AN APPLICATION OF NANOTECHNOLOGY-CRYONICS

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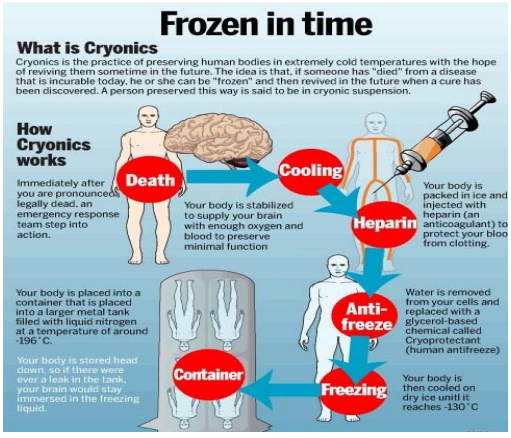
ABSTRACT
Today technology plays a vital role in every aspect of life. Increasing standards in technology in many fields, has takenman today to high esteem. But the present available technologiesare unable to interact with the atoms, such a minute particles.Hence Nanotechnology has been developing. Nanotechnologyis nothing but a technology which uses atoms with a view tocreate a desired product. It has wider applications in allthe fields. The important application is **Cryonics**.Cryonics isnothing but an attempt of raising the dead - making themalive. First we preserve the body then by using molecularmachines based nanotechnology we could revive the patientsby repairing damaged cells. In this technical paper we would liketo discuss cryonics, how the process of cryonics goes on andwhy nanotechnology is being used and description of molecularmachines which has the capability of repairing damaged cells.Therefore Cryonics is an area in which most of the work is tobe done in future.

INTRODUCTION
Today technology plays a vital role in every aspect of life. Increasingstandards in technology in many fields particularly in medicine,has taken man today to high esteem. Nanotechnology is anew technology that is knocking at the doors.This technologyuses atoms with a view to create a desired product. Theterm **nanotechnology** has been a combination of twoterms,"Nano"and " technology".The term nano is derived from aGreek word "Nano" which means "dwarf". Thus nanotechnologyis dwarf technology. A nanometer is one billionth of a meter.Our former President A.P.J.Abdul Kalam being a scientist made a note about this technology,that nanotechnology would give us anopportunity, if we take appropriate and timely actions to becomeone of the important technological nations in the world. Themain application of nanotechnology is cryonics. Cryonics isnothing but an attempt of raising the dead. Cryonics is not awidespread medical practice and viewed with skepticism bymost scientists and doctors today.

HISTORY
NANOTECHNOLOGY
It is a technology which uses atoms with a view to create a desired product. The term nanotechnology is a combination of two terms:**"nano"** and **"technology"**. The term Nano is derived from a Greek word "Nanos" which means **"dwarf".**The first mention of nanotechnology occurred in a talk givenby Richard Feynman in 1959, entitled"**There's plenty of Roomat the Bottom.**The term **nanotechnology** is often used today to refer to manufacturing products with nanoscale features. This nanoscale manufacturing is something that is often done today, but it has little to do with the manufacturing and manipulation by molecular machinery that is discussed in books such as **Engines of Creation.** Nanotechnology is having a wide range of applications, cryonics is one among them

CRYONICS:
The word **"cryonics"** is the practice of freezing a dead bodyin hopes of someday reviving it.Historically cryonics began in 1962 with the publication of "The prospect of immortality" referred by Robert Ettinger, a founder and the first president of the cryonicsinstitute. A Cryonics is the practice ofcooling people immediately after death to the point wheremolecular physical decay completely stops, in the expectationthat scientific and medical procedures currently beingdeveloped will be able to revive them and restore them togood health later. A patient held in such a state is said to be in**'cryonic suspension'**. Cryonics is the practice of cryopreservinghumans and pets (who have recently become legally dead)until the cryopreservation damage can be reversed and thecause of the fatal disease can be cured (including the diseaseknown as aging). However, there is a high representation ofscientists among cryonicists. Support for cryonics is based oncontroversial projections of future technologies and of theirability to enable molecular-level repair of tissues and organs.During 1980's the extent of the damage from freezing process became much clearer and better known, when the emphasis of the movement began to shift to the capabilities of nanotechnology.

