

Evaluation de la microcirculation dans le choc septique

Médecin en Chef C. PELLETIER

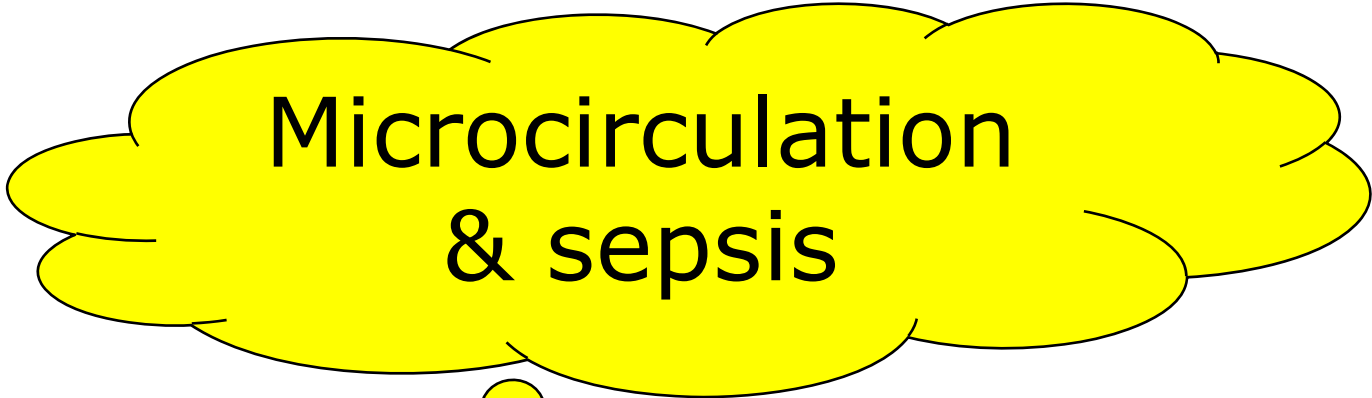
Service d'anesthésie-réanimation, HIA BEGIN

Définition :

La circulation du sang à travers le **réseau vasculaire** entre les artérioles et les veinules.

La microcirculation correspond donc :

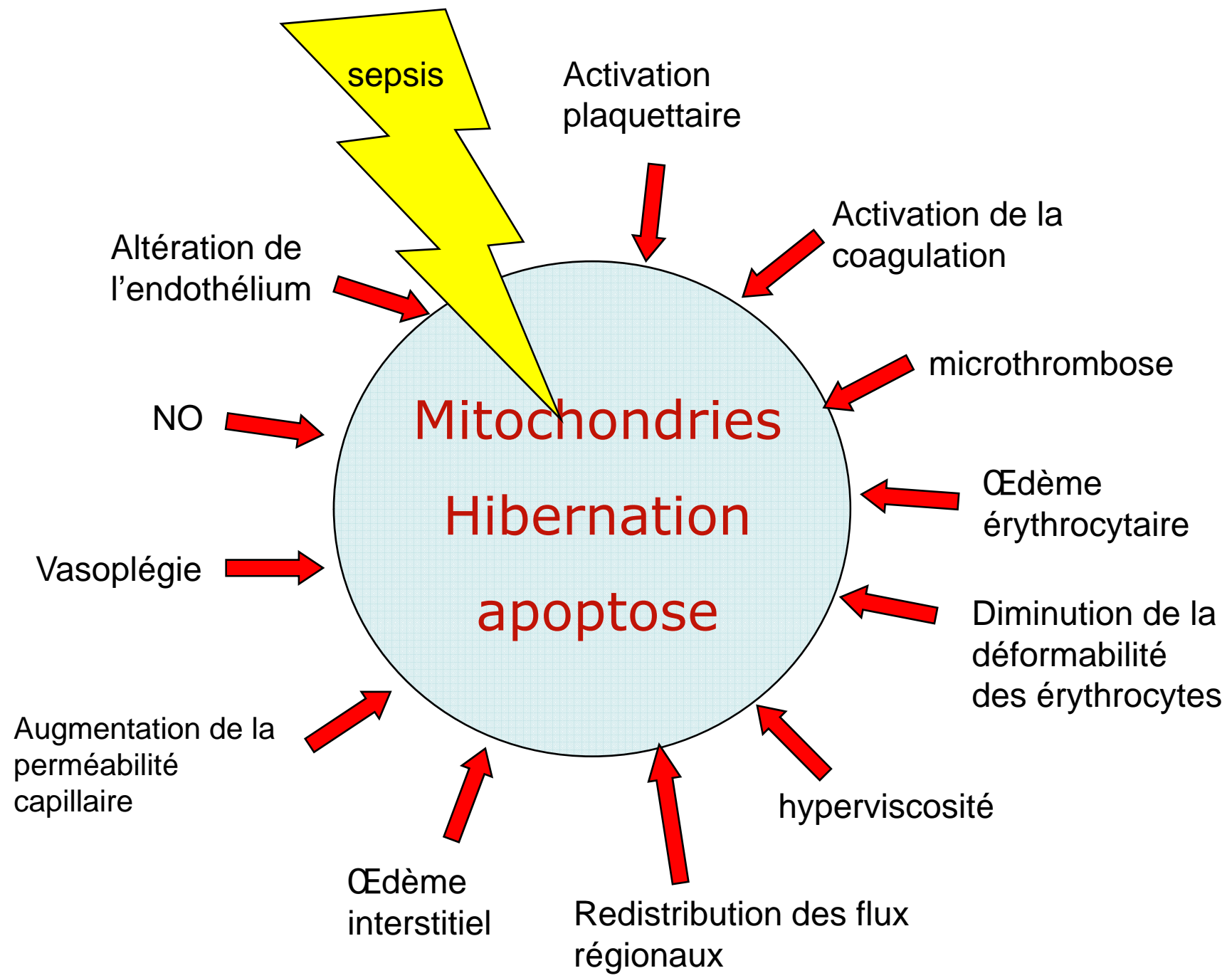
- Artériolles < à 100 μm
- Au capillaires
- Aux veinules



