



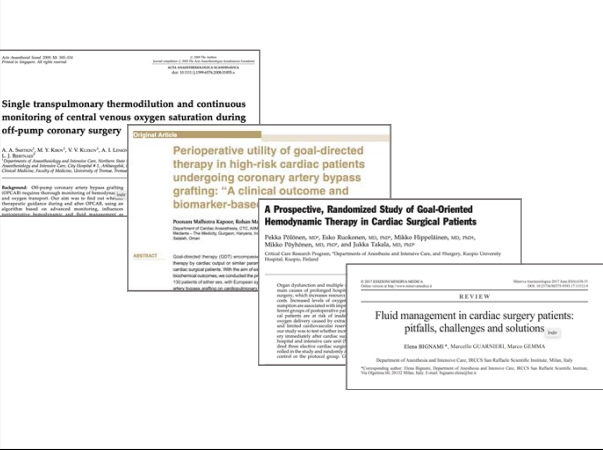
**GKDA ve YB Derneği
26. ULUSAL E-KONGRESİ**

Sıvı yönetiminde Biyobelirteçler ve Diğer Parametreler

Dr. Özlem Sağır
Balıkesir Üniversitesi Tıp Fakültesi
Anesteziyoloji ve Reanimasyon AD.

Sunum Planı

- Hedefe yönelik sıvı tedavisi
- Doku oksijenizasyonu
- Biyobelirteçler
- Diğer parametreler
 - SvO_2-ScvO_2
 - *Laktat*
 - $\Delta Pv-aCO_2$
 - $Pv-aCO_2/Ca-vO_2$

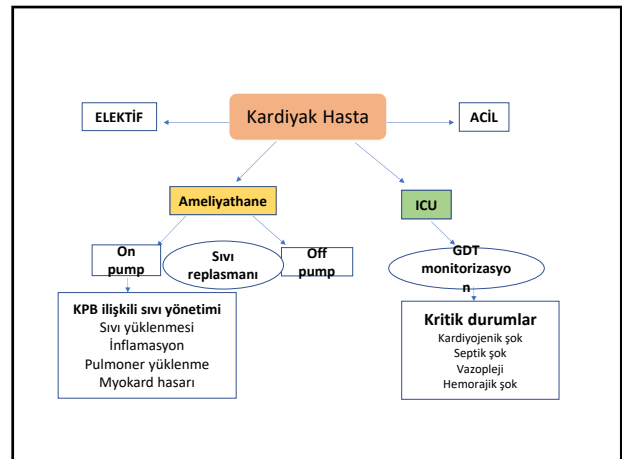
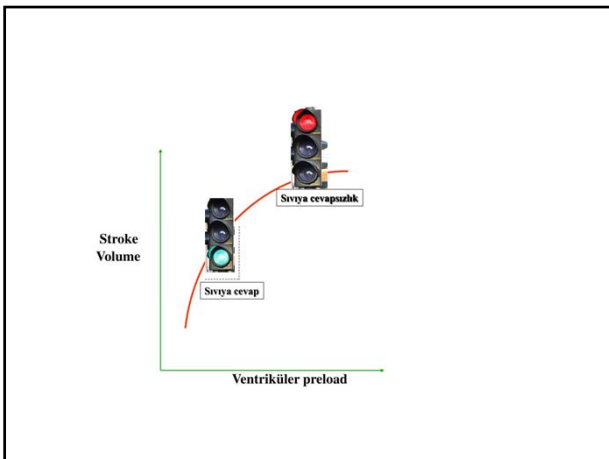
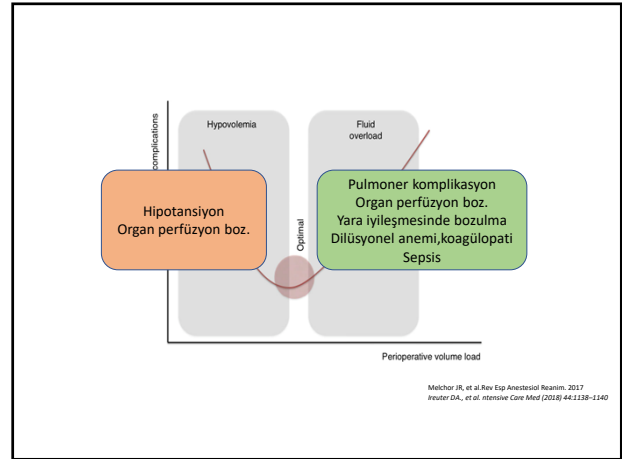


