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SIMEU

Comparison Between Capillary and Serum Lactate Levels in Predicting Short-term Mortality of Septic Patients at the Emergency Department

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DEFINITIONS

Sepsis

Life-threating organ dysfunction resulting from a dysregulated host response to wide range of infections.

Septic shock

Subset of sepsis in which underlying circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than sepsis alone.

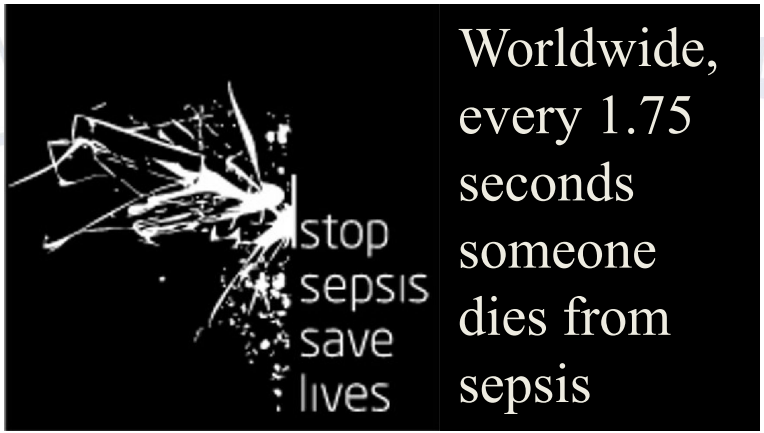
Singer M *et al. JAMA*. 2016; 315:801-810.

EPIDEMIOLOGY

Sepsis is a medical emergency.

Sepsis contributes to up to half of all hospital deaths.

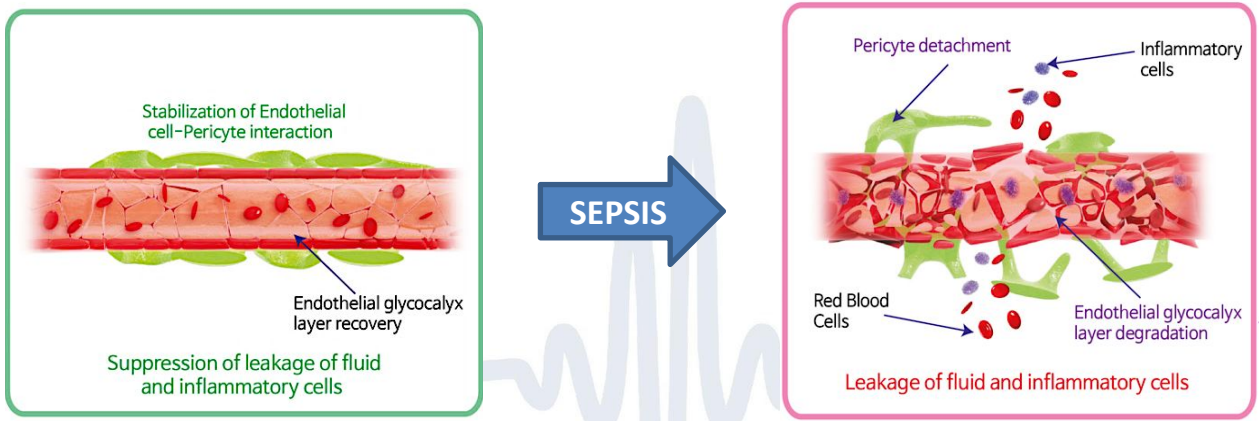
Sepsis is the most costly in-patient medical condition costing $545M in Colorado each year.

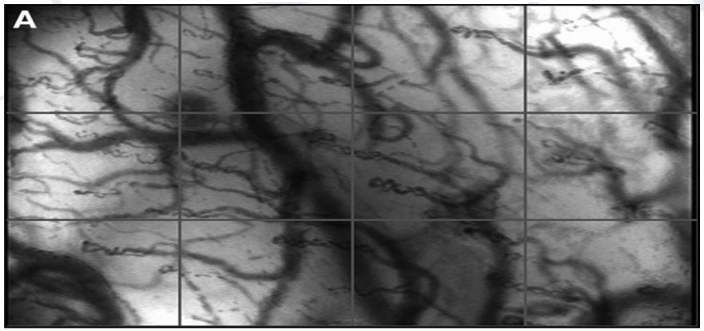


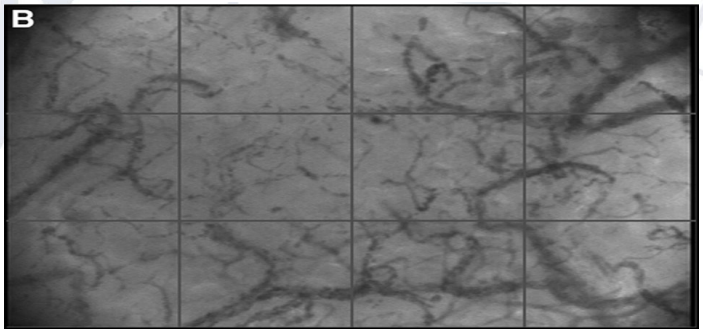
Mortality rate ~40%

Chiu C et al. Curr Opin Anaesthesiol. 2021;34:71-76.