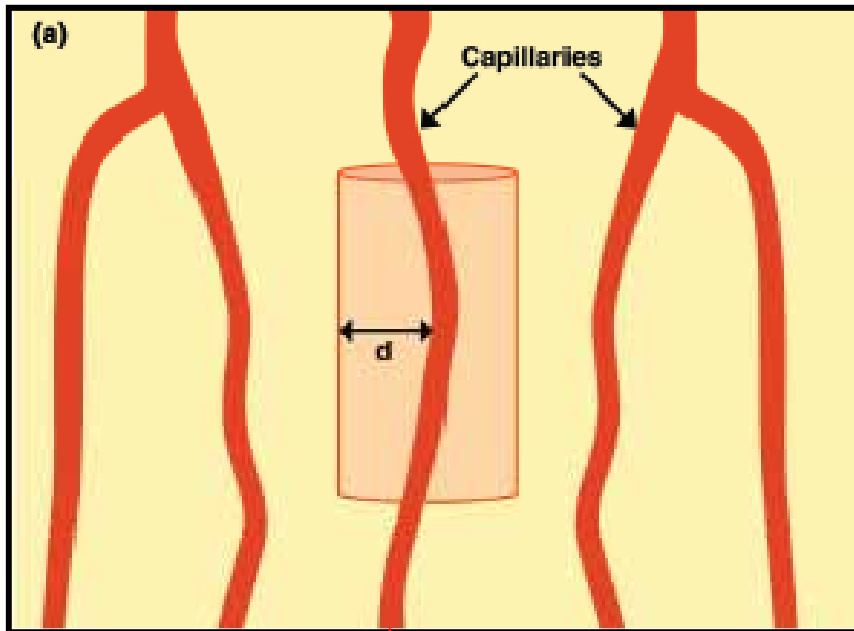
Microcirculation
& sepsis



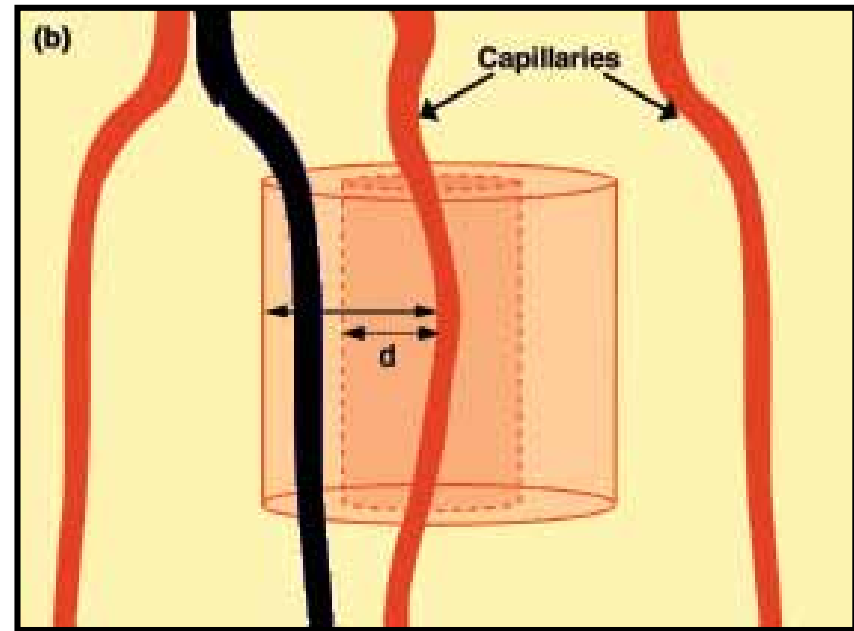
Physiopathologie



Le modèle de Krogh de diffusion de l'oxygène par le réseau capillaire

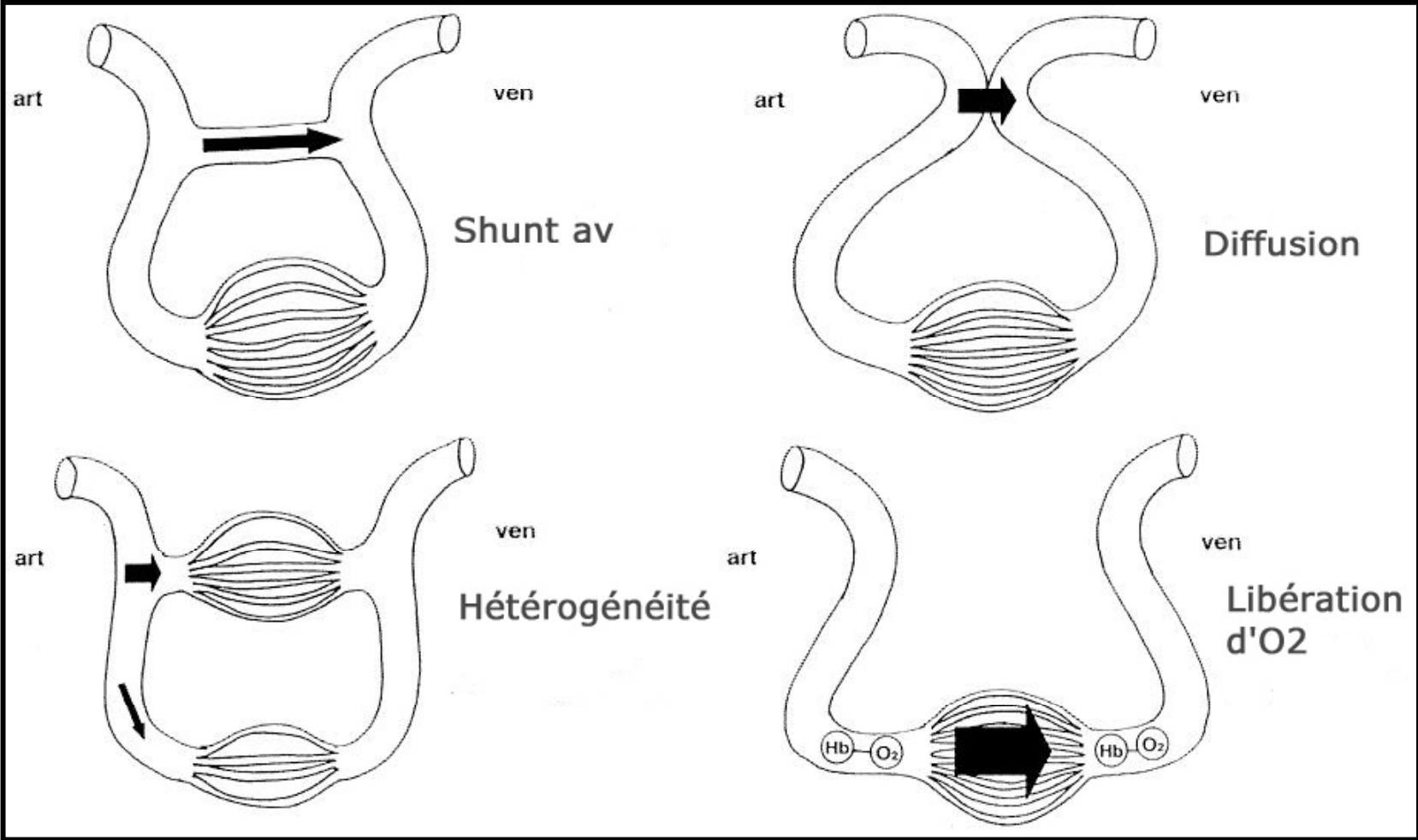


Capillaires perméables



Capillaire non perméable

Shunt microcirculatoire





Comment
monitorer?

Microcirculation
&
choc septique

Moyens indirects en 2007

L'examen clinique

- Marbrure
- Temps de recoloration distal
- Signal de spO2!!!