Single transpulmonary thermodilution and continuous monitoring of central venous oxygen saturation during off-pump coronary surgery

Perioperative utility of goal-directed therapy in high-risk cardiac patients undergoing coronary artery bypass grafting: A clinical outcome and biomarker-based

A Prospective, Randomized Study of Goal-Oriented Hemodynamic Therapy in Cardiac Surgical Patients

Fluid management in cardiac surgery patients: pitfalls, challenges and solutions



Significance of perioperative goal-directed hemodynamic approach in preventing postoperative complications in patients after cardiac surgery: a meta-analysis and systematic review

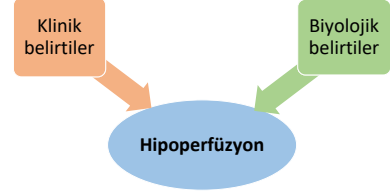
ANNALS OF MEDICINE, 2017
VOL. 49, NO. 4, 343-351

Peng Li^{a,*}, Li-ping Qu^{b,*}, Dong Qi^c, Bo Shen^{c,d}, Yi-mei Wang^{c,d}, Jia-rui Xu^{c,d}, Wu-hua Jiang^{c,d}, Hao Zhang^{c,d}, Xiao-qiang Ding^{c,d,e} and Jie Teng^{c,d,e}

- Sol yetmezliği, aritmi
- AKI riski
- İnfeksiyon riski
- Hastanede kalma süresi
- Mekanik ventilasyon süresi
- ICU kalma süresi
- Mortalite

AZALIR

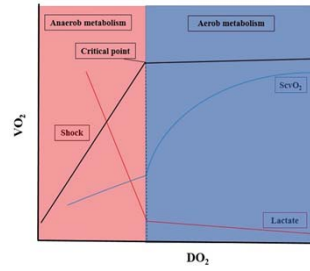
BENZER



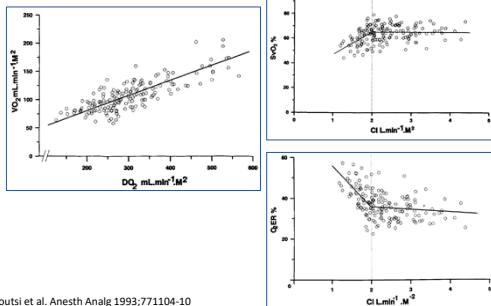
Doku oksijenizasyonu

$$DO_2 = CO \times (Hb \times 1.34 \times SaO_2) + (PaO_2 \times 0.003) \times 10$$

$$VO_2 = CO \times ((Hb \times 1.34 \times (SaO_2 - SvO_2)) + (PaO_2 - PvO_2) \times 0.003) \times 10$$



Molnar Z, Nemeth M. 2018; doi: 10.3389/fmed.2017.00247



Routis et al. Anesth Analg 1993;77:1104-10

CLINICAL PHARMACOLOGY & THERAPEUTICS

MARCH 2001

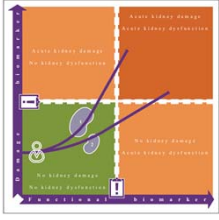
COMMENTARY

Biomarkers and surrogate endpoints:
Preferred definitions and conceptual
framework

- Normal biyolojik süreçlerin
- Patolojik süreçlerin
- Tedaviye karşı gelişen cevabın

