

# Monitoring System of Regional Cerebral Oxygen Saturation (rSO<sub>2</sub>) During Pre-hospital Cardiopulmonary Resuscitation

Goro Tajima<sup>1</sup>, Tadahiko Shiozaki<sup>2</sup>, Hiroo Izumino<sup>1</sup>, Shuhei Yamano<sup>1</sup>, Tomohito Hirao<sup>1</sup>, Takamitsu Inokuma<sup>1</sup>, Kazunori Yamashita<sup>1</sup>, Atsuko Nagatani<sup>1</sup>, Osamu Tasaki<sup>1</sup>

Nagasaki University Hospital, Emergency Medical Center<sup>1</sup>  
Department of Traumatology and Acute Critical Medicine, Osaka University Graduate School of Medicine<sup>2</sup>

## Backgrounds

- It is very difficult to recover without neurological deficit in out of hospital cardiac arrest (OHCA).
- rSO<sub>2</sub> (regional cerebral SO<sub>2</sub>) may predict neurological outcome or return of spontaneous circulation (ROSC) (Ito et al. *Resuscitation* 2012, Ahn et al. *Resuscitation* 2013)

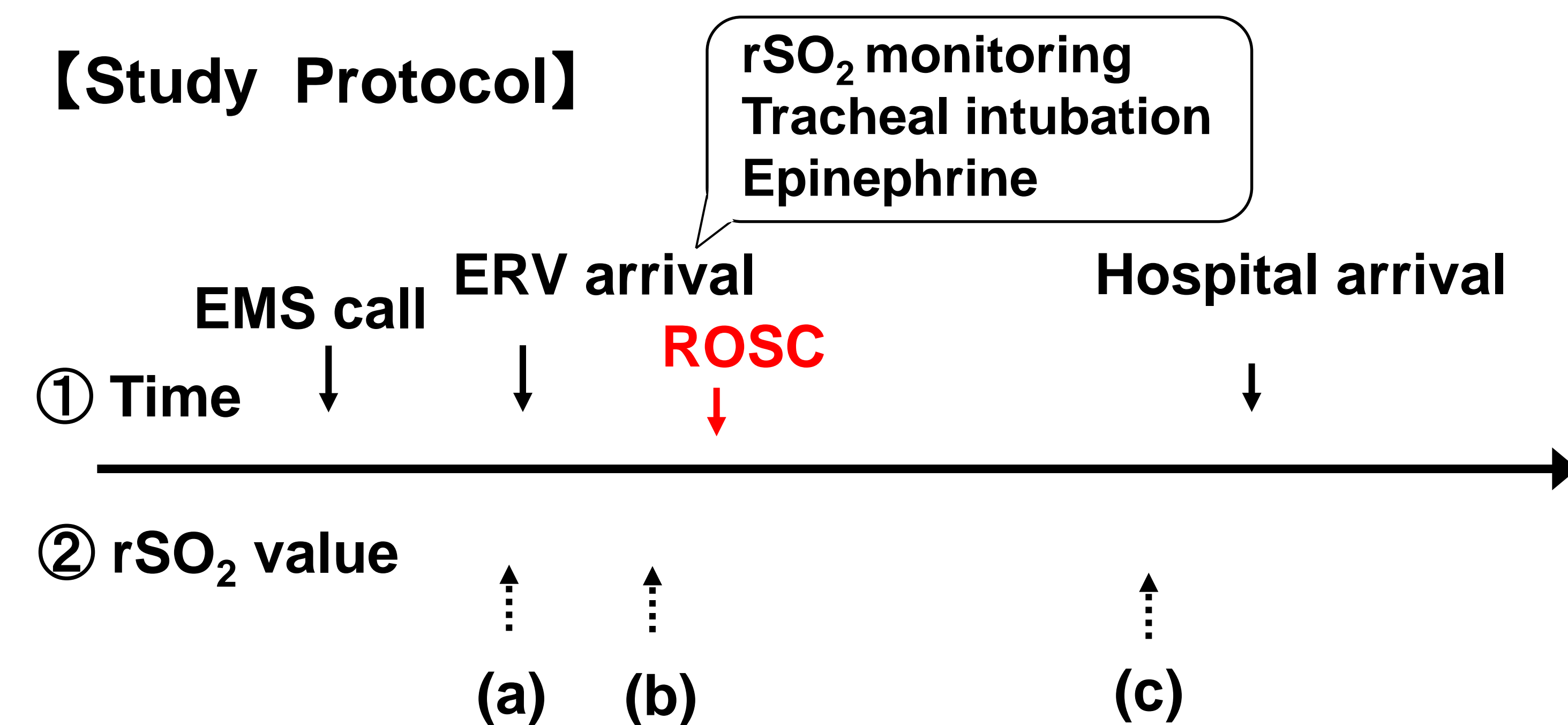
## Objective

- To establish the monitoring system of rSO<sub>2</sub> in patients with cardiopulmonary arrest (CPA) from pre-hospital.
- To clarify the changes in rSO<sub>2</sub> during cardiopulmonary resuscitation (CPR).