Moyens indirects en 2007

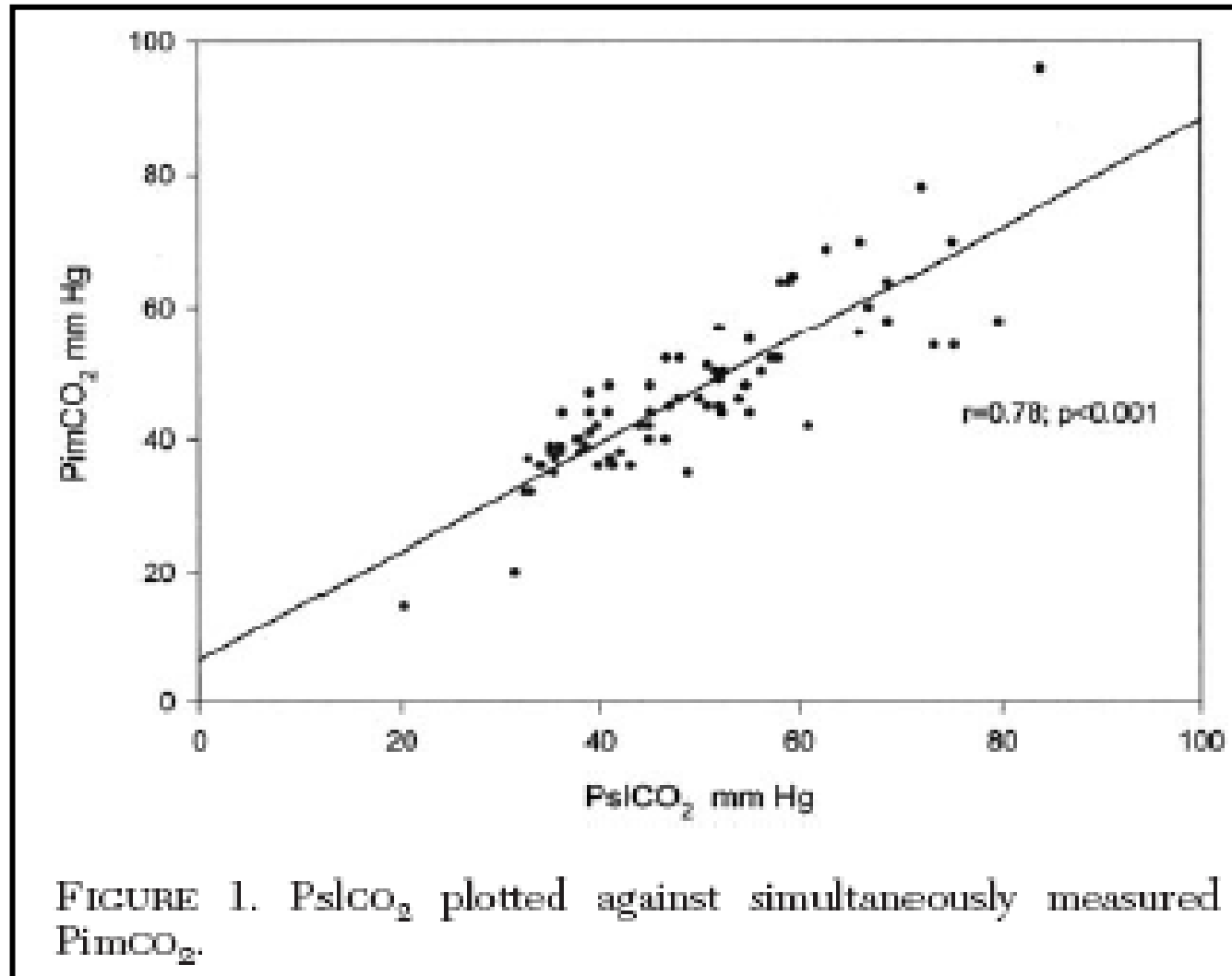
Les examens paracliniques!

- Lactate
- SVO2
- Tonométrie gastrique
- Capnométrie sub linguale

Tonometrie gastrique

- Le contenu cellulaire en CO₂ est un bon marqueur de l'adéquation entre les besoins et l'apport circulatoire
 - La muqueuse digestive est particulièrement sensible aux situations de choc
 - L'introduction d'une sonde gastrique est une procédure facile en réa
-
- Impose l'arrêt de la nutrition entérale
 - Interférence avec les inhibiteurs de la pompe à proton

