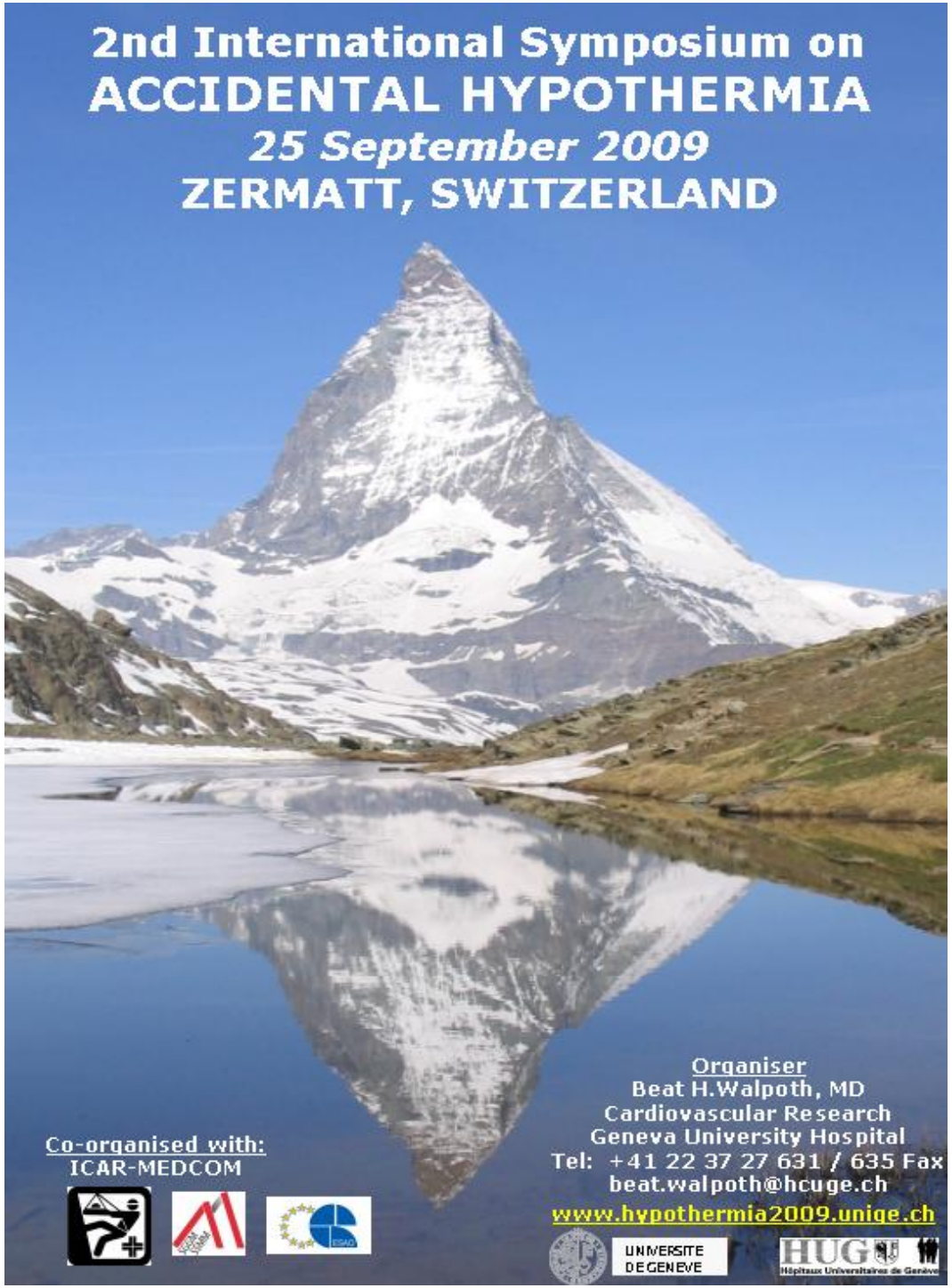
2nd International Symposium on ACCIDENTAL HYPOTHERMIA

25 September 2009

ZERMATT, SWITZERLAND



Co-organised with:
ICAR-MEDCOM

Organiser
Beat H.Walpoth, MD
Cardiovascular Research
Geneva University Hospital
Tel: +41 22 37 27 631 / 635 Fax
beat.walpoth@hcuge.ch

www.hypothermia2009.unige.ch

UNIVERSITE DE GENEVE

HUG Hôpitaux Universitaires de Genève

2nd International Symposium on Accidental Hypothermia
Zermatt, Switzerland - 25 September, 2009
WELCOME ADDRESS

- Organised bi-annually by leading European Universities involved in treatment of hypothermia victims

- 1st Symposium held in Cortina d'Ampezzo by the University of Verona

- Co-organised with ICAR-MEDCOM regrouping mountain rescue professionals from over 50 countries

2nd International Symposium on Accidental Hypothermia
Zermatt, Switzerland - 25 September, 2009

AIM OF THE SYMPOSIUM

"Towards better outcome"

- Sharing worldwide experiences
- Educating rescue and hospital staff
- Improve networking, COST actions
- Coordinating research collaborations FP7
- Increase awareness of accidental hypothermia
- Launch International Hypothermia Registry (IHR)
- Create Hypothermia Working Group
- Establish legal basis for IHR

2nd International Symposium on Accidental Hypothermia
Zermatt, Switzerland - 25 September, 2009
SCIENTIFIC PROGRAMME - I

***Organisers*: Beat H. WALPOTH, Hermann BRUGGER, Giuseppe FAGGIAN, Marie MEYER, Bruno JELK**

08.15 – 08.30	**Introduction**	*Walpoth BH*
08.30 – 10.00	**Hypothermia Pathophysiology / Aetiology**	
	Chair: Zafren K, Richon J	
	Body Reaction to Cold	*Girardet P, Ledoux X*
	High Altitude and Hypothermia	*Richalet J-P*
	Hypothermia Rescue Case Reports:	
	- Crevasse rescue with minimal motion of hypothermic patients	*Jelk B, Reisten O*
	- 4-hours ground transportation of hypothermic 'pulseless' patient	*Ellerton J*
10.00 – 10.30	**International Hypothermia Registry Demonstration**	*Baumann Ph*
	during Coffee break	
10.30 – 12.00	**Pre-hospital/Rescue of Hypothermic Patients**	
	Chair: Boyd J, Pfeiffhofer W	
	Dilemmas of pre-clinical field therapy	*Durrer B*
	Treatment of Hypothermic Patients, with and without Polytrauma	*Cauchy M*
	Hypothermia in Avalanche Victims	*Brugger H*
	Temperature Measurements in Hypothermia	*Ledoux X, Metraux G, Walpoth BH*
12.00 – 13.00	**Plenary Lecture**	
	Chair: Walpoth BH	
	10-years after the deepest accidental hypothermia survival: what has changed?	*Bågenholm A, Naesheim T, Skagseth A*

2nd International Symposium on Accidental Hypothermia
Zermatt, Switzerland - 25 September, 2009
10th ANNIVERSARY
of survival of the deepest accidental hypothermia case

- **Our Honorary Guest Lecture will come from the team of Tromso, Norway.**
- **Anna, Torvind and Arne will present the accident, rescue, outcome and lessons learned over the last 10 years**

Anna :
- **13.7°C**
- **9 hours of resuscitation**

M.Gilbert et al: Lancet 2000;335:375-376

2nd International Symposium on Accidental Hypothermia
Zermatt, Switzerland - 25 September, 2009
SCIENTIFIC PROGRAMME II

13.00 – 14.00 **Moderated Poster Session**
Moderators: Brodman M, Blancher M
on-site Lunch provided

14.00 – 15.30 **Hospital Treatment & Rewarming**
Chair: Faggian G, ZenRuffinen G

Non-invasive ICU rewarming	*Paal P*
Cardio-pulmonary bypass rewarming (CPB)	*Khabiri E*
Advantages of heparin-bonded CPB circuits + case report	*Horisberger J*
Can we improve in-hospital treatment in hypothermic CPR?	*Mair P*
Recent Initiatives to Study Accidental Hypothermia in the Netherlands	*Bierens J*

15.30 – 16.00 **International Hypothermia Registry Demonstration** *Baumann Ph*
during Coffee break