MICROCIRCULATION DAMAGES

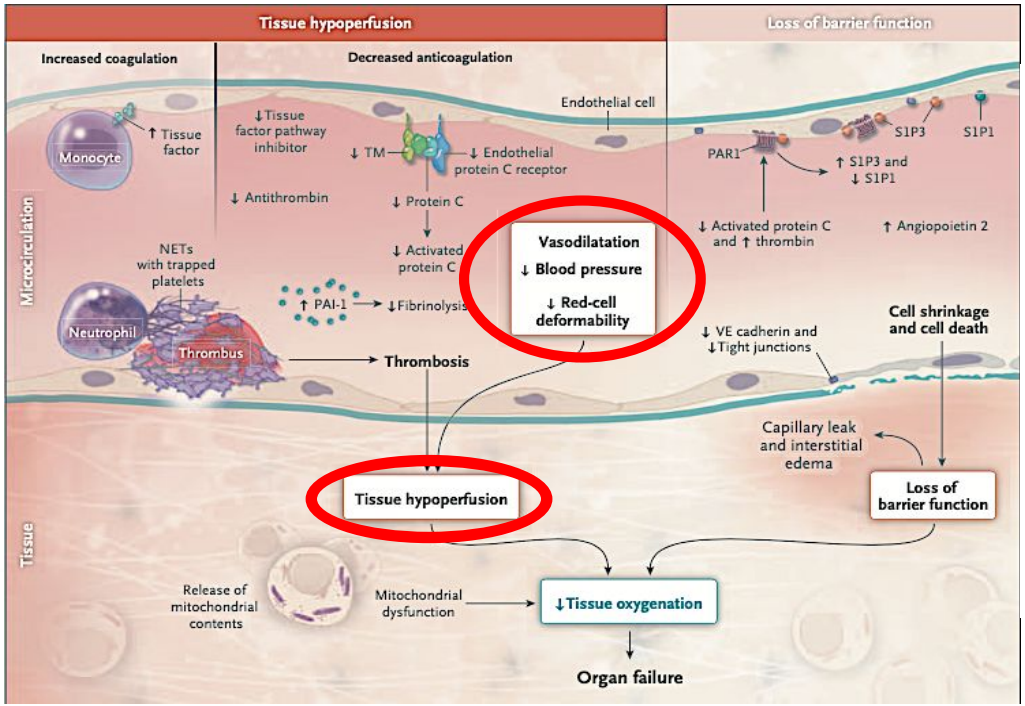


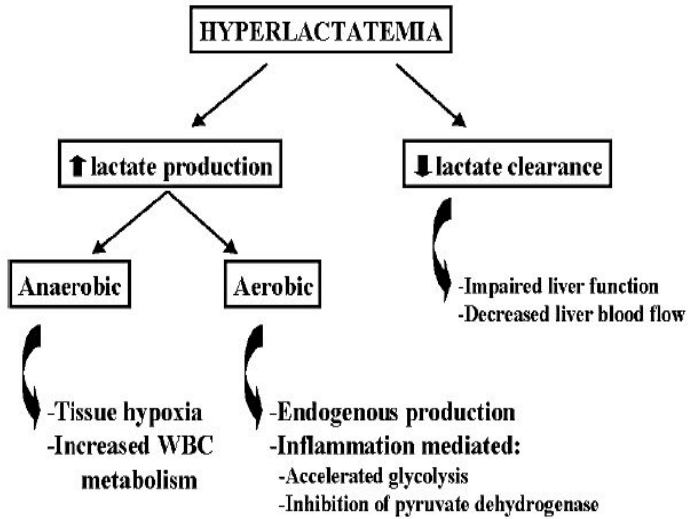




Angus DC et al. *N Engl J Med*. 2013; 369: 840-851

LACTATES





Angus DC et al. N Engl J Med. 2013; 369: 840-851

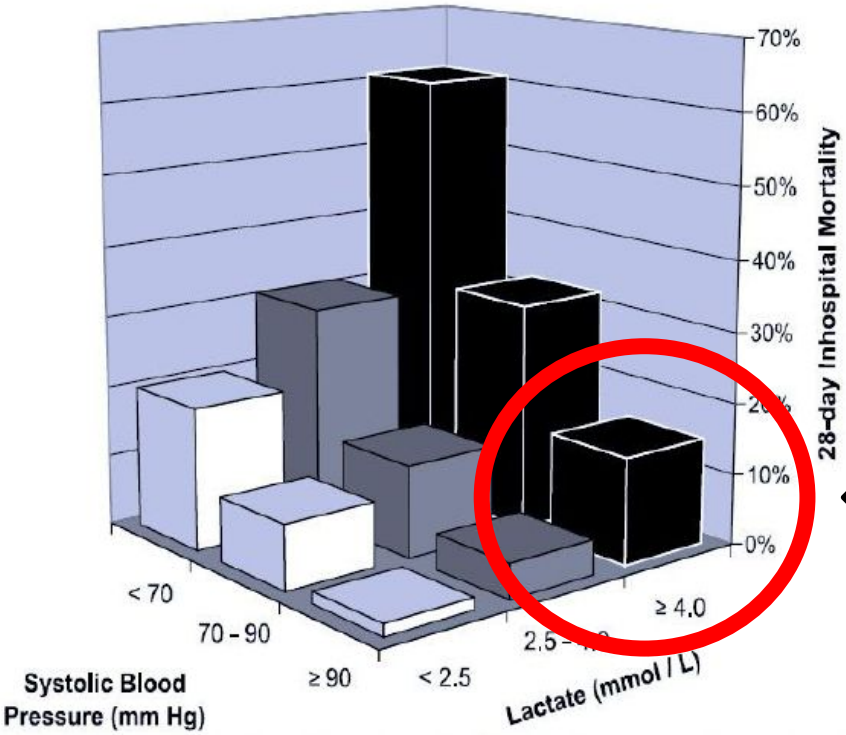


Fig. 1 28-day in-hospital mortality risk stratified by blood pressure and serum lactate level

Number of Patients
In Each Lactate/Blood Pressure Group

Lactate (mmol / L)	Systolic Blood Pressure (mm Hg) < 70	70 - 90	≥ 90
< 2.5	20	99	819
2.5 - 4.0	13	31	202
≥ 4.0	18	25	60

15%

SEPSIS KILLS
RECOGNISE · RESUSCITATE · REFER