Cryonics patient prepares for the future:



ORGANIZATIONS
There are three major organizations in the United States providing cryonic suspension services.

- The Alcor Foundation
- Cryonic Institute
- American Cryonics Society

The **ALCOR FOUNDATIONS** is by far the largest of the organizations and is clearly more advanced than the others in terms of both medical technology and legal organization.Anyone signing up for cryonic preservation should read everything about Alcor and about cryonics that they can, and make the decision carefully.Alcor uses very sophisticated cryonic preservation procedures, although they will surely be regarded as crude in the future as medical technology continues to advance. Shortly after legal death the body is infused with a cryoprotectant (a biological"antifreeze") in a carefully controlled procedure in a well-equipped operating room. The process used now is known as vitrification. Straight freezing is rarely done. The cryonics organizations are constantly refining their techniques, but the entire vitrification process from legal death to liquid nitrogen temperature usually takes about three weeks.

ALCOR

LIFE EXTENSION FOUNDATION

PATIENT DECLARED LEGALLY DEAD

A declaration of legal death does not mean that life has suddenly ended—death is a gradual process, not a sudden event. A person is said to be legally dead ,if his brain is still working but the heart beat stops.A person is said to be totally dead ,if both of his brain and heart stops functioning. In the final analysis, aging and death have only one cause: for whatever reason, the atoms and molecules in our bodies have moved from their proper positions; and other molecules and atoms have moved into positions where they should not be.

FREEZING THE BODY

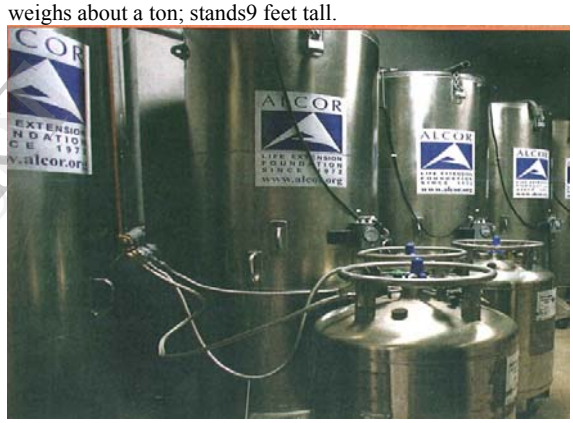
The patient is placed in cold silicone oil, chilling the bodyto -79°C. Then it's moved to an aluminium pod and slowlycooled over 5 days in liquid nitrogen to -196°C (minus 320°Fahrenheit), then stored.Replacement of over 60% of water in the human body with cryoprotectants to reduce cellular destruction at extremely low temperatures.

ACTUAL PROCESS STARTS:

After preserving the body for somedays, they will start thesurgery.As a part of it, they will apply some chemicals like glyceroland some advanced chemicals to activate the cells of the body by doing so, 0.2% of the cells in the body will be activated.After that they will preserve the body for future applications.The cryonists strongly believe that future medicines will be useful to rapidly increase those cells that willhelp to retrieve the dead person back.

STORAGE VESSEL

Stainless-steel vats formed into a large thermos-bottle-likecontainer. Vat for up to four bodies weighs about a ton; stands9 feet tall.



REVIVAL PROCESS

Critics have often quipped that it is easier to revive a corpsethan a cryonically frozen body. Many cryonicists might actuallyagree with this, provided that the "corpse" were fresh, but theywould argue that such a "corpse" may actually be biologicallyalive, under optimal conditions. A declaration of legal deathdoes not mean that life has suddenly ended,death is a gradualprocess, not a sudden event. Rather, legal death is a declarationby medical personnel that there is nothing more they can doto save the patient. But if the body is clearly biologically dead,
having been sitting at room temperature for a period of time,or having been traditionally embalmed, then cryonicists wouldhold that such a body is far less revivable than a cryonicallypreserved patient, because any process of resuscitationwill depend on the quality of the structural and **molecularpreservation of the brain.**

FINANCIAL ISSUES

Cryopreservation arrangements can be expensive, currentlyranging from $28,000 at the Cryonics

Institute to $150,000 atAlcor and the American Cryonics Society.