16.00 – 17.30 **Hypothermia Outcome / Registry / Research**
Chair: Brugger H, Mair P

International Hypothermia Registry	*Meyer M, Walpoth BH*
Hypothermia Research	*Tveita T*
Open Issues: Hypoglycaemia, ATP Depletion	*Paal P*
Clinical Perspectives of Hypothermia Research	*Faggian G*
Closing Remarks & Hypothermia COST Project	*Walpoth BH*

8 CME Credits given from the Société Suisse de Médecine d'Urgence et de Sauvetage (SSMUS/SGNOR)

Co-organised with ICAR-MEDCOM
www.hypothermia2009.unige.ch

2nd International Symposium on Accidental Hypothermia
Zermatt, Switzerland - 25 September, 2009
PATRONAGE

International Society for Mountain Medicine

International mountaineering and Climbing Federation

European Society for Artificial Organs

Austrian Society of Mountain Medicine

Italian Society of Mountain Medicine

German Society for mountain & Expedition Medicine

Swiss Society of Mountain Medicine

Société Suisse de Médecine d'Urgence et de Sauvetage (SSMUS)

GRoupe d'Intervention Médicale en Montagne

SAUVETAGE

ALPINE RESCUE CENTER

swissalpinerescue

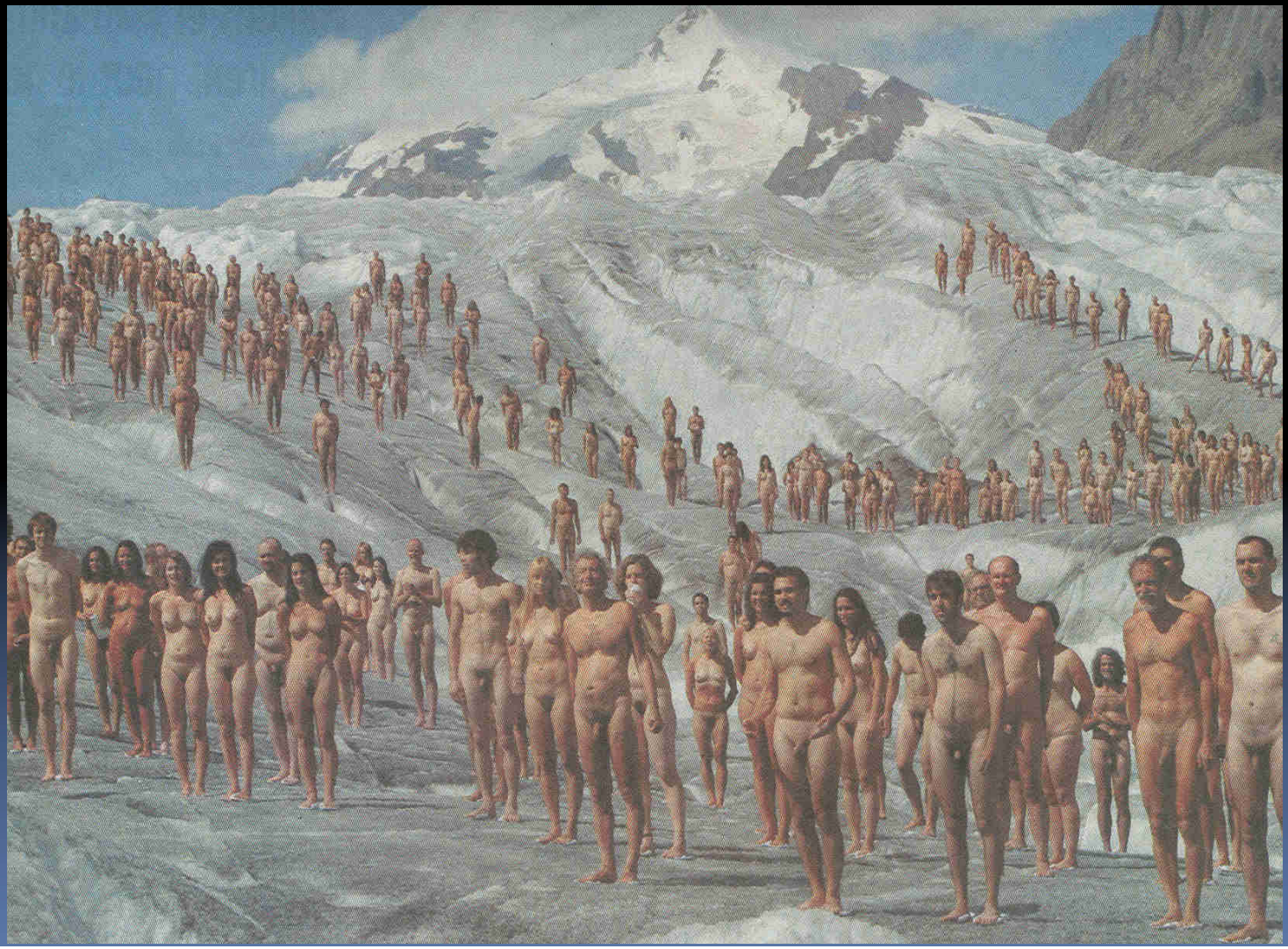
AIR-GLACIERS

AIR ZERMATT

rega

THE BARE FACTS

HYPOTHERMIA IN SWITZERLAND



Spencer
Tunick
2007
Aletsch Glacier

DIFFICULT RECOVERY AT 4,500 METRES

Jack hammer freedom from ice-embedding

FIVE YEARS AFTER HYPOTHERMIC CARDIAC ARREST

Core temperature 17.5°C

Total arrest time 240 mins

HYPOTHERMIA RECORDS

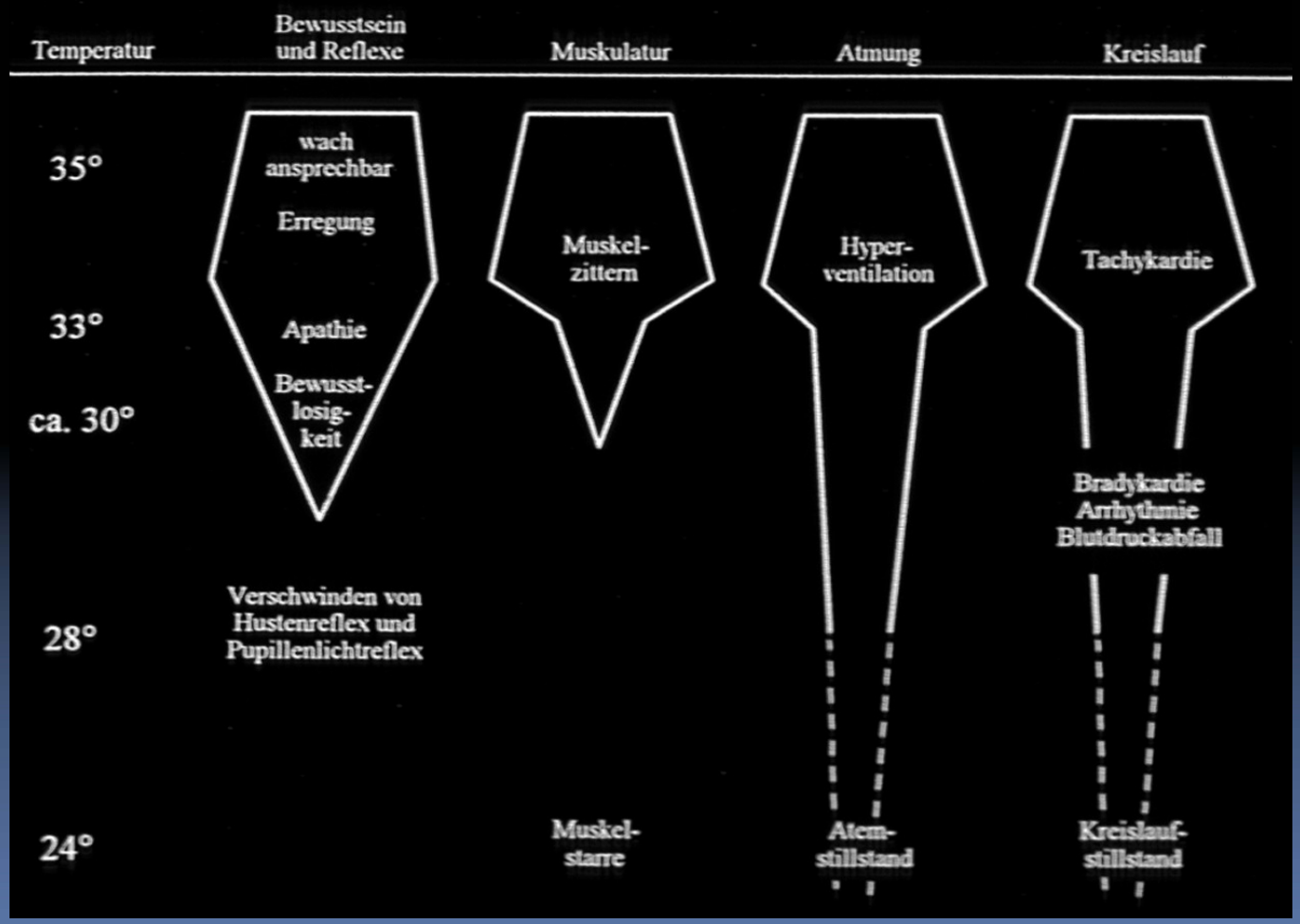
- 9°C: lowest induced hypothermia with Survival *(Niasi et al)*
- 13.7°C: lowest temperature of accidental hypothermia with survival *(Gilbert et al)?*
- 20 mins: longest immersion with survival of an adult
- 66 mins: longest cold water immersion with survival of a child