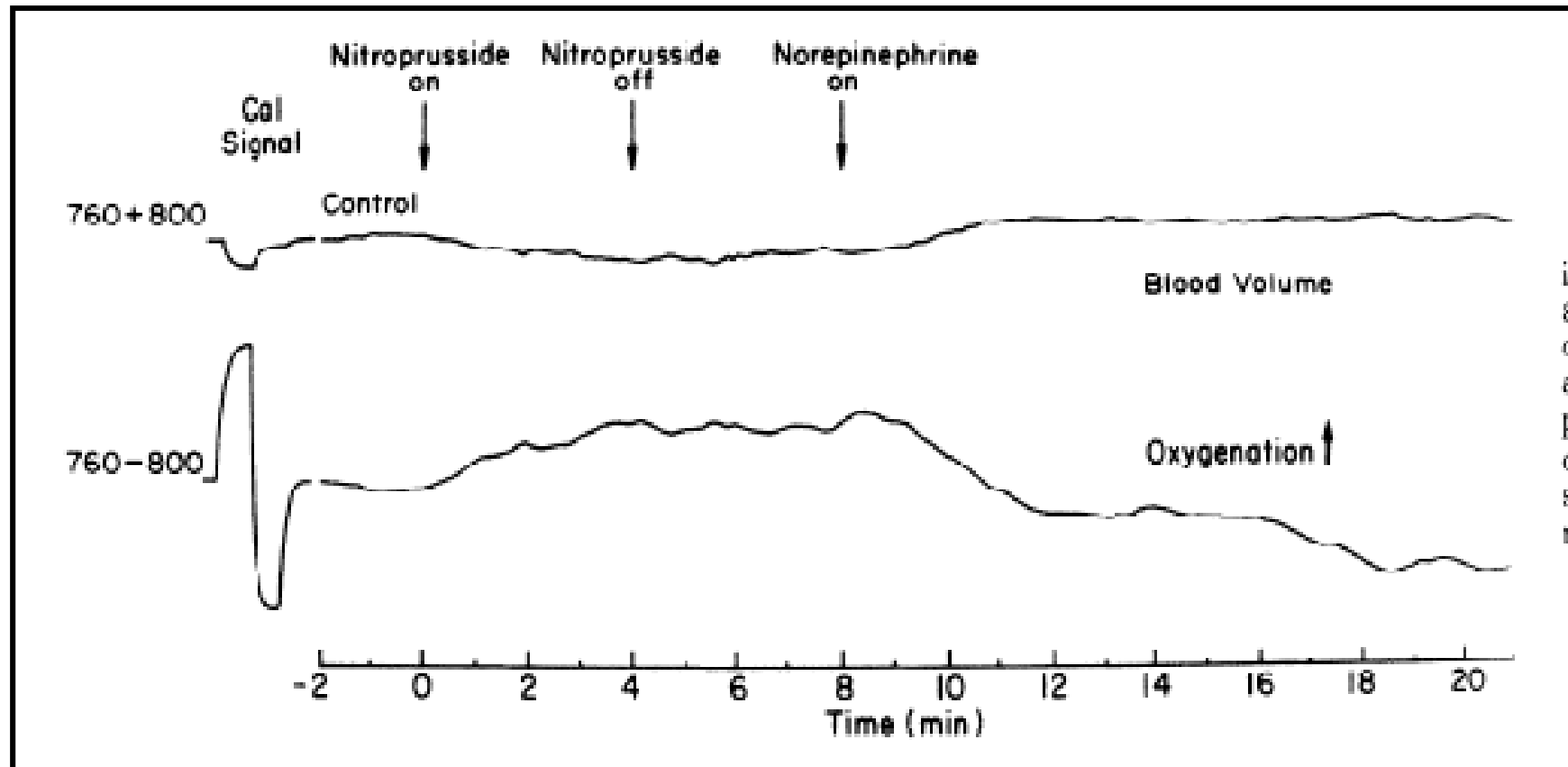
Capnométrie sublinguale



Techniques d'évaluation directes de la microcirculation

- Microscopie intravitale
- Doppler
- Near infrared spectrometry
- OPS

Near infrared spectroscopy



Validation of near-infrared spectroscopy in humans, DONNA, 1994

Orthogonal polarization spectral imaging

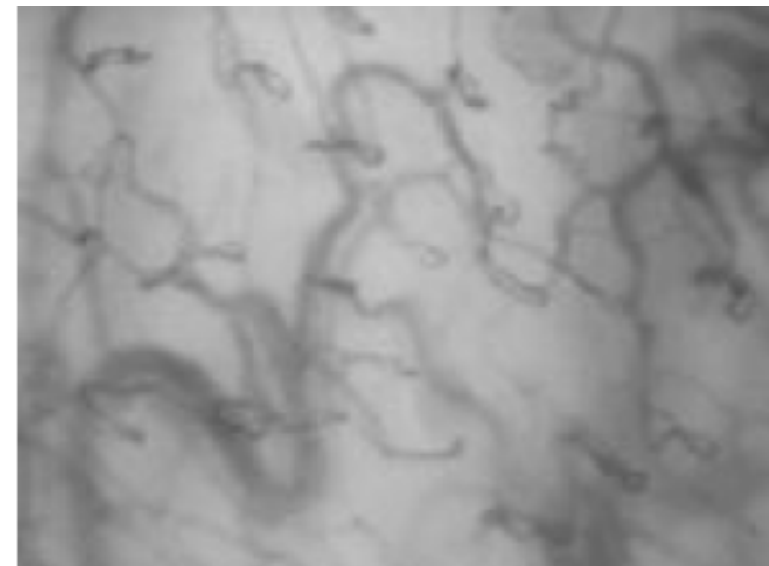
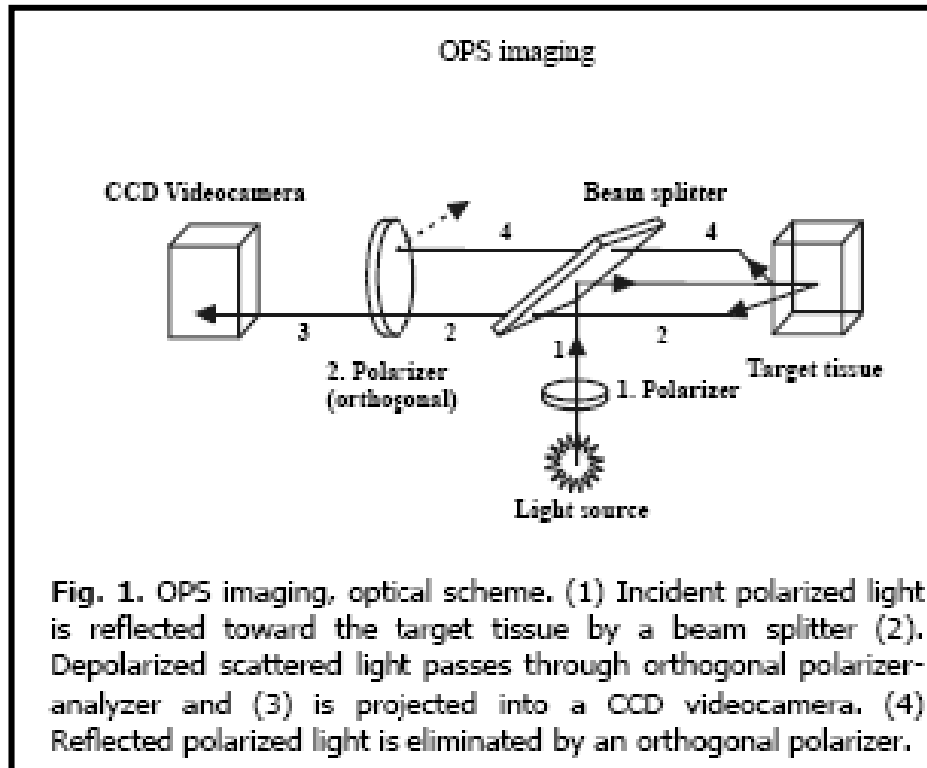


Fig. 3. Sublingual microcirculation by OPS imaging

Orthogonal polarization spectral imaging



<http://www.cytometrics.com>

Orthogonal polarization spectral imaging

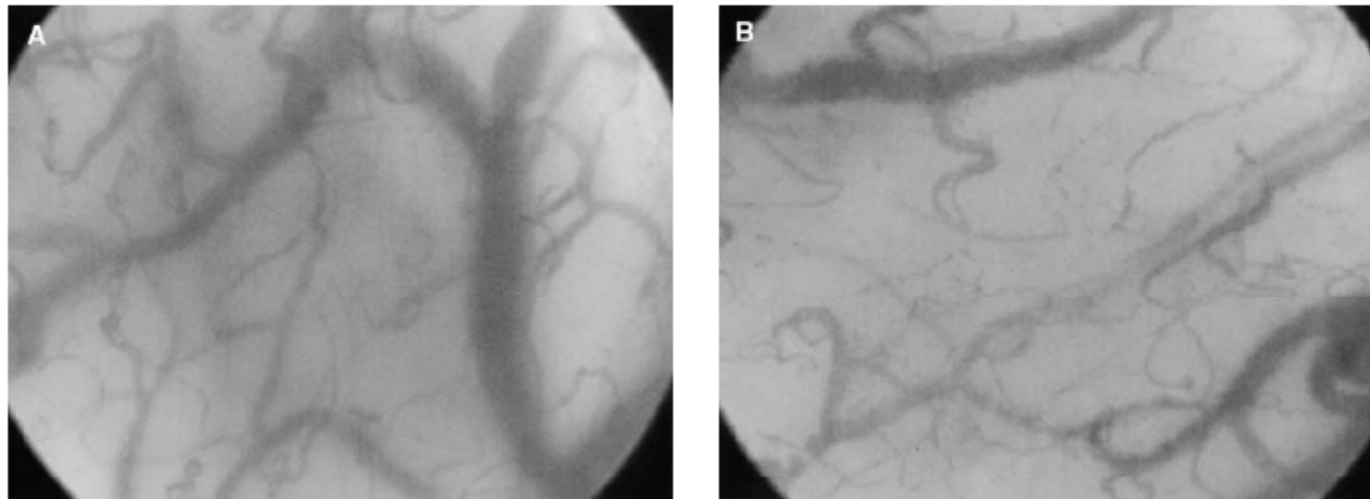
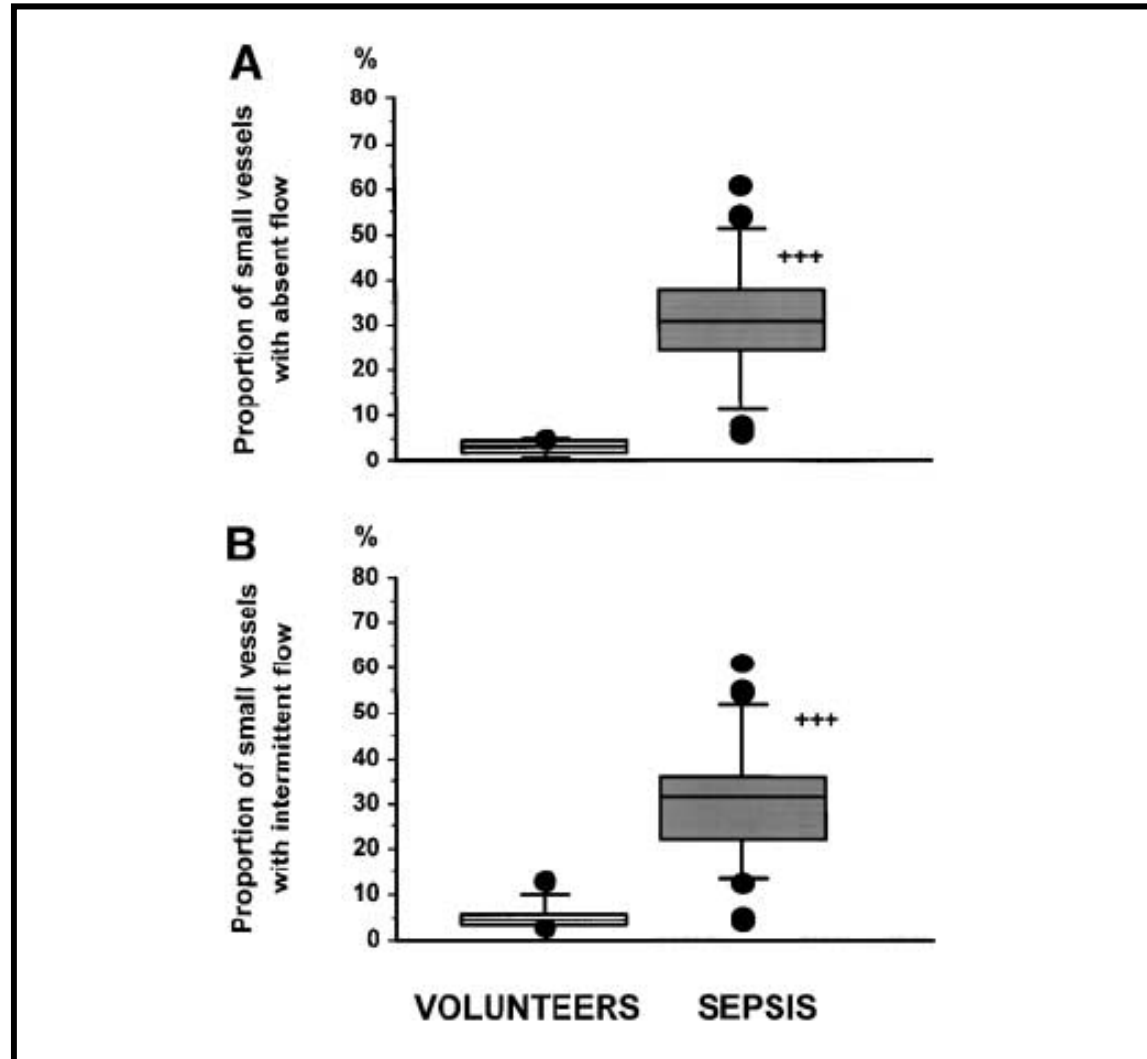


