

fraction was increased in a dose-related manner in the DCLHb recipients, but the total LDH was not elevated. No myalgias, temperature elevations, or associated symptoms were observed.

Conclusions: DCLHb infusion was well-tolerated by all participants. The pressor effect reported in pre-clinical studies was also observed in the normal, healthy participants. These Phase I findings support planned, patient-safety studies involving treatment of hemorrhagic, hypovolemic shock.

CPR

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Early Defibrillation in a Two-Tier Emergency Medical System (EMS) with Physician Staffed Ambulances

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Hypothesis: Early defibrillation by emergency medical technicians-defibrillator (EMT-Ds) improves outcome and long-term survival in a two-tier emergency medical services (EMS) with emergency physician staffed ambulances.

Methods: In a prospective, multi-center study, patients with witnessed out-of-hospital ventricular fibrillation (VF) treated by EMS personnel were assigned randomly in one of two groups. The study group (S) consisted of patients defibrillated by EMT-Ds; a control group (C) comprised patients defibrillated by an emergency physician (physician-staffed ambulance vehicle). Time intervals to key events were determined by means of tape-recording during a required review of CPR.

Results: A total of 121 patients (S:n = 45/ C:n = 76) were included.

Median time intervals (25th to 75th percentile) in minutes: from collapse to:

	Study Group	Control Group
Commencement of CPR	7.7 (3.7–11.4)	7.0 (2.5–9.7)
Defibrillation	9.9 (7.1–13.5)**	12.3 (9.5–16.0)
Physician Arrival	13.0 (10.9–17)*	10.4 (7.5–13.6)
ROSC	14.0 (9.1–22.0)*	18.5 (14.1–24.7)

Survival rate (%):

	Study Group	Control Group
ROSC	67 (n = 30)	79 (n = 60)
6 Hours	58 (n = 25)	59 (n = 45)
Discharged from Hospital	31 (n = 14)	29 (n = 21)

Amount of epinephrine (epi) until ROSC:

	Study Group	Control Group
Total epi until ROSC (mg)	2.2–2.7	6.8–7.2
Patients without epi until ROSC		
Patients	40% (n = 12)	12% (n = 7)

ROSC = return of spontaneous circulation

* $p < 0.05$; ** $p < 0.01$ versus C (Mann-Whitney-U test, Fisher's exact test for frequencies)

No significant differences in the initial survival rate, the number of patients discharged alive, and in the neurological long-term prognosis were recorded.

Conclusion: Because of apparent differences in indirect parameters (time interval to ROSC and the number of patients not requiring epi administration) and because of the reduction of the time interval to the first defibrillatory shock by the EMT-D defibrillation, EMT-Ds may perform prehospital defibrillation,

if they reach the patient before the emergency physician and if they are trained extensively and supervised continuously.

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Arrest Interval (IA) Determines the Efficacy of Sodium Bicarbonate (HCO₃) Ventricular Fibrillation

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Objective: To determine whether or not treatment with sodium bicarbonate (HCO₃) alters outcome after I_A of 5, 10, or 15 minutes (min) of VF.

Methods: Seventy-two dogs were anesthetized with halothane/N₂O/O₂. Monitored were: femoral and pulmonary arterial and right atrial pressures; cardiac output; arterial blood gases; ECG; urine output; and expired CO₂. After 5, 10, or 15 min VF without CPR, resuscitation consisted of advanced cardiac life support protocols including epinephrine (0.1 mg/kg) and norepinephrine after restoration of spontaneous circulation (ROSC). In the HCO₃ groups, one mEq/kg was given and then base deficit (BD) corrected to ±5 Meq/L. All animals were necropsied after the final neurological deficit score (NDS: 0% = normal, 100% = brain dead) determination. Mean arterial (MAP/CPR) and coronary perfusion (CPP/CPR) pressures were compared prior to Return of Spontaneous Circulation (ROSC) or at 5 min of CPR.

Results:

Arrest Interval (IA)	5 minutes		10 minutes		15 minutes	
	HCO ₃	Control	HCO ₃	Control	HCO ₃	Control
N/group	6	6	20	20	10	10
ROSC***	6	6	20	*15	9	*3
24 HR SURV****	5	5	19	*11	7	*1
24 HR NDS****	18	*43	27	*65	72	*99
pHa, 52mm	7.29	7.22	7.26	7.20	7.27	*7.11
PaCO ₂ , 52mm	39	32	50	37	43	38
BD, 52mm	8.1	*14.6	5.5	*14.3	7.3	*16.3
MAP/CPR***	77	58	82	*64	49	*28
CPP/CPR***	62	45	34	18	36	*15

*between group differences at each I_A; overall effects:
 HCO₃; *HCO₃ and I_A; ****HCO₃ and I_A with interaction, all p < .05).

ROSC was more frequent and 24-hour survival better with HCO₃ administration with increasing efficacy as I_A increased. NDS was reduced by HCO₃ and was increased by I_A, with a reduction in the effect of I_A by HCO₃ administration.

Conclusion: These data suggest that the administration of HCO₃ improves outcome overall and this effect is greater after prolonged I_A.

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Does Age Affect the Outcome of Prehospital Resuscitation?

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Objective: To compare resuscitation outcomes in elderly (E, >65 years old) and younger (Y, 30–65 years old) prehospital cardiac arrest victims.

Design: Retrospective case series over a four-year period.

Setting: Rural, advanced life support (ALS) units; university hospital.

Participants: Field resuscitation (n = 563) of adults; excluded were those with unknown initial rhythms (n = 31), non-cardiac etiologies, and age <30 years.

Interventions: Patients were grouped by age. Return of spontaneous circulation (ROSC) and survival to hospital discharge were compared by chi-square and Fisher's exact test. ALS treatment of cardiac arrest was by regional protocol and on-line [direct] physician command.

Results: Sixty percent (320/532) of patients were elderly. The proportion with initial rhythm ventricular fibrillation (VF) was 50% for elderly and 48% for younger patients (p = NS).

Group	ROSC (%)			
	Elderly	Younger	Elderly	Younger
All (n = 532)*	17.8	15.8	4.2	4.9
VF (n = 258)	26.1	18.8	8.3	8.9
EMD (n = 101)	14.7	23.1	1.3	0
Asystole (n = 173)	7.1	9.3	0	1.3

p = NS for each comparison

*power: 80 for a 50% difference (ROSC) and 80% (survival)

Twelve of the younger and 16 of the elderly survived; the oldest survivor was 87 years old. In VF patients who received CPR <8 min, the elderly had better ROSC (50% vs 18.5%, p = .008), but the same rate of survival (22.5% vs 18.5%, p = NS).

Conclusions: Age over 65 years has less effect on resuscitation outcomes than does initial rhythm, early CPR, and early defibrillation. Analysis of outcomes using other age cutoffs yielded similar results. Advanced age alone should not deter resuscitation attempts.