Howell MD et al. Intensive Care Med. 2007;33:1892-9.

ENDPOINTS

PRIMARY OUTCOME

Assess the prognostic accuracy of capillary vs. serum lactates on 48-hour mortality in patients with suspected sepsis.

SECONDARY OUTCOME

Assess the prognostic accuracy of capillary vs. serum lactates on 7-day mortality in patients with suspected sepsis.

MATERIALS AND METHODS

- Observational, prospective, monocentric and non-interventional study (n=203).

Criterion	Sensitivity	Specificity	+LR	-LR	PPV	NPV
≥16,8 mmol/L	72,22	94,02	12,08	0,30	54,2	97,2

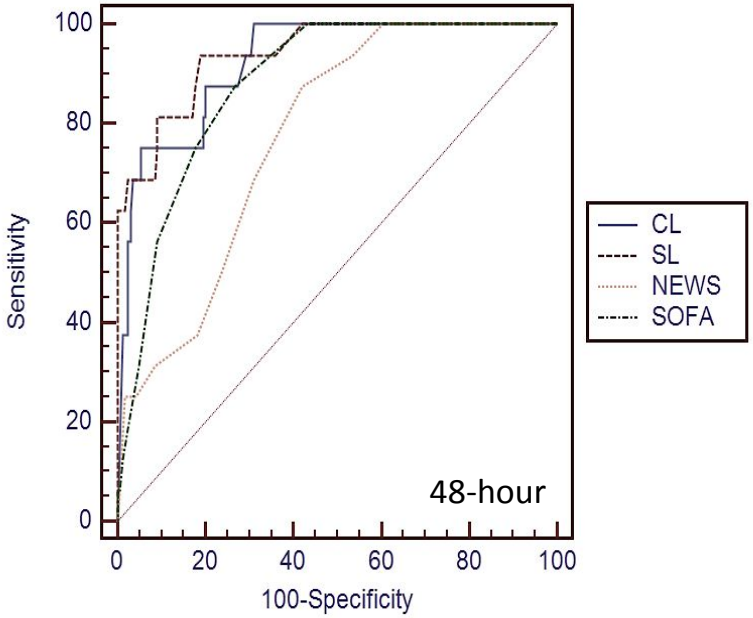
years; iv) a signed informed consent.

