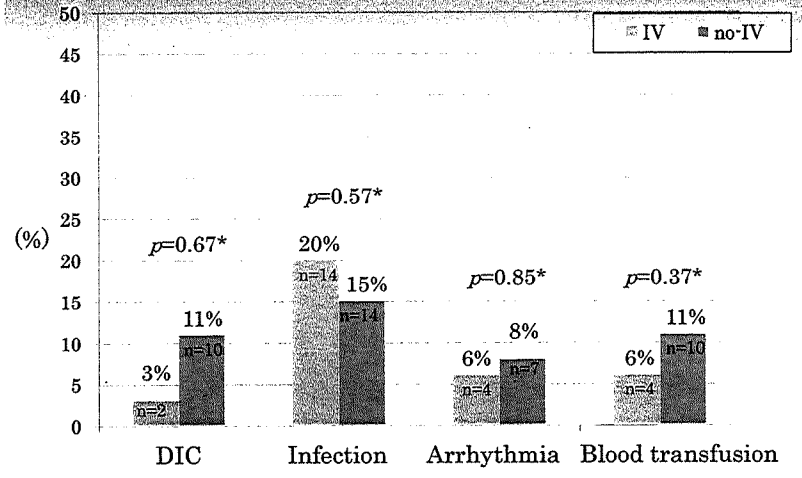
Hemodynamics

	IV Group (n=70)	no-IV Group (n=91)	p*
At the time of induction			
Systolic Blood Pressure (mmHg)	128±36	133±37	0.38
Heart rate (bpm)	100±23	99±30	0.88
At the time of attainment of core temperature at 34℃			
Systolic Blood Pressure (mmHg)	128±30	126±29	0.67
Heart rate (bpm)	92±20	83±24	0.02
At the time of completion of rewarming			
Systolic Blood Pressure (mmHg)	126±23	122±25	0.31
Heart rate (bpm)	91±17	88±19	0.40

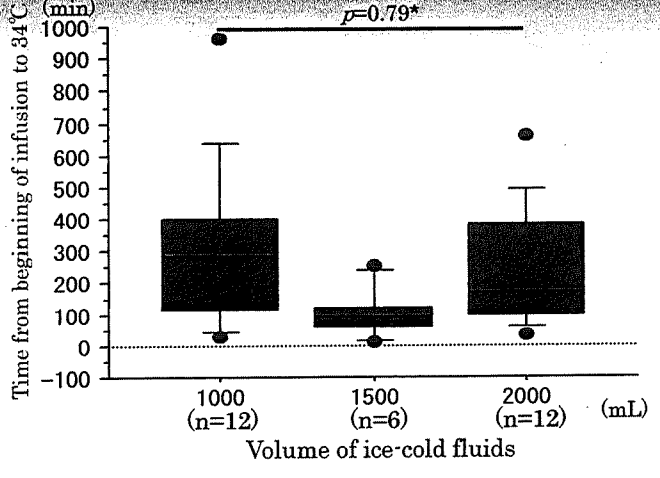
*Based on t test

Complications



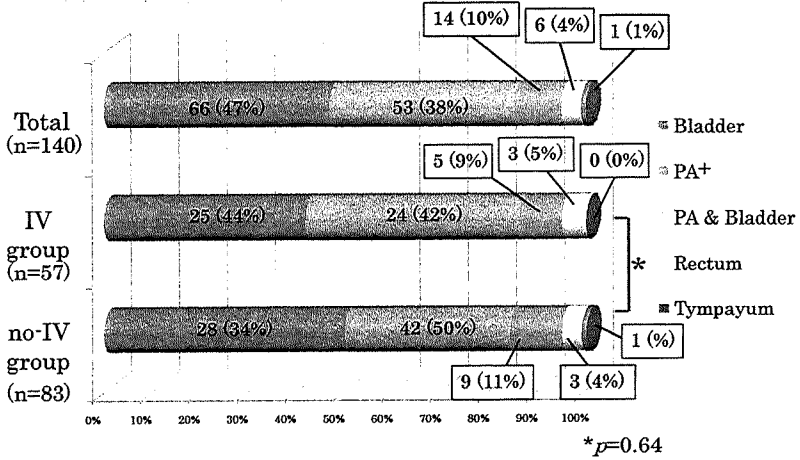
*Based on χ^2 test

Volume of Ice-cold Fluids in IV-group and Time Interval from Cooling to 34℃



* Based on Kruskal-Wallis test

Monitoring Places of Core Temperature During Hypothermia



*p=0.64
+ Pulmonary Artery

Rapid Infusion Method and Its Optimal Monitoring Places of Core Temperature

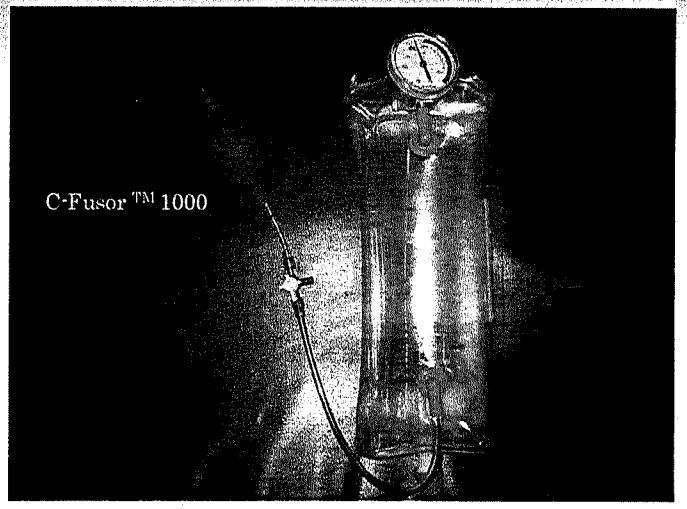
患者

駿河台日本大学病院救命救急センターに搬送されてきた院外心肺停止患者で、J-PULSE-Hypo. Registryの登録基準に該当する患者とした。

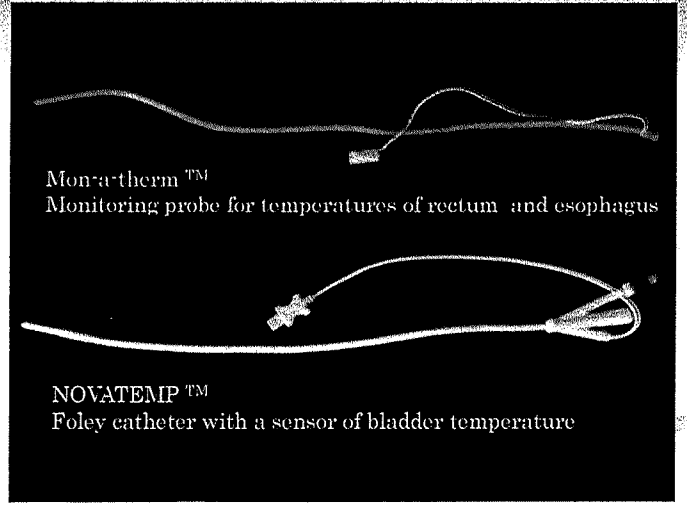
方法

患者が救命センターに到着して間もなく、両上肢または両鼡径部のいずれか2か所に18ゲージ以上の太い静脈路を確保し、そこから加圧バッグ(>300 mmHg)に取り付けられた4℃の生理食塩水を合計2000mL投与した(*Circulation 2007; 115: 3064-3070* の方法に準拠した)。その際の深部体温は膀胱、直腸、食道でモニターした。

