Reviving Accidental Hypothermic Victims with Extracorporeal Life Support

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Improving the efficacy of the treatment of accidental hypothermia is hugely important to safety in these extreme environments

Dr Beat Walpoth, Director of Cardiovascular Research at the University Hospital of Geneva, Switzerland, is a leading surgeon and expert on rewarming victims of hypothermia using extracorporeal life support (ECLS).

The technique has been adapted from cardiac surgery as early as the 60's and 70's when patients were cooled down to core temperatures around 20°C in order to perform complex cardiac surgical repairs in a state of deep hypothermic cardiac arrest with good survival after rewarming to normothermia.

Dr Beat Walpoth said, "Such operations would be impossible in normothermia because the brain has a tolerance to anoxia – not being perfused by blood – of about three minutes. However, when you cool the body to 20°C, the brain's tolerance is extended to around 30 minutes."

"After the first successful rewarming of a patient in cardiac arrest with accidental hypothermia by Professor Ulrich Althaus, I joined the team at the University Hospital of Bern, Switzerland and we developed the method much further. This pioneering research has shown that it is possible to revive a victim in deep hypothermia with cardiac arrest by rewarming the body with ECLS (cardio-pulmonary bypass, or ECMO) and to give him a chance for a sequela-free long-term survival (published by our group in the New England Journal of Medicine in 1997). Prior to this event such patients would have been declared dead."

But could this technique be advanced to the point at which humans could lie dormant for years at a time? Suspended animation is the concept that lowering a person's core temperature dramatically can enter them into a dormant state, waiting to be reanimated years later.

It is a theme that is often revisited in science fiction and is regularly proposed as a way of dealing with the long timescales of interstellar travel, but how realistic is the possibility of cryonic suspension?

Dr Walpoth continues, "It has always been the dream of many scientists and writers."

"At the moment I'm not convinced that it will be possible for the whole body to be 'frozen' (cryo-preserved). As you may know, it is possible for cells; you can freeze certain types of cells for 20 years or even longer and they will still carry all of their capacity when thawed."

"There is work in progress to try to apply this technology not only to isolated cells but to whole organs. So far, some organs have the potential to be cryo-preserved at -196°C and thawed; you can, for instance, do that with simple organs such as heart valves, which function quite well after thawing."

“But from there, to go to ‘freezing’ a whole body is an enormous step. I don’t want to be overly optimistic or pessimistic but time will tell – my expectation is that these technologies will not be available in the near future.”

The pioneering cardiovascular surgeon is the founder of the International Hypothermia Registry, which gathers patient data and collates peer-reviewed analysis to improve the treatment of accidental hypothermia victims.

Dr Walpoth will be speaking at the World Extreme Medicine Conference and Expo at Dynamic Earth, Edinburgh, EH8 8AS on 19 November 2016. The Extreme Medicine Exposition brings together leading experts from around the globe to share learnings on prehospital care, expedition and wilderness medicine, sport, endurance, humanitarian and disaster medicine.

Mark Hannaford, founder of conference organisers World Extreme Medicine, said, “Dr Walpoth’s great experience is relevant and poignant for a lot of doctors working in expedition and wilderness medicine, as hypothermia is a great danger to all mountaineers and polar explorers.

“Improving the efficacy of the treatment of accidental hypothermia is hugely important to safety in these extreme environments, and Dr Walpoth is at the very forefront of that research.

“World Extreme Medicine was founded around a campfire in Namibia, and we coined the phrase ‘World Extreme Medicine’ as an umbrella term for all practices of medicine outside of a clinical environment, whether it is prehospital, disaster and humanitarian, endurance, sport, expedition or wilderness medicine.

“Our message is that there is a great diversity of careers in medicine, and that traditional hospital environments are not the only option for a fulfilling career. To put it into a layperson’s terms, there’s never been a more exciting time to work in medicine.”

For further information about the Extreme Medicine Expo, which takes place 18 – 21 November 2016, please visit: http://www.extrememedicineexpo.com/events/event/extreme-medi... .

Links:
University Hospital of Geneva: http://www.hug-ge.ch/
Professor Ulrich Althaus: http://www.ctsnet.org/home/ualthaus
University Hospital of Bern: http://www.insel.ch/en/
International Hypothermia Registry: https://www.hypothermia-registry.org/
World Extreme Medicine Conference and Expo: http://www.extrememedicineexpo.com/
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High resolution imagery and interviews are available on request. Journalists are invited to attend the conference too and are asked to register their interest as early as possible.