STAGES OF HYPOTHERMIA

I (35-32°C)

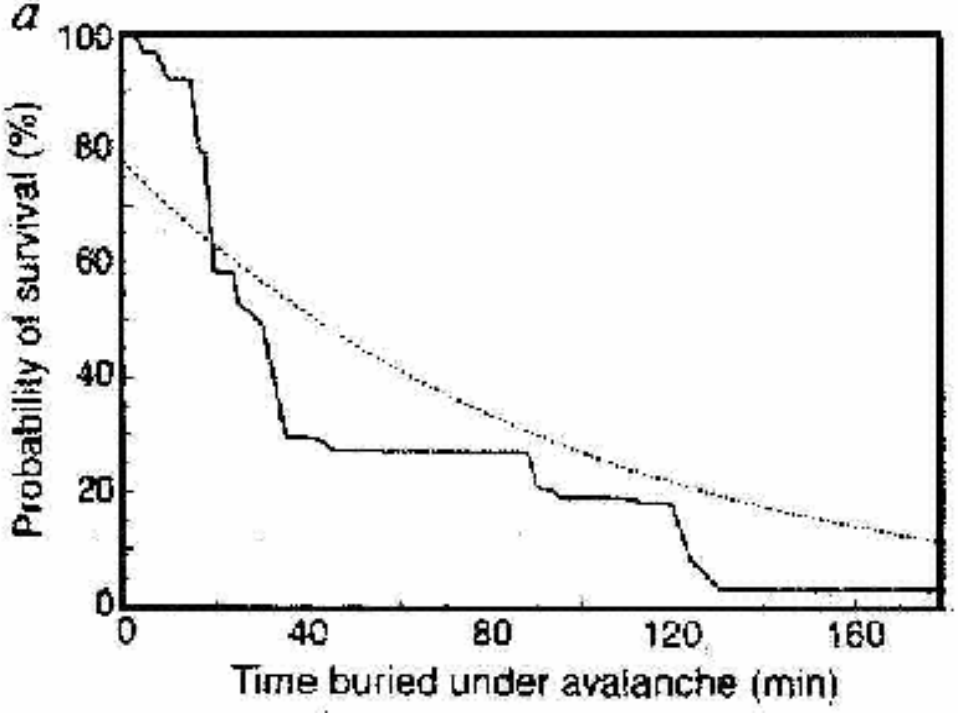
II (32-28°C)

III (<28°C)



AKOR SRK, 1998

ASPHYXIA vs HYPOTHERMIA



PROBLEMS ON RESCUE:

Presence of vital signs ?

Core temperature < 28°C

Potassium < 12 mmol/l

Cardio-respiratory arrest

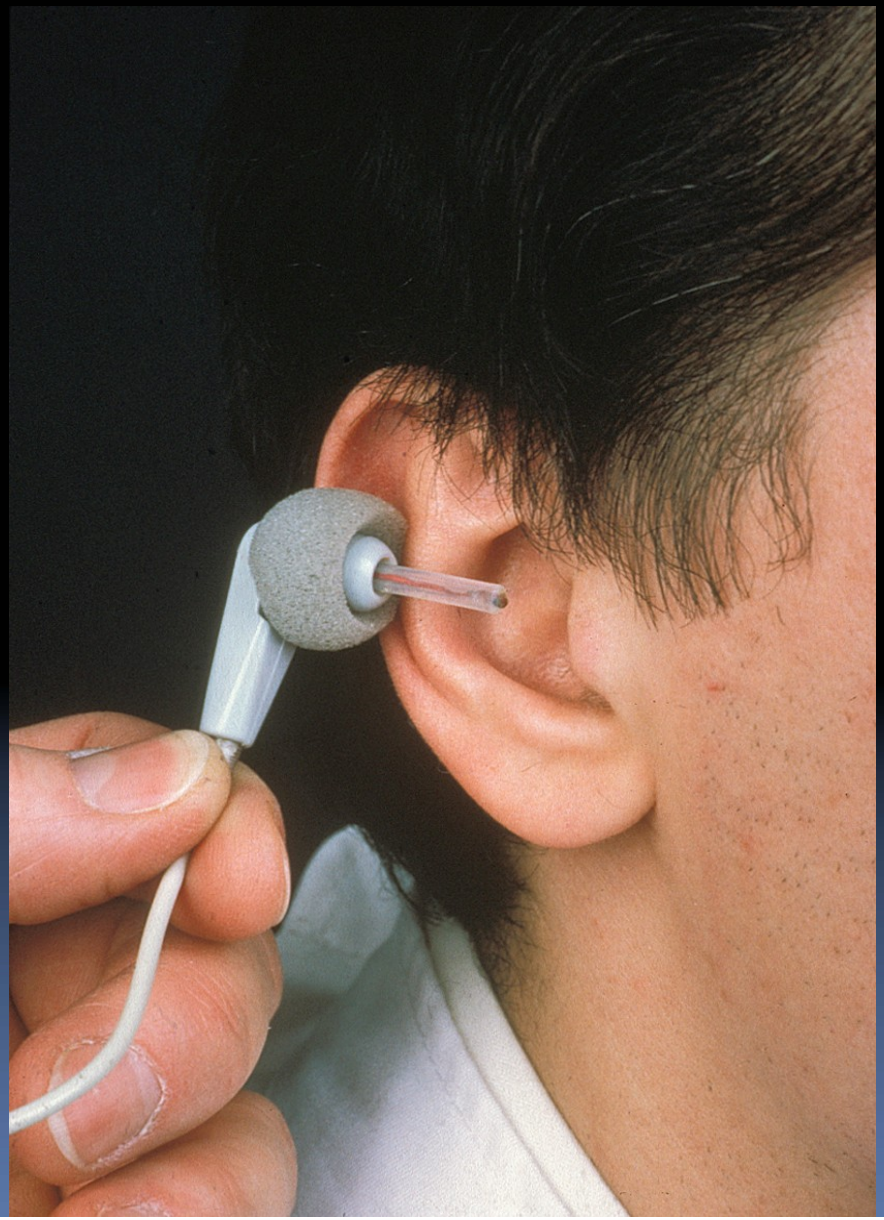
« Rescue death »

Perform normal CPR (frequency and strength)

CORE TEMPERATURE:
? EPI TYMPANIC

Good in maintained circulation (tympanic artery is a branch of carotid artery)