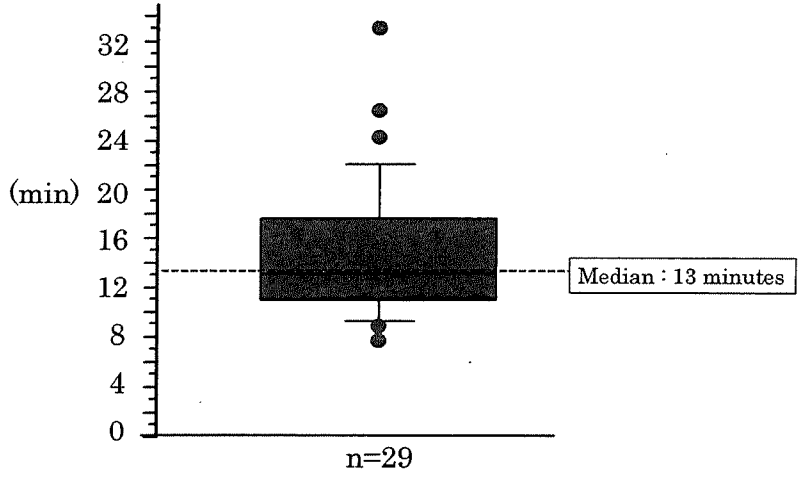
Ice-cold Normal Saline (4℃) with a High-pressure Bag



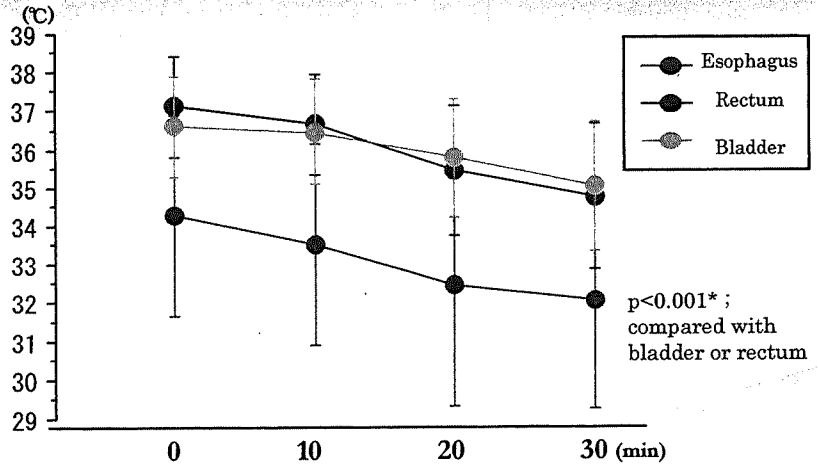
Monitoring Probe of Core Temperature



The Interval from Initiation of Intravenous Ice-cold Fluids (2000mL) to Completion of the Fluids.



Core Temperatures
Esophagus vs. Bladder vs. Rectum



* Based on repeated measured ANOVA

Discussion

・J-PLUSE-Hypo Registryにおいて、IV groupではno-IV groupに比し、良好な神経学的転帰が得られた。冷却水輸液は導入が簡便なため、初期診療時により早期に導入できたことが要因であると考えられる。

・冷却水輸液を行うことで合併症や輸血の機会が増すことはなかった。

・そのため、冷却水輸液は迅速、簡便、安価、安全であるため、冷却水輸液による脳低体温療法の導入を積極的に行うべきである。

Discussion

・加圧バッグに取り付けられた2000mLの冷却水は、13分程度で投与完了することができ、30分後には深部体温で35℃前後まで低下しうることが判明した。

・今回食道温は膀胱温や直腸温と比べ、常に2℃程度低値を示した。これは初期診療時には外気温や換気の影響を受けやすいこと、測定デバイスが適切な位置に留置しにくいことなどが原因として挙げられる。

・深部体温の低下の程度は、輸液の温度と投与量、患者の体型、外気温などにより規定されると考えられるため、さらなる症例の蓄積が必要と考えられる。

Conclusion

冷却水輸液を用いた迅速な脳低体温療法の導入は、院外VF心停止蘇生後の昏睡患者の神経学的転帰に寄与する。

初期診療時の深部体温のモニタリングとして、食道温は過大評価を生じる可能性がある。

The Impact of Percutaneous Cardiopulmonary Assisted Devices to Treat Patients under Therapeutic Hypothermia in Hemodynamic Compromised State

Background: Therapeutic hypothermia (TH) improves neurological outcomes of patients with out-of-hospital cardiac arrest (OHCA), however, impact of cardiopulmonary assisted devices (PCPS) to treat the patients with prolonged cardiogenic shock under therapeutic hypothermia (HT) have not been sufficiently studied.

Methods: Four years (2005-2008) data were available for 281 patients after OHCA treated with TH in the multicenter registry in Japan. In this study, 57 patients (20.3%) were treated with PCPS. We evaluated factors to influence on favorable neurologic outcome (FNC) in the patients treated with PCPS under TH.

Results: In the patients treated with PCPS, 18 patients showed good out-come with FNC (FNC-group) and 39 had not good out-come with FNC (Non-FNC-group). Although there was no significant in age, gender, the presence of bystanders, initial ECG findings, arterial pH and arterial base excess, but FNC-group showed significantly shorter time of the collapse to return of spontaneous circulation (ROSC) interval, higher rate of ROCS before admission and higher maximum blood pressure after ROSC (27.9±24.0min, 50.0% and 136±44mmHg, respectively) than Non-FNC-group (66.1±37.3min, 7.7% and 96±28mmHg, respectively, $p<0.01$).

Conclusions: The patients treated with TH using PCPS were reached FNC at 30 days up to 31.6%. Time of the collapse to ROSC interval, ROSC before admission and blood pressure after ROSC were important factors to become FNC.

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Impacts of Percutaneous Cardiopulmonary Assisted Devices to Treat Patients under Therapeutic Hypothermia in Compromised State

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JCS 2010

Sapporo Medical University

Presenter Disclosure Information

Nobuaki Kokubu, MD
Impacts of Percutaneous Cardiopulmonary Assisted Devices to Treat Patients under Therapeutic Hypothermia in Compromised State

FINANCIAL DISCLOSURE: None

UNLABELED/UNAPPROVED USES DISCLOSURE: None

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Backgrounds

Although it has been reported that therapeutic hypothermia (TH) improves neurological outcomes of patients with cardiac arrest, procedures of the hypothermia remain to be established.

Particularly, impact of cardiopulmonary assisted devices (PCPS) to treat the patients with prolonged cardiogenic shock under TH has not been sufficiently studied.

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Objective

To investigate the efficacy of TH including PCPS in patients with return of spontaneous circulation (ROSC) after resuscitation from out-of-hospital or inhospital cardiac arrest.

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Study Populations

281 consecutive patients with ROSC after resuscitation treated with TH in the multicenter registry in Japan (J-Pulse-Hypo registry) for 4 years (2005-2008).

<Inclusion criteria>
- Adult patients who remained unconscious after resuscitation from out-of-hospital or inhospital cardiac arrest.
- Presented the stable hemodynamics with treatment or mechanical supporting system including IABP or PCPS.