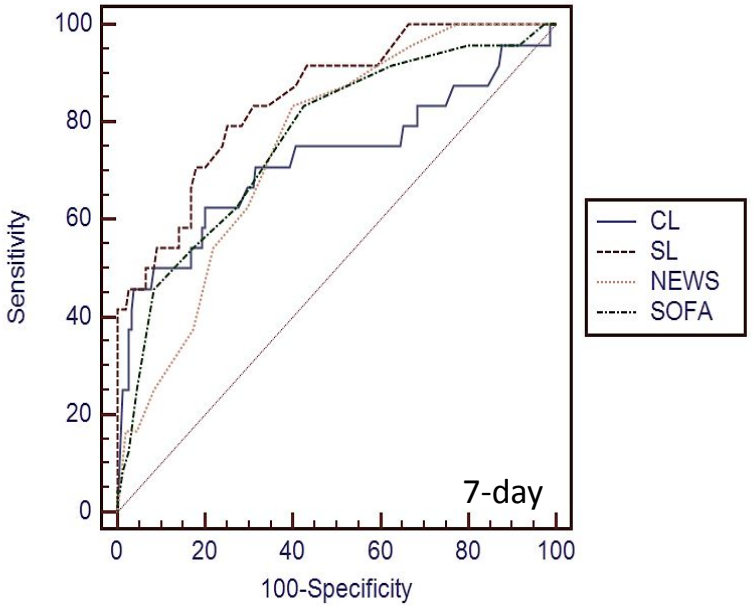
- Data considered: i) capillary and arterial blood lactates; ii) vital parameters; iii) lab tests; iv) treatment during hospitalization; v) occurrence of 48-hour and 7-day mortality.
- CLs were assessed on admission at ED with LactateProTM2®.
- Approved by the Ethics Committee of the Area Vasta Emilia Centro (CE-AVEC).

RESULTS (1)

	48-hour mortality			7-day mortality		
	Survived	Deceased	p	Survived	Deceased	p
	n=184 (90.7%)	n=19 (9.3%)		n=175 (86.2%)	n=28 (13.8%)	
Man	79 (42.5)	10 (52.6)	0.395	76 (43.4)	11 (39.3)	0.68
Age, years	85 (79-89)	85 (73-90)	0.74	85 (79-90)	84 (71-88)	0.91
CCI > 4	36 (19.4)	5 (26.3)	0.47	34 (19.4)	6 (21.4)	0.8
Severity scores						
SIRS ≥ 2	124 (67.8)	16 (84.2)	0.14	116 (67.4)	23 (82.1)	0.12
NEWS ≥ 7	111 (59.7)	17 (89.5)	0.11	103 (58.9)	23 (82.1)	0.02
NEWS	8 (5-10)	10.5 (9-12)	<0.001	8 (5-10)	10 (9-13)	0.001
SOFA ≥ 2	154 (82.8)	17 (89.5)	0.45	146 (83.4)	24 (85.7)	0.76
SOFA	4 (3-6)	7 (5-8)	<0.001	4 (3-6)	8 (7-9)	0.001
Treatments in the ED						
O2 supplementation	78 (42.2)	13 (72.2)	0.01	73 (42)	17 (63)	0.04
Optimal fluid replacement	127 (68.6)	16 (84.2)	0.16	119 (68.4)	22 (78.6)	0.27
Antibiotics administration	95 (51.9)	12 (66.7)	0.23	89 (51.7)	17 (63)	0.28
Vasopressors administration	4 (2.2)	3 (15.8)	0.01	4 (2.3)	3 (10.7)	0.02
Serum and Capillary Lactate						
SLs mmol/L	1.1 (0.7-2)	2.75 (1.55-8.1)	<0.001	1.1 (0.7-2)	6.5 (2.4-11.1)	0.001
SLs ≥ 2 mmol/L	47 (25.3)	15 (78.9)	<0.001	43 (24.6)	18 (64.3)	<0.001
CLs mmol/L	5 (3.1-9.1)	11.15 (3.7-22.95)	<0.001	5 (3-9.05)	19.3 (10.8-25)	<0.001
CLs ≥ 16.8 mmol/L	11 (5.9)	13 (68.4)	<0.001	11 (6.3)	12 (42.9)	<0.001