Remember: false high temperatures cannot be obtained if adequately measured



Reprinted From

The New England Journal of Medicine

Established in 1812 as THE NEW ENGLAND JOURNAL of MEDICINE AND SURGERY

VOLUME 337 NOVEMBER 20, 1997 NUMBER 21

ORIGINAL ARTICLES

SWISS MULTI-CENTRE FOLLOW-UP STUDY

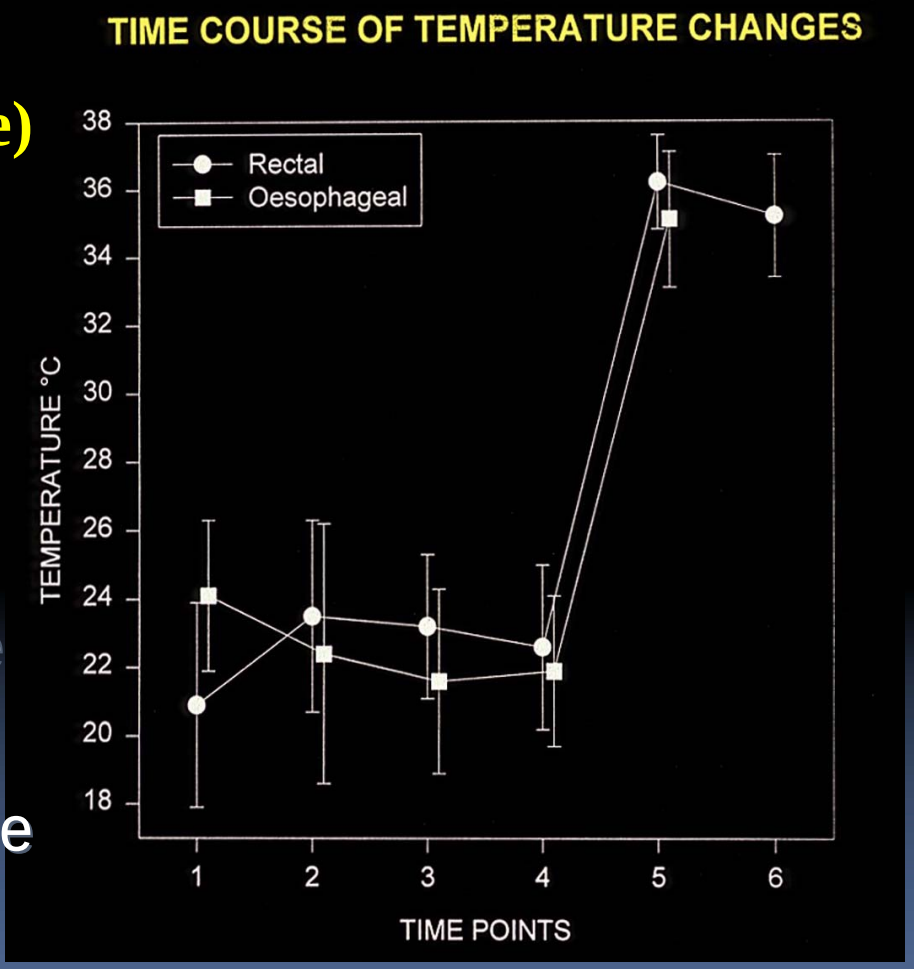
15/32 Survivors of accidental deep hypothermia with cardiac arrest, rewarmed by cardiopulmonary bypass

- University of Bern (n= 9)
- University of Zürich (n= 4)
- University of Lausanne (n = 2)

TIME COURSE AND TEMPERATURES FROM RESCUE TO SURVIVAL

Mean Time in minutes / (Range)

- Arrest (no CPR)
  39 ± 53 (0 – 135)
- Arrest (with CPR)
  151 ± 40 (89 – 130)
- CPB time until Sinus Rate
  45 ± 56 (1 – 240)
- Total time until Sinus Rate
  224 ± 71 (148 – 355)



1-Recovery, 2-First hospital, 3-University Hospital , 4-Pre-CPB, 5-Post-CPB, 6-ICU

REWARMING METHODS

Passive: Body's heat production (isolation!) 1°C/h

Active external: Airway warming 1-2°C/h

Hot pad (burns!) 2°C/h

Forced air 2-3°C/h

Active invasive: Warm lavages 4-6°C/h

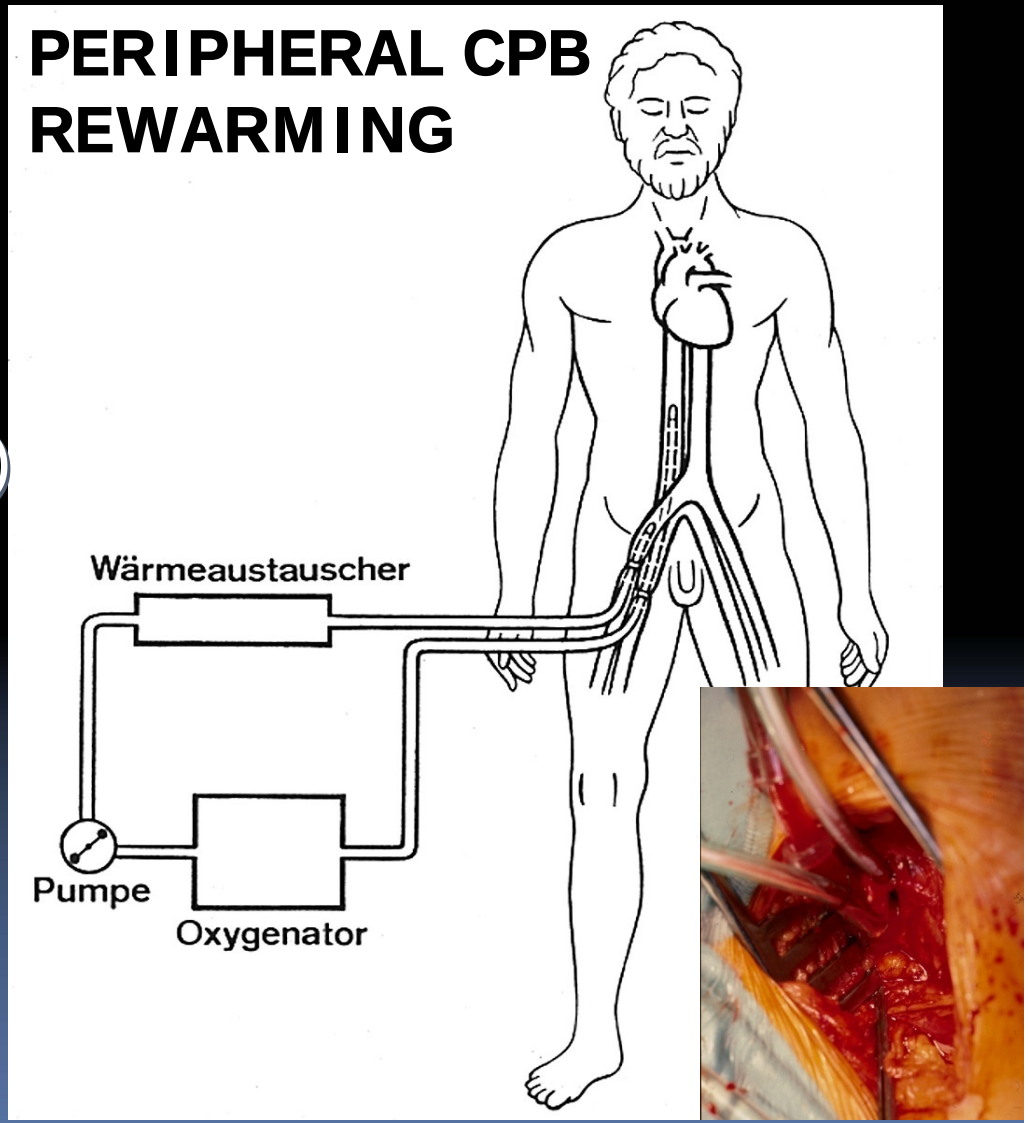
CPB 8-10°C/h

(CAVE: delta T < 10°)

CARDIOPULMONARY BYPASS REWARMING

- CPB time (min)
  103 ± 46 (60–240)
- Temp. start (oeso)
  21.9° ± 2.2 (19–25)
- Temp. end (oeso)
  35.1° ± 2 (32-38)
- Rewarming rate
  7.7 (°C/hr)

Sinus rate at a mean temperature of 32°C:
Spontaneous (n=7)
Defibrillation (n=8)