<Exclusion criteria>
- pregnancy
- dissection of aorta
- pulmonary thromboembolism
- drug poisoning
- poor daily activity

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Study Organization

Principle Investigator:
Hiroshi Nonogi

Working members:
Ken Nagao, Hiroyuki Yokoyama Yohio Tahara, Shinichi Shirai, Shunji Kasaoka, Kazunori Kashiwase, Yuichi Motomura, Tomotaka Sawano, Mamoru Hase, Takuro Hayashi, Tatsuya Maruhashi, Yuji Yasuga, Nobuaki Kokubu, Yoritaka Otsuka Hideaki Arimoto, Kazui Soma, Yasuhiro Kuroda, Hiroshi Hazui

Biostatisticians:
Naohiro Yonemoto, Akiko Kada

Participating institution:

National Cardiovascular Center	Sapporo Medical University Hospital
Nihon University Surugadai Hospital	Yokohama City University Hospital
Osaka Police Hospital	Kokura Memorial Hospital
Saga University Hospital	Saiseikai Senri Hospital
Hiroshima City Hospital	Osaka City University Hospital
Takatsuki Red Cross Hospital	Kitazato University Hospital
Yamaguchi Univrsity Hospital	Mishima Emergency critical Center
Kagawa University Hospital	Sumitomo Hospital

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Methods-1

Selection of cooling procedure was left to each institution.

The patients with hemodynamic compromised state were treated with PCPS (PCPS group).

↓

PCPS group: n=57 (20%)
Non-PCPS group: n=224 (80%)

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Methods-2

We evaluated clinical characteristics of the patients treated with PCPS under TH, and factors to influence on favorable neurologic outcome (FNC) in patients treated with PCPS.

Primary end point of this study was FNC, cerebral performance category (CPC) 1 and 2 rate at 30 days.

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Clinical characteristics of patients treated with TH

	All patients (n = 281)
Age (years)	58± 13
Male	235 (84%)
Initial cardiac rhythm	
Ventricular fibrillation	196 (69%)
Pulseless electrical activity	26 (9%)
Asystole	21 (8%)
Unidentified	37 (13%)
Witnessed cardiac arrest	247 (88%)
Bystander CPR	145 (52%)
OHCA	267 (95%)
ROSC before admission	167 (60%)
Collapse to ROSC interval (min)	37.8± 50.9
Acute coronary syndrome	170 (60%)
Emergency PCI	122 (43%)
PCPS use	57 (20%)
IABP use	108 (38%)
FNC rate at 30 days	123 (44%)

Data are presented as mean value ± SD or number (%) of patients.
CPR, cadiopulmonary resuscitation; IABP, intra aortic balloon pumping;
OHCA, out of hospital cardical arrest; PCI, percutaneous coronary intervention.

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Clinical characteristics between PCPS group and non-PCPS group

	PCPS group (n = 57)	Non-PCPS group (n = 224)	p value
Age (years)	59± 9	58 ± 14	0.56
Male	52 (91%)	183 (82%)	0.06
Initial cardiac rhythm			0.32
Ventricular fibrillation	35 (61%)	161 (72%)	
Pulseless electrical activity	6 (10%)	20 (9%)	
Asystole	4 (7%)	17 (7%)	
Unidentified	12 (21%)	25 (11%)	
Witnessed cardiac arrest	50 (88%)	197 (88%)	0.96
Bystander CPR	33 (58%)	112 (50%)	0.29
OHCA	54 (95%)	213 (95%)	0.91
ROSC before admission	13 (23%)	154 (69%)	<0.01
Collapse to ROSC interval (min)	66.8 ± 48.9	30.8 ± 49.0	<0.01
Acute coronary syndrome	41 (72%)	129 (58%)	0.04
Emergency PCI	36 (63%)	86 (38%)	<0.01
IABP use	43 (75%)	65 (29%)	<0.01

Data are presented as mean value ± SD or number (%) of patients.

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Cooling parameters and laboratory value on admission between PCPS group and non-PCPS group

	PCPS group (n = 57)	Non-PCPS group (n = 224)	p value
Maximam BP after ROSC	110± 39	132± 34	<0.01
Initiation cooling to target temperature (min)	124 ± 137	293± 248	<0.01
Cooling duration (hour)	32± 13	35 ± 15	0.24
Arterial blood pH	7.06± 0.19	7.17± 0.18	<0.01
Arterial blood Base Excess(mmol/l)	-16.3± 6.5	-11.5 ± 6.2	<0.01
Blood Sugar(mg/l)	297± 120	256± 85	<0.01
Creatinine(mg/dl)	1.3± 1.3	1.5± 1.8	0.32
Potassium(mEq/dl)	4.2± 1.0	4.1± 0.1	0.43
Hemoglobin(g/dl)	13± 2	14 ± 2	0.07

Data are presented as mean value ± SD or number (%) of patients.

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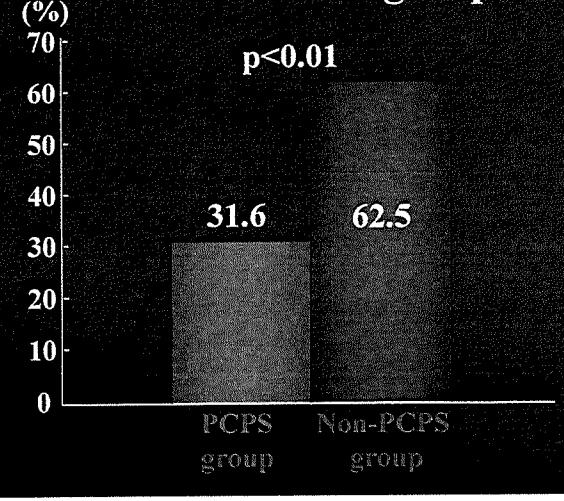
FNC rate at 30 days between PCPS group and non-PCPS group



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Comparison between FNC(CPC1/2) category and Non-FNC(CPC 3/4) category in PCPS group

	FNC group (CPC1/2) (n = 18)	Non-FNC group (CPC3/4) (n = 39)	p value
OHCA	16 (89%)	38 (97%)	0.20
ROSC before admission	9 (50%)	4 (10%)	<0.01
Collapse to ROSC interval (min)	42.6 ± 32.5	79.2 ± 51.6	<0.01
Acute coronary syndrome	16 (89%)	25 (64%)	0.04
Emergency PCI	11 (61%)	25 (64%)	0.83
IABP use	12 (67%)	31 (79%)	0.30
Maximam BP after ROSC(mmHg)	136± 44	96 ± 28	<0.01
Initiation cooling to target temperature (min)	113 ± 105	145± 185	0.43
Arterial blood pH	7.11± 0.20	7.03 ± 0.20	0.17
Arterial blood Base Excess(mmol/l)	-14.9± 7.8	-17.0 ± 5.7	0.27
Blood Sugar(mg/l)	260± 114	316 ± 119	0.11

Data are presented as mean value ± SD or number (%) of patients

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Summary

To compare with non-PCPS group, PCPS group showed much less FNC rate at 30 days.

Although PCPS group showed much hemodynamic compromised state in maximum blood pressure, rate of ROSC before admission, collapse to ROSC interval, blood sugar, pH and base excess of arterial blood gas at admission, PCPS group was more treated with PCI and IABP than in non-PCPS group.

Patients with FNC in PCPS group showed higher maximum blood pressure, more often coronary artery syndrome, higher rate of ROSC before admission and shorter collapse to ROSC interval than patients without FNC.

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Conclusions

The patients treated with TH using PCPS, even who were in very ill condition, were reached FNC at 30 days up to 31.6%.

Higher maximum blood pressure after ROSC, cardiac arrest due to acute coronary syndrome, ROSC before admission and collapse to ROSC interval were important factors of FNC in PCPS group.

