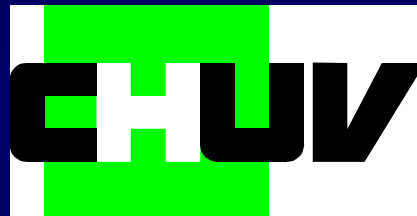


1st European Hypothermia Workshop

Implementation of therapeutic hypothermia in clinical practice

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Staff Physician

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Choice of the cooling technique

- External cooling
 - Easy to use
 - Non-invasive
- Intravascular cooling
 - Vascular access
 - Invasive

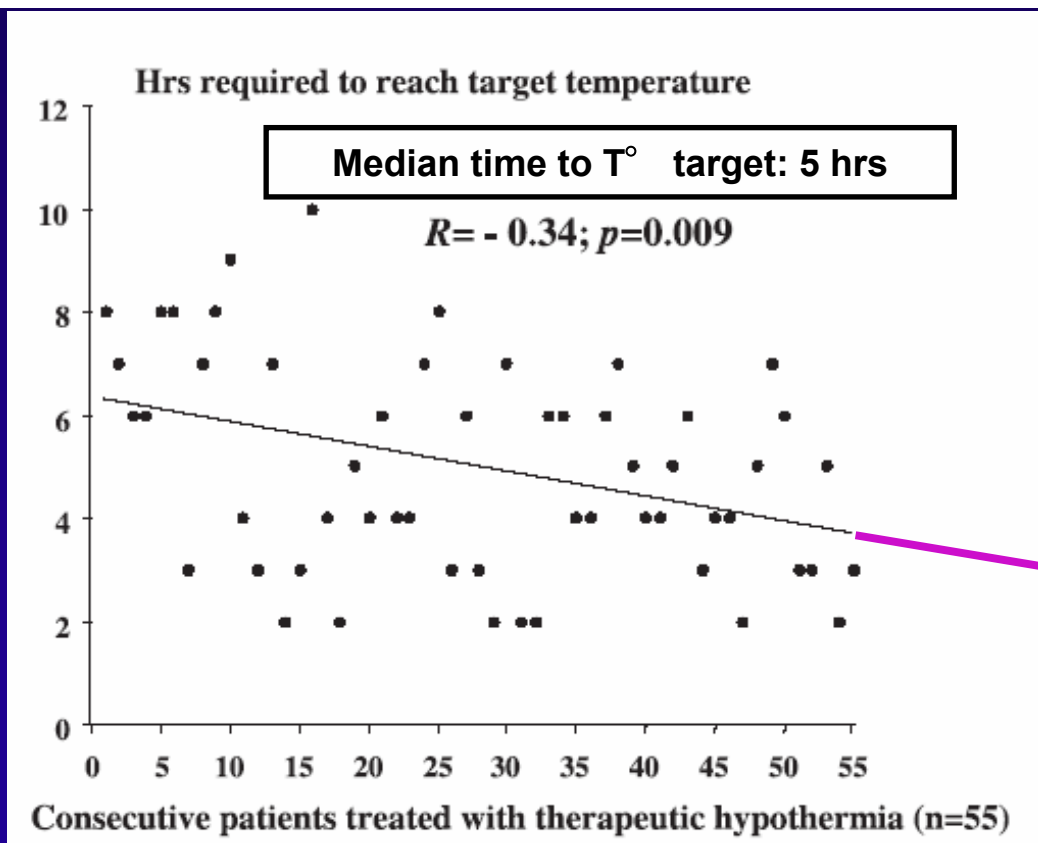
Team building

- Intra - ICU
 - Written protocol
 - Repeated lessons to nurse & medical team
 - Technical methodology => dedicated nurse
 - Theoretical background
- Extra - ICU
 - ER physicians
 - Cardiologists
 - Neurosurgeons

From evidence to clinical practice: Effective implementation of therapeutic hypothermia to improve patient outcome after cardiac arrest*