Media information provided by Famous Publicity. For more information, please contact Tina Fotherby at 07703 409 622 or tina@famouspublicity.com or Adam Betteridge at 0333 344 2341 or adam@famouspublicity.com.

About the World Extreme Medicine Expo:
The World Extreme Medicine Conference and Expo will take place at Dynamic Earth, Edinburgh, EH8 8AS from 18 – 21 November 2016. Bringing together many of the world’s brightest medical minds, it will focus on humanitarian and disaster medicine, expedition medicine, endurance and sports medicine and prehospital medicine. The exposition’s mission is to break down barriers, build bridges and make connections within the extreme medicine community.

The term ‘Extreme Medicine’ was first coined by Mark Hannaford and Sean Hudson as an umbrella term for these extra-clinical medical practices.

About Dr Beat Walpoth:
A trained cardiovascular surgeon, Dr Beat Walpoth is currently the Director of Cardiovascular Research at the University Hospital of Geneva in Switzerland. He is ex-President of the European Society for Artificial Organs. His main areas of research include vascular tissue engineering, biomaterials, drug delivery, cell therapy, angiogenesis as well as bio-artificial cardiovascular support. His main clinical expertise covers coronary blood flow measurement, hemodynamics, cardiac transplantation and mainly hypothermia.

Dr Walpoth is a recipient of several national and international awards, the most prestigious being the Ernst-Derra-Prize (1993) for the paper “MR Spectroscopy for assessing myocardial rejection in the transplanted rat heart” and more recently his research group has received the ESAO Wichtig Award in the years 2008 and 2012 for their research on vascular tissue engineering. He has also received more than 10 peer-reviewed national and international grants.

He has over 100 publications, of which more than 50 are first-author papers, in peer reviewed journals with a total impact factor over 150. A keystone paper “Outcome of Survivors of Accidental Deep Hypothermia and Circulatory Arrest Treated with Extracorporeal Blood Warming” was published in the New England Journal of Medicine in 1997 and describes for the first time the sequelae free long-term outcome of 15 survivors of accidental deep hypothermic cardiac arrest rewarmed by cardiopulmonary bypass. This research was carried out at the University Hospital, Bern, where Professor Ulrich Althaus pioneered the extracorporeal rewarming of a deep hypothermic victim in cardiac arrest.

He is also the founder of the International Symposium on Accidental Hypothermia which he organized, or co-organized in the years 2007, 2009, 2012 and 2014. This year the meeting will be organized on November 11, in Interlaken, Switzerland, under his guidance.

Dr Walpoth was the founder of the International Hypothermia Registry which is now entering its fifth year and counts more than 50 international participating centres. This registry is web-based (https://www.hypothermia-registry.org) and aims to gather enough patient data worldwide, followed by a peer-reviewed analysis, in order to establish new consensus guidelines for establishing better outcome predictors and improving the treatment of accidental hypothermia victims.

Glossary:
Cardio-pulmonary bypass: Cardiopulmonary bypass (CPB) is a technique that temporarily takes over the function of the heart and lungs during surgery, maintaining the circulation of blood and the oxygen content of the body. The CPB pump itself is often referred to as a heart–lung machine or "the pump".

Cryo-preserved: Cryopreservation is a process where cells, whole tissues, or any other substances susceptible to damage caused by chemical reactivity or time are preserved by cooling to sub-zero temperatures.

ECLS: Extracorporeal life support (ECLS) is a variation of cardiopulmonary bypass. Whereas cardiopulmonary bypass facilitates open heart surgery for a number of hours, extracorporeal life support maintains tissue oxygenation for days to weeks in patients with life threatening respiratory or cardiac failure (or both).

ECMO: Extracorporeal membrane oxygenation (ECMO) works by removing blood from the person’s body and artificially removing the carbon dioxide and oxygenating red blood cells. Generally it is only used in the later treatment of a person with heart or lung failure as it is solely a life-sustaining intervention.

Normothermia: A normal state of temperature.
Sequela-Free: Living without a condition which is the consequence of a previous disease or injury.

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Attached files

-  Dr Beat Walpoth

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