Figure 1. Representative examples of the sublingual microvasculature in a healthy volunteer (A) and in a patient with septic shock (B). Note the rich density in large and small vessels in the volunteer and the decrease in the density of small vessels in sepsis. Physiologic data of the volunteer: temperature, 36.8° C; heart rate, 65 bpm; mean arterial pressure, 82 mm Hg. Patient's hemodynamic data: temperature, 38° C; heart rate, 120 bpm; mean arterial pressure, 60 mm Hg; mean pulmonary artery pressure, 30 mm Hg; pulmonary artery occluded pressure, 16 mm Hg; right atrial pressure, 13 mm Hg; cardiac index, 3.5 L/min · m²; pH 7.32; Pa_{CO2}, 38 mm Hg; Pa_{O2}, 65 mm Hg; Sa_{O2}, 93%; mixed-venous oxygen saturation, 68%; hemoglobin, 8.1 g/dl; lactate, 2.9 mEq/L; dopamine, 20 µg/kg · min; norepinephrine, 0.4 µg/kg · min.

Orthogonal polarization spectral imaging





Une fatalité?

Défaillance microcirculatoire
du choc septique

Intérêt de la dobutamine

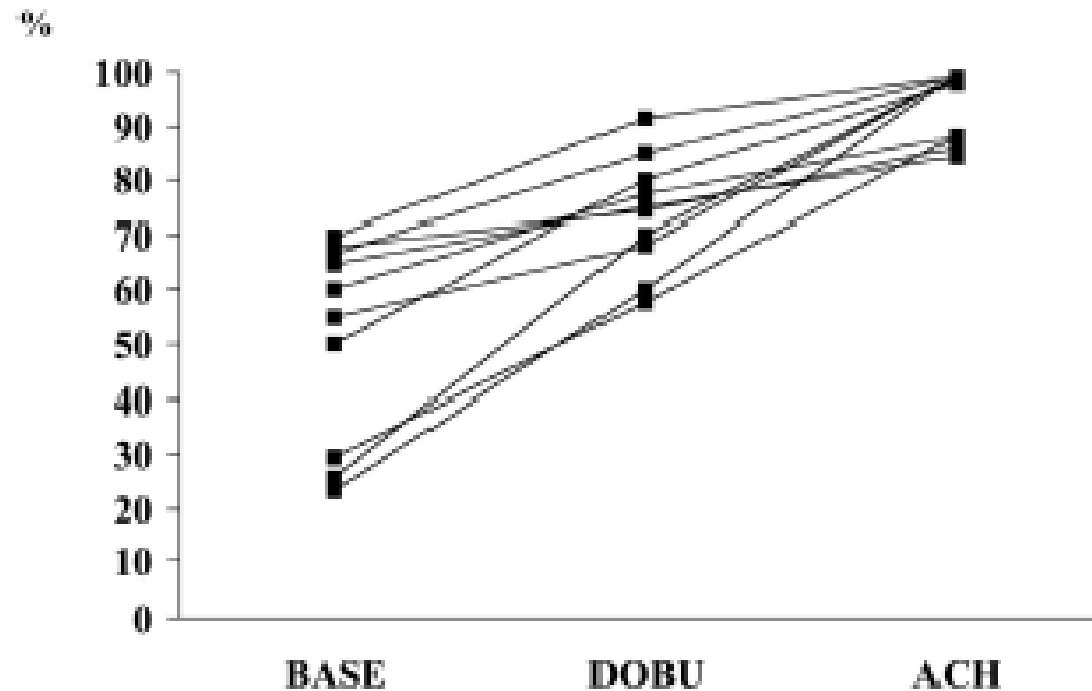


Figure 1. Individual changes in capillary perfusion in the subset of ten patients also investigated with acetylcholine. *BASE*, baseline; *DOBU*, dobutamine; *ACH*, acetylcholine.

Protéine C activée

Chez l'homme au cours du sepsis il existe une altération de l'équilibre normal entre coagulation et fibrinolyse

La protéine C activée :

- Inhibe les facteurs Va and VIIIa
- Neutralise l'inhibiteur-1 de l'activateur du plasminogène