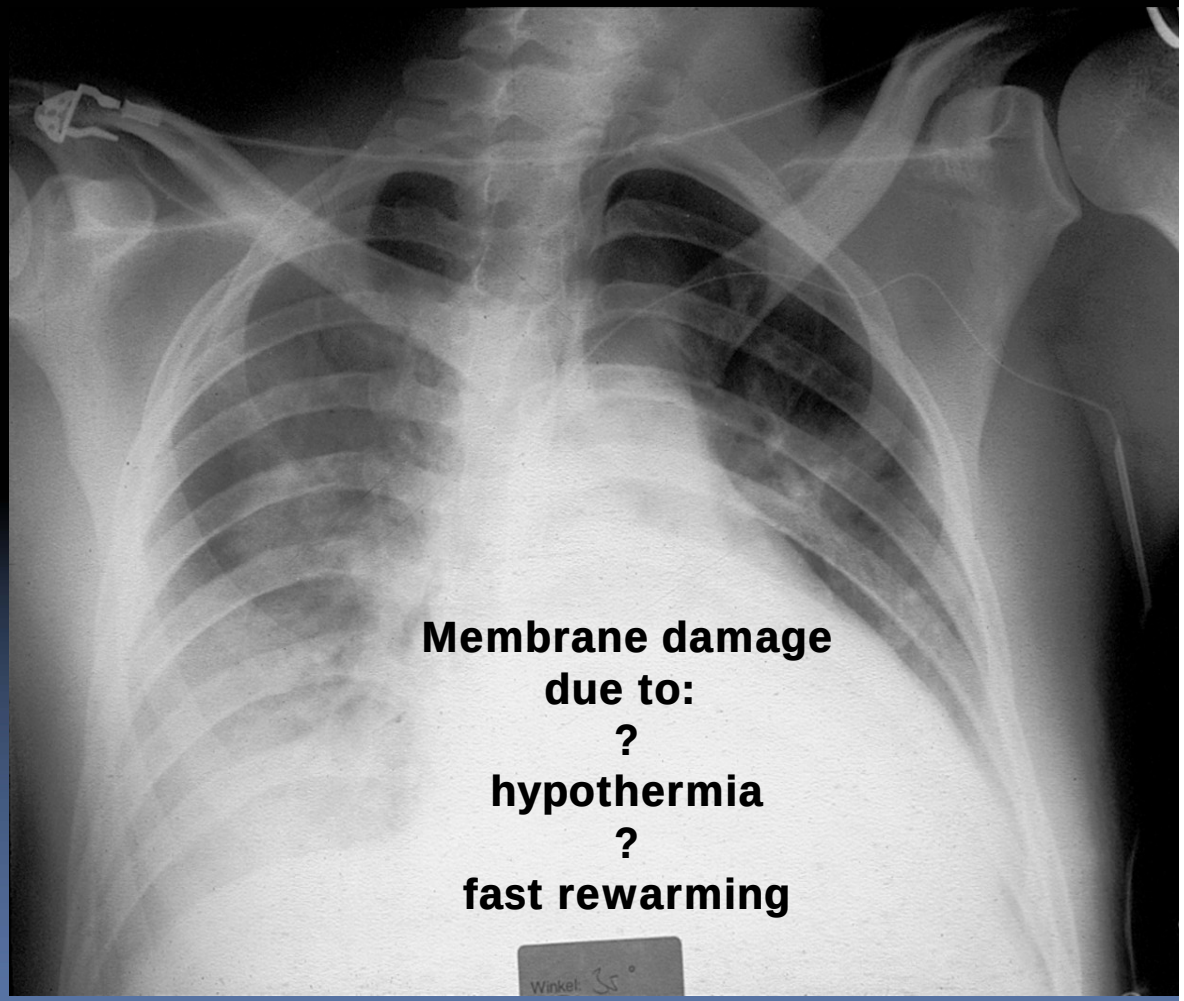
Althaus U et al, Ann Surg 1982;195:492-5

ADVANTAGES OF CPB
REWARMING

- Organ perfusion and oxygenation
- Fast rewarming ?
- Core rewarming before periphery
- Rapid metabolic correction
- Improve micro-circulation (haemodilution)
- Detoxification by dilution / filtration

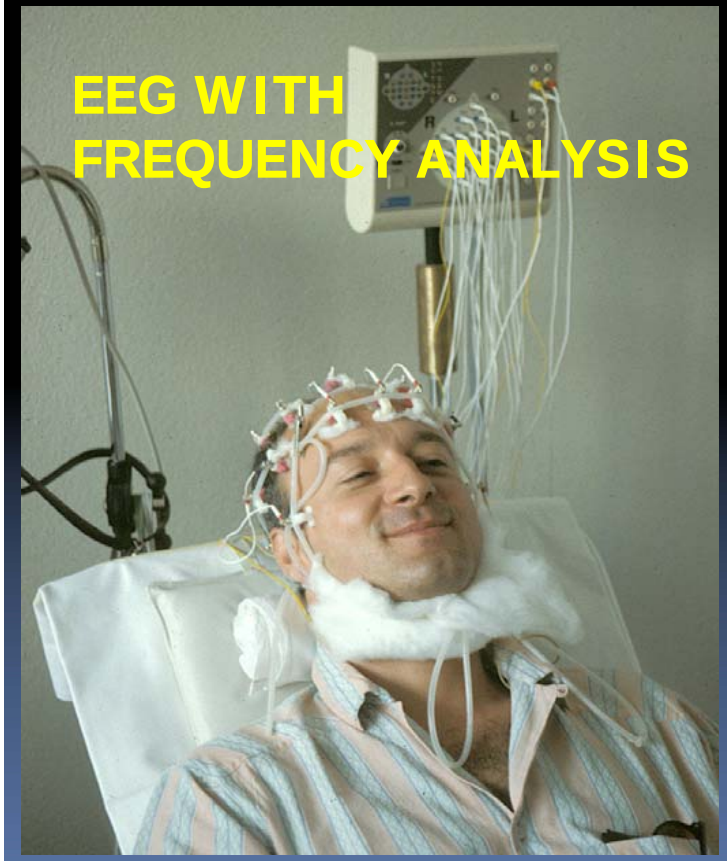
POST REWARMING COMPLICATIONS

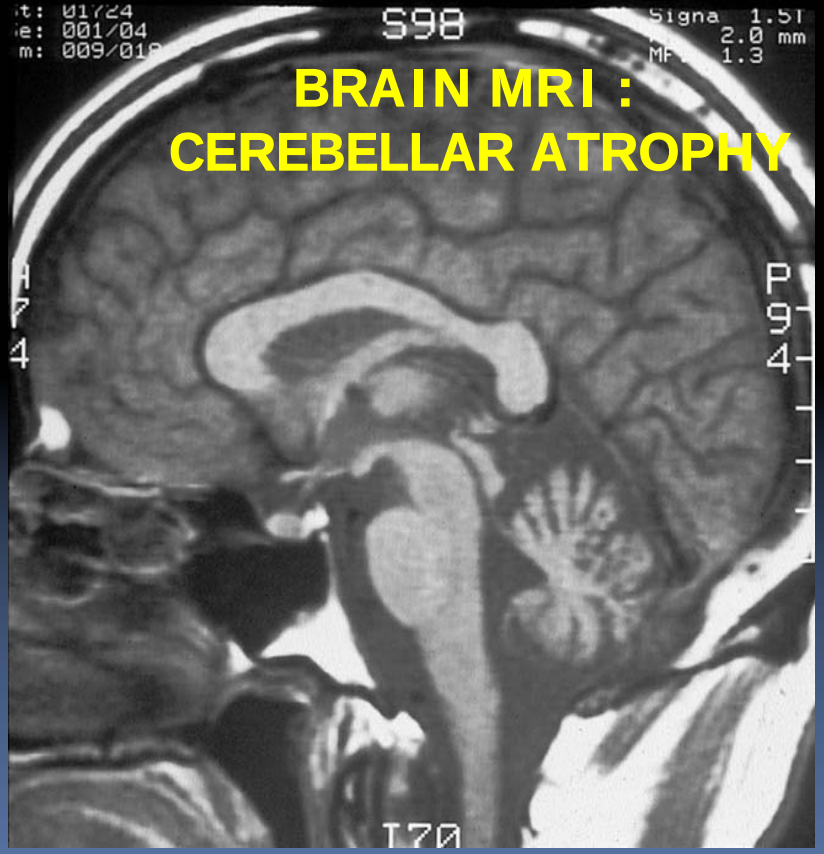
- 6 pulmonary oedema
- 2 pneumonia
- 2 ARDS
- 3 pneumothorax
- 1 cardiac arrythmia/
  1 pericarditis
- 3 anuria/
  2 haematuria
- 9 neurological
  dysfunctions