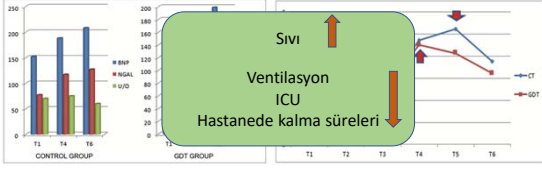
OBJEKTİF OLARAK ÖLÇÜLÜP DEĞERLENDİRMESİ YAPILABİLEN GÖSTERGELER

- **Fonksiyonel biyobelirteçler**
 - Üre
 - Kreatinin
 - İdrar çıkışı
- **Hasar biyobelirteçleri**
 - NGAL
 - TIMP
 - IGFBP-7



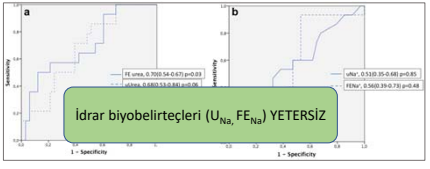
Perioperative utility of goal-directed therapy in high-risk cardiac patients undergoing coronary artery bypass grafting: "A clinical outcome and biomarker-based study"

Poonam Malhotra Kapoor, Rohan Kapoor, Rajinder Rawat*, Yatin Mehta*



Urine sodium concentration to predict fluid responsiveness in oliguric ICU patients: a prospective multicenter observational study

RESEARCH Open Access



İdrar biyobelirteçleri (U_{Na}, FE_{Na}) YETERSİZ

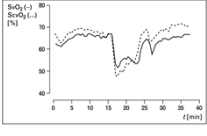
N-terminal pro-B-type natriuretic peptide for predicting fluid challenge in patients with septic shock

Hui-Bin Huang^{1,2}, Biao Xu¹, Guang-Yun Liu¹, Bin Du¹

Characteristics	Responders	Non-responders	P
Plasma creatinine (µmol/L)	127 (105.6-146)	92 (65.8-134)	0.178
CPK-MB	1.2 (0.5-3.86)	1.0 (0.5-7.3)	0.87
cTropoin I (pg/mL)	0.164 (0.055-0.631)	0.259 (0.054-3.456)	0.48
NT-ProBNP (ng/mL)	3,568 (1,140-10,419)	2,856 (1,103-10,889)	0.92
ScvO ₂	68.7±1.5	68.3±1.0	0.89

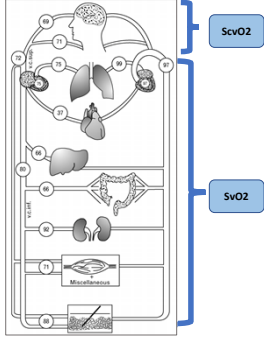
Sıvı yanıtını belirlemede YETERSİZ Vazopressör ihtiyacı, CO ve SV ile korelasyonu YOK