Crit Care Med, 2006;34(7):1865

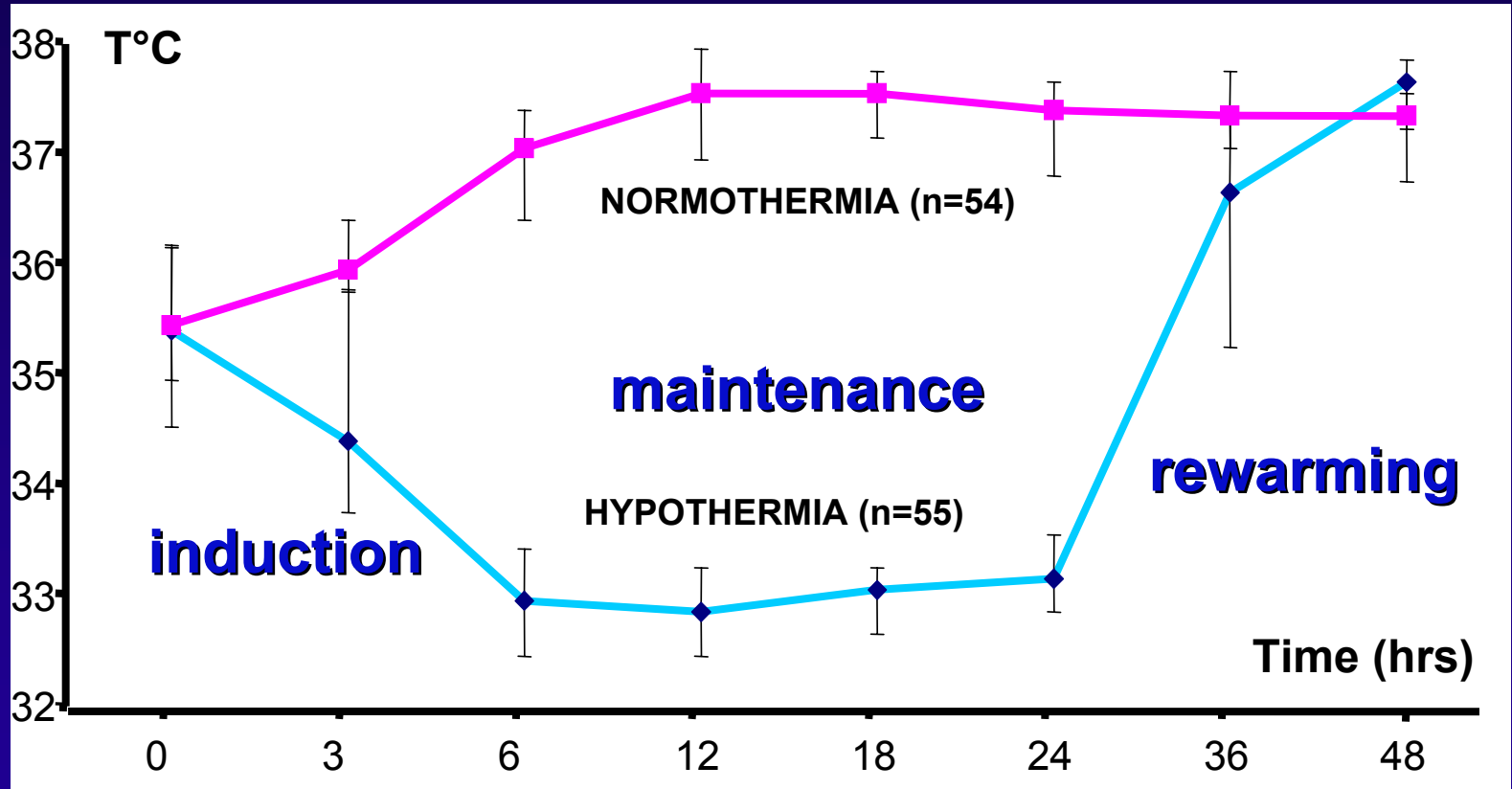
Mauro Oddo, MD; Marie-Denise Schaller, MD; François Feihl, MD; Vincent Ribordy, MD; Lucas Liaudet, MD



2.5 hrs
(n = 110)

6 hrs 4 hrs

Therapeutic hypothermia : 3 phases



Avoidance of side-effects

- Technically related
 - T° fluctuations
 - Cooling delays
 - Excessive hypothermia
- Related to hypothermia
 - Electrolyte disorders (K⁺ , Mg⁺⁺)
 - Arrhythmia
 - Infections
 - Hemodynamics