AFTER HOSPITAL DISCHARGE

- 10 further hospitalisations(40 days)
- 8 ongoing problems (117 days)
- 13 back to work (137 days)
- 7 married/children

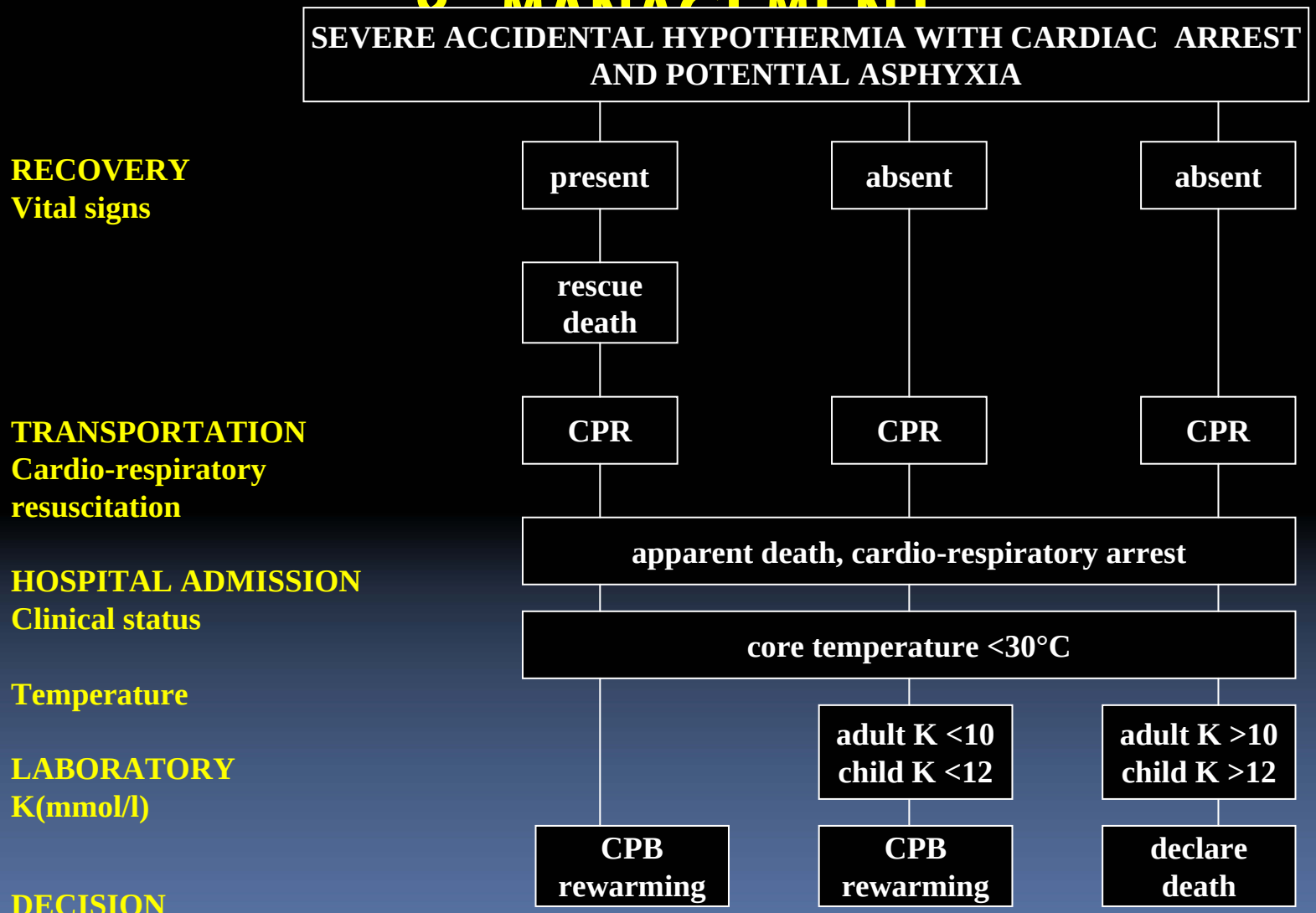




REASONS FOR GOOD OUTCOME

- Hypothermia, brain protection
- No asphyxia (despite 1 avalanche)
- Young, healthy (no homeless)
- Professional rescue organisations
- Fast rescue, CPR & treatment
- CPB rewarming

TABLE FOR DECISION MAKING & MANAGEMENT



CONCLUSIONS

- All survivors of accidental hypothermia feel healthy and are free of symptoms at follow-up
- Results confirm that CPB rewarming is very promising for patients with accidental deep hypothermia, even after prolonged circulatory arrest

2nd International Symposium on Accidental Hypothermia
Zermatt, Switzerland - 25 September, 2009
Worldwide Launch of International Hypothermia Registry

- Accidental deep hypothermia:
  rare, insufficiently diagnosed
- Lack of knowledge to improve management
- Worldwide data base
- IHR Working Group
- Establish consensus guidelines
- Increase awareness

www.hypothermia2009.unige.ch

2nd International Symposium on Accidental Hypothermia
Zermatt, Switzerland - 25 September, 2009
Worldwide International Hypothermia Registry

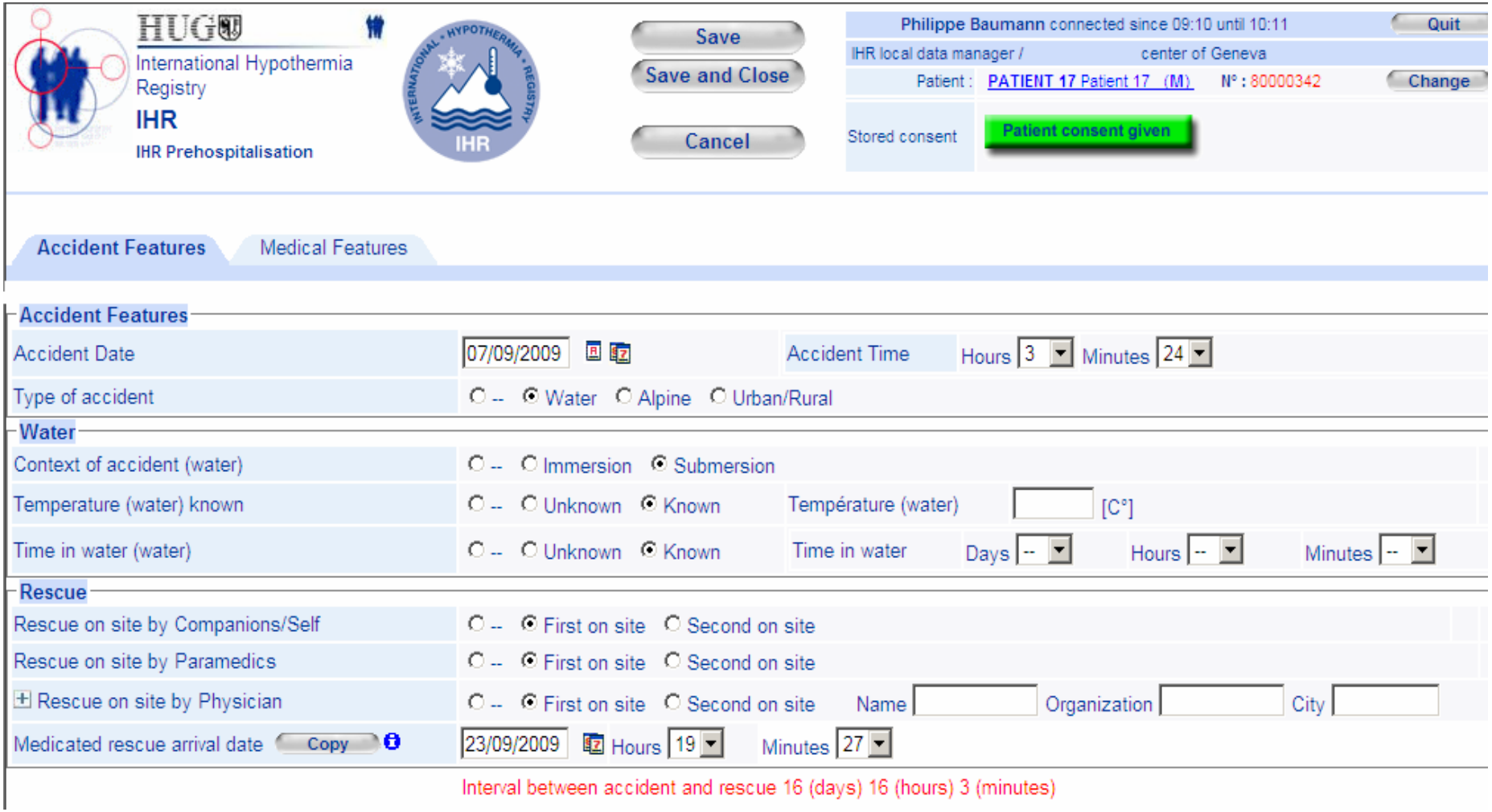
- **Internet-based English survey**
- **Eligibility: all interested hospitals/rescue centres**
- **Includes:**
  - **victims with core body T° < 32°C, preference for T° < 28°C with cardiac arrest.**
  - **accidental hypothermia of any origin (exposure/avalanche/immersion/suicide attempt…)**
- **Registry components:**
  - **Anonymous patient data**
  - **Accident data**
  - **Prehospital treatment**
  - **Hospital treatment, rewarming method, clinical and laboratory data**
  - **Post-rewarming complications**
  - **Outcome**
- **Data access and analysis by nominated international working group**