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Efficacy of Therapeutic Hypothermia for Out-of-Hospital Cardiac Arrest in Patients with Non-Ventricular Fibrillation: J-PULSE-Hypo Registry

Yoshio Tahara, Kazuo Kimura, Noriyuki Suzuki, Ken Nagao, Naohiro Yonemoto, Hiroyuki Yokoyama, Hiroshi Nonogi and the J-PULSE-Hypo Investigators

Background: Two randomized trials and a meta-analysis showed therapeutic hypothermia improved survival and neurological outcomes in adults who remained comatose after initial resuscitation from out-of-hospital cardiac arrest due to ventricular fibrillation (VF). However, whether therapeutic hypothermia is effective for cardiac arrest without VF remains unclear.

Methods: We conducted a multicenter retrospective study at 12 institutions to evaluate the effect of therapeutic hypothermia on out-of-hospital cardiac arrest between January 2005 and December 2007. Enrolled patients were divided into the VF group, pulseless electrical activity (PEA) group, and asystole group according to the initial rhythm, and neurologic outcomes at discharge from the hospital were compared. A favorable outcome was defined as a Cerebral Performance Category (CPC) of 1-2.

Results: A total of 281 patients were enrolled. The mean age was 58±13 years. Men accounted for 84% of all patients. The median interval from collapse to return of spontaneous circulation was 18 (13-25) minutes. As compared with the asystole group (N=16), the VF group (N=239) and the PEA group (N=26) had higher rates of favorable outcomes (VF 62%; PEA 35%; asystole 6%, $p<0.01$).

Conclusions: Our results suggested that therapeutic hypothermia was effective not only for out-of-hospital cardiac arrest due to VF, but also for cardiac arrest due to causes other VF, particularly PEA. Further larger studies are needed to confirm our results.

Efficacy of Therapeutic Hypothermia for Out-of-Hospital Cardiac Arrest in Patients with Non-Ventricular Fibrillation: J-PULSE-Hypo Registry

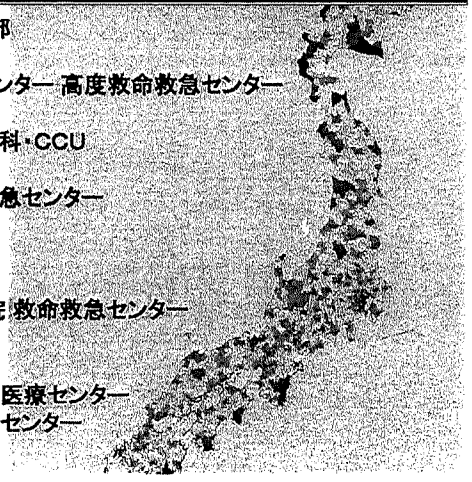
Yoshio Tahara, Kazuo Kimura, Noriyuki Suzuki, Ken Nagao, Naohiro Yonemoto, Hiroyuki Yokoyama, Hiroshi Nonogi and the J-PULSE-Hypo Investigators

初期調律が心室細動以外の院外心停止蘇生後に対する低体温療法の効果

J-PULSE-Hypo Registry：

心原性心停止蘇生後の低体温療法に関する多施設共同研究

厚生労働省：H19-心筋-03　急性心筋梗塞と脳卒中に対する急性期診療体制の構築に関する研究（主任研究者　野々木　宏）



札幌医大付属病院　救急集中治療部
駿河台日本大学病院　循環器科
横浜市立大学付属市民総合医療センター 高度救命救急センター
北里大学病院　救急救命センター
国立循環器病センター　心臓血管内科・CCU
大阪府三島救命救急センター
大阪市立総合医療センター　救命救急センター
大阪警察病院
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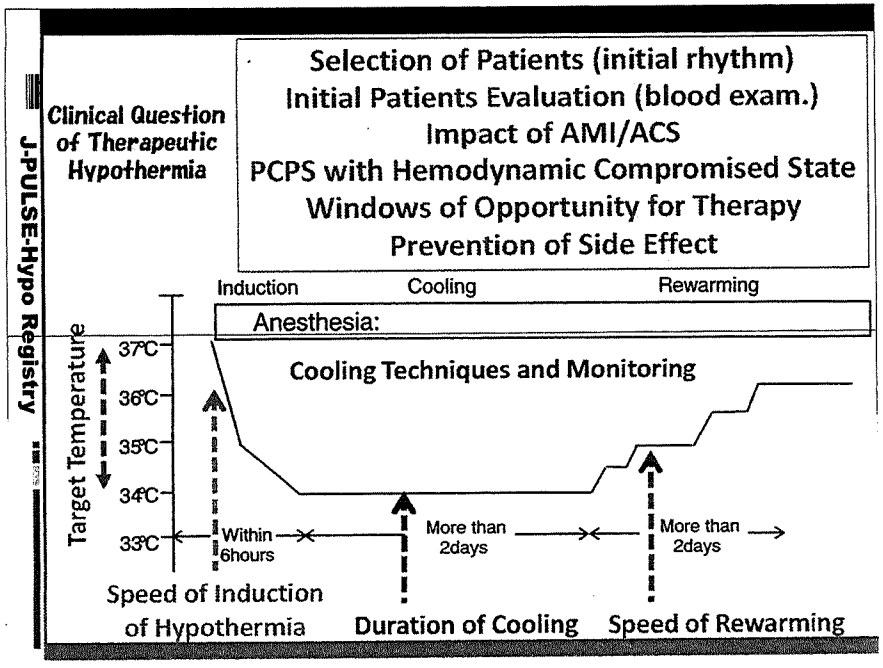
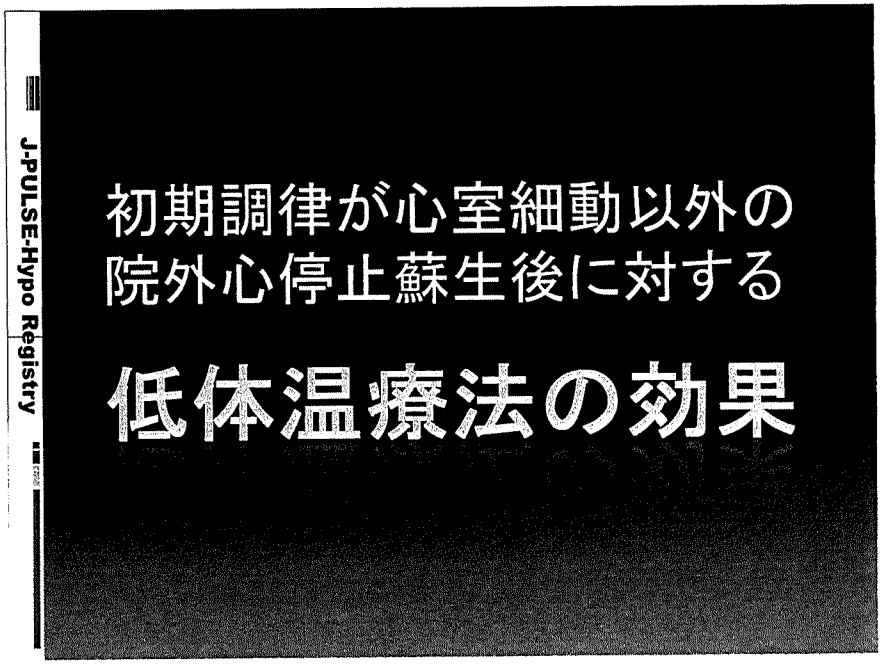
小倉記念病院循環器科