Technical problems

- Cooling delays
 - Coronary angioplasty for patients with ST elevation myocardial infarction
 - Obese patients
- Excessive hypothermia
 - $T^{\circ} < 32^{\circ}\text{C}$
 - Increased risk of arrhythmia & hemodynamic instability

Side-effects of therapeutic hypothermia

- Electrolyte disorders
 - ↓↓↓ K⁺, ↓↓↓ Mg⁺⁺
 - Give i.v. K-Chlorure and Mg-Sulfate
- Arrhythmia
 - Monitor regularly electrolytes (every 4 hrs)
 - More frequent when T°<32°C
 - In general : unsustained atrial fibrillation or ventricular tachycardia
 - 2 / 110 cases of refractory VF in Lausanne (occurred at T°<32°C)

Side-effects of therapeutic hypothermia

- Implementation of strategies for infection monitoring
- Infectious complications may occur during therapeutic hypothermia
 - Increased incidence of pneumonia
- Antibiotic prophylaxis ?
 - Selective digestive decontamination (SDD)

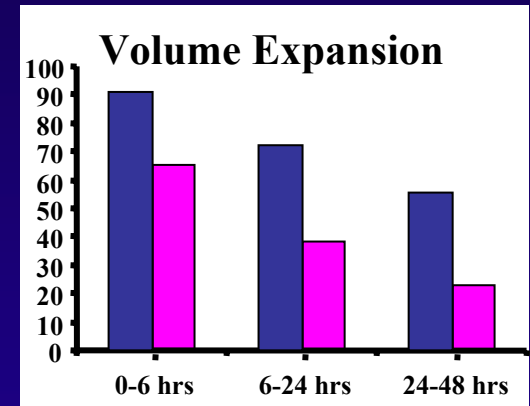
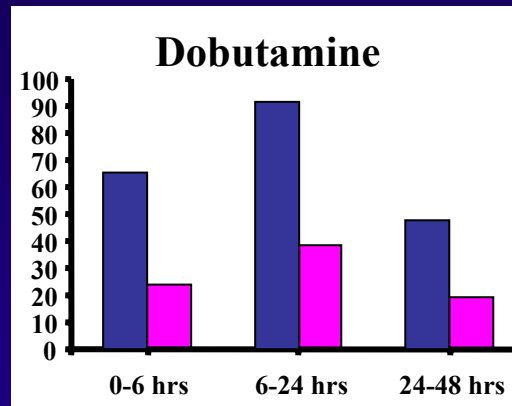
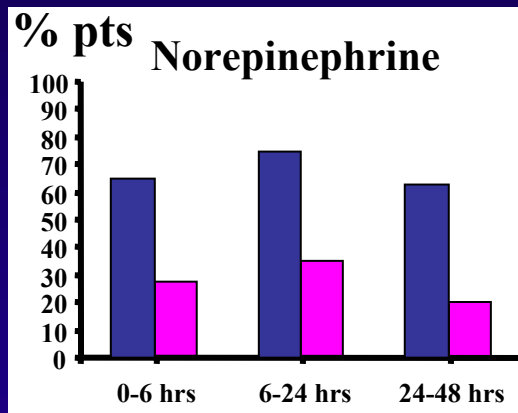
Side-effects of therapeutic hypothermia

Study	Arrhythmia	Pneumonia	Sepsis	Bleeding
Bernard, 1997	Yes	No	No	No
Yanagawa, 1998	No	Yes ^{*p<0.05}		No
Zeiner, 2000	Yes	No	No	No
Nagao, 2000			Yes	Yes
Felberg, 2001	Yes	Yes		Yes
Idrissi, 2001	No	No	No	No
Holzer, 2002	No	No	No	Yes
HACA, 2002	Yes	Yes	Yes	Yes
Bernard, 2002	No	No	No	No
Bernard, 2003	No	No	No	No
Oddo, 2006	No	No	No	No

Hemodynamic monitoring during therapeutic hypothermia

- Hemodynamic instability occur frequently after cardiac arrest
 - Left ventricular dysfunction and hypovolemia (Laurent, *J Am Coll Cardiol*, 2002)
- Post-resuscitation syndrome (Adrie, *Circulation*, July 2002)