INTERNATIONAL HYPOTHERMIA REGISTRY (IHR)

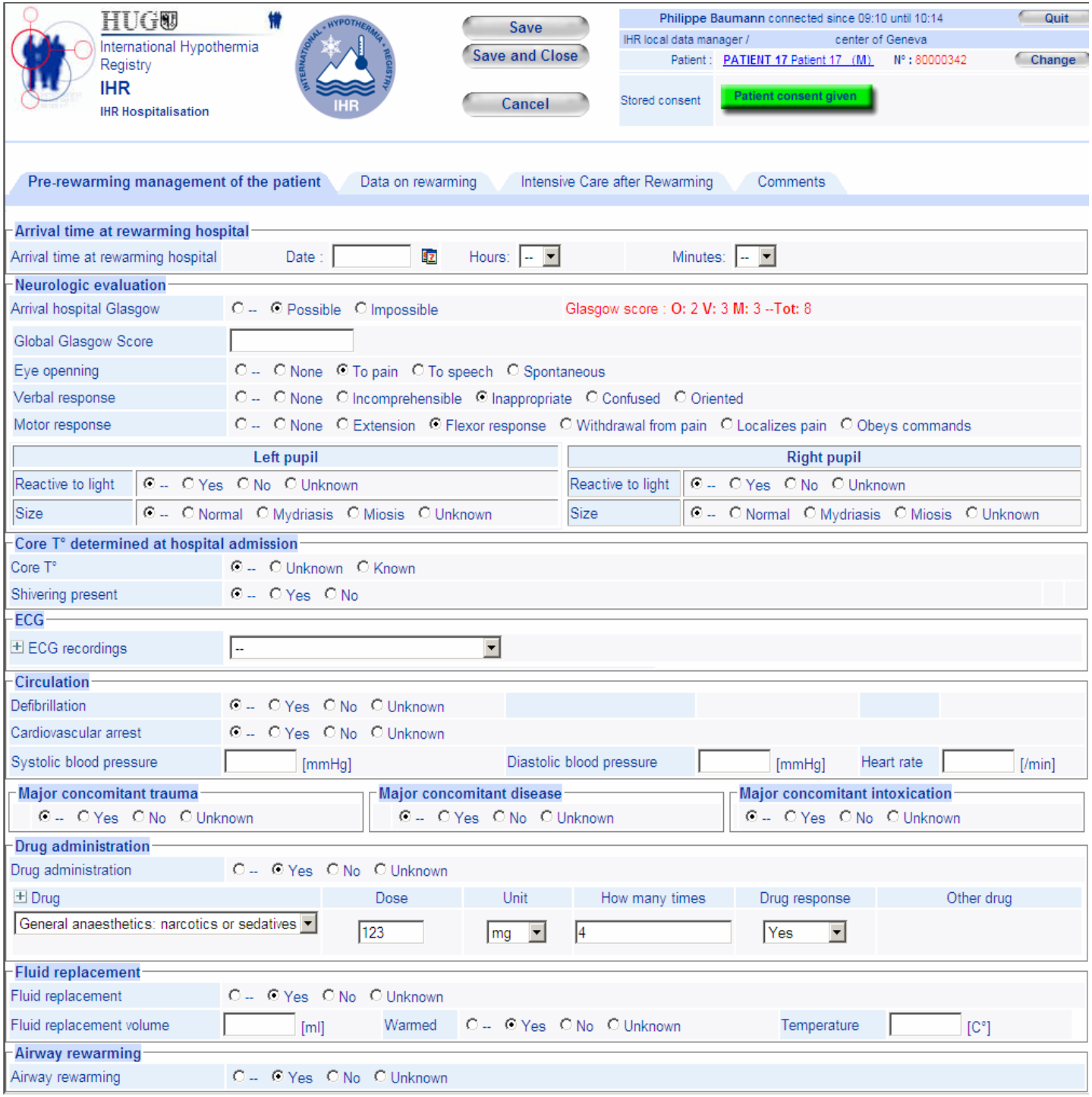
M. Meyer, Ph. Baumann, B.H. Walpoth &
The International Hypothermia Working Group