SvO₂-ScvO₂



ScvO₂ ile SvO₂ ilişkisi

- Sepsis
- Şok
- Ağrı
- Titreme



VO₂ DO₂

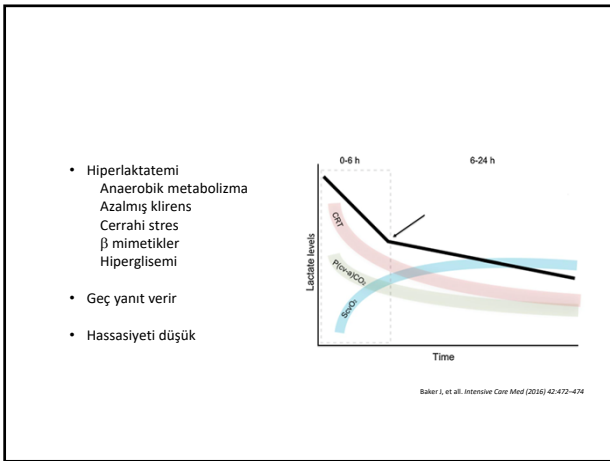
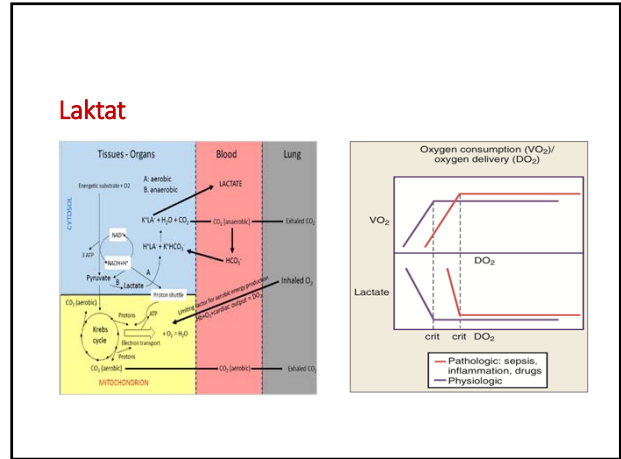
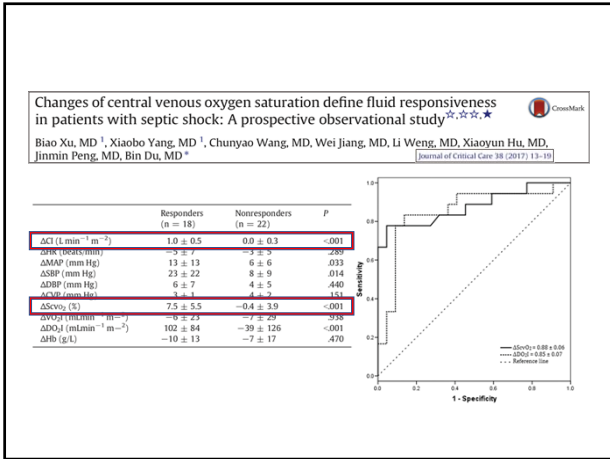
%70

Venöz oksijen

NORMAL/ YÜKSEK ScvO₂ her zaman dolaşımın NORMAL olduğunu GÖSTERMEZ

DÜŞÜK **YÜKSEK**

Mikrosirkülasyon değişikliği Mitochondriyal disfonksiyon !



Assessment of macro- and micro-oxygenation parameters during fractional fluid infusion: A pilot study

Marc-Olivier Fischer^{1,2,3,4}, Vincent Bonnet¹, Emmanuel Lorne^{1,2}, Jean-Yves Lefrant¹, Olivier Rebet¹

Journal of Critical Care 40 (2017) 93–98

	VO ₂ -Responders (n = 6)		VO ₂ -non-Responders (n = 11)	
	Before fluid infusion	After fluid infusion	Before fluid infusion	After fluid infusion
CaO ₂ (ml/dL)	14.6 (1.1)	12.9 (0.9)*	15.1 (1.8)	13.5 (1.8)*
CvO ₂ (ml/dL)	7.8 (0.7)	7.8 (1.1)	9.2 (1.4)*	9.6 (1.4)
C(a-v)O ₂ (ml/dL)	6.8 (0.8)	5.2 (0.8)*	5.9 (1.6)	3.9 (1.1)*
Oxygen delivery (ml/min/m ²)	193 (60)	313 (96)*	285 (48)*	389 (139)*
VO ₂ (ml/min/m ²)	91 (33)	129 (58)*	112 (37)	108 (37)
FDO ₂ (ml/min/m ²)	0.47 (0.04)	0.40 (0.06)*	0.39 (0.08)*	0.29 (0.06)*
Arterial lactate (mmol/L)	1.0 (0.3)	0.9 (0.2)*	1.2 (0.2)	1.1 (0.2)
ScVO ₂ (%)	53 (7)	60 (7)*	60 (7)*	70 (6)*
P(v-a)CO ₂ (kPa)	1.50	1.11	1.24	0.85
P(v-a)CO ₂ (a-v)O ₂ (kPa)	0.22	0.23	0.23	0.22
(kPa·min)	[0.17–0.22]	[0.22–0.24]	[0.17–0.26]	[0.14–0.26]
Cerebral rSO ₂ (%)	50 (6)	53 (6)*	58 (6)*	62 (6)*
Somatic rSO ₂ (%)	59 (10)	59 (8)	65 (11)	68 (9)*
Bispectral index	48 (4)	50 (8)	50 (11)	53 (9)

