

Remplissage vasculaire et sepsis

- Un mal nécessaire -



LES RENCONTRES EN REA

Société Française d'Anesthésie et de Réanimation

Mercredi 5 décembre 2012
Institut Mutualiste Montsouris, Paris XIVe



SFAR

Société Française d'Anesthésie et de Réanimation

Didier Journois

HEGP, Paris

FACULTÉ
DE MÉDECINE
PARIS DESCARTES



Didier Journois : Conflits d'intérêt

Source	Prestation	Bénéficiaire	Nature	Période	Destination des fonds
AP-HP	Praticien Hospitalier mi-temps + Gardes	DJ	< 60 k€/an salaire	1985 - actuel	DJ
Université René Descartes	Praticien Universitaire	DJ	< 50 k€/an salaire	2006 - actuel	DJ
AMGEN, Pasteur Diagnostics	Exploitation de brevets en biologie moléculaire	DJ	6 k€/an	1997 - actuel	DJ
DGS	Crédits de recherche PHRC	Études	200 k€/an	2008 - actuel	Recherche clinique
Fresenius	Contrat de formation	Pôle hospitalier	< 20 k€/an	2010 - actuel	Achat de solutés
Abbott, Novartis, HAS	Consultant	Pôle hospitalier	< 4 k€/an	2011-actuel	Production de soins - Equipement

Remplissage vasculaire

Dieu ne nous remplit qu'autant
que nous sommes vides.

[Henry de Montherlant]

Au cours d'un état de choc septique un remplissage vasculaire doit être assuré

1. Dès l'admission en réanimation
2. De façon à obtenir une PAM ≥ 70 mmHg
3. De façon à obtenir une ScVO₂ $\geq 70\%$
4. Associé à des concentrés globulaires pour Hte $\geq 30\%$
5. Afin de maintenir la PVC ≥ 8 cmH₂O

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5. Afin de maintenir la PVC ≥ 8 cmH₂O

Dès la prise
en charge !

65 mmHg

mmHg !

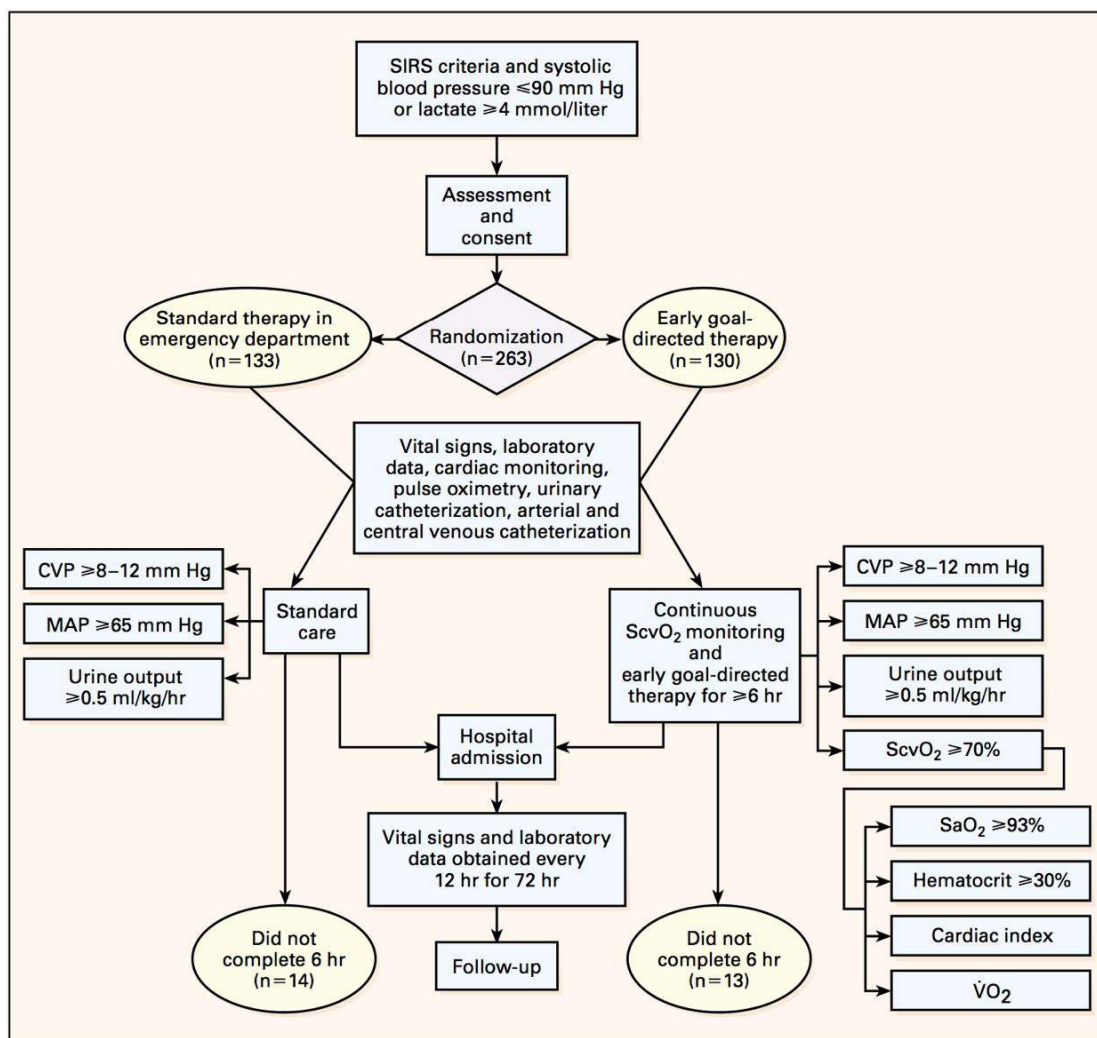
R. Phillip Dellinger
Mitchell M. Levy
Jean M. Carlet
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Roman Jaeschke
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Richard Beale
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Surviving Sepsis Campaign: International guidelines for management of severe sepsis and septic shock: 2008

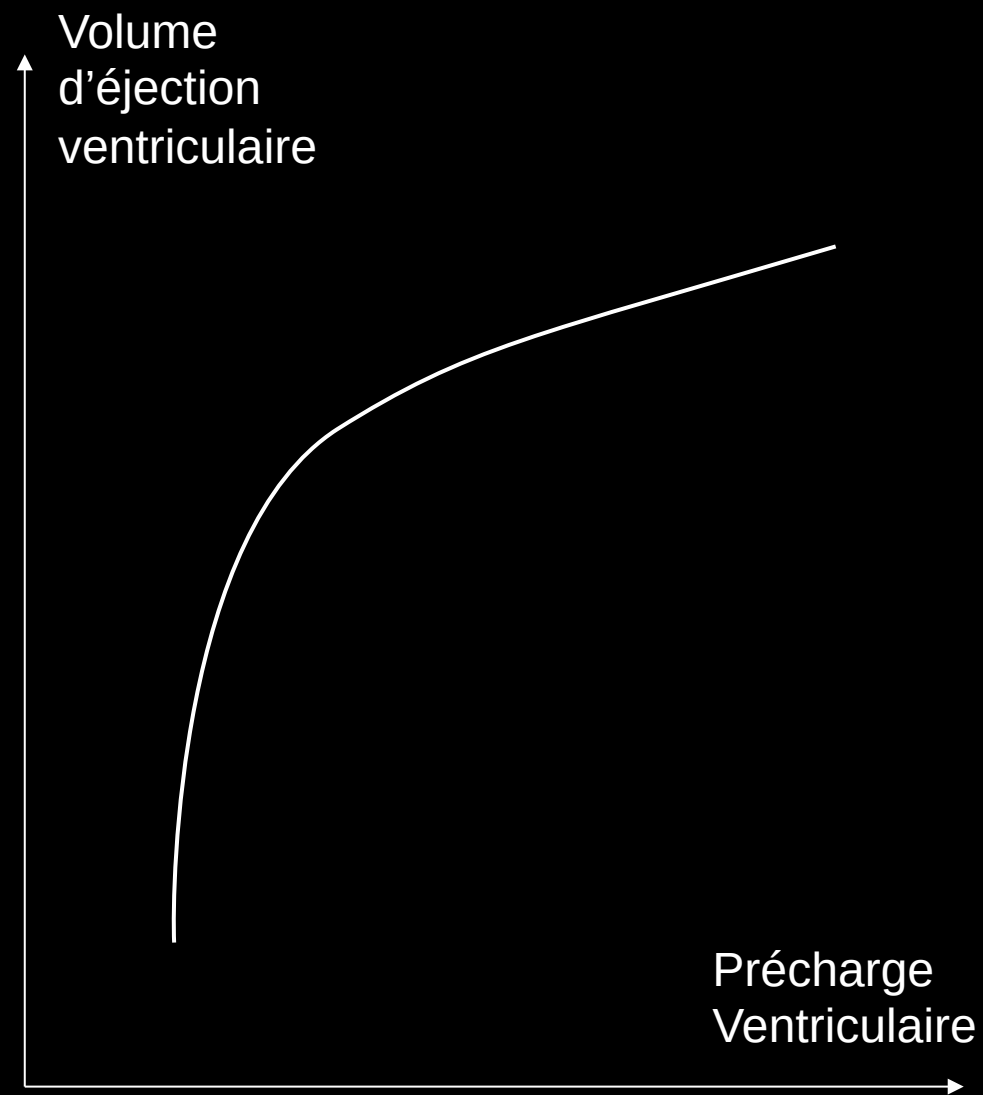


EARLY GOAL-DIRECTED THERAPY IN THE TREATMENT OF SEVERE SEPSIS AND SEPTIC SHOCK

EMANUEL RIVERS, M.D., M.P.H., BRYANT NGUYEN, M.D., SUZANNE HAVSTAD, M.A., JULIE RESSLER, B.S.,
ALEXANDRIA MUZZIN, B.S., BERNHARD KNOBLICH, M.D., EDWARD PETERSON, PH.D., AND MICHAEL TOMLANOVICH, M.D.,
FOR THE EARLY GOAL-DIRECTED THERAPY COLLABORATIVE GROUP*



Précharge cardiaque - Loi de Franck et Starling



Colloids versus crystalloids for fluid resuscitation in critically ill patients (Review)

Perel P, Roberts I



**THE COCHRANE
COLLABORATION®**

Au cours des 4 premiers jours de réanimation l'administration de 100 mL de SSI assure une expansion volémique identique à celle de :

1. 33 mL d'albumine (4%)
2. 52 mL d'albumine (4%)
3. 68 mL d'albumine (4%)
4. 51 mL d'HEA (200/0,5)
5. 66 mL d'HEA (200/0,5)