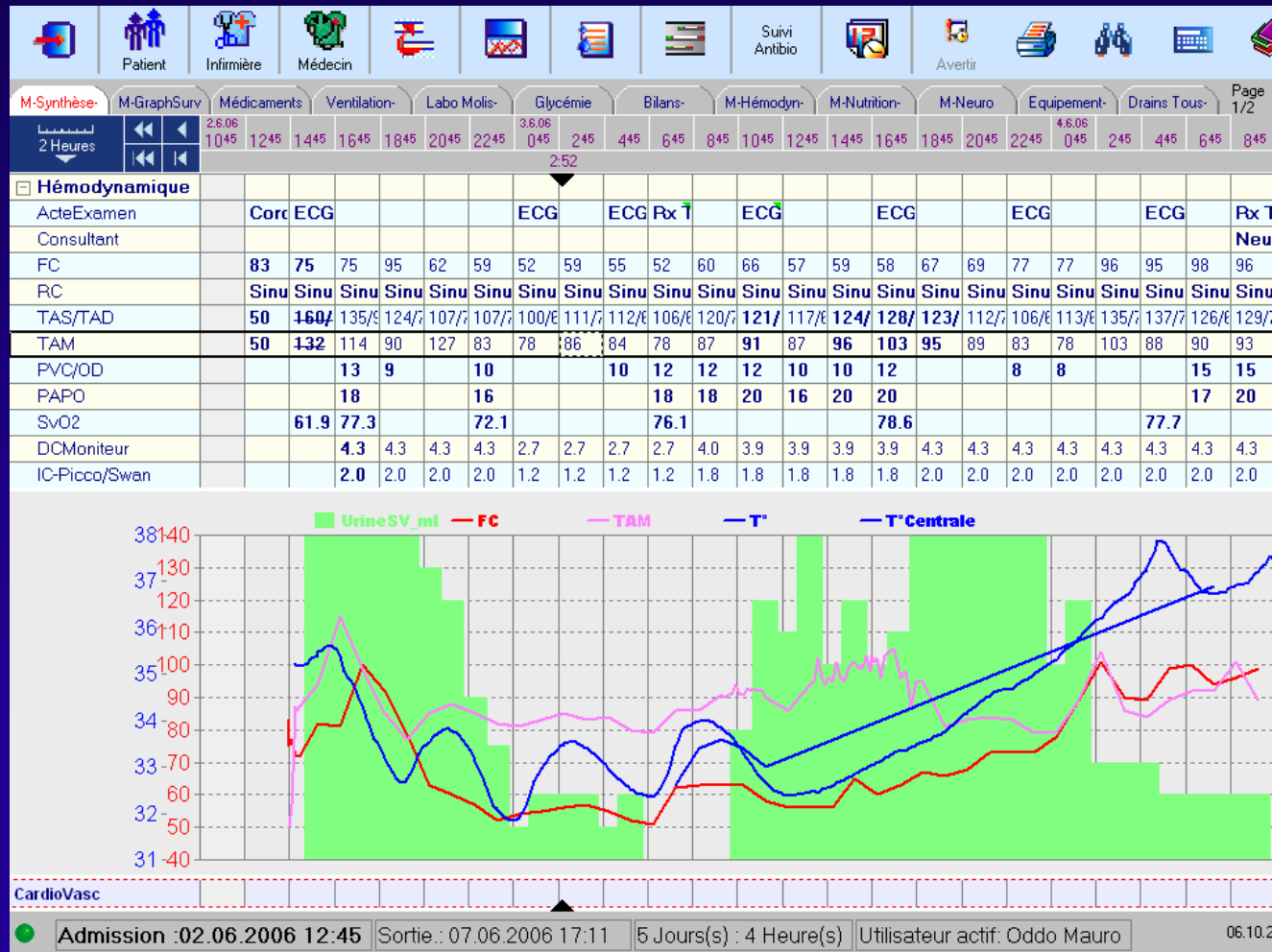
Hemodynamic monitoring



■ Hypothermia
■ Normothermia

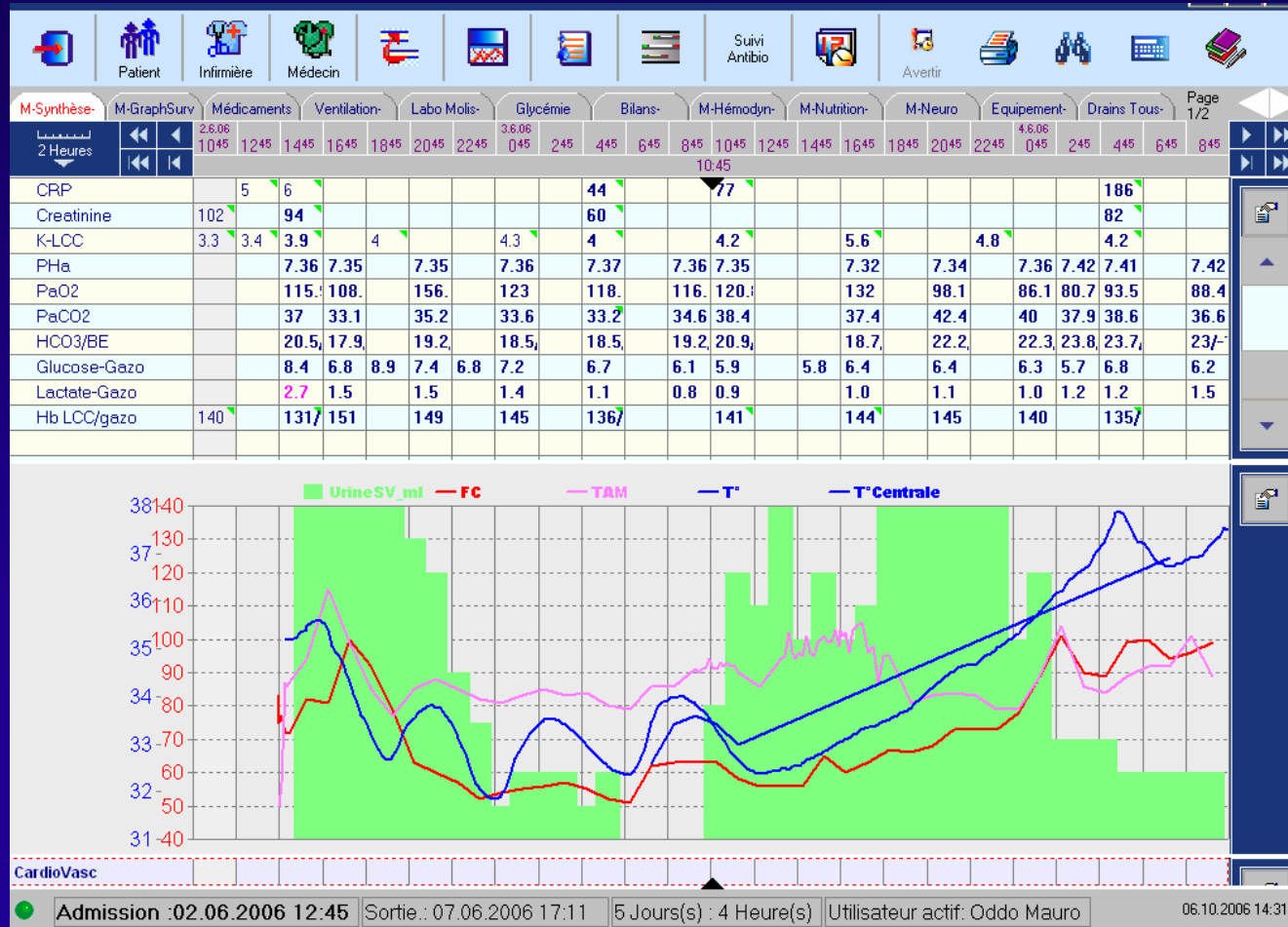
Therapeutic hypothermia: from evidence to clinical practice...

Pt. 1



Therapeutic hypothermia: from evidence to clinical practice...

Pt. 1



Therapeutic hypothermia: from evidence to clinical practice...

Pt. 2