Protéine C activée

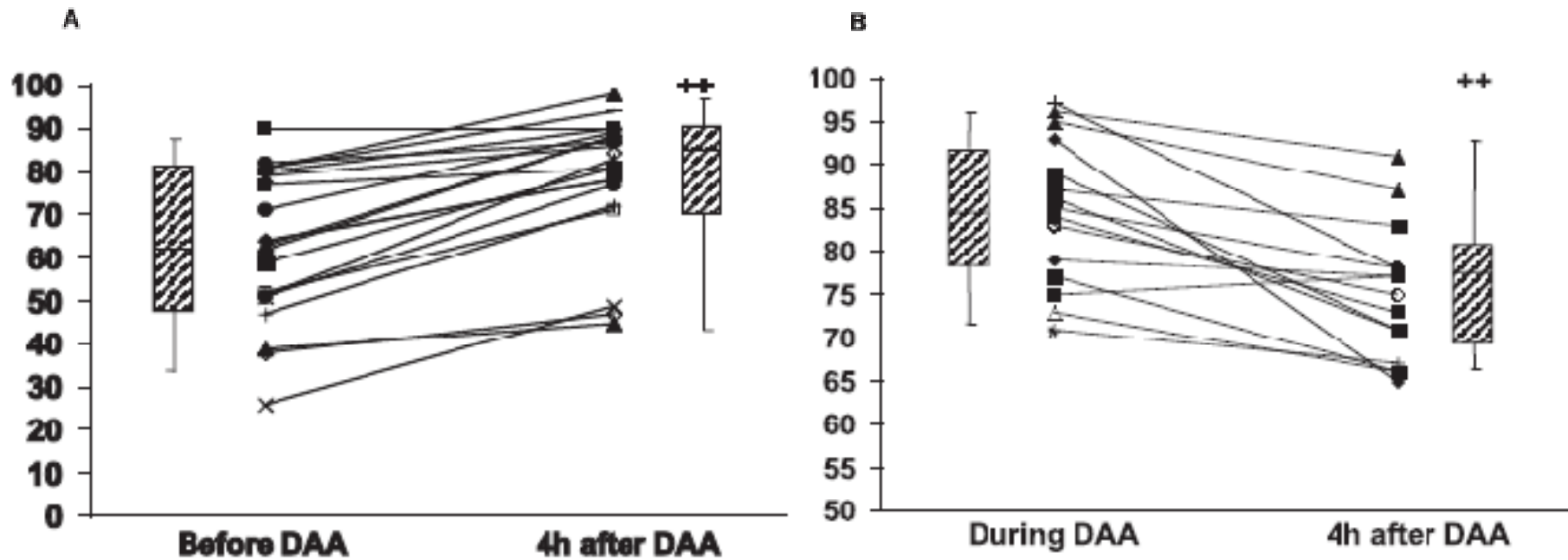
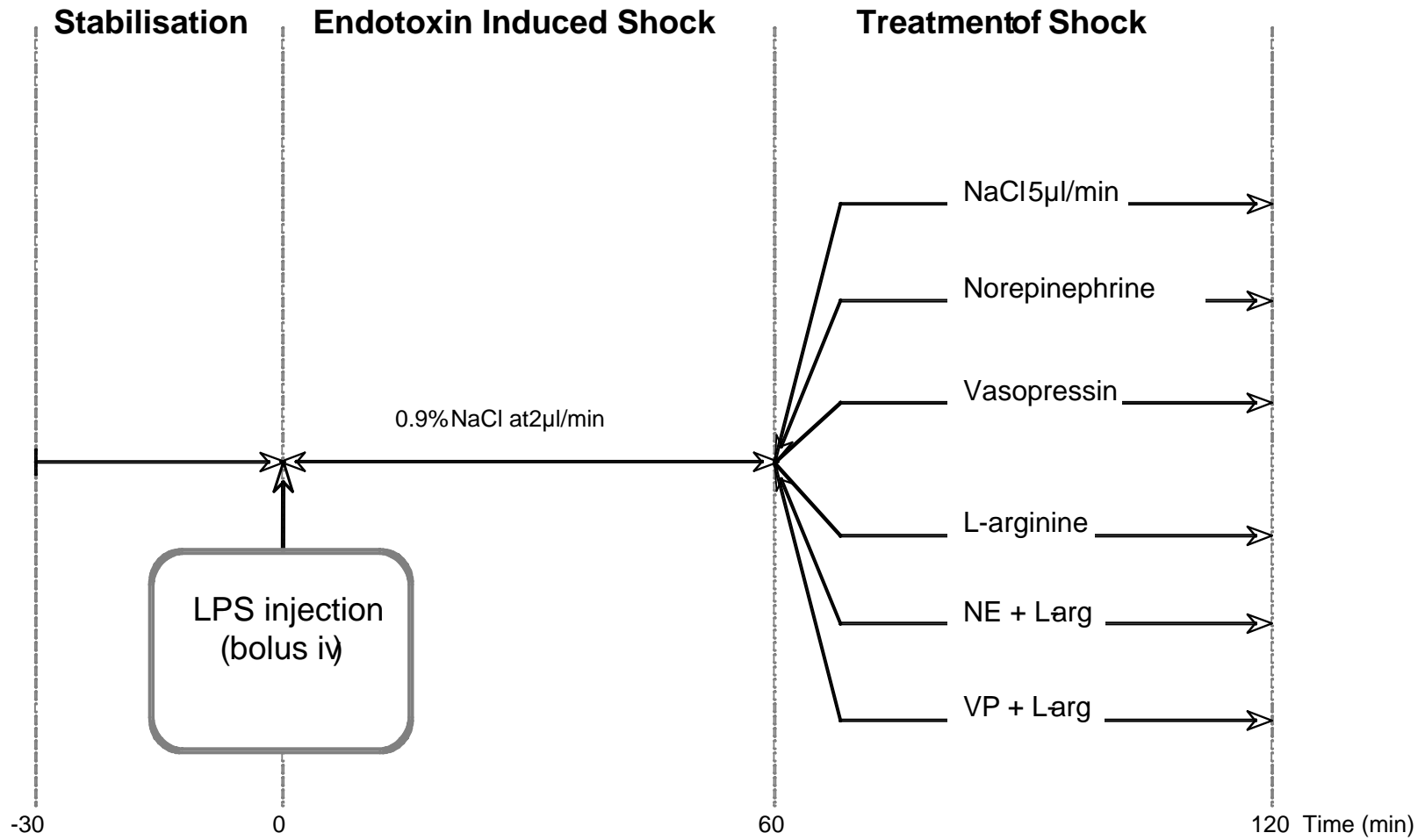


Figure 1. Evolution of microvascular perfusion at the start (*left panel*) and at the end (*right panel*) of drotrecogin alfa activated (DAA) administration. ++ $p < .01$ vs. previous time.

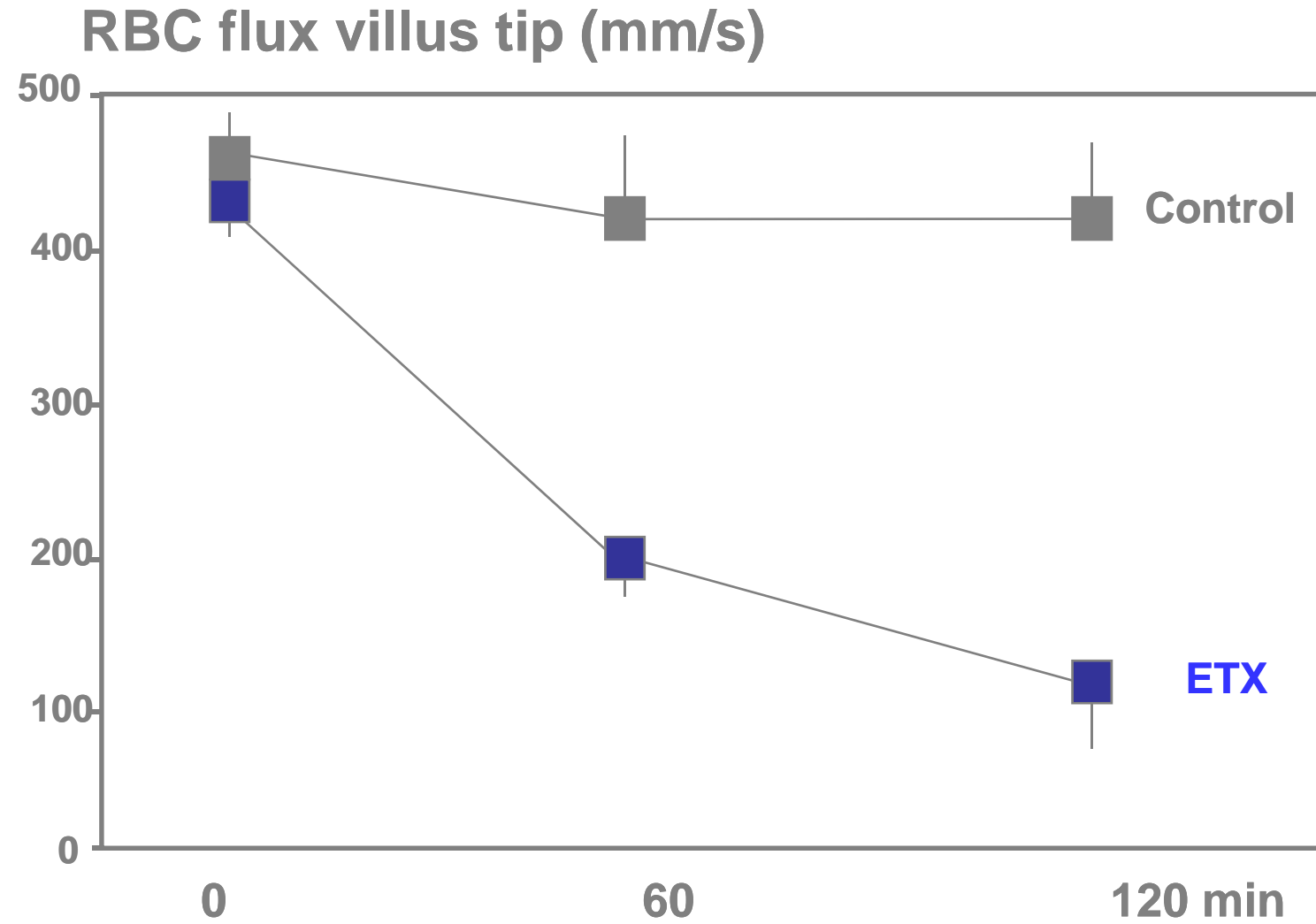
Des
vasodilatateurs?