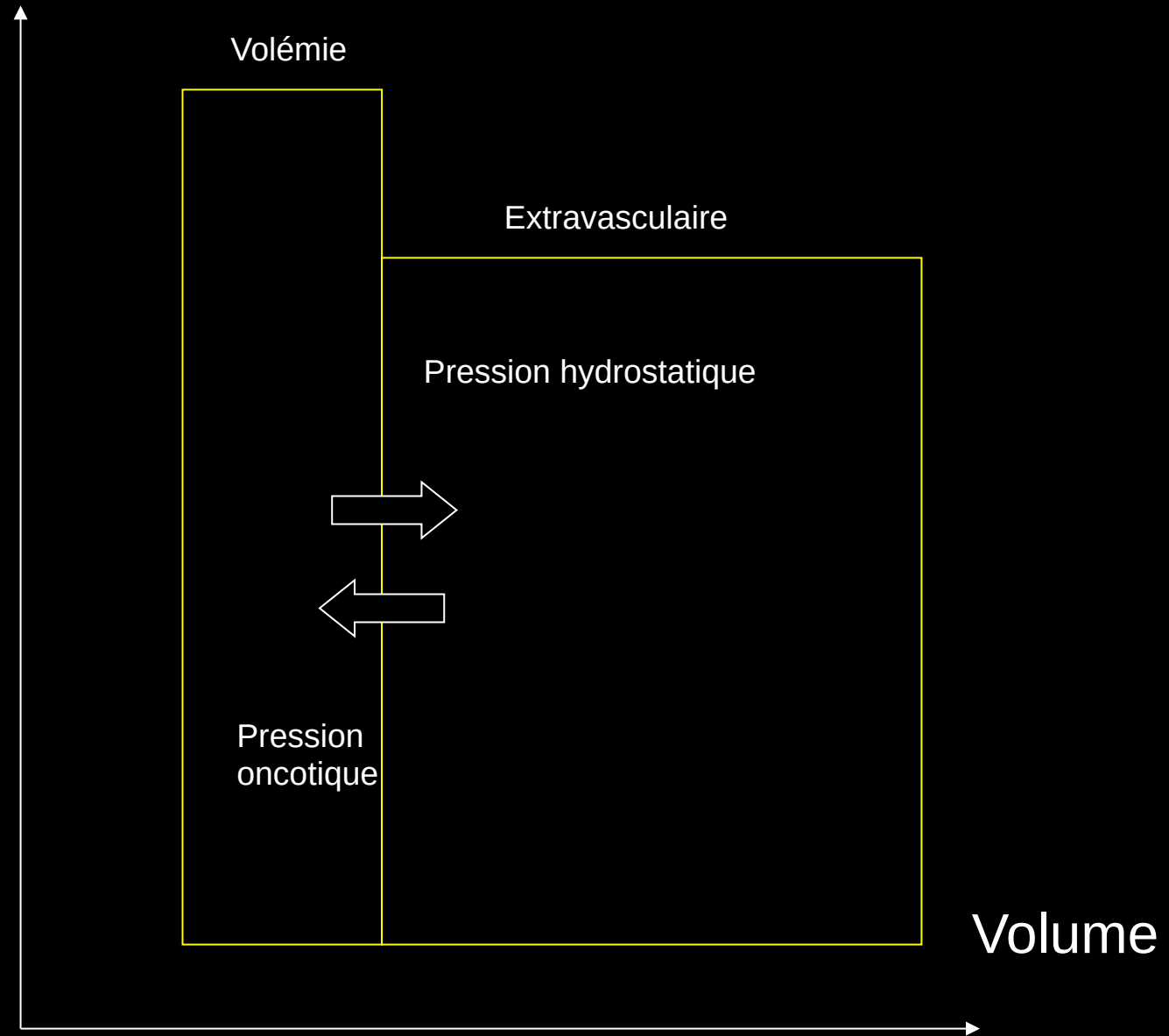
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4. 51 mL d'HEA (200/0,5)
5. 66 mL d'HEA (200/0,5)

Étude SAFE

Étude
« Brunkhorst »

Pression
osmotique

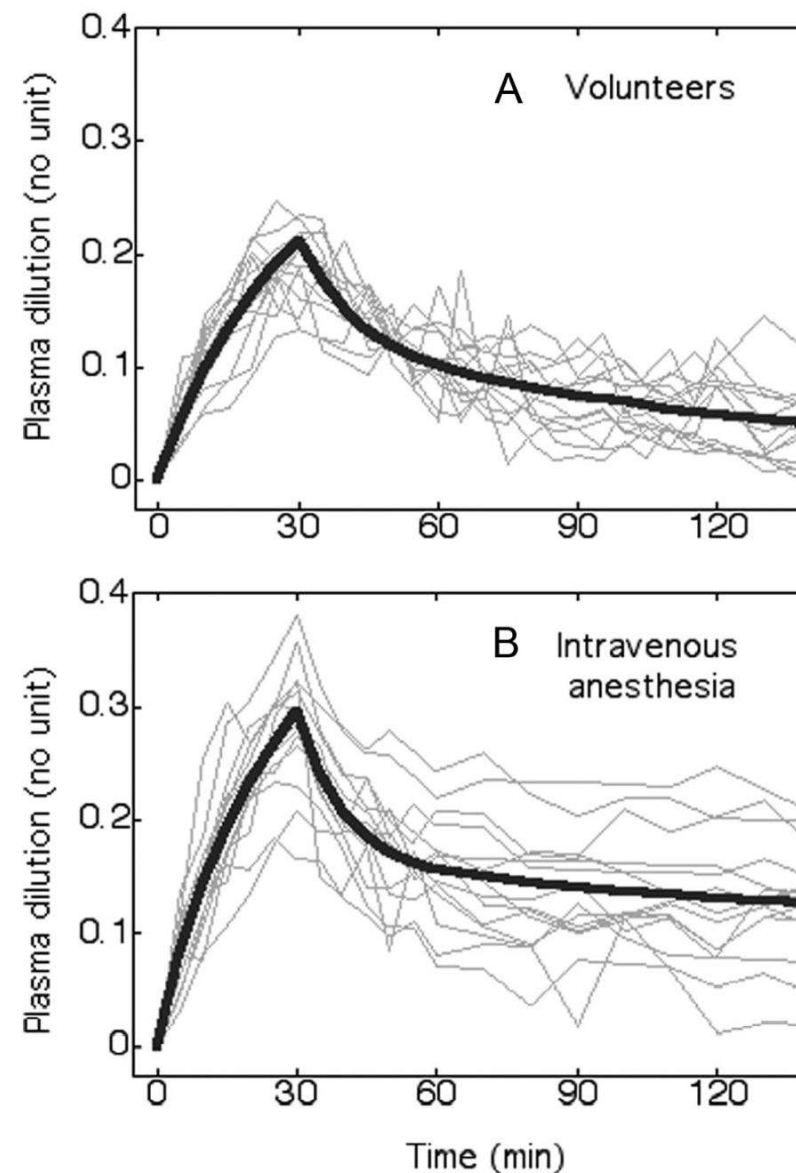
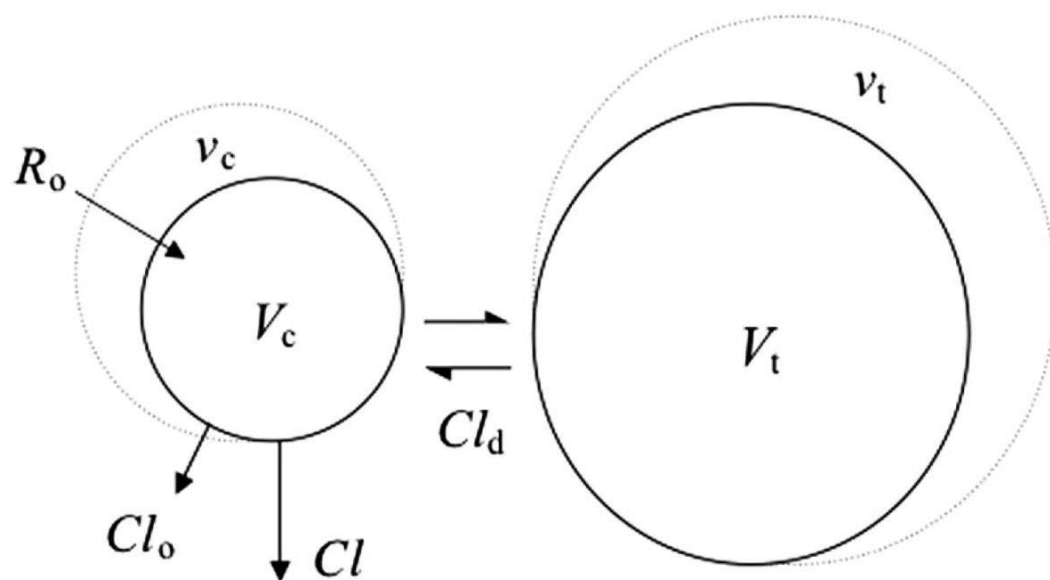




David S. Warner, M.D., Editor

Volume Kinetics for Infusion Fluids

Robert G. Hahn, M.D., Ph.D.*



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Titre						Créateur	Année	Publication	Date d'ajout
Bellomo Renal recovery POSTER.pdf									18.9.12 06:46:35
Association between a chloride-liberal vs chloride-restrictive intravenous fluid administration strategy and kidney injury in critically ill adults						Yunos N	2012	JAMA: The Journal of the American Medical Associ...	17.10.12 17:22:12
Early Intensive Care Sedation Predicts Long-Term Mortality in Ventilated Critically Ill Patients						Shehabi et al.	2012	American Journal of Respiratory and Critical Care ...	15.10.12 10:18:29
Measurement of renal blood flow by phase-contrast magnetic resonance imaging during septic acute kidney injury						Prowle et al.	2012	Critical Care Medicine	25.5.12 17:48:38
Kidney Attack						Bellomo	2012	JAMA: The Journal of the American Medical Associ...	6.6.12 07:18:07
Variability of antibiotic concentrations in critically ill patients receiving continuous renal replacement therapy: a multicentre pharmacokinetic study						Roberts et al.	2012	Critical care medicine	6.9.12 11:52:41
A risk, injury, failure, loss, and end-stage renal failure score-based trigger for renal replacement therapy and survival after cardiac surgery						Schneider et al.	2012	Journal of critical care	17.9.12 21:21:53
Hydroxyethyl Starch or Saline for Fluid Resuscitation in Intensive Care						Myburgh et al.	2012	New England Journal of Medicine	18.10.12 15:56:00
The impact of intrarenal nitric oxide synthase inhibition on renal blood flow and function in mild and severe hyperdynamic sepsis*						Ishikawa et al.	2011	Critical Care Medicine	23.5.12 20:32:54
Dynamic lactate indices as predictors of outcome in critically ill patients						Nichol et al.	2011	Critical Care	18.9.12 07:28:34
Totem and Taboo: Fluids in sepsis						Hilton et Bellomo	2011	Critical Care	20.6.12 09:05:45
Extracorporeal membrane oxygenation for 2009 influenza A (H1N1) acute respiratory distress syndrome						Davies et al.	2009	JAMA: The Journal of the American Medical Associ...	30.5.12 15:40:51
Intensity of continuous renal-replacement therapy in critically ill patients						Bellomo et al.	2009	The New England journal of medicine	30.4.12 08:25:25
Continuous versus intermittent renal replacement therapy for critically ill patients with acute kidney injury: a meta-analysis						Bagshaw et al.	2008	Crit Care Med	30.4.12 08:25:25
A pilot randomized controlled comparison of extended daily dialysis with filtration and continuous veno-venous hemofiltration: fluid removal and hemodynamics						Baldwin et al.	2007	The International journal of artificial organs	5.9.12 21:40:42
Saline or albumin for fluid resuscitation in patients with traumatic brain injury						Myburgh et al.	2007	The New England journal of medicine	1.12.12 22:03:50
Continuous renal replacement therapy: A worldwide practice survey						Uchino et al.	2007	Intensive Care Medicine	9.6.12 08:32:13
The Effect of Albumin Concentration on Plasma Sodium and Chloride Measurements in Critically Ill Patients						Story et al.	2007	Anesthesia & Analgesia	22.5.12 21:39:48
A pilot randomised controlled comparison of continuous veno-venous haemofiltration and extended daily dialysis with filtration: effect on small solutes and acid-base balance						Baldwin et al.	2007	Intensive Care Medicine	9.6.12 08:32:19
A pilot randomized controlled crossover study comparing regional heparinization to regional citrate anticoagulation for continuous venovenous hemofiltration						Fealy et al.	2007	Int J Artif Organs	30.4.12 08:25:25
Defining and classifying acute renal failure: from advocacy to consensus and validation of the RIFLE criteria						Bellomo et al.	2007	Intensive Care Medicine	1.5.12 18:48:09
The effects of saline or albumin resuscitation on acid-base status and serum electrolytes*						Bellomo et al.	2006	Critical Care Medicine	26.11.12 10:34:51
An assessment of the RIFLE criteria for acute renal failure in hospitalized patients						Uchino et al.	2006	Critical Care Medicine	30.4.12 13:55:38
Early isovolaemic haemofiltration in oliguric patients with septic shock						Piccinni et al.	2006	Intensive Care Med	30.4.12 08:25:25
Pilot study on the effects of high cutoff hemofiltration on the need for norepinephrine in septic patients with acute renal failure						Morgera et al.	2006	Crit Care Med	30.4.12 08:25:25
Do we know the optimal dose for renal replacement therapy in the intensive care unit?						Bellomo	2006	Kidney Int	30.4.12 08:25:25
Early isovolaemic haemofiltration in oliguric patients with septic shock						Piccinni et al.	2005	Intensive Care Medicine	9.6.12 08:32:22
Use of fondaparinux (ARIXTRA®) in a dialysis patient with symptomatic heparin-induced thrombocytopenia type II						Haase et al.	2005	Nephrology Dialysis Transplantation	28.6.12 07:35:47
Acute renal failure in critically ill patients: a multinational, multicenter study						Uchino et al.	2005	Jama	30.4.12 08:25:25
Blood flow reductions during continuous renal replacement therapy and circuit life						Baldwin et al.	2004	Intensive Care Medicine	9.6.12 08:32:31
A comparison of albumin and saline for fluid resuscitation in the intensive care unit						Finfer et al.	2004	The New England journal of medicine	1.12.12 22:04:02
Defining acute renal failure: physiological principles						Bellomo et al.	2004	Intensive Care Medicine	9.6.12 08:32:28
Continuous venovenous hemofiltration without anticoagulation						Uchino et al.	2004	Asaio J	30.4.12 08:25:25
Acute renal failure-definition, outcome measures, animal models, fluid therapy and information technology needs: the Second International Consensus Conference of the Acute Dial...						Bellomo et al.	2004	Crit Care	4.6.12 13:29:13
Acute renal failure - definition, outcome measures, animal models, fluid therapy and information technology needs: the Second International Consensus Conference of the Acute Dia...						Bellomo et al.	2004	Crit Care	30.4.12 08:25:25
Solute mass balance during isovolaemic high volume haemofiltration						Uchino et al.	2003	Intensive Care Medicine	9.6.12 08:32:34
Pre-Dilution vs. Post-Dilution during Continuous Veno-Venous Hemofiltration: Impact on Filter Life and Azotemic Control						Uchino et al.	2003	Nephron Clinical Practice	9.6.12 08:32:00
Continuous is not continuous: the incidence and impact of circuit "down-time" on uraemic control during continuous veno-venous haemofiltration						Uchino et al.	2003	Intensive Care Med	30.4.12 08:25:25
Interpreting the mechanisms of continuous renal replacement therapy in sepsis: the peak concentration hypothesis						Ronco et al.	2003	Artif Organs	30.4.12 08:25:25
Acid-base status of critically ill patients with acute renal failure: analysis based on Stewart-Figge methodology						Rocktaeschel et al.	2003	Critical Care	9.6.12 17:33:05
Hemofiltration during cardiopulmonary bypass for high risk adult cardiac surgery						Raman et al.	2003	Int J Artif Organs	30.4.12 08:25:25
The impact of lactate-buffered high-volume hemofiltration on acid-base balance						Cole et al.	2003	Intensive Care Med	30.4.12 08:25:25
A technique for the monitoring of blood flow during continuous haemofiltration						Baldwin et al.	2002	Intensive care medicine	1.5.12 23:31:28
Clearance of vancomycin during high-volume haemofiltration: impact of pre-dilution						Uchino et al.	2002	Intensive Care Med	30.4.12 08:25:25
Super high flux hemofiltration: a new technique for cytokine removal						Uchino et al.	2002	Intensive Care Med	30.4.12 08:25:25
Cytokine removal with a large pore cellulose triacetate filter: an ex vivo study						Uchino et al.	2002	Int J Artif Organs	30.4.12 08:25:25
Continuous renal replacement therapy: opinions and evidence						Ronco et al.	2002	Adv Ren Replace Ther	30.4.12 08:25:25
A phase II randomized, controlled trial of continuous hemofiltration in sepsis						Cole et al.	2002	Critical care medicine	30.4.12 08:25:25
The effect of coupled haemofiltration and adsorption on inflammatory cytokines in an ex vivo model						Cole et al.	2002	Nephrol Dial Transplant	30.4.12 08:25:25
POSSIBLE STRATEGIES TO PROLONG CIRCUIT LIFE DURING HEMOFILTRATION: THREE CONTROLLED STUDIES						Baldwin et al.	2002	Renal Failure	30.4.12 08:25:25
Importance of increased ultrafiltration volume and impact on mortality: sepsis and cytokine story and the role of continuous veno-venous haemofiltration						Ronco et al.	2001	Curr Opin Nephrol Hypertens	30.4.12 08:25:25
High-volume haemofiltration in human septic shock						Cole et al.	2001	Intensive care medicine	30.4.12 08:25:25
Early and intensive continuous hemofiltration for severe renal failure after cardiac surgery						Bent et al.	2001	Ann Thorac Surg	30.4.12 08:25:25
Blood purification in the intensive care unit: evolving concepts						Bellomo et Ronco	2001	World J Surg	30.4.12 08:25:25
Intensive care unit management of the critically ill patient with fluid overload after open heart surgery						Bellomo et al.	2001	Cardiology	30.4.12 08:25:25
Extracorporeal blood purification therapy for sepsis and systemic inflammation: its biological rationale						Bellomo et al.	2001	Contrib Nephrol	30.4.12 08:25:25
Continuous veno-venous hemofiltration without anticoagulation in high-risk patients						Tan et al.	2000	Intensive Care Med	30.4.12 08:25:25
Effects of different doses in continuous veno-venous haemofiltration on outcomes of acute renal failure: a prospective randomised trial						Ronco et al.	2000	Lancet	30.4.12 08:25:25
A prospective, multicenter study of the epidemiology, management, and outcome of severe acute renal failure in a "closed" ICU system						Cole et al.	2000	Am J Respir Crit Care Med	30.4.12 08:25:25
Cellulose triacetate: another membrane for continuous renal replacement therapy						Ronco et al.	1999	J Nephrol	30.4.12 08:25:25
Renal replacement therapy in the intensive care unit						Bellomo et Ronco	1999	Crit Care Resusc	30.4.12 08:25:25
Continuous renal replacement therapy: continuous blood purification in the intensive care unit						Bellomo et Ronco	1998	Ann Acad Med Singapore	30.4.12 08:25:25
Preliminary experience with high-volume hemofiltration in human septic shock						Bellomo et al.	1998	Kidney Int Suppl	30.4.12 08:25:25
Who should manage CRRT in the ICU? The intensivists' viewpoint						Bellomo et al.	1997	Am J Kidney Dis	30.4.12 08:25:25
Treatment of sepsis-associated severe acute renal failure with continuous hemodiafiltration: clinical experience and comparison with conventional dialysis						Bellomo et al.	1995	Blood Purif	30.4.12 08:25:25
Severe acute renal failure: a comparison of acute continuous hemodiafiltration and conventional dialytic therapy						Bellomo et al.	1995	Nephron	30.4.12 08:25:25
Continuous hemofiltration as blood purification in sepsis						Bellomo	1995	New Horiz	30.4.12 08:25:25
The outcome of critically ill elderly patients with severe acute renal failure treated by continuous hemodiafiltration						Bellomo et al.	1994	Int J Artif Organs	30.4.12 08:25:25
Continuous veno-venous hemofiltration with dialysis removes cytokines from the circulation of septic patients						Bellomo et al.	1993	Crit Care Med	30.4.12 08:25:25
Anticoagulant regimens in acute continuous hemodiafiltration: a comparative study						Bellomo et al.	1993	Intensive Care Med	30.4.12 08:25:25
Use of continuous haemodiafiltration: an approach to the management of acute renal failure in the critically ill						Bellomo et al.	1992	Am J Nephrol	30.4.12 08:25:25

ON THE ABSORPTION OF FLUIDS FROM THE
CONNECTIVE TISSUE SPACES. BY ERNEST H.
STARLING. (Two Figures in Text.)

(*From the Physiological Laboratory, Guy's Hospital.*)

UNTIL within the last few years, all workers, who investigated the question of absorption by the blood vessels, confined their experiments to cases in which some substance, not occurring normally in the blood, was introduced into some connective tissue space. That, under these conditions, absorption by the blood vessels does take place, was shown by Majendie, and confirmed in recent years by Ascher¹ as well as by Tubby and myself². Although the ease, with which this interchange by a process of diffusion between blood and extravascular fluids takes place, must be of great importance for the normal metabolism of the

$$J_v = K_f ([P_c - P_i] - \sigma [\pi_c - \pi_i])$$

tained in the tissue-spaces have the same tonicity and the same composition in salts as blood-plasma. We have to inquire first whether the blood vessels do absorb such isotonic fluids, and secondly the manner in which this absorption takes place.

EVIDENCE AS TO ABSORPTION BY BLOOD VESSELS.

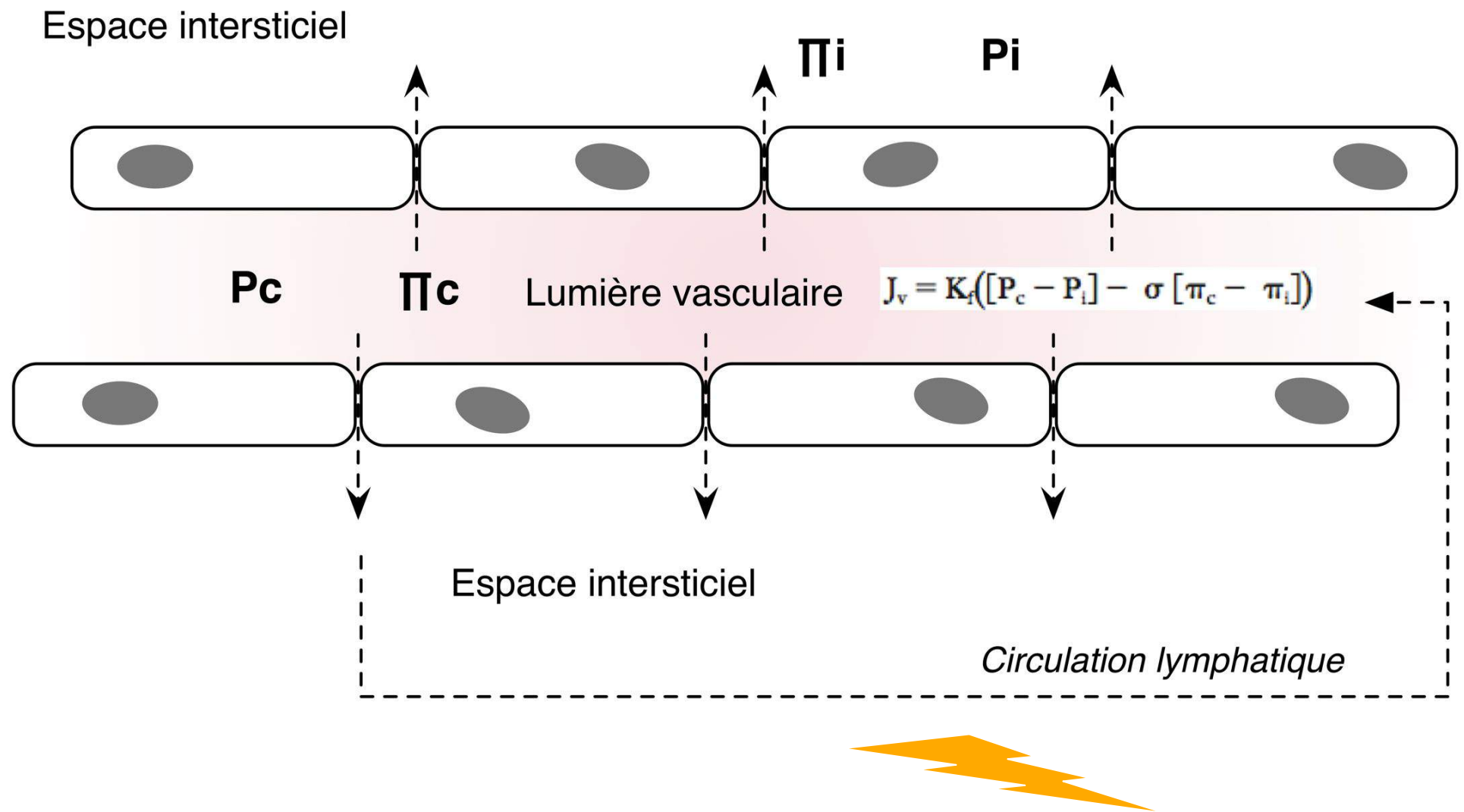
1. *Absorption from the serous cavities.*

A number of experiments have been made recently on the subject of the absorption of isotonic fluids (*e.g.* 1 % salt solution or serum) from the serous cavities. Orlow³ showed that isotonic fluids were absorbed from the peritoneal cavity with considerable rapidity without producing any corresponding lymph-flow from the thoracic duct, and concluded

¹ *Zeitschrift f. Biologie*, 1893. 247.

² *This Journal*, xvi. 140. 1894.

³ *Pflüger's Archiv*, LIX. 170. 1894.

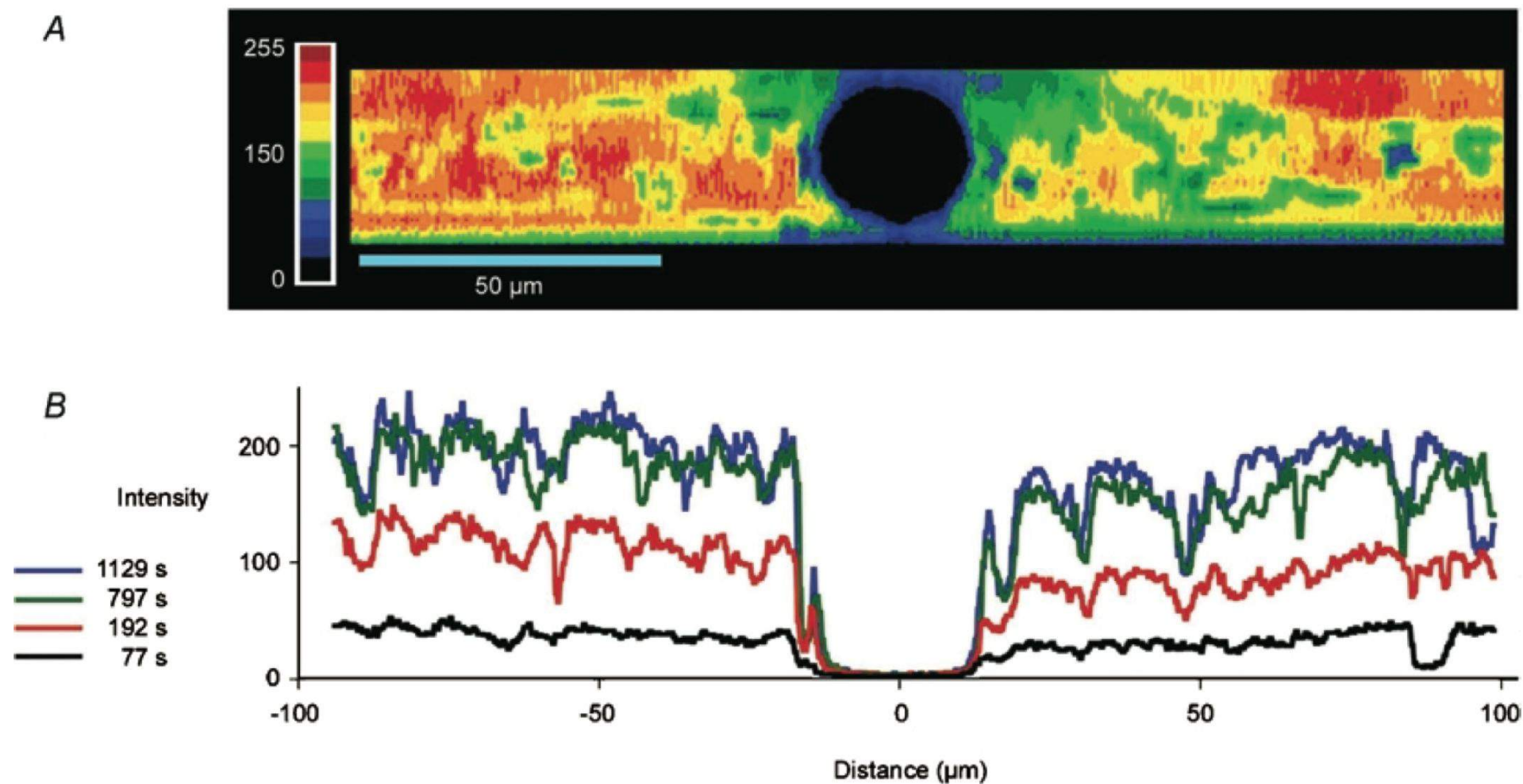


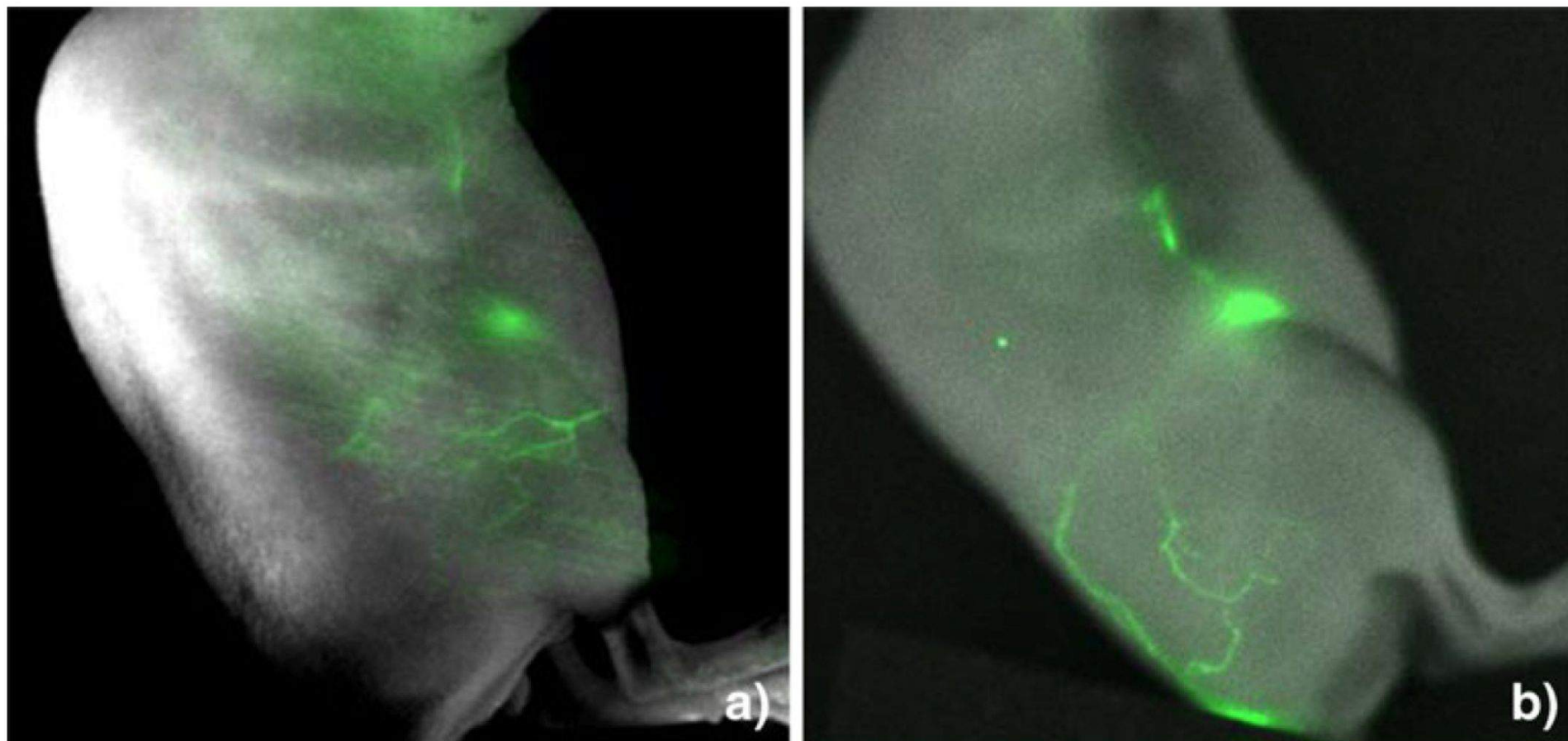
Oncotic pressures opposing filtration across non-fenestrated rat microvessels

R. H. Adamson¹, J. F. Lenz¹, X. Zhang², G. N. Adamson¹, S. Weinbaum² and F. E. Curry¹

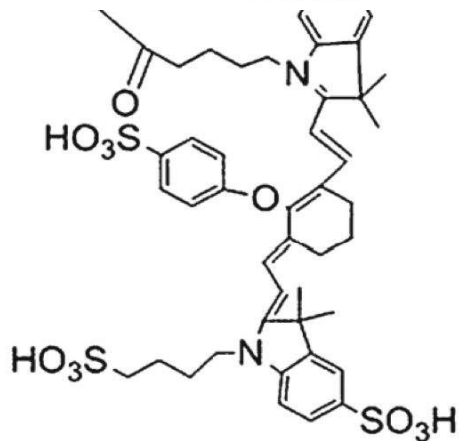
¹Department of Human Physiology, University of California, Davis, CA 95616, USA

²Department of Biomedical Engineering, The City College of New York, New York, NY 10031, USA





Bond



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Published Online: 18 June 2011

Mol Imaging Biol (2012) 14:301–314
DOI: 10.1007/s11307-011-0499-x

RESEARCH ARTICLE

Albumin-Binding Domain Conjugate for Near-Infrared Fluorescence Lymphatic Imaging

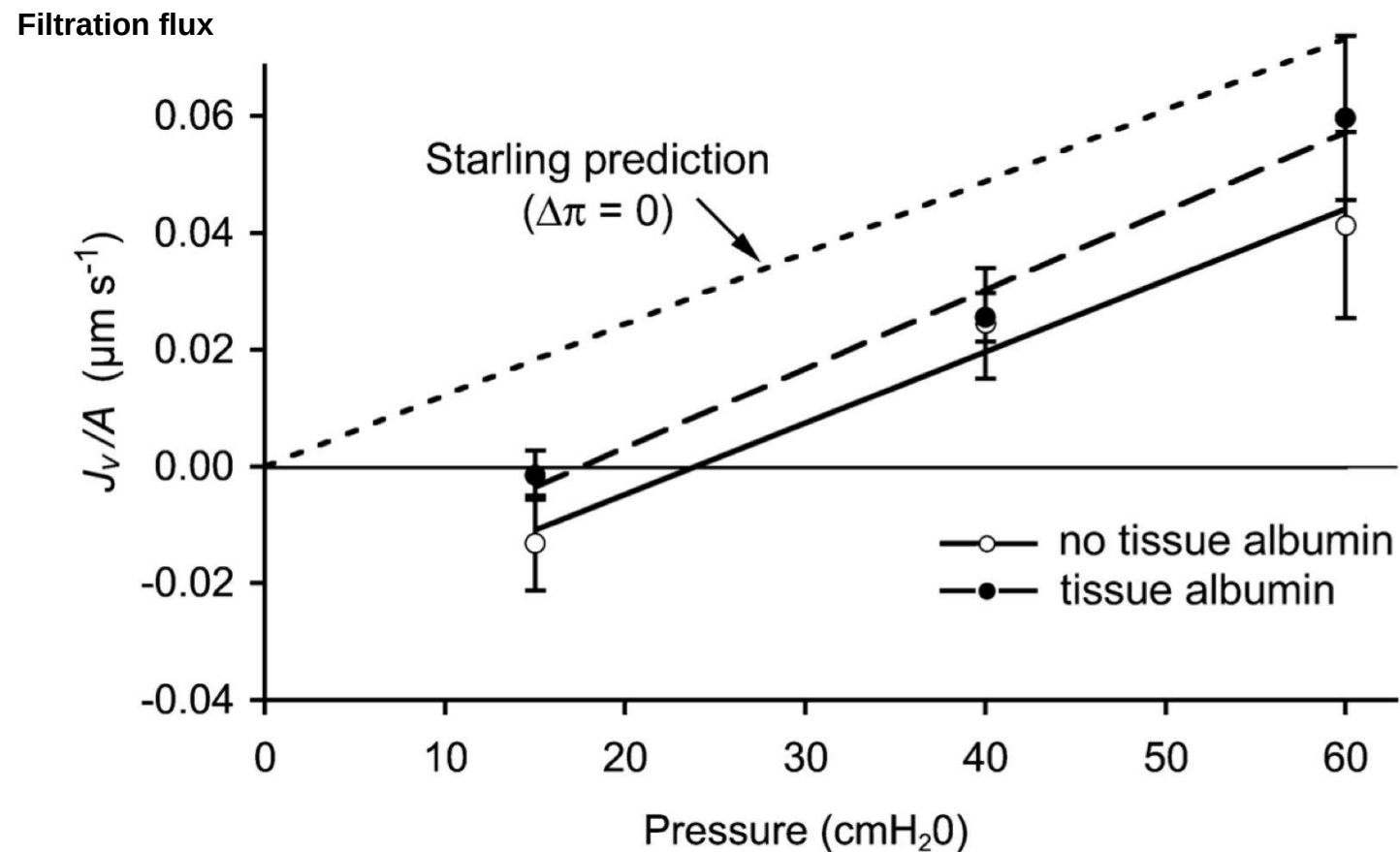
Cynthia A. Davies-Venn,^{1,3} Bonnie Angermiller,¹ Nathaniel Wilganowski,¹ Pradip Ghosh,¹ Barrett R. Harvey,² Grace Wu,¹ Sunkuk Kwon,¹ Melissa B. Aldrich,¹ Eva M. Sevick-Muraca¹

Oncotic pressures opposing filtration across non-fenestrated rat microvessels

R. H. Adamson¹, J. F. Lenz¹, X. Zhang², G. N. Adamson¹, S. Weinbaum² and F. E. Curry¹

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FILTRATION COEFFICIENTS AND OSMOTIC REFLEXION
COEFFICIENTS OF THE WALLS OF SINGLE
FROG MESENTERIC CAPILLARIES

By C. C. MICHEL

From the University Laboratory of Physiology, Parks Road, Oxford, OX1 3PT

(Received 17 December 1979)

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C. C. MICHEL

If the porous regions of all capillary walls contain a matrix of glycoprotein of constant concentration and composition, all capillaries should have similar reflexion coefficients to molecules such as albumin and myoglobin. The solute permeability coefficients and L_p , however, should be determined by the thickness and area of the porous regions (the size and frequency of the channels through the endothelium) as well as the properties of the matrix within them. Thus the higher L_p seen in the

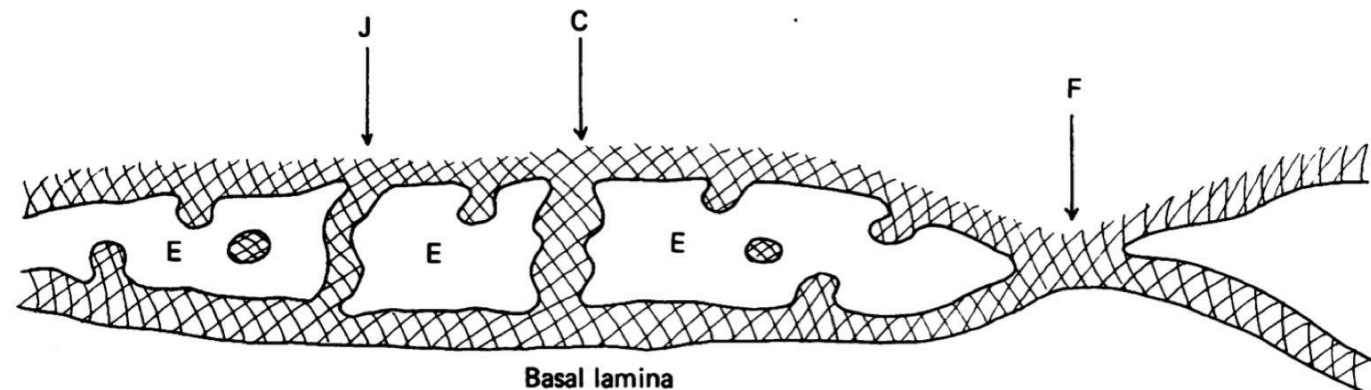
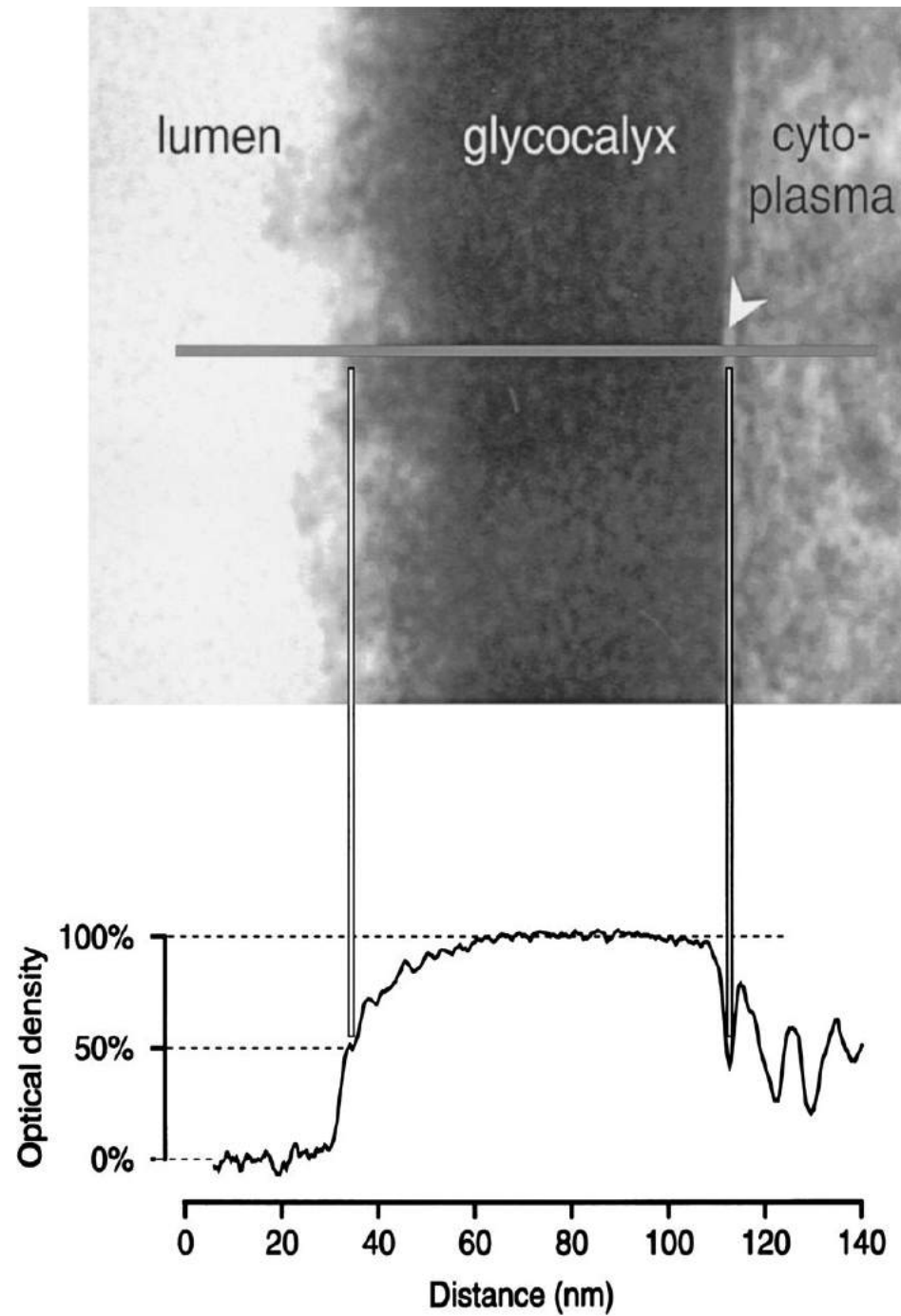
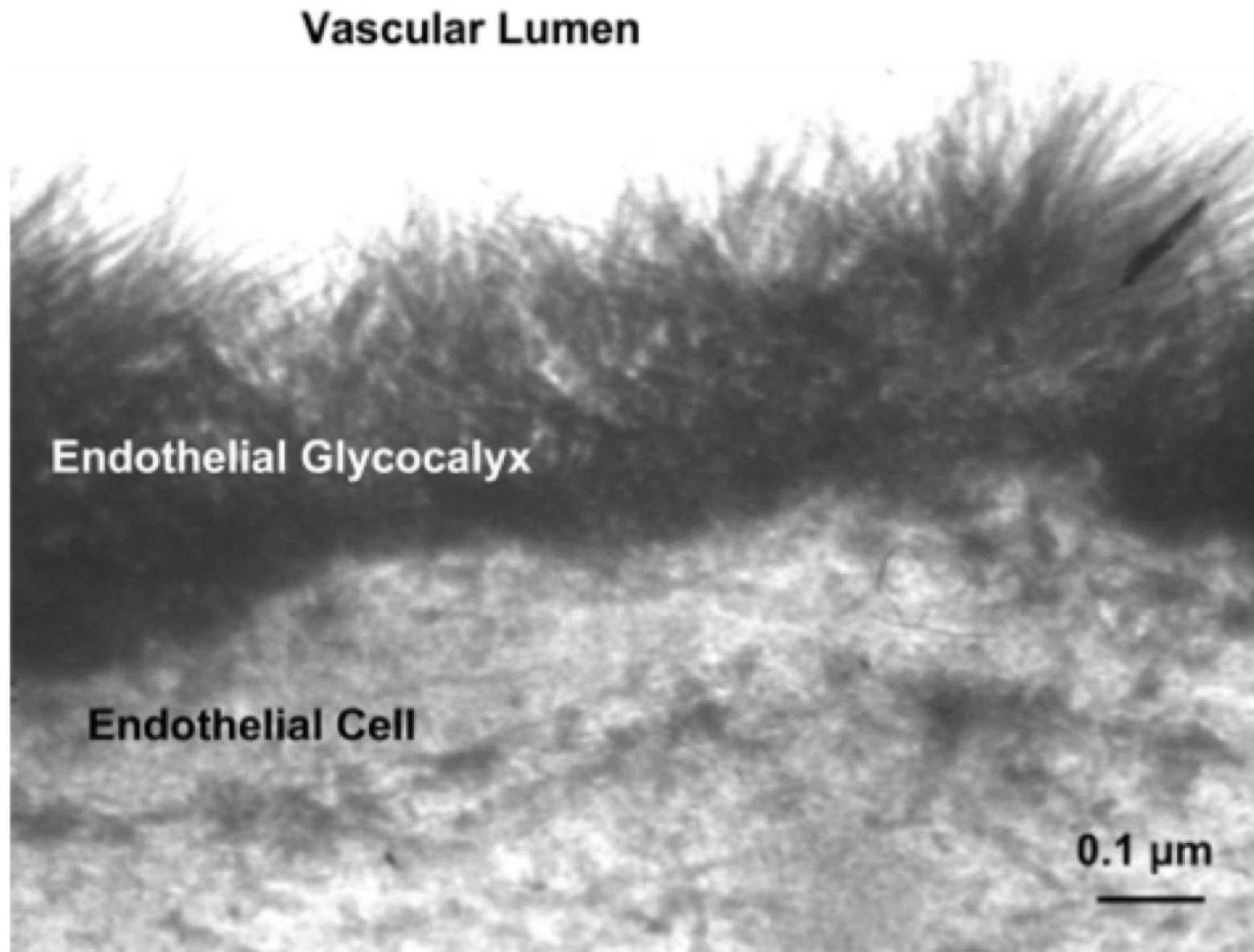
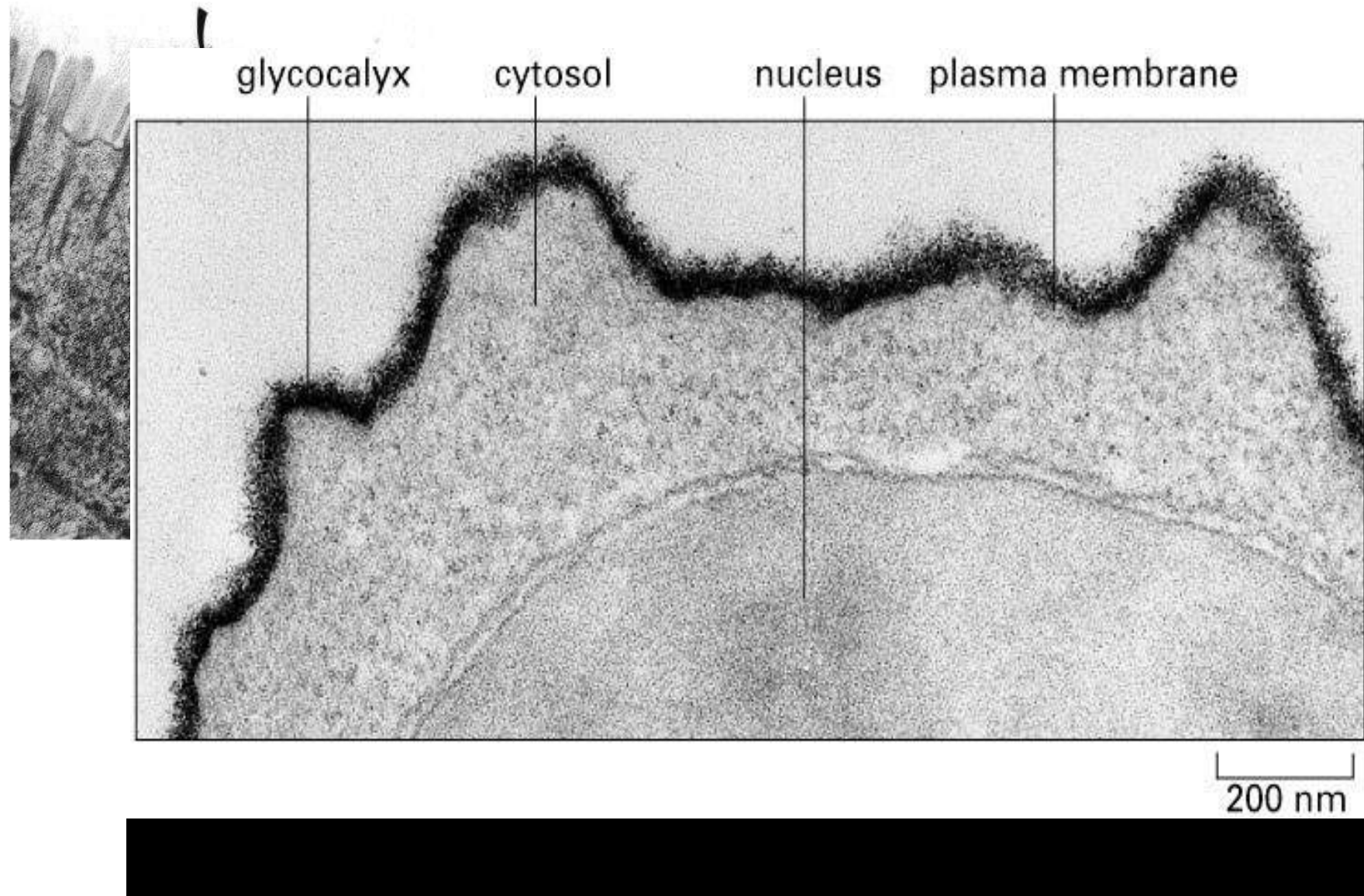


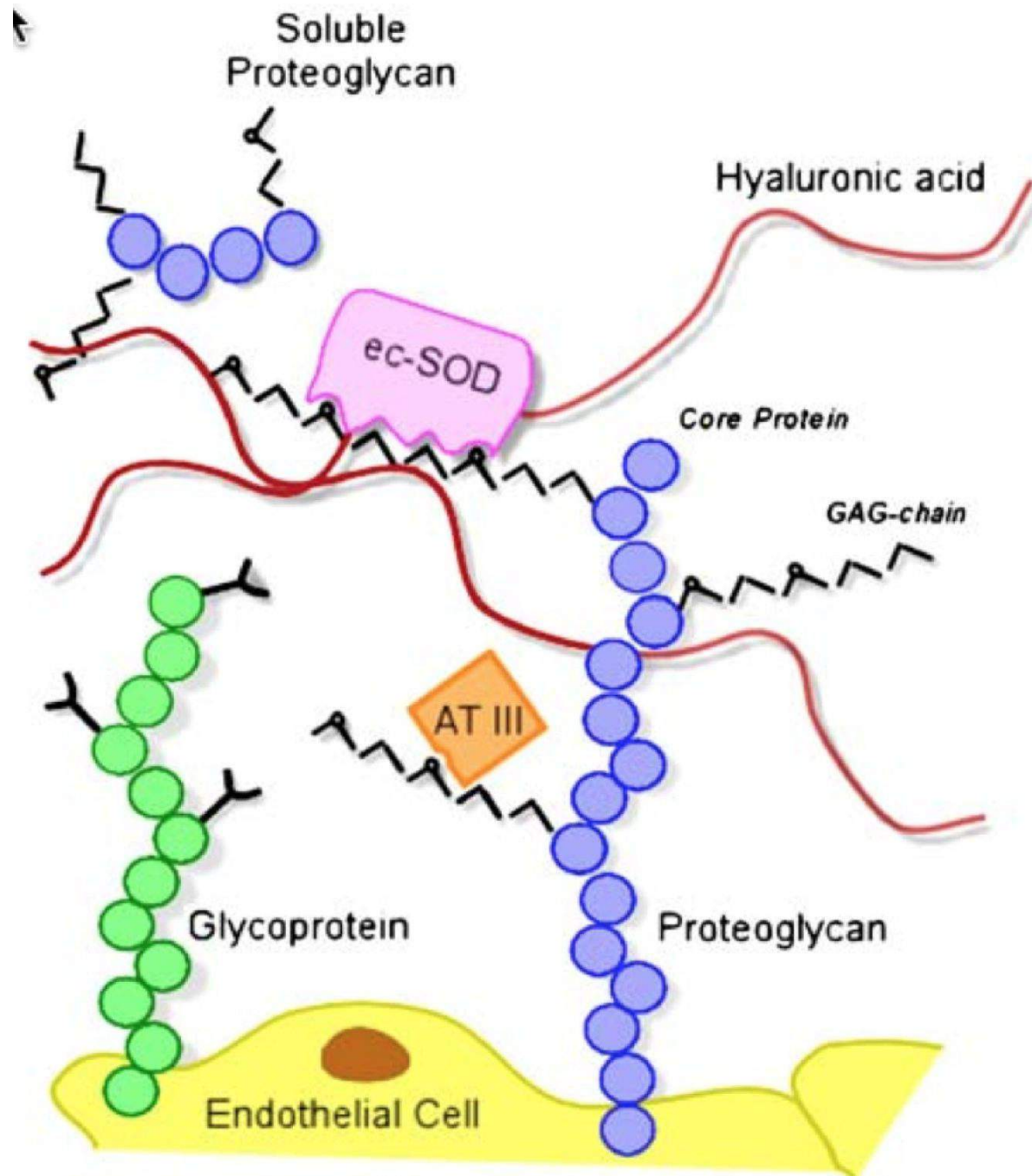
Fig. 7. A diagrammatic representation of the fibre matrix model of capillary permeability. The endothelium (E) is traversed by intercellular junctions (J), transendothelial channels (C) and fenestrations (F). The dimensions and numbers of these channels determine the area of the permeable regions of the capillary wall but the molecular sieving properties are endowed on the capillary by the size of the interstices of the fibre matrix which envelopes the cell surface and fills the channels which penetrate it.

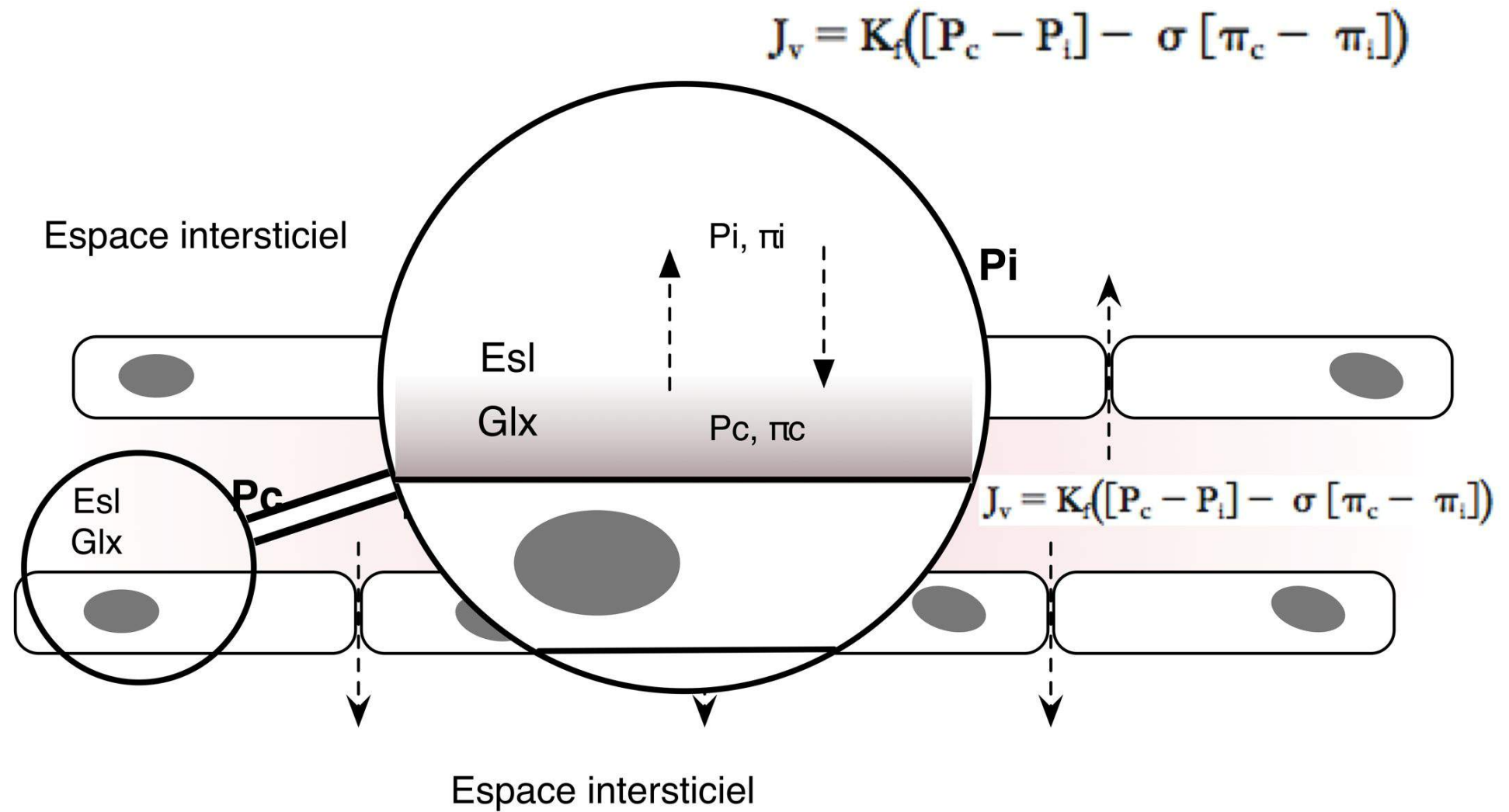
Glycocalyx











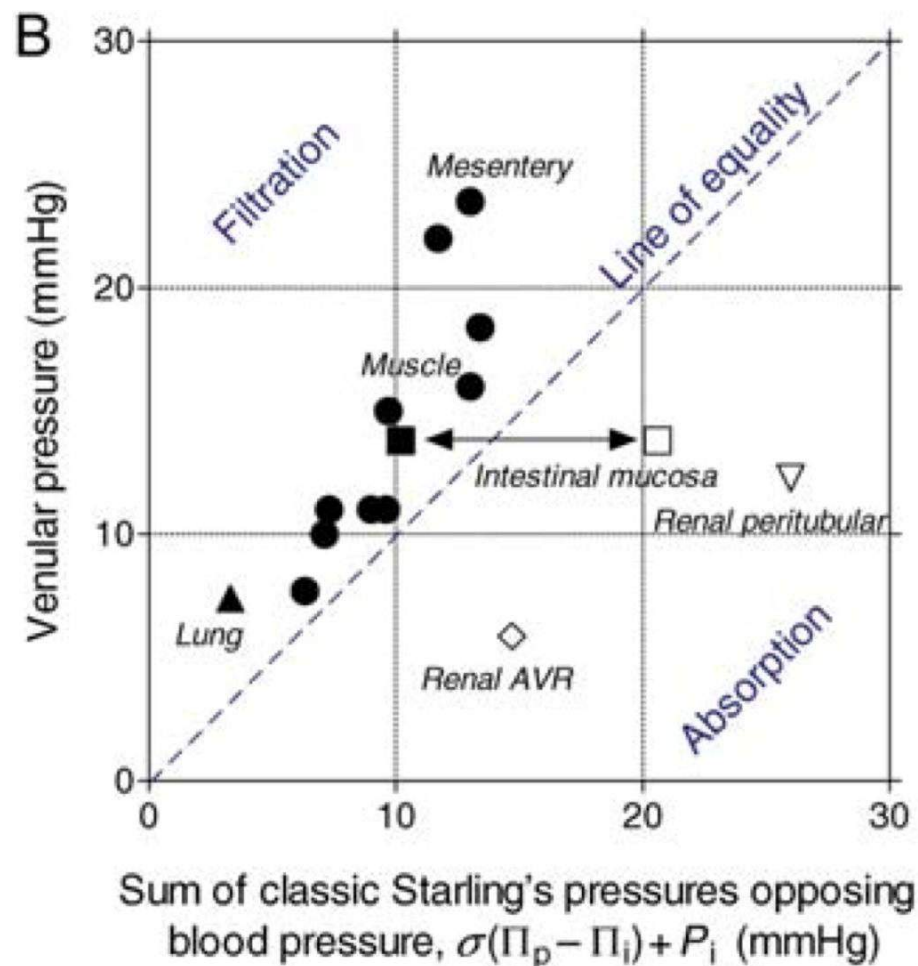


Microvascular fluid exchange and the revised Starling principle

J. Rodney Levick¹ and C. Charles Michel^{2*}

¹Physiology, Basic Medical Sciences, St George's Hospital Medical School, London SW17 0RE, UK; and ²Department of Bioengineering, Imperial College, Exhibition Road, London SW7 2AZ, UK

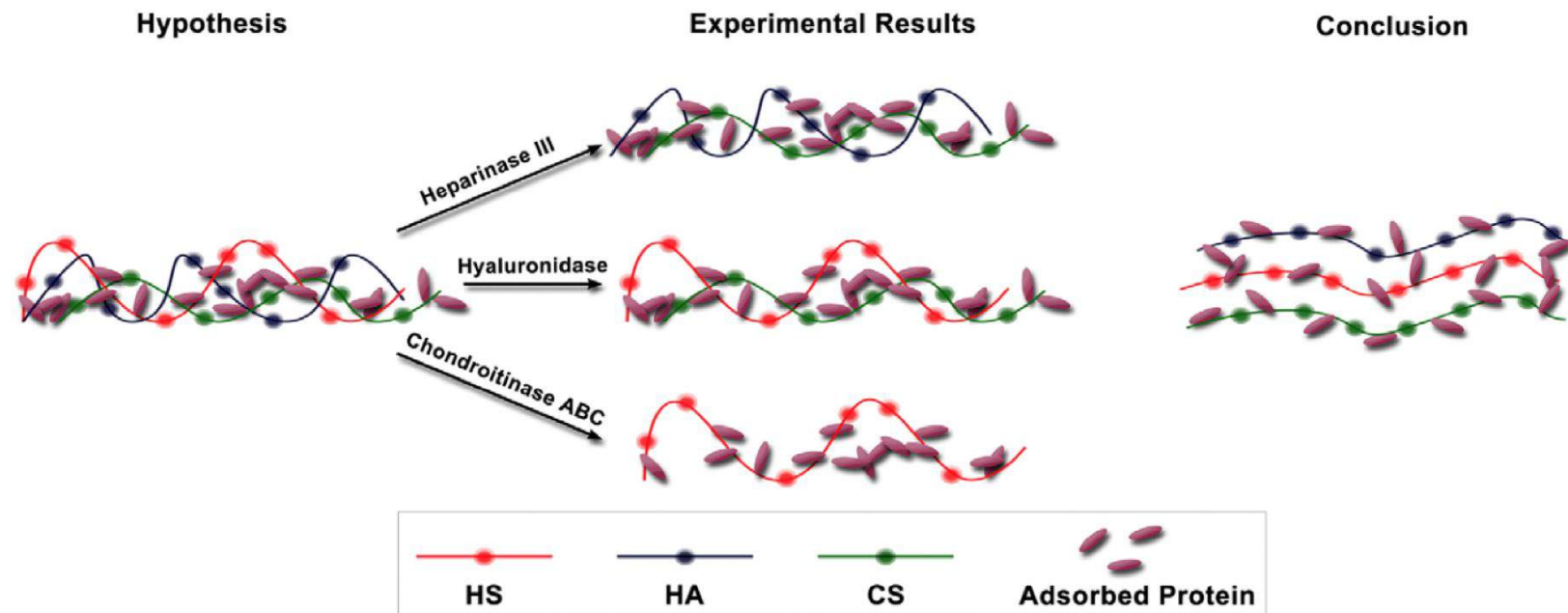
$$\frac{J_v}{A} = L_p \left[\Delta P - \sigma^2 \Pi_p \frac{(1 - e^{-Pe})}{(1 - \sigma \cdot e^{-Pe})} \right]$$



The Structural Stability of the Endothelial Glycocalyx after Enzymatic Removal of Glycosaminoglycans

Ye Zeng¹, Eno E. Ebong², Bingmei M. Fu¹, John M. Tarbell^{1*}

¹ Department of Biomedical Engineering, The City College of New York, New York, New York, United States of America, ² Department of Neuroscience, Albert Einstein College of Medicine, New York, New York, United States of America



Contrasting Effects of Colloid and Crystalloid Resuscitation Fluids on Cardiac Vascular Permeability

Matthias Jacob, M.D.,* Dirk Bruegger, M.D.,* Markus Rehm, M.D.,† Ulrich Welsch, M.D., Ph.D.,‡
Peter Conzen, M.D.,§ Bernhard F. Becker, M.D., Ph.D.||

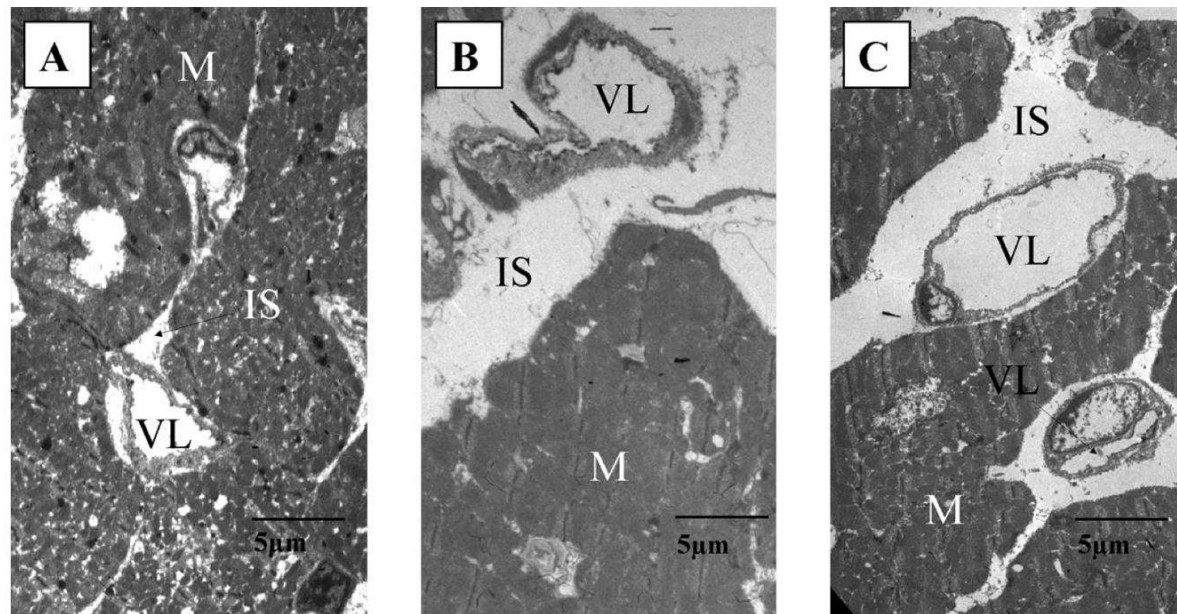
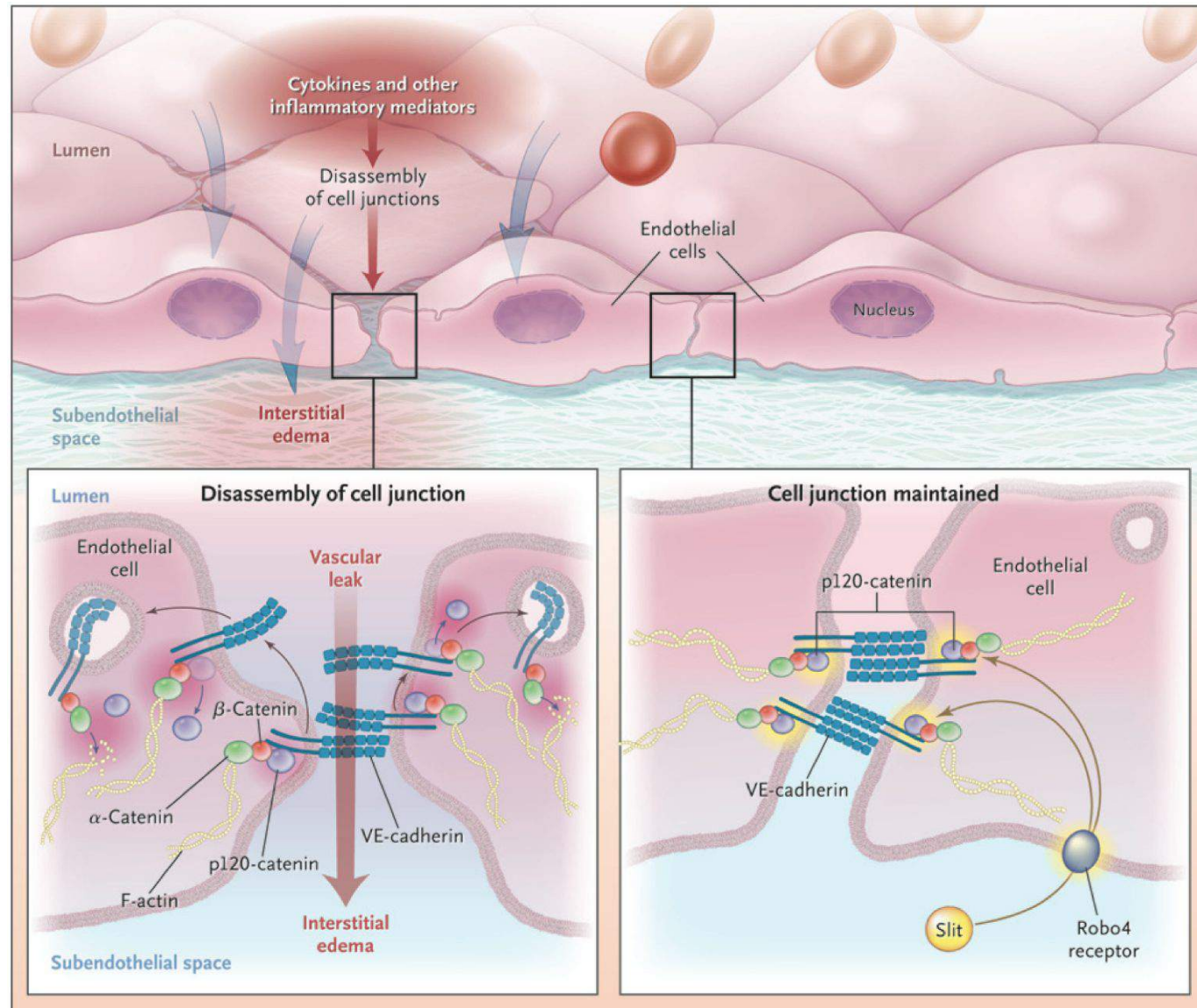


Fig. 8. Exemplary display of interstitial edema at the end of protocol, magnification $\times 3,640$ in all panels. Groups albumin 5% (A), hydroxyethyl starch 6% (B), and NaCl (C). IS = interstitial space; M = myocardium; VL = vascular lumen.

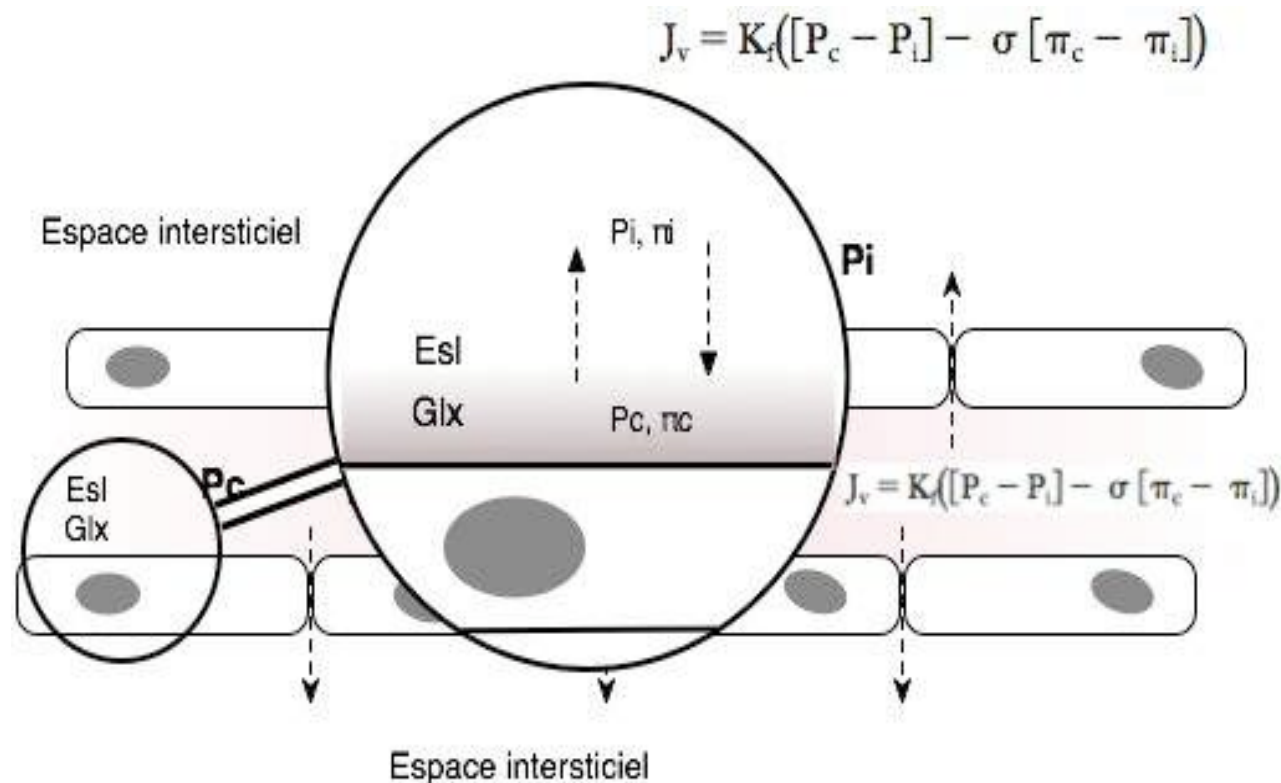
Sepsis and Endothelial Permeability

Warren L. Lee, M.D., Ph.D., and Arthur S. Slutsky, M.D.



Les cristalloïdes administrés rapidement :

- Réduisent le pouvoir oncotique du plasma
- Déplacent l'albumine du glycocalyx
- Accroissent leur propre fuite extravasculaire
- Effets de la température ?



ORIGINAL ARTICLE

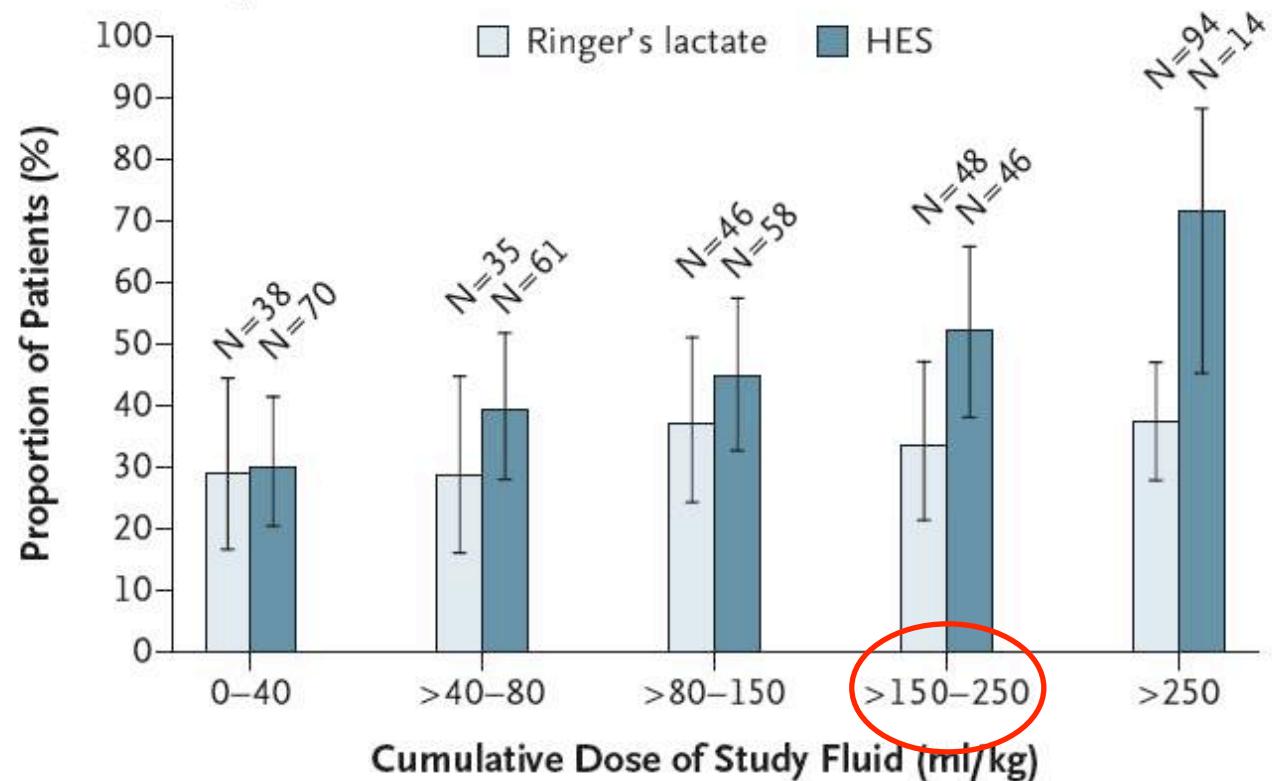


Intensive Insulin Therapy and Pentastarch Resuscitation in Severe Sepsis

Frank M. Brunkhorst, M.D., Christoph Engel, M.D., Frank Bloos, M.D., Ph.D.,
Andreas Meier-Hellmann, M.D., Max Ragaller, M.D., Norbert Weiler, M.D.,
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Evelyn Kuhnt, M.Sc., Michael Kiehntopf, M.D., Christiane Hartog, M.D.,
Charles Natanson, M.D., Markus Loeffler, M.D., Ph.D., and Konrad Reinhart, M.D.,
for the German Competence Network Sepsis (SepNet)

- L'HEA 10% (200/0,5)
- RL

Death at 90 Days



PRELIMINARY
COMMUNICATION

Association Between a Chloride-Liberal vs Chloride-Restrictive Intravenous Fