Slow-frozen people? Latest research supports possibility of cryopreservation

The latest research on water - still one of the least understood of all liquids despite a century of intensive study – seems to support the possibility that cells, tissues and even the entire human body could be cryopreserved without formation of damaging ice crystals, according to University of Helsinki researcher Anatoli Bogdan, Ph.D.

He conducted the study, scheduled for the July 6 issue of the *ACS Journal of Physical Chemistry B*, one of 34 peer-review journals published by the American Chemical Society, the world's largest scientific society.

In medicine, cryopreservation involves preserving organs and tissues for transplantation or other uses. Only certain kinds of cells and tissues, including sperm and embryos, currently can be frozen and successfully rewarmed. A major problem hindering wider use of cryopreservation is formation of ice crystals, which damage cell structures.

Cryopreservation may be most familiar, however, as the controversial idea that humans, stricken with incurable diseases, might be frozen and then revived years or decades later when cures are available.

Bogdan's experiments involved a form of water termed "glassy water," or low-density amorphous ice (LDA), which is produced by slowly supercooling diluted aqueous droplets. LDA melts into highly viscous water (HVW). Bogdan reports that HVW is not a new form of water, as some scientists believed.

"That HVW is not a new form of water (i.e., normal and glassy water are thermodynamically connected) may have some interesting practical implications in cryobiology, medicine, and cryonics." Bogdan said.

"It may seem fantastic, but the fact that in aqueous solution, [the] water component can be slowly supercooled to the glassy state and warmed back without the crystallization implies that, in principle, if the suitable cryoprotectant is created, cells in plants and living matter could withstand a large supercooling and survive," Bogdan explained. In present cryopreservation, the cells being preserved are often damaged due to freezing of water either on cooling or subsequent warming to room temperature.

"Damage of the cells occurs due to the extra-cellular and intra-cellular ice formation which leads to dehydration and separation into the ice and concentrated unfrozen solution. If we could, by slow cooling/warming, supercool and then warm the cells without the crystallization of water then the cells would be undamaged."

Source: American Chemical Society

"Slow-frozen people? Latest research supports possibility of cryopreservation." PHYSorg.com. 20 Jun 2006.
www.physorg.com/news70025926.html