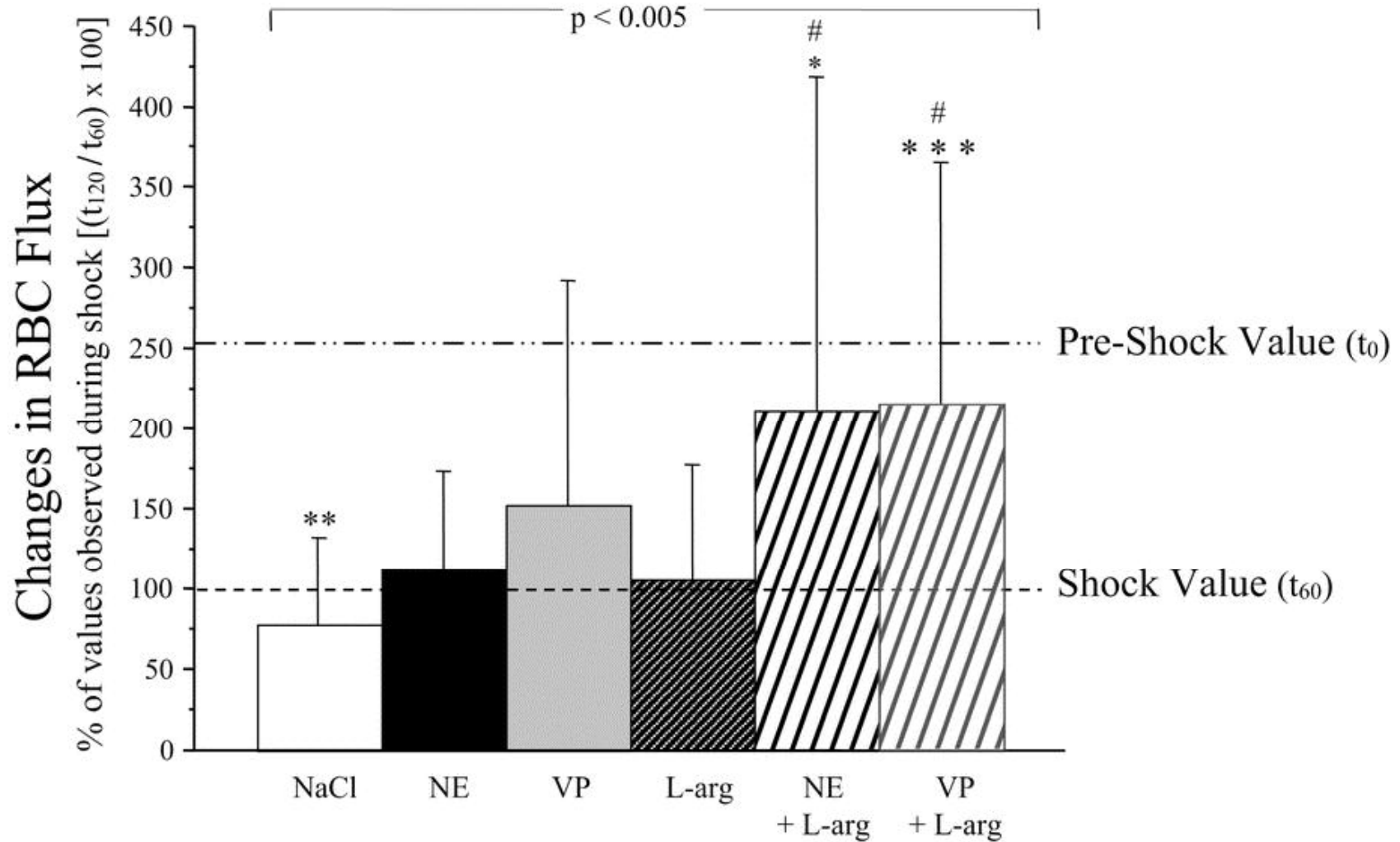
Donneurs de NO



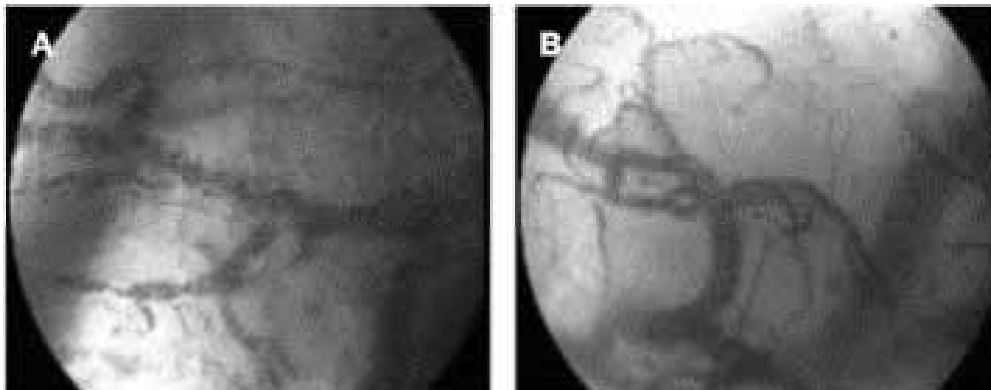
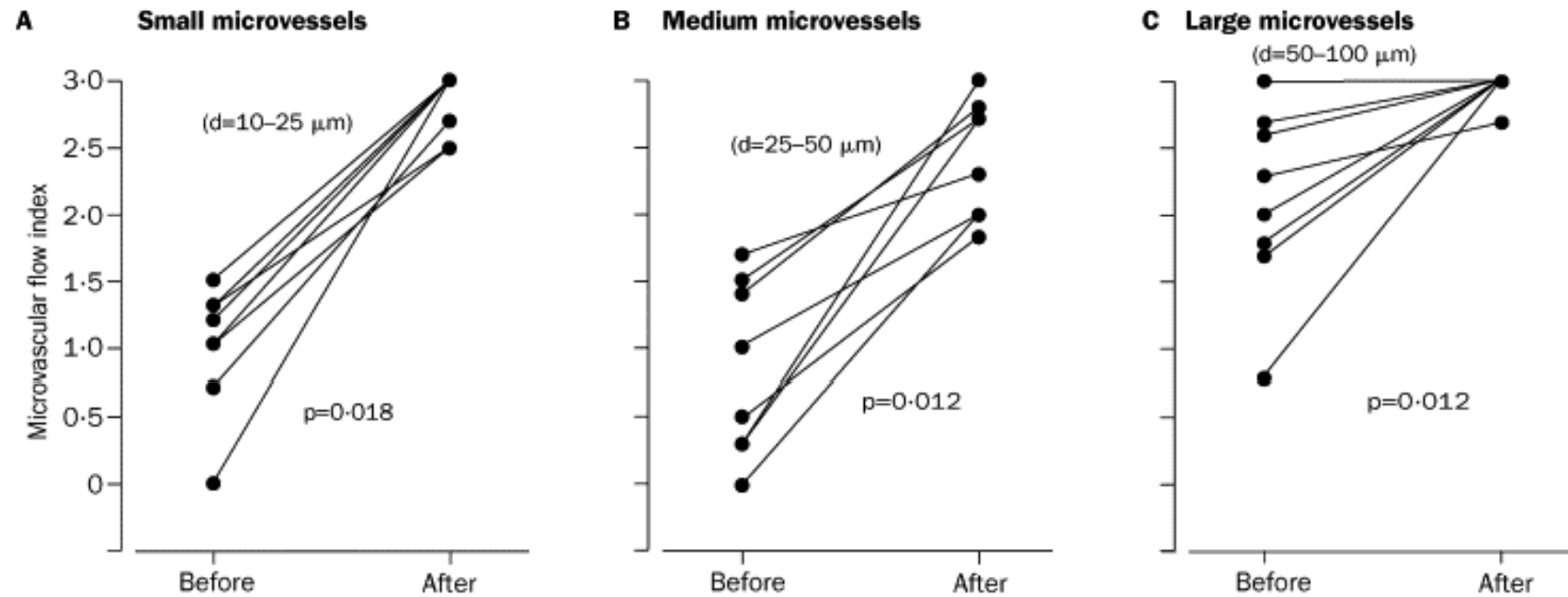
Donneurs de NO



Donneurs de NO



Donneurs de NO



Spronk E, Lancet 2002

EPPUR SI MUOVE!