J-PULSE-Hypo Registry

＜多施設共同登録研究（コホート研究）＞

参加施設：	16施設
適格基準：	2005年から2009年までの5年間の各施設で低体温療法を施行した院外心原性心停止蘇生後患者 1）18歳以上 2）心拍再開後に循環動態が安定している（薬物あるいは補助循環で安定していても可） 3）心拍再開後も昏睡状態にある患者で、低体温療法を施行した患者
除外基準：	1）妊婦 2）大動脈解離 3）頭蓋内出血 4）発症前ADL不良の患者
目標登録数：	500
調査期間：	2005年1月～2009年12月
今回の調査期間：	2005年1月～2008年12月
登録患者数：	281

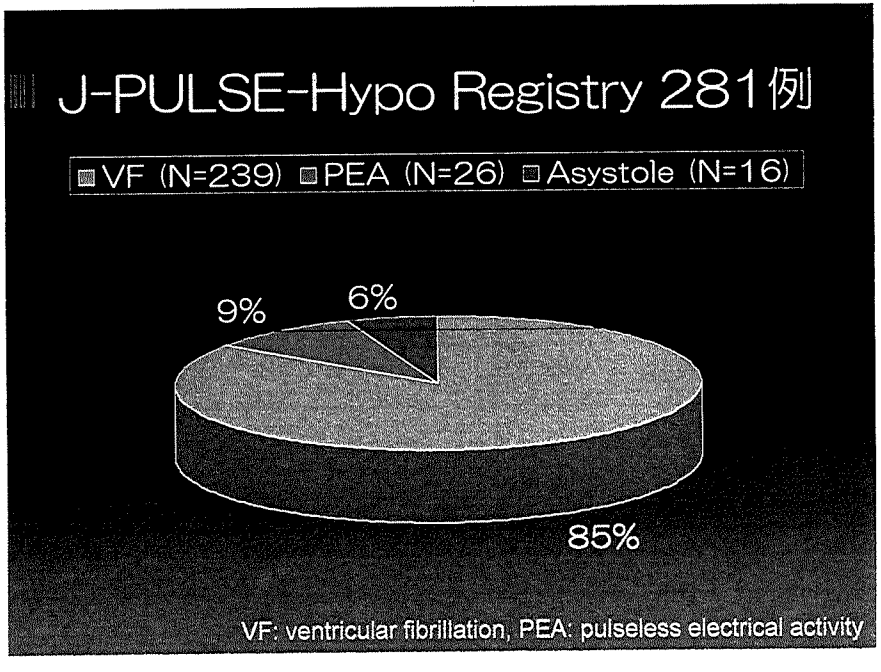




蘇生後低体温療法（ガイドライン 2005）

＜初期調律＞

VF	Class Ⅱa	Randomized trials	Favorable outcome
		N Engl J Med. 2002;346:549–556. (European study)	VF (n=136) 55%
		N Engl J Med. 2002;346:557–563. (Australian study)	VF (n=43) 49%
Non VF	Class Ⅱb	Case series	Faborable outcome
		Resuscitation. 2001;51:275–281. (Helmet device study)	PEA+Asystole (n=16) 21%



患者背景

	VF (N=239)	PEA (N=26)	Asystole (N=16)	p
年齢（歳，mean ± SD）	57±13	62±13	61±13	0.21
男性（%）	85	73	81	0.29
目撃者（%）	88	92	75	0.22
バイスタンダーCPR（%）	52	62	38	0.32
心原性（%）	99	89	88	<0.01
緊急PCI（%）	45	35	25	0.18
IABP（%）	38	42	44	0.81
PCPS（%）	20	35	6	0.07
心停止から自己心拍再開までの時間（分，mean ± SD）	27±28	31±23	36±26	0.01
心停止から目標体温到達までの時間（分，mean ± SD）	379±259	368±274	442±167	0.16

来院時血液検査　所見

（数値はすべて平均値）

	VF (N=239)	PEA (N=26)	Asystole (N=16)	p
WBC (/uL)	12297 (N=234)	12293 (N=26)	11839 (N=16)	0.73
RBC (X10⁴/uL)	435 (N=234)	417 (N=26)	423 (N=16)	0.26
Hb (g/dL)	13.8 (N=234)	13.0 (N=26)	13.2 (N=16)	0.11
Ht (%)	41.4 (N=234)	39.5 (N=26)	38.4 (N=16)	0.18
BUN (mg/dL)	20 (N=234)	24 (N=26)	18 (N=16)	0.32
Cre (mg/dL)	1.4 (N=234)	1.9 (N=26)	1.3 (N=16)	0.19
K (mEq/L)	4.0 (N=234)	4.6 (N=26)	4.7 (N=16)	<0.01
LDH (IU/L)	378 (N=223)	416 (N=25)	516 (N=15)	0.04
Glucose (mg/dL)	257 (N=234)	295 (N=25)	323 (N=16)	0.03
HbA1c (%)	5.6 (N=123)	6.2 (N=14)	6.1 (N=9)	0.26
NH3 (ug/dL)	94 (N=64)	120 (N=8)	181 (N=8)	0.27

来院時血液ガス分析　所見

	VF (N=239)	PEA (N=26)	Asystole (N=16)	p
pH	7.17 (N=217)	7.06 (N=26)	6.98 (N=16)	<0.01
PaCO2 (mmHg)	46.4 (N=217)	60.6 (N=26)	75.7 (N=16)	<0.01
PaO2 (mmHg)	272 (N=215)	213 (N=26)	223 (N=16)	0.08
HCO3 (mmol/L)	16.3 (N=212)	15.2 (N=26)	15.9 (N=15)	0.37
BE (mmol/L)	-11.9 (N=215)	-15.1 (N=26)	-15.7 (N=16)	<0.01

（数値はすべて平均値）

来院時血液ガス分析　所見

	VF (N=239)	PEA (N=26)	Asystole (N=16)	p
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HCO3 (mmol/L)	16.3 (N=212)	15.2 (N=26)	15.9 (N=15)	0.37
BE (mmol/L)	-11.9 (N=215)	-15.1 (N=26)	-15.7 (N=16)	<0.01