Laktatın sıvı yanıtını öngörmeye prediktif değeri DÜŞÜK

Early Lactate-Guided Therapy in Intensive Care Unit Patients

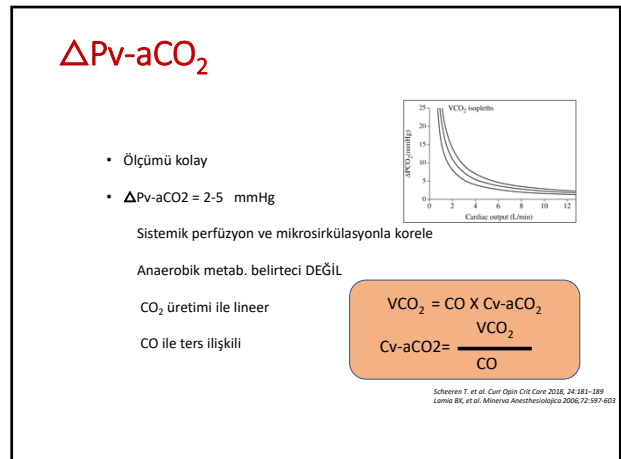
A Multicenter, Open-Label, Randomized Controlled Trial

Am J Respir Crit Care Med Vol 182, pp 752–761, 2010

Tim C. Jansen¹, Jasper van Bommel¹, F. Jeanette Schoonderbeek¹, Steven J. Sleswijk Visser¹, Johan M. van der Klooster², Alex P. Lima¹, Sten P. Willemsen¹, and Jan Bakker¹, for the LACTATE study group*

Treatment	Control Group	Lactate Group	P Value
Fluids, ml*			
0–8 h	2,198 ± 1,609	2,097 ± 1,765	0.011
9–72 h	10,043 ± 6,141	8,315 ± 4,587	0.055
Red blood cell transfusion, ml			
0–8 h	196 ± 495	322 ± 1037	0.15
9–72 h	345 ± 667	423 ± 1300	0.59
Any inotropic agent, %†			
0–8 h	32.9	40.1	0.17
9–72 h	44.2	35.2	0.12
Any vasodilator, %†			
0–8 h	20.2	42.5	<.0001
9–72 h	27.1	43.2	0.005
Any vasopressor, %**			
0–8 h	63.6	69.5	0.25
9–72 h	63.7	71.4	0.16