Near infrared spectroscopy

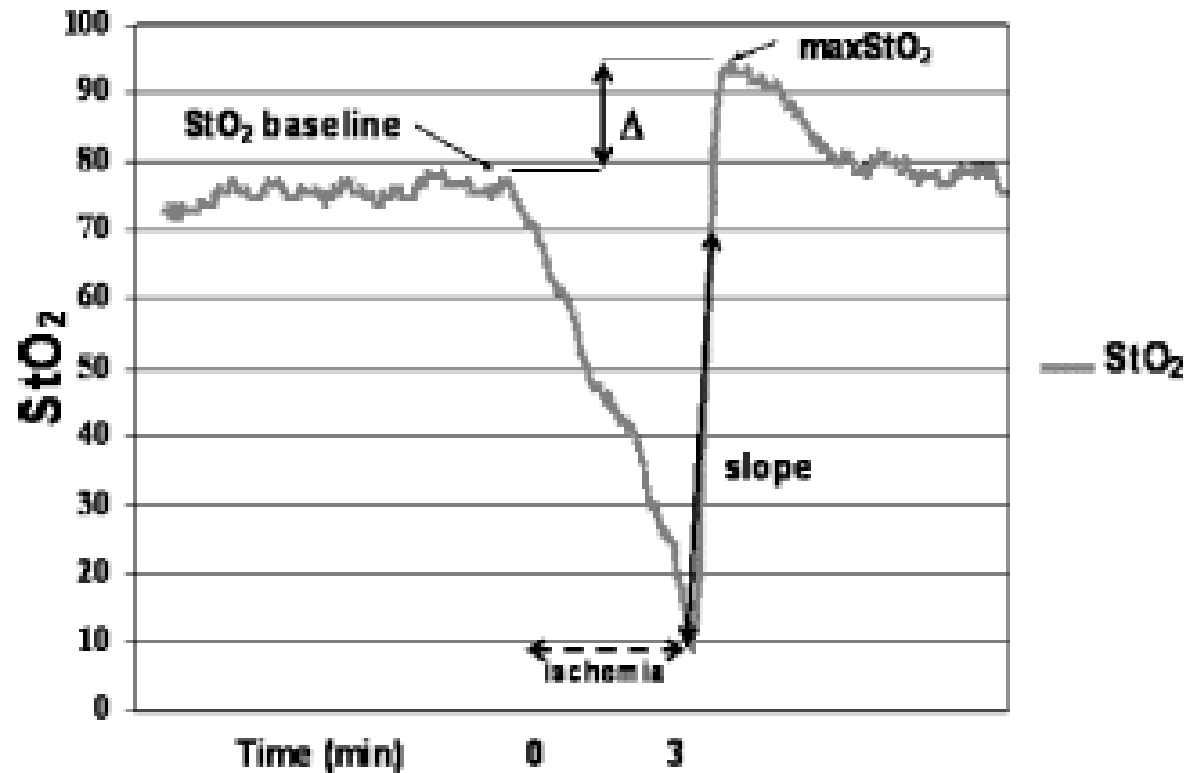


Fig. 1 Representative StO_2 curve. Δ , difference between maximum StO_2 value during the reperfusion period and baseline StO_2 . *Slope*, slope of the increase in StO_2 during the first 14 s of the reperfusion period

Near infrared spectroscopy

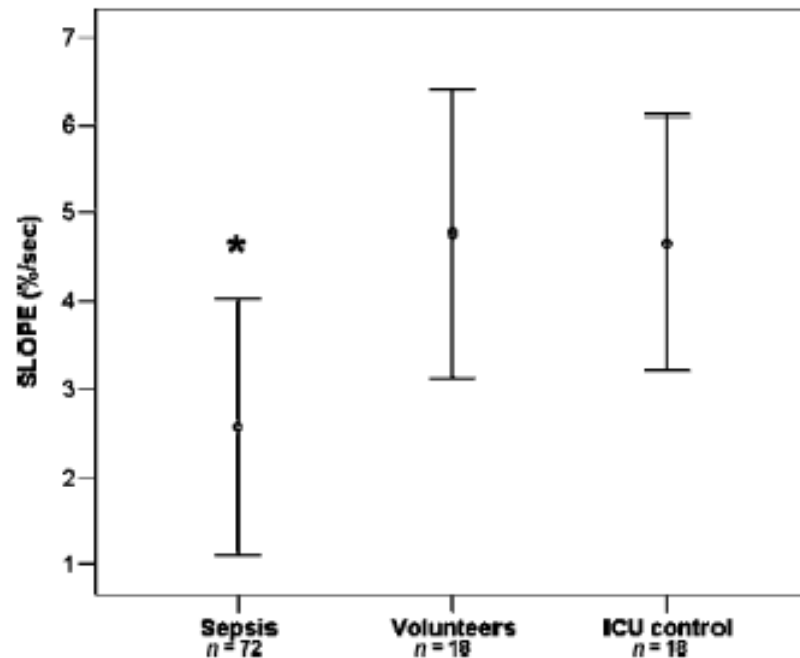


Fig. 2 Slope in septic patients ($n = 72$), healthy volunteers ($n = 18$), and ICU control patients ($n = 18$). Asterisk, Significant difference at 0.05 level vs. healthy volunteers and ICU control

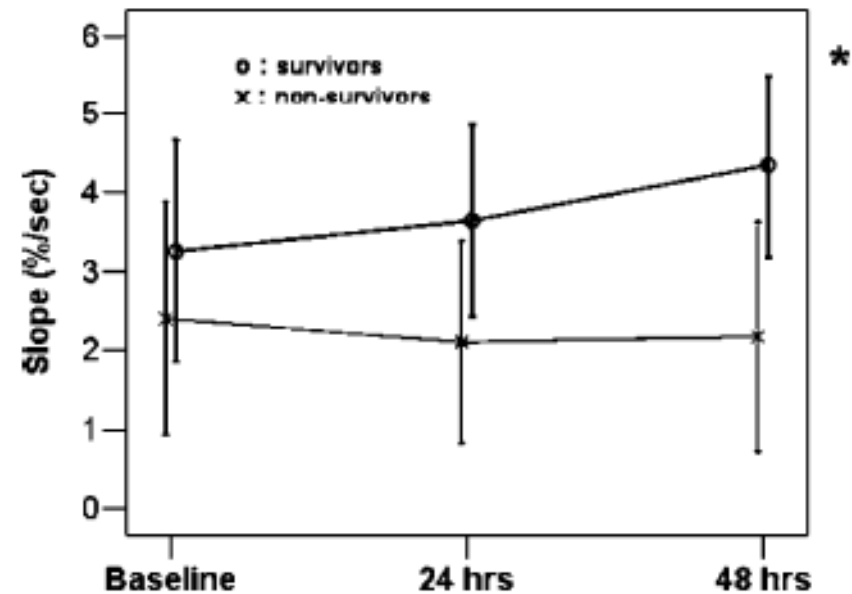


Fig. 4 Time course of slope (mean \pm SD) in survivors ($n = 28$; circles) and non-survivors ($n = 24$; crosses) at baseline, and after 24 and 48 h in 52 septic patients. Asterisk, Significant difference at 0.05 level between groups across time

Notion des unités microvasculaires faibles