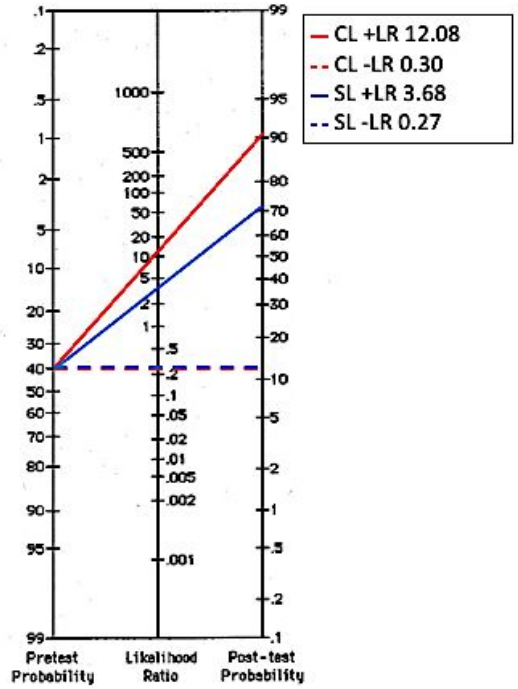
RESULTS (2)



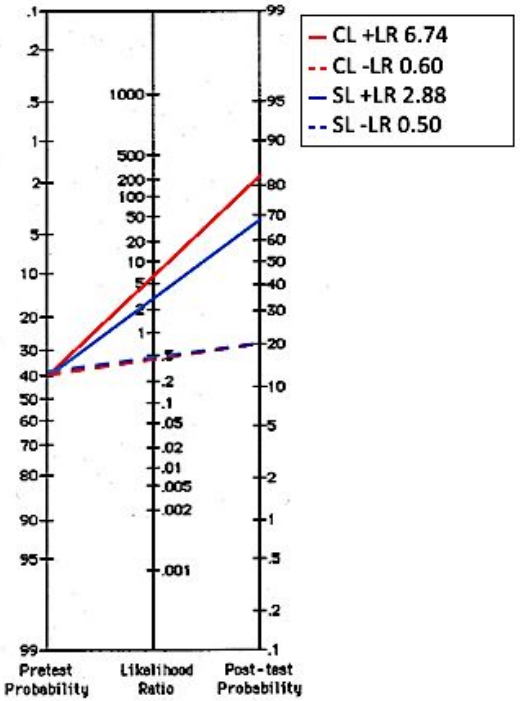


Panel A: CL AUC 0.924, 95%CI 0.875-0.958; SL AUC 0.941, 95%CI 0.896-0.970; NEWS AUC 0.773, 95%CI 0.707-0.832; SOFA AUC 0.879, 95%CI 0.823-0.923. Panel B CL AUC 0.724, 95%CI 0.8652-0.788; SL AUC 0.848, 95%CI 0.787-0.898; NEWS AUC 0.751, 95%CI 0.681-0.812; SOFA AUC 0.766, 95%CI 0.697-0.826.

RESULTS (3)



48-hour mortality



7-day mortality

RESULTS (4)

	48-hour mortality			7-day mortality		
	OR	95% CI	p	OR	95% CI	p
CLs ≥ 16.8 mmol/L	22.960	4.72-111.53	<0.001	6.090	1.78-20.87	0.004
SLs ≥ 2 mmol/L	13.790	1.43-132.9	0.020	3.880	1.25-12.05	0.020
SOFA	1.460	0.98-2.18	0.060	1.160	0.91-1.48	0.210
NEWS	1.030	0.77-1.38	0.830	1.130	0.94-1.36	0.160

		CLs	NEWS	SOFA	SLs	Age	SBP
CLs	Correlation coefficient	1,000	,359	,412	,497	-0,101	-0,105
	p		<0,001	<0,001	<0,001	0,183	0,166
NEWS	Correlation coefficient	,359	1,000	,467	,422	0,112	-,485
	p	<0,001		<0,001	<0,001	0,140	<0,001
SOFA	Correlation coefficient	,412	,467	1,000	,389	0,051	-,193
	p	<0,001	<0,001		<0,001	0,498	0,010
SLs	Correlation coefficient	,497	,422	,389	1,000	-0,091	-,253
	p	<0,001	<0,001	<0,001		0,227	0,001
Age	Correlation coefficient	-0,101	0,112	0,051	-0,091	1,000	0,421
	p	0,183	0,140	0,498	0,227		0,421
SBP	Correlation coefficient	-0,105	-,485	-,193	-,253	0,061	1,000
	p	0,166	<0,001	0,010	0,001	0,421	

CONCLUSIONS

- CLs early identify patients at higher risk of 48-hour and 7-day mortality for sepsis.
- Therefore, CLs assay can be a useful test to establish diagnosis and adequate therapeutic approaches at any stage of the emergency settings.
- Further confirmatory results on larger series are eagerly awaited to aid emergency physicians in establishing timely outcome of septic patients.

Grazie!