- $200,000.00 Whole Body Cryopreservation
- $ 80,000.00 Neurocryopreservation.

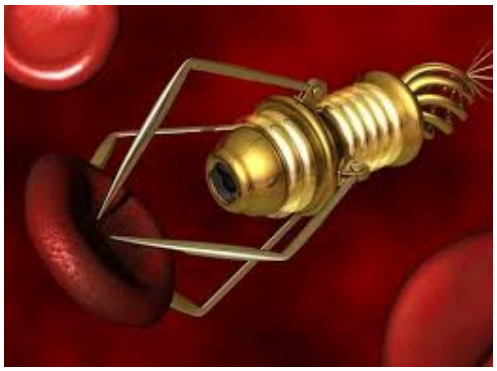
The biggest drawbackto current vitrification practice is a costs issue. Because themost cost-effective means of storing a cryopreserved personis in liquid nitrogen, fracturing of the brain occurs, a result ofthermal stresses that develop when cooling from −130°C to−196°C (the temperature of liquid nitrogen). Actually quiteaffordable for the vast majority of those in the industrializedworld who really make arrangements while still young.

WHY ONLY NANOTECHNOLOGY IS USED IN CRYONICS ?

Biological molecules and systems have a number of attributesthat make them highly suitable for nanotechnology applications.Remote control of DNA has proved that electronics can interactwith biology. Gap between electronics and biology is nowclosing.The key to cryonics' eventual success is nanotechnology, manipulating materials on an atomic or molecular scale,according to most techniques who are interested in cryonicsuspension. "Current medical science does not have the toolsto fix damage that occurs at the cellular and molecular level,and damage to these systems is the cause of vast majority offatal illnesses." Nanotechnology is the ultimate miniaturization thatcan achieve. A nanometer is equivalent to the width of sixbonded carbon atoms. A DNA molecule is 2.5nm wide. Cryonicsbasically deals with cells, these cells are in the order ofnanometers. At present there is no other technology which deals with such minute cells. Only nanotechnology can havethe ability to deal with cells. Normally fatal accidents could bewalked away, thanks to range of safety devices possibleonly with nanotechnology (e.g., air bag in car).Viruses, parasites and bacteria continue to mutate andproduce new diseases. Our natural immune system may, or maynot, handle. In theory, a nano 'cell sentinel' could make ourbody immune to any present or future infectious disease.Fracturing is a special concern for new vitrification protocolbrought online by Alcor for neuro patients. If advancednanotechnology is available for patient recovery, then fracturingprobably causes little information loss. Fracturing commitscryopatient to the need for molecular repair at cryogenictemperature a highly specialized and advanced form ofnanotechnology. Whereas unfractured patients may be able tobenefit sooner from simple forms of nanotechnology developedfor more main stream medical applications. Damage causedby freezing & fracturing is thought to be potentially repairablein future using nanotechnology which will enable manipulationof matter at the molecular level.

HOW NANOTECHNOLOGY IS USED IN CRYONICS?

MOLECULAR MACHINES could revive patients by repairingdamaged cells but for making those cell repair machines, wefirst need to build a molecular assembler.It is quite possible to adequately model the behavior ofmolecular machines that satisfy two constraints.They are built from parts that are so stable that smallerrors in the empirical force fields don't affect the shapeor stability of the parts.The synthesis of parts is done by using positionallycontrolled reactions, where the actual chemical reactionsinvolve a relatively small number of atoms.Drexler's assembler can be built with these constraints.



FUTURE ENHANCEMENTS

With the knowledge of cryonics cryonists are preserving thebrains of humans. We know that each person alive today wasonce a single cell, and a complete human being can be grownin the natural state.Thus they believe that genetic programmingof a single cell on the surface of that brain begins a process ofgrowth and development that perhaps appends to the brain acomplete young adult body.

CONCLUSION

- With the implementation of Cryonics we can get back thelife.(limitations)
- But Cryonics is an area in which most of the work is to bedone in future and till now mainly the concept of this areahas been proposed.
- So the Scientists are not making long promises for the future of this Cryonics