MV'de kalma süresi
ICU'da kalma süresi
Mortalite



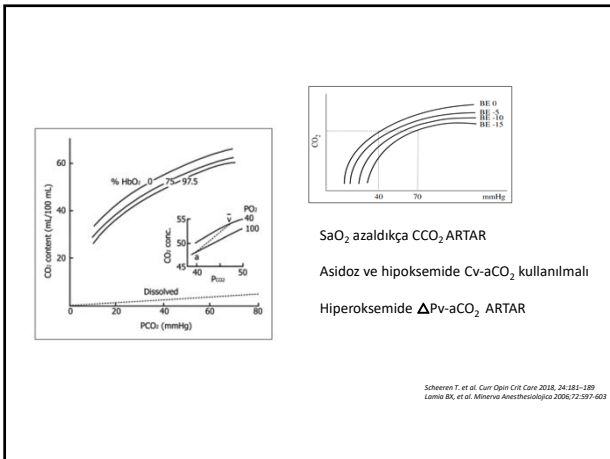


Table 3: Comparison of oximetry parameters in patients with ScvO₂ >70%

Parameters	Time	Group A (n=20)	Group B (n=45)	P
ScvO ₂	1 st hr ICU	75.3±3.55	74.8±3.64	0.6409
	6 th hr ICU	71.35±4.86	72.35±4.04	0.3883
	18 th hr ICU	70.6±4.61	71.4±3.51	0.4456
SvO ₂	1 st hr ICU	67.3±7.16	72.8±4.71	<0.001
	6 th hr ICU	66.05±6.82	68.0±2.91	0.3619
	18 th hr ICU	67.45±6.10	69.2±4.19	0.1842
CaO ₂	1 st hr ICU	13.32±1.67	15.05±2.09	0.0017
	6 th hr ICU	13.48±0.89	13.62±1.92	0.7513
	18 th hr ICU	13.47±1.42	13.56±1.18	0.791
CvO ₂	1 st hr ICU	9.1±1.61	10.95±1.63	<0.001
	6 th hr ICU	9.35±1.26	9.48±1.68	0.7435
	18 th hr ICU	9.34±1.17	9.73±0.98	0.1654
DO ₂ I	1 st hr ICU	299.76±72.50	355.84±78.9	0.0082
	6 th hr ICU	309.28±64.13	318.95±68.29	0.7201
	18 th hr ICU	317.96±65.84	318.95±66.8	0.959
VO ₂ I	1 st hr ICU	98.35±31.71	95.48±27.13	0.7109
	6 th hr ICU	102.15±39.2	95.3±26.0	0.4124
	18 th hr ICU	101.1±32.12	92.55±26.08	0.2612
OER	1 st hr ICU	0.323±0.07	0.299±0.049	<0.001
	6 th hr ICU	0.314±0.075	0.302±0.035	0.4395
	18 th hr ICU	0.304±0.065	0.287±0.047	0.2378

Kanzariya et al. Annals of Cardiac Anaesthesia 2020, 20:26

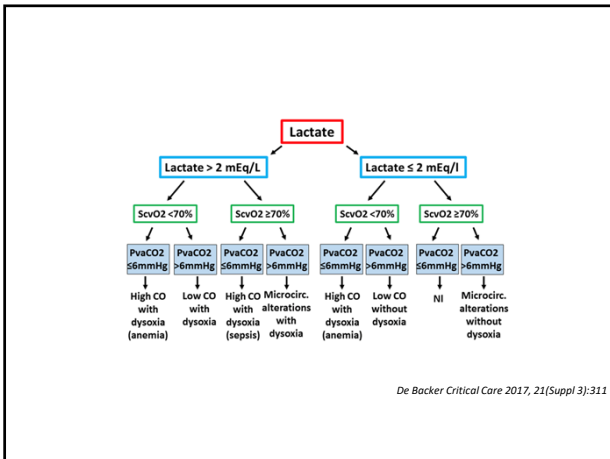
ScvO₂ ≥ %70 off pump CABG.