## Methods

Patients are all the CPA patients who got CPR and were transferred by Emergency response vehicle (ERV) of Nagasaki University Hospital. Using the portable Near Infrared Spectroscopy (NIRS), rSO<sub>2</sub> was measured continuously during pre-hospital CPR.

### 【Study Protocol】



### 【Measurements】

- ① EMS call ~ ERV arrival (rSO<sub>2</sub> monitoring), EMS call ~ Hospital arrival
- ② rSO<sub>2</sub> value : First touch (a), 5 minutes after intubation (b), 20 minutes after ROSC (c)

## 【 ERV】 【 NIRS : HAND ai TOS, TOSTEC, Tokyo, Japan】



ERV arrival



Tracheal Intubation

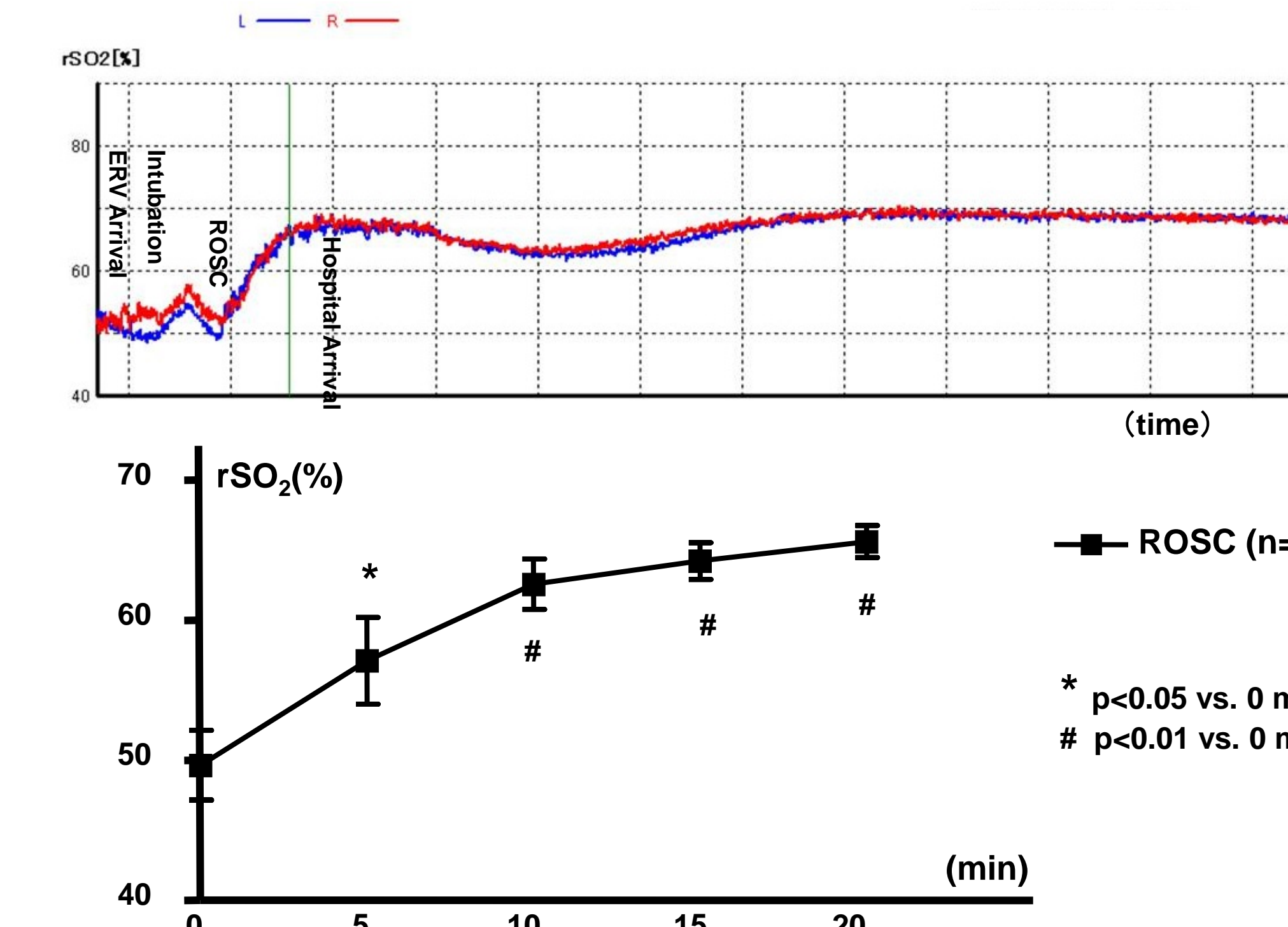