www.hypothermia-registry.org

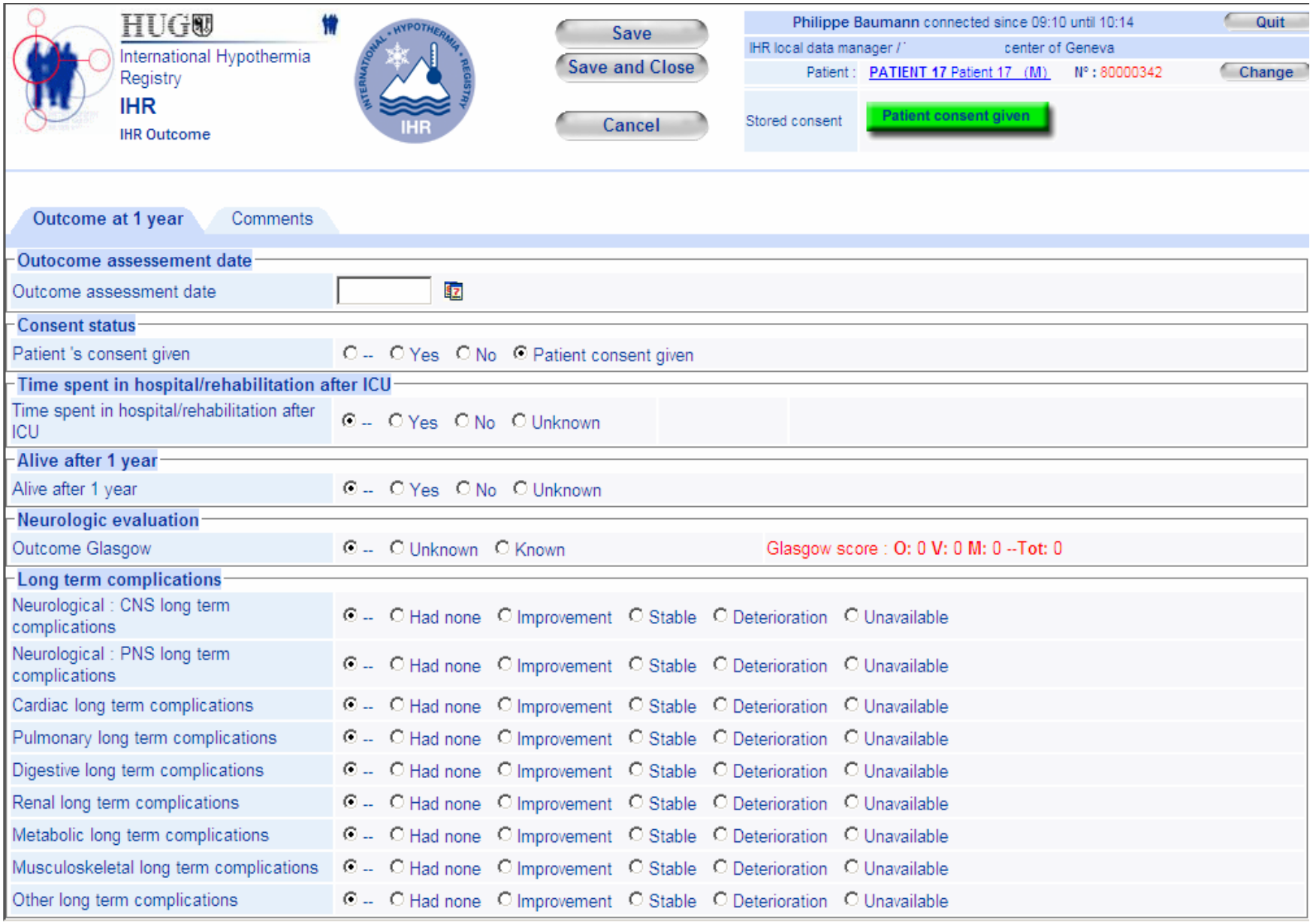
PRE-HOSPITALISATION



HOSPITALISATION



OUTCOME


HUG
International Hypothermia Registry
IHR
IHR Outcome
Save
Save and Close
Cancel
Philippe Baumann connected since 09:10 until 10:14
Quit
IHR local data manager / ` center of Geneva
Patient : PATIENT 17 Patient 17 (M) N° : 80000342
Change
Stored consent
Patient consent given
Outcome at 1 year
Comments
Outcome assessement date
Outcome assessment date
Consent status
Patient 's consent given
-- Yes No Patient consent given
Time spent in hospital/rehabilitation after ICU
Time spent in hospital/rehabilitation after ICU
-- Yes No Unknown
Alive after 1 year
Alive after 1 year
-- Yes No Unknown
Neurologic evaluation
Outcome Glasgow
-- Unknown Known
Glasgow score : O: 0 V: 0 M: 0 --Tot: 0
Long term complications
Neurological : CNS long term complications
Neurological : PNS long term complications
Cardiac long term complications
Pulmonary long term complications
Digestive long term complications
Renal long term complications
Metabolic long term complications
Musculoskeletal long term complications
Other long term complications
-- Had none Improvement Stable Deterioration Unavailable

2nd International Symposium on Accidental Hypothermia
Zermatt, Switzerland - 25 September, 2009
BEAT WALPOTH'S VIEW ON HYPOTHERMIA !

"NOBODY IS DEAD UNTIL WARM AND DEAD"

LESSONS LEARNED FROM :

- Accidental Hypothermia

(31,000 citations)

- Induced Therapeutic Hypothermia

(20,000 citations)

Treatment of traumatic brain injury with moderate hypothermia.
Marion DW, Penrod LE, Kelsey SF, Obrist WD, Kochanek PM, Palmer AM, Wisniewski SR, DeKosky ST.
N Engl J Med. 1997 Feb 20;336(8):540-6.

Hypothermia therapy after traumatic brain injury in children.
Karakitsos D, Karabinis A.
N Engl J Med. 2008 Sep 11;359(11):1179-80.

Clinical practice. Neurologic prognosis after cardiac arrest.
Young GB.
N Engl J Med. 2009 Aug 6;361(6):605-11. Review.

Reprinted From

The New England Journal of Medicine

Established in 1812 as The New England Journal of Medicine and Surgery

VOLUME 337 NOVEMBER 20, 1997 NUMBER 21

ORIGINAL ARTICLES

SWISS MULTI-CENTRE FOLLOW-UP STUDY

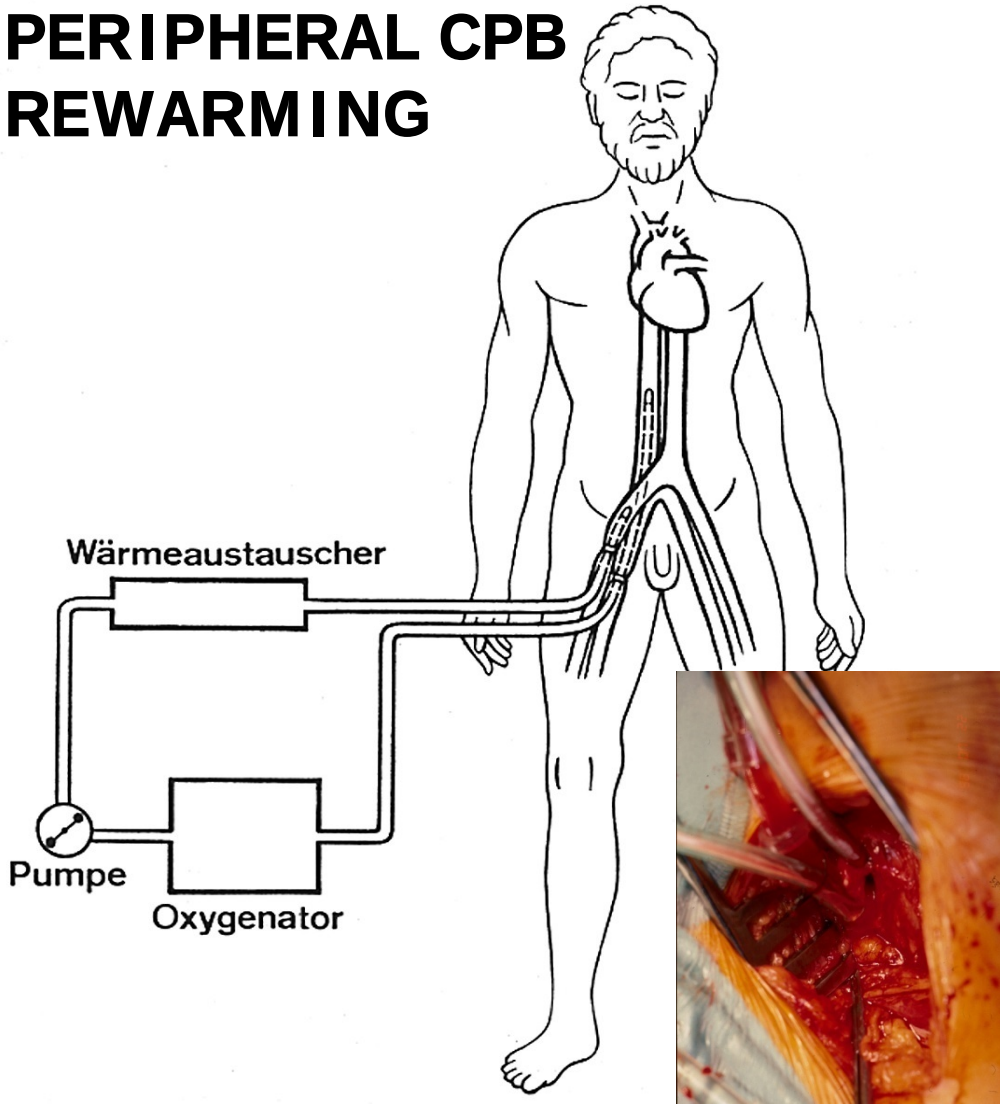
15/32 Survivors of accidental deep hypothermia with cardiac arrest, rewarmed by cardiopulmonary bypass

- University of Bern (n= 9)
- University of Zürich (n= 4)
- University of Lausanne (n = 2)

CARDIOPULMONARY BYPASS REWARMING

- CPB time (min)
  103 ± 46 (60–240)
- Temp. start (oeso)
  21.9° ± 2.2 (19–25)
- Temp. end (oeso)
  35.1° ± 2 (32-38)
- Rewarming rate
  7.7 (°C/hr)

Sinus rate at a mean temperature of 32°C:
Spontaneous (n=7)
Defibrillation (n=8)



Althaus U et al, Ann Surg 1982;195:492-5

REASONS FOR GOOD OUTCOME

- Hypothermia, brain protection
- No asphyxia (despite 1 avalanche)
- Young, healthy (no homeless)
- Professional rescue organisations
- Fast rescue, CPR & treatment
- CPB rewarming

TABLE FOR DECISION MAKING & MANAGEMENT