ΔPv-aCO₂ > 8

Cl ve DO₂I azalmış

ERO₂ artmış

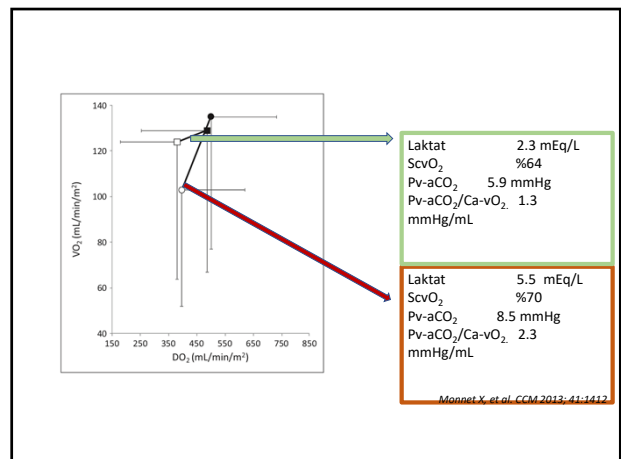
MV ve ICU süresi uzamış

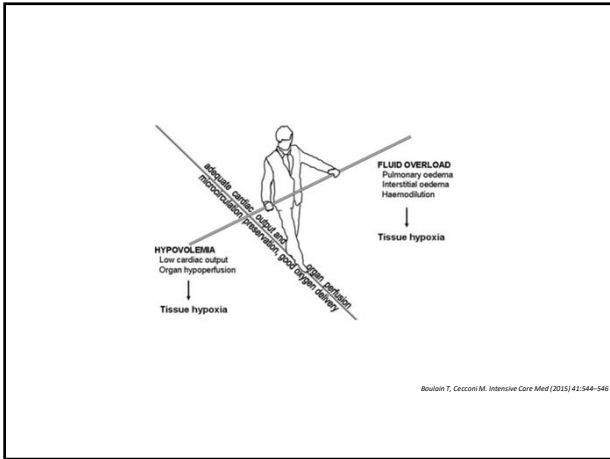


- ### Pv-aCO₂/Ca-vO₂
- VCO₂/VO₂
 - Doku hipoperfüzyon belirtici
 - Anaerobik metab. göstergesi (cut-off değer > 1.4)
 - Laktata göre daha hızlı yanıt
 - Haldane etkisi
 - Asidoz
 - SpO₂
 - Htc
- Scheeren T, et al. Curr Opin Crit Care 2018, 24:181-189

Variables	VO ₂ increase group (n = 48)		VO ₂ no-increase group (n = 24)	
	Baseline	After intervention	Baseline	After intervention
CVP (mean ± SD), mmHg	9.5 ± 3.9	12.1 ± 3.5	9.3 ± 2.9	11.4 ± 3.7
GEDVI (mean ± SD), ml/m ²	66.1 ± 19.0	68.5 ± 16.9	67.5 ± 20.4	72.1 ± 33.7
CI (mean ± SD), L min ⁻¹ m ⁻²	3.0 ± 0.8	3.7 ± 1.0	3.2 ± 0.7	3.9 ± 0.6
SVRI (mean ± SD), dynes cm ⁻² m ²	2106.7 ± 954.1 [†]	1565.9 ± 572.3	2106.0 ± 711.2	1648.9 ± 594.0
EVLIW (mean ± SD), ml/kg	7.7 ± 2.5	7.3 ± 2.4	9.1 ± 5.5	10.1 ± 6.1
DO ₂ (mean ± SD), ml min ⁻¹ m ⁻²	488.5 ± 124.9 [†]	494.4 ± 151.9	497.8 ± 154.4 [†]	594.9 ± 162.4
VO ₂ (mean ± SD), ml min ⁻¹ m ⁻²	88.8 ± 28.9 [†]	129.1 ± 51.9	106.3 ± 32.4	118.4 ± 37.9
ERO ₂ %	22.7 ± 7.5	36.0 ± 7.2	28.3 ± 11.7	20.2 ± 5.3
ScvO ₂ %	76.3 ± 6.7	73.5 ± 6.4 [†]	75.4 ± 7.4 [†]	79.2 ± 5.7
Lactate (mean ± SD), mmol/L	5.4 ± 3.1	4.9 ± 3.5	5.9 ± 3.3	5.5 ± 3.1
Pv-aCO ₂ (mean ± SD), mmHg	6.2 ± 2.5	4.3 ± 2.9	4.9 ± 2.2	3.2 ± 2.6
Pv-aCO ₂ /Ca-vO ₂ ratio (mean ± SD), mmHg/ml	2.2 ± 1.2 [†]	1.2 ± 0.8	1.2 ± 0.4	1.1 ± 0.8
Microcirc (mean ± SD), mmol/L	18.1 ± 5.1	18.2 ± 4.9	20.2 ± 3.0	19.0 ± 4.8

Wei D, et al. Chinese Medical Journal 2015; 128(10): 1306-13





Fizyolojik gerekçeler
Bireysel olarak ayarlama
Eleştirel sorgulama
ile
DAHAYİ SİYONETİMİ