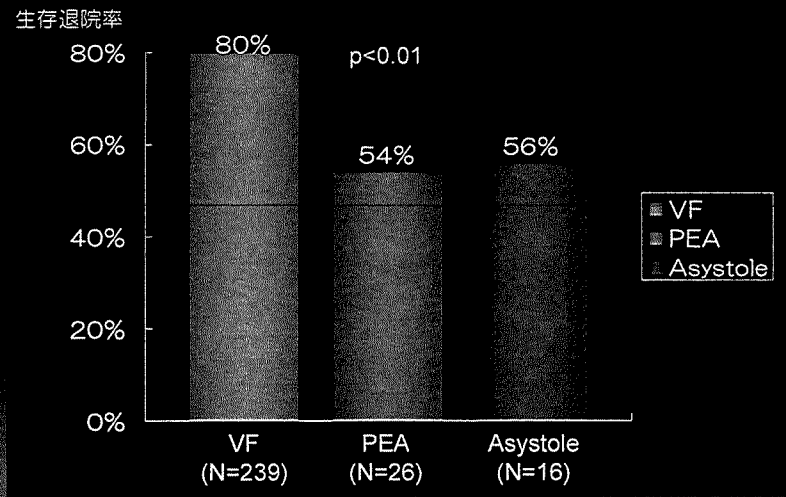
（数値はすべて平均値）

	VF (N=239)	PEA (N=26)	Asystole (N=16)	p
病院到着前自己心拍再開率（%）	65	27	25	<0.01

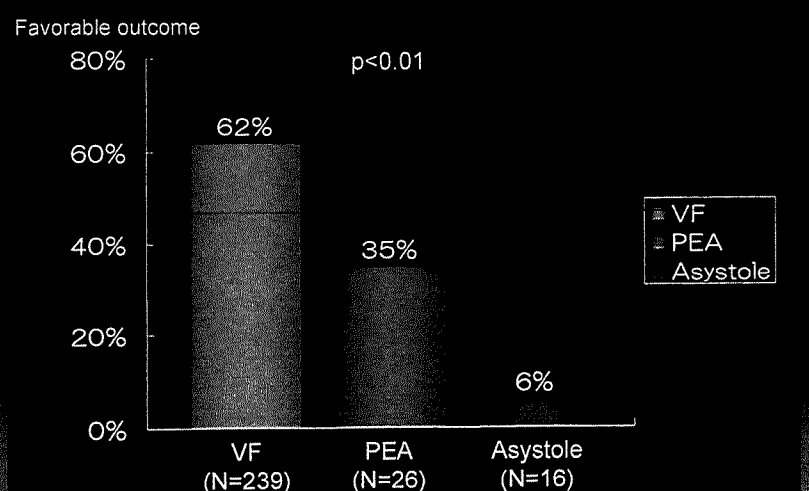
原因疾患

	VF (N=239)	PEA (N=26)	Asystole (N=16)	p
急性冠症候群（%）	61	58	56	0.89
肥大型心筋症（%）	5	0	6	0.47
拡張型心筋症（%）	2	4	6	0.39
その他の原因による不整脈（%）	13	4	0	0.13
推定心原性（%）	18	23	19	0.82
非心原性（%）	1	11	13	<0.01
	縊頸（1） 不明（1）	もち窒息（1） 腎不全（1） 呼吸器疾患（1）	喘息（1） 外傷（1）	

結果：生存退院



結果：退院時 Favorable outcome



Favorable outcome: CPC 1 or 2, CPC: Cerebral Performance Category

Non-VF (PEA, Asystole) のFavorable outcomeに寄与する因子 <単変量解析>

	Favorable Group [N=10]	Non favorable Group [N=32]	p
初期調律PEA（%）	90	53	0.04
病院前自己心拍再開（%）	70	13	<0.01
心停止-心拍再開時間（分）	14.8±7.8	38.3±24.1	<0.01
来院時血液検査 Glucose（mg/dL）	239±46	327±122	0.03
血液ガス分析 pH	7.21±0.17	6.97±0.21	<0.01
血液ガス分析 HCO3（mmol/L）	17.8±5.7	14.7±3.4	0.04
血液ガス分析 BE（mmol/L）	-9.6±5.8	-17.1±6.0	<0.01
PCPS（%）	0	31	0.04

Limitations

- PEAとAsystoleの症例数が少ない。
- 低体温療法の適応および管理基準が施設間で異なる。
- J-PULSE Hypo参加施設で治療した院外心停止全体のアウトカムが不明である。

まとめ

- 院外心停止蘇生後に対して低体温療法はVF症例のみならず、非VF（特にPEA）症例に対しても効果があることが示唆された。
- さらなる症例の集積により検討を要する。

J-PULSE hypothermia registry

札幌医大付属病院　救急集中治療部
駿河台日本大学病院　循環器科
横浜市立大学付属市民総合医療センター 高度救命救急センター
北里大学病院　救急救命センター
国立循環器病センター　心臓血管内科・CCU
大阪府三島救命救急センター
大阪市立総合医療センター　救命救急センター
大阪警察病院
大阪府済生会千里病院
住友病院　循環器内科
神戸市立医療センター中央市民病院 救命救急センター
広島市民病院　循環器科
香川大学医学部付属病院
山口大学医学部付属病院 先進救急医療センター
佐賀大学医学部附属病院 救命救急センター
小倉記念病院循環器科

厚生労働省：H19-心筋-03　急性心筋梗塞と脳卒中に対する急性期診療体制の構築に関する研究（主任研究者　野々木 宏）

Relationship between favorable neurological outcome and time interval from collapse to ROSC in patients treated with hypothermia:
J-PULSE-Hypo; a multi-center observational study

Taketomo Soga, Ken Nagao
Naohiro Yonemoto, Hiroyuki Yokoyama
Hiroshi Nonogi and the J-PULSE-Hypo Investigators

Background- Clinical evidence strongly supported mild hypothermia as an effective therapy for patients with return of spontaneous circulation (ROSC) after out-of-hospital cardiac arrest, but the patients who may benefit from this treatment have not been fully elucidated. We investigated the relationship between neurological benefits and time interval from collapse to ROSC.

Methods and Results- We did a multicenter observational study of therapeutic hypothermia for unconscious adult patients with ROSC after out-of-hospital cardiac arrest. The committee entrusted each hospital with timing of cooling, cooling methods, target temperature, duration, and rewarming rate. The primary endpoint was a favorable neurological outcome at hospital discharge.

A total of 281 patients were enrolled in this study. Of those, a favorable neurological outcome was seen in 157(55.9%). A median (IQR) collapse-to-ROSC interval was 25 (17-40) min, and the collapse-to-ROSC interval of patients with favorable neurological outcome was shorter than that with unfavorable neurological outcome (median; 18 min vs. 34 min, $p<0.0001$). The collapse-to-ROSC interval cutoff value of 25.5 min had an accuracy of 76.0% for identification of a favorable neurological outcome. In addition, a collapse-to-ROSC interval of 65.5 min had a negative predictive of 100% for a favorable neurological outcome. In the multiple logistic-regression analysis, a collapse-to-ROSC interval cutoff value of 25.5 min was an independent predictor of a favorable neurological outcome.

Conclusions- In patients undergoing mild hypothermia after ROSC, time interval from collapse to ROSC was an independent predictor for a favorable neurological outcome. Further research is needed in patients with prolonged CPR of 25 min or longer.

Relationship between favorable neurological outcome and time interval from collapse to ROSC in patients treated with hypothermia: J-PULSE-Hypo; a multi-center observational study

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Naohiro Yonemoto, Hiroyuki Yokoyama
Hiroshi Nonogi and the J-PULSE-Hypo Investigators

Introduction

- 1990年代以降、院外心停止心拍再開後の患者におけるhypothermiaは、神経学的転帰を改善させるとの報告が多くされてきている。
- 2002年、2つのRCTが報告され、hypothermiaの有効性を示した。
- 2003年、ILCORは、初回心電図がVFの院外心停止蘇生後患者に対し、32～34℃、12～24時間のhypothermiaをすべきとしている。

しかし、hypothermiaの至適対象、目標深部体温、開始時期、冷却期間、復温期間などにおいて、まだ検討する必要がある。

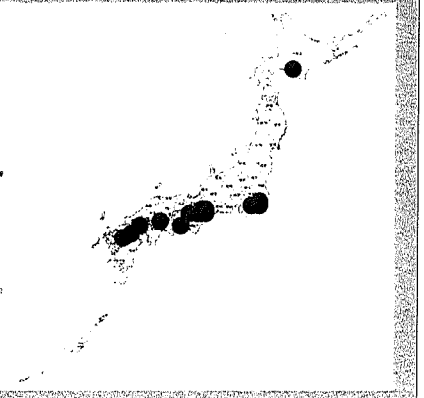
日本において、院外心停止蘇生後患者に対するhypothermiaの有効性は報告されているが、単施設の報告がほとんどである。Hypothermiaの有効性などをより検討するために、日本でも多施設共同試験J-PULSE-Hypoが開始された。

ClinicalTrials.gov
A service of the U.S. National Institutes of Health

Multicenter Registry Study With Therapeutic Hypothermia After Cardiac Arrest in Japan (J-PULSE-HYPO)

This study is currently recruiting participants.
Verified by National Cardiovascular Center, Japan, May 2009

First Received: May 12, 2009 No Changes Posted



J-PULSE hypothermia registry

ClinicalTrials.gov
A service of the U.S. National Institutes of Health

Multicenter Registry Study With Therapeutic Hypothermia After Cardiac Arrest in Japan (J-PULSE-HYPO)

This study is currently recruiting participants.
Verified by National Cardiovascular Center, Japan, May 2009

Study Population

Patients with therapeutic hypothermia after cardiac arrest from 2005 to 2009 in each hospitals.

