

Cryonics: Public Debate Gone Cold?

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Cryonics is a rapidly developing technology for preserving those deemed legally, but not medically dead, through deep freezing. The idea is simple: freeze a patient in the period between legal death (generally accepted to be a complete lack of brain function) and biological death (where there is no biological function), and then revive them later when the illness causing death can be effectively treated. The process is more complicated. First, the patient is declared legally dead. The doctors then immediately start to reduce the core body temperature to -5°C (roughly ice temperature). Whilst the patient is cooled their fluids are drained and replaced with a vitrifying fluid. This prevents the formation of ice crystals at sub zero temperatures. Once vitrification is complete, the body temperature is reduced by approximately 1°C per hour until it reaches the final

These include the injury that caused the death (often this will be significant, and spread across the body), ischemic injury (the injury occurring due to lack of oxygen in the

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body between the cessation of circulation and freezing), and any storage based injuries such as frostbite, or cellular damage caused by water crystallisation. There are several problems with cryonic freezing. The most significant is that revival is not yet possible. Many argue that the technology will exist in the future, and so the only current requirement is to preserve the brain and its contents so that when the technology is available, be it nanotechnology, bioengineering, nano-medicine, or mind uploading, the patient can be treated with minimal damage.

It is a little known fact that the United Kingdom, Canada, and the United States have established a variety of legal frameworks to regulate cryonics. In British Columbia, a province of Canada, there is a total prohibition on the offering or sale of cryonic suspension. Physicist and Cryobiologist Dr Wowk says this is the most direct legislative response of any government to date [2]. Despite a full prohibition, there are still questions as to its effectiveness—many people simply leave British Columbia in order to get cryonic treatment. Whilst a total prohibition may alleviate any social or ethical fears, this will be short lived if cryonics is continued regardless, or if the number of people in favour of cryonics grows larger, in which case a significant part of the population may have their rights unnecessarily restricted. According to Baker, an American bioethicist and physician, a better approach would be to address both the cryonicists' and public's concerns through public debate, and then use comprehensive legislation to achieve

a middle outcome rather than a complete prohibition, which can offend a patient's autonomy [3]. Californian law, in contrast, permits cryonic technology. Despite this, the legal position is still unsatisfactory. The principal statute is the Californian Uniform Anatomical Gift Act under which crytoriums and cryonic organisations are treated as procurement agencies for human body donations. Therefore, persons wishing to be cryonically suspended are required to donate their bodies as anatomical gifts for



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resting temperature of approximately -196°C . The body can now be stored in a liquid nitrogen cooled vacuum for an extended period [1]. This technology is wide spread, particularly in the US. Actual figures are closely guarded but worldwide the number of people frozen is close to 500,000, each awaiting revival when medical technology has sufficiently advanced.

Three types of injury occur during freezing. All of these must be treatable on revival for the treatment to be a success.

research. This was not deliberate, but the result of legislative inaction and several rounds of litigation between cryonics organisations, individuals and the Department for Health Services [4]. There are several problems with this model. Whilst a patient is suspended they have no legal rights, and there is no professional code of conduct regulating how their body is handled. Upon revival there are more issues. The revived person would regain legal status as a person, but lack ownership to their body. This raises difficult questions over body ownership and rights, and raises the spectre of 'slavery' [5].

Wisconsin has adopted a third approach, which essentially follows two Opinions by the Attorney General [6], which regulate mausoleums and cemetery vaults. Unfortunately, the Opinions have not been revised since 1968 and are thus seriously outdated. In the attorney general's opinions, he states that the legislation requires any person to have a license to diffuse dimethyl sulphoxide solution into a human body. It has become normal practice to use more efficient updated solutions. However, for these solutions a license is not required. Some problems have been noted by Baker. First, the opinions are not binding law, and may be ignored by judiciary if they consider them legally incorrect. It would be far more desirable to have a more certain legal framework and provisions suited to modern cryonic suspension practices. There are also some jurisprudential issues regarding Attorney Generals opinions. Other problems also exist under the US legislation. It is not possible to have a perpetual trust, so putting money aside for maintenance, or to receive upon revival is not possible. Thus, patients may be forced to awaken not only out of social context, but in poverty as well.