Transfer into the ambulance

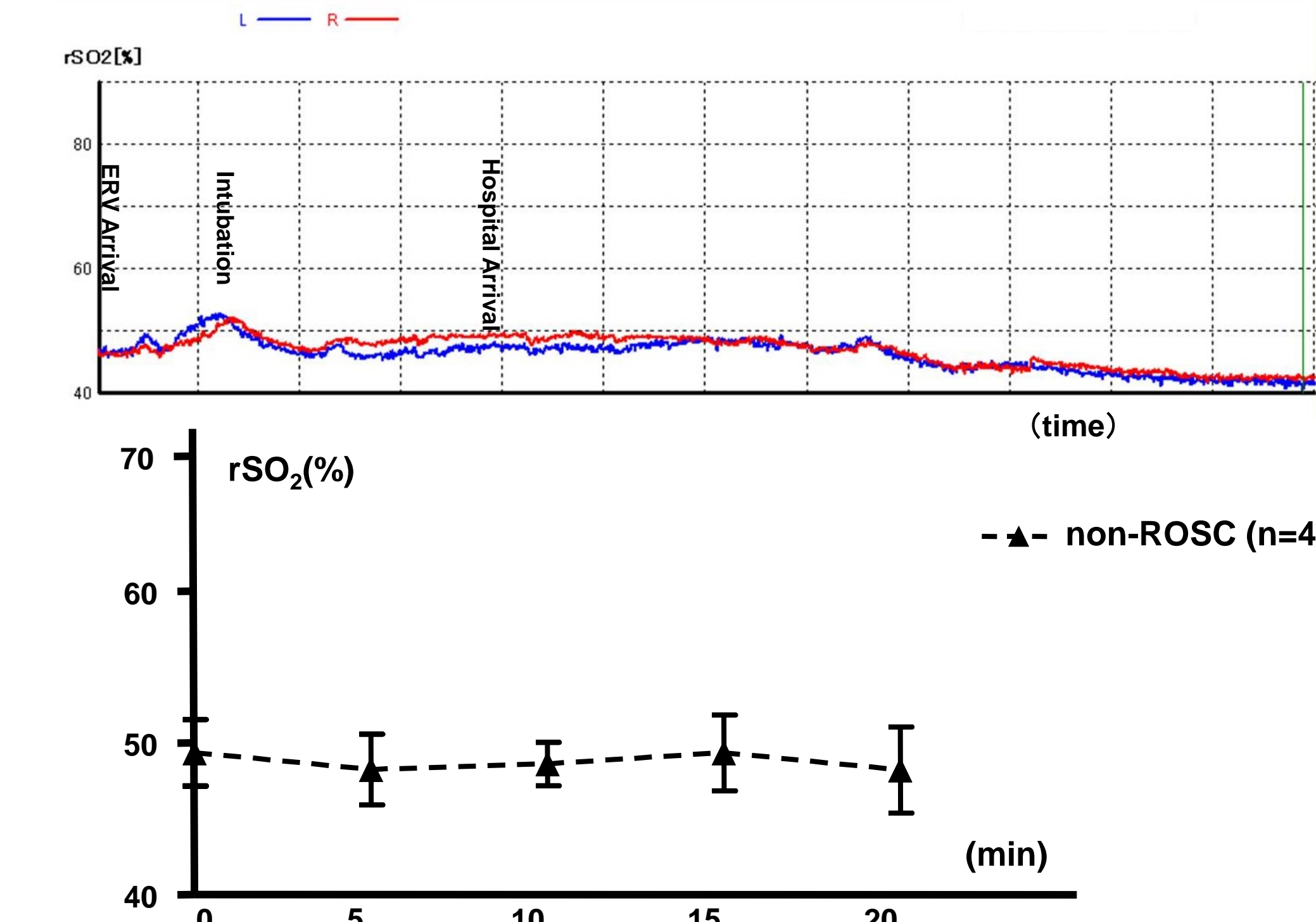


In the ambulance

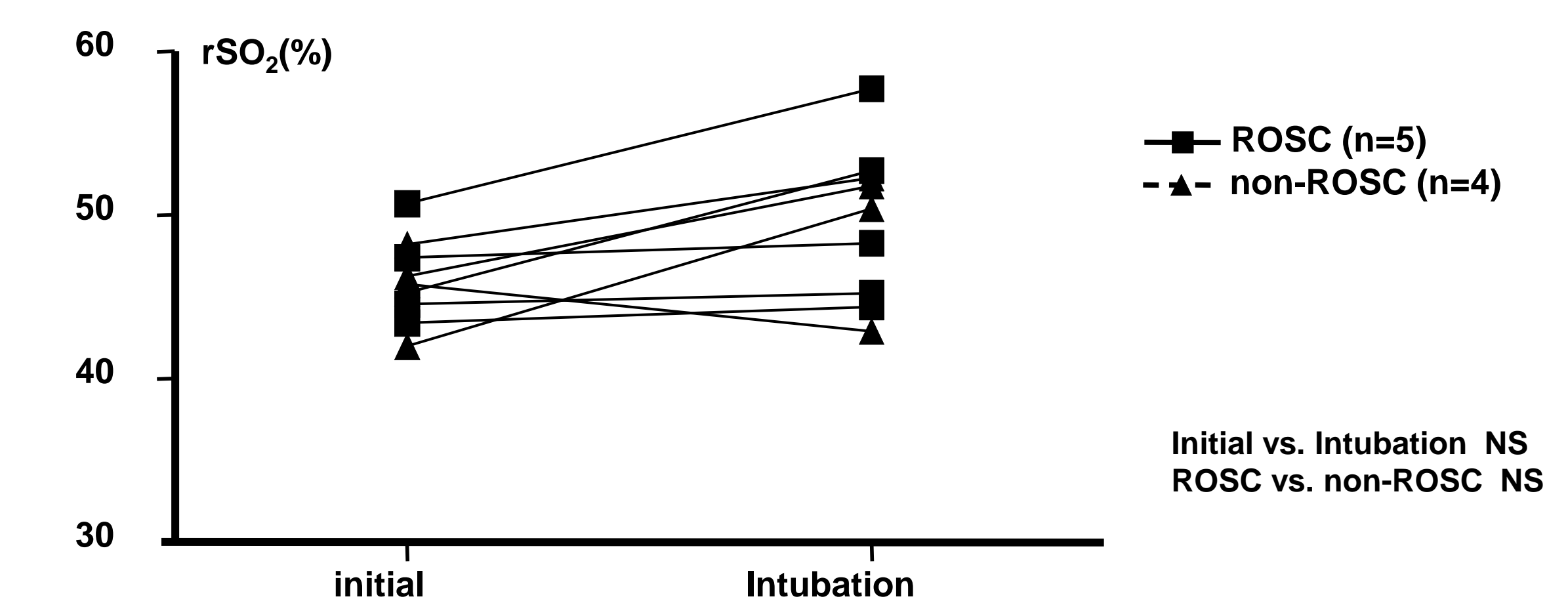
## rSO<sub>2</sub>: ROSC



## rSO<sub>2</sub>: non-ROSC



## rSO<sub>2</sub>: Initial vs. after intubation



## Patients

	Age	Sex	Witness	Rhythm	Bystander CPR	Etiology	ROSC	Time 1*	Time 2*	Outcome
Case 1	80	M	O	Vf	O	ACS	O	16	31	CPC5 (10h)
Case 2	85	F	X	Asystole	X	unknown	O	14	35	CPC5 (7h)
Case 3	70	F	X	Asystole	X	unknown	X	7	33	CPC5
Case 4	71	F	X	Asystole	X	Asphyxia	X	12	37	CPC5
Case 5	71	F	X	PEA	X	Drowning?	X	16	47	CPC5
Case 6	85	M	O	Asystole	O	SCI	O	23	44	CPC4 (45day)
Case 7	52	F	O	Asystole	O	Asphyxia	O	25	52	CPC5 (10day)
Case 8	90	M	X	Asystole	X	Asphyxia	O	10	30	CPC5 (2day)
Case 9	1	F	X	Asystole	X	unknown	X	17	46	CPC5
								16(11-20)	37(32-46)	

\*Time 1 : EMS call ~ ERV arrival  
Time 2 : EMS call ~ Hospital arrival

## Conclusion

- We developed the rSO<sub>2</sub> monitoring system during pre-hospital CPR. This system made it possible to evaluate the cerebral oxygenation about in 15minutes from EMS call.
- rSO<sub>2</sub> significantly increased after ROSC, but not after intubation.
- There was no significant difference in rSO<sub>2</sub> between ROSC and non-ROSC during pre-hospital CPR.