Criteria

Inclusion Criteria:

- Adult patients who remained unconscious after resuscitation from out-of-hospital or inhospital cardiac arrest
- Presented the stable hemodynamics with drug treatments or mechanical supporting system including IABP or PCPS

Exclusion Criteria:

- Patients with:
  - pregnancy
  - acute aortic dissection
  - pulmonary thromboembolism
  - drug poisoning
  - poor daily activity

J-PULSE hypothermia registry

低体温療法プロトコル

4℃の細胞外液を30～60分以内に投与し、低体温療法を導入する。
- 低体温療法の維持方法:
  1) Surface cooling (a: Cooling Blanket (Blanketrol II, CSZ medical, Cincinnati, OH, USA, b: Cooling device with self-adhesive, hydrogel-coated pads (Arctic Sun, Medivance, Louisville, KY, USA),
  2) Blood cooling (c: Extracorporeal direct blood cooling (KTEK-III, Kawasumi, Tokyo, Japan, d: Endovascular cooling device (CoolGard 3000, Alsius, Irvine, CA, USA).
- 低体温療法の目標深部体温は32～34℃、冷却期間は24～72時間.
- 復温は緩徐に行い、少なくとも24～72時間をかけて行う.

5

Study endpoints

The primary endpoint :30日後の良好な神経学的転帰とする(CPC 1or2)。
The secondary endpoint:24時間、1週間、30日後生存率とする。

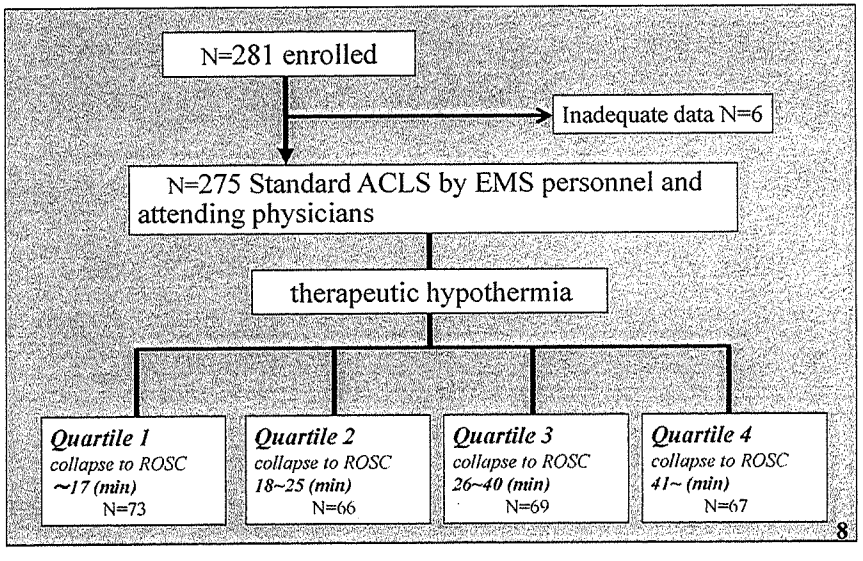
6

目的

心停止時間と良好な神経学的転帰の関係を検討する。

7

Study profile



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Baseline characteristics

	Quartile 1 (<18 min) N=73	Quartile 2 (18-25 min) N=66	Quartile 3 (26-40 min) N=69	Quartile 4 (>41 min) N=67	p value
年齢	58 (47-66)	61 (52-67)	62 (52-70)	59 (52-67)	0.43
性別（男性）	60 (82%)	53 (80%)	60 (87%)	57 (85%)	0.73
心停止初回心電図					
VF/pulseless VT	67 (92%)	61 (92%)	56 (81%)	47 (71%)	0.0015
non-VF/pulseless VT	6 (8%)	5 (8%)	13 (19%)	19 (29%)	
心停止原因					
Acute coronary syndrome (ACS)	32 (44%)	23 (35%)	28 (41%)	37 (55%)	0.11
non-ACS	41 (56%)	43 (65%)	41 (59%)	30 (45%)	
目撃者	67 (92%)	63 (95%)	63 (91%)	49 (73%)	0.0002
バイスタンダーCPR	37 (51%)	32 (48%)	35 (51%)	39 (58%)	0.69
時間経過（分）					
心停止～119番通報	1 (0-3)	2 (1-5)	3 (1-5)	4 (2-10)	<0.0001
119番通報～患者接触	5 (4-7)	6.0 (4-7)	6.5 (5-9)	6.0 (5-9)	0.043
患者接触～ER	19 (13-25)	15 (10-21)	18 (14-22)	18 (9-23)	0.029
心停止～目標深部体温	270 (189-445)	360 (212-531)	370 (225-563)	317 (200-510)	0.19

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Baseline characteristics (No.2)

	Quartile 1 (<18 min) N=73	Quartile 2 (18-25 min) N=66	Quartile 3 (26-40 min) N=69	Quartile 4 (>41 min) N=67	p value
目標深部体温					
32 ℃	1 (1%)	1 (2%)	4 (6%)	2 (3%)	0.21
33 ℃	6 (8%)	3 (5%)	6 (9%)	11 (16%)	
34 ℃	63 (86%)	59 (89%)	59 (86%)	51 (71%)	
35 ℃	3 (4%)	3 (5%)	0 (0%)	3 (5%)	
低体温療法冷却期間					
24 hours	32 (44%)	25 (38%)	23 (33%)	24 (36%)	0.58
48 hours	26 (36%)	22 (33%)	24 (35%)	19 (28%)	
72 hours	13 (18%)	15 (23%)	21 (30%)	20 (30%)	
低体温療法冷却手法					
surface cooling	36 (51%)	45 (69%)	37 (57%)	33 (52%)	0.13
blood cooling	34 (49%)	20 (31%)	28 (43%)	31 (48%)	
低体温療法開始時血圧 (mmHg)	130 (113-160)	129 (110-156)	120 (104-143)	116 (88-130)	0.006
低体温療法開始時脈拍 (/min)	94 (80-114)	94 (81-120)	94 (80-112)	109 (90-124)	0.15
冠動脈造影	60 (82%)	54 (82%)	55 (80%)	54 (80%)	0.98
冠再灌流療法	32 (44%)	23 (35%)	28 (41%)	37 (55%)	0.11

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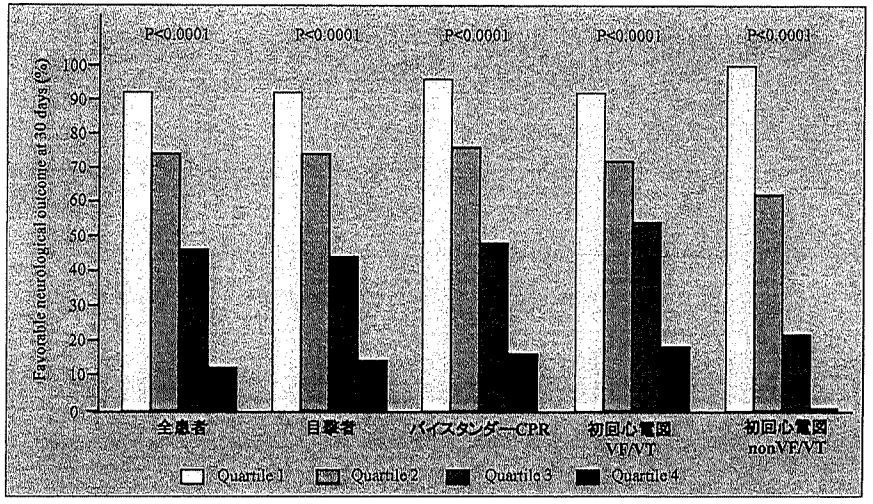
primary endpoint



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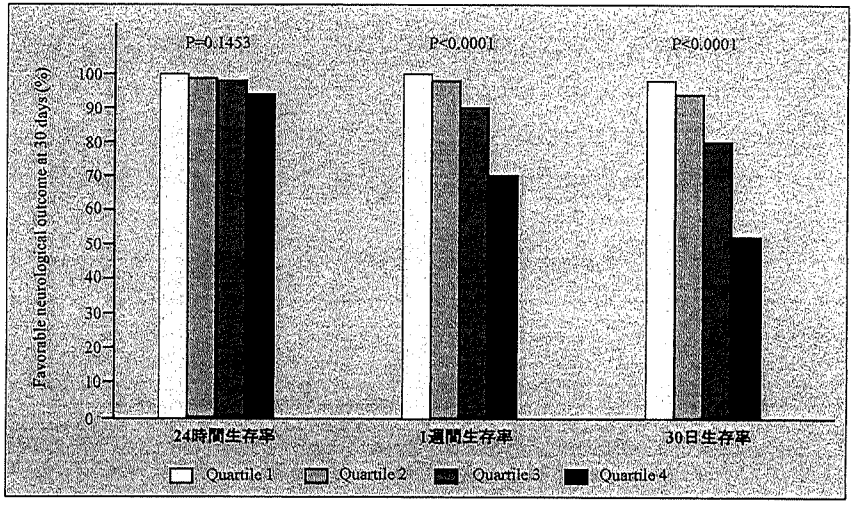
secondary endpoint



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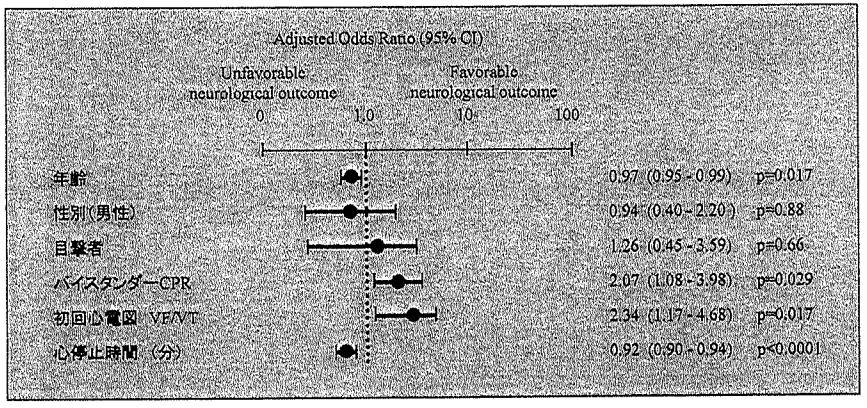
Adjusted odds ratios for a favorable neurological outcome at 30 days survival associated with selected factors, from the multiple logistic-regression analysis



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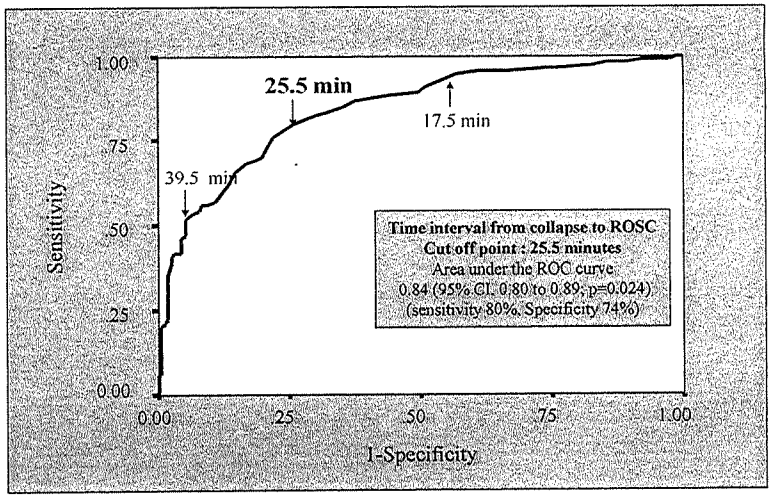
Receiver-operating-characteristics (ROC) curves for various cutoff levels of the collapse-to-ROSC interval to differentiate a favorable neurological outcome and an unfavorable neurological outcome at 30 days survival



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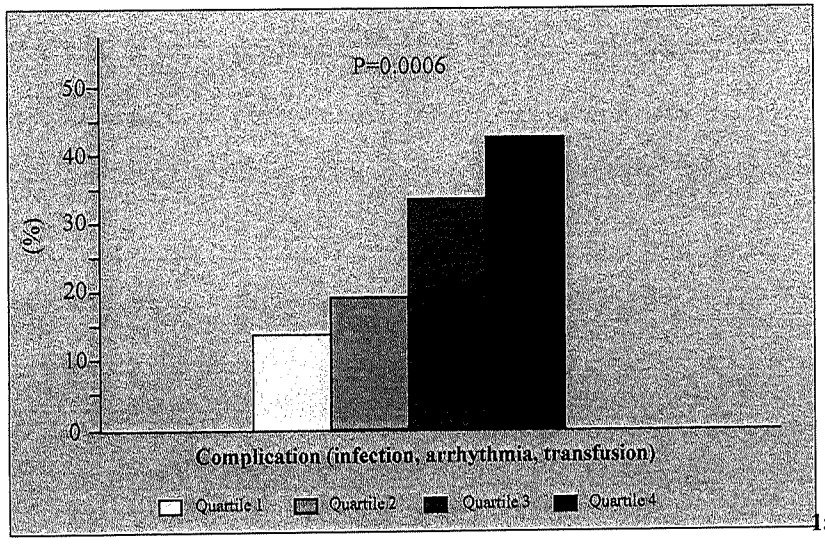
Complications



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Conclusions

- Hypothermiaは院外心臓性心停止患者において有用、有効な手法である。
- 本研究において、現行のhypothermiaは、約6割の社会復帰率を得られるとの結果。
- 心停止時間が25分以内であれば、約8割の社会復帰率を認め、25分以内の心停止はhypothermiaの至適対象となりうる。
- 25以上の心停止、初回心電図がVF/VT以外の症例においては、さらなる研究や戦略が必要である。

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J-RCPR

抄録・スライド