The United Kingdom's response has been slower. To date, no time has been allocated for legislating on cryonics, and under the Human Tissue Act 2004 [7]; it appears to be

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outside of the jurisdiction of the Human Tissue Authority. Considering the small number of cryonics organisations in the United Kingdom, and the limited number of persons suspended, Parliament's time may be more valuably spent on other issues. However, this fails to realise that any legislation on the matter should be in place before patients are frozen. Any person frozen should be able to determine under what conditions they will be revived, and how they

will be treated whilst frozen. The legally dead patient is not biologically dead and so, it is suggested, should be afforded a certain amount of rights and care [8].

Underneath these questions of regulation are serious ethical issues. There is not enough space to fully discuss the ethical issues surrounding cryonics, however the originally thesis can be found online. The utility argument, in my opinion, provides the best justification. That is that the benefits provided by the technology outweigh the costs to society and so it is ethically acceptable. A cost benefit analysis does demonstrate that the economic, social, and individual benefits



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outweigh the limited costs of cryonic suspension. Within this ethical framework it is also important to protect and respect individual autonomy [9], for example by providing a legal environment that protects a patients' ability to make an informed choice.

Now we have reached an ethical and practical crossroads. Cryonic technologies are developing at an increasing rate, and the capacity for misuse increases with these developments. Many States realise the need for some degree of regulation, but to date, none has found a satisfactory legal or ethical structure that provides real protection for individuals and society. Public discussion is urgently needed, before an unchecked technology enters society without sufficient consideration for the ethical or practical issues. ■

Mark Hunting has recently graduated in Law from Robinson College. This article is based upon an undergraduate dissertation for the Law Tripos. Special thanks to Dr Kathy Liddell for her advice and comments before publishing

References:

- [1] For further information on the scientific procedure see generally: Platt C. Effect of Human Cryopreservation Protocol on the Ultrastructure of the Canine Brain. Alcor Life extension foundation [document on the Internet] 1995 Jul. Available from: <http://www.alcor.org/Library/html/braincryopreservation1.html> and Mazur P. Freezing of living cells: mechanisms and implications. *Am J Physiol Cell Physiol* 1984 Sep 1;247(3):C125-C142.
- [2] Wowk B, Darwin M. Cryonics: Reaching for Tomorrow. Scottsdale, AZ: Alcor Life Extension Foundation; 1991. p. 29-30.
- [3] Baker DM. Cryonic Preservation of Human Bodies – A Call for Legislative Action. *Dickinson Law Rev* 1994;98(4):677-711.
- [4] *Trans Time Inc v. Workman*, No HM823400 (D. Md. 1984); *Halpert v. Nelson*, No 161229 (Cal. LA. County Super. Ct. 1981); *Kent v. Carillo*, No 191277 (Cal.

- Riverside County Super. Ct. 1988); *Henson v. Carillo*, No. SAC 90-021JSL (Cal. Riverside County Super. Ct. 1990); *Roe v. Mitchell* No. C697147 (9 Cal. Rptr. 2d 572 (Cal. Ct. App. 1992)); and *Alcor Life Extension Foundation Incorporated v. Mitchell* 9 Cal. Rptr. 2d 572 (Cal. Ct. App. 1992).
- [5] For a further discussion see Bainham A. *Body lore and Laws*. Oxford: Hart Publishing; 2002.
- [6] WIS STAT ANN ss157.12 (West 1991)(Quoting Op Att'y Gen. Oct. 15, 1968) and WIS STAT ANN ss157.12 (Quoting Op Att'y Gen. Nov. 1, 1967)
- [7] Human Tissue Act 2004 s1(1), and Schedule 1.
- [8] Despite being outside the remit of the Human Rights Act 1998, and relevant European Convention.
- [9] For a discussion on autonomy: Beauchamp TL, Childress JF. *Principles of Biomedical Ethics*. 5th ed. Oxford: Oxford University Press; 2008.