asanguineous hyperkalemic hypothermic arrest in a swine model of traumatic exsanguination," pg. 278-88.

Note: Signing of this letter does not imply endorsement of any particular cryonics organization or its practices. Opinions on how much cerebral ischemic injury (delay after clinical death) and preservation injury may be reversible in the future vary widely among signatories.

This project was developed by The Immortality Institute in support of cryonics. Contact: support@imminst.org

For more information about cryonics please visit the Alcor Life Extension Foundation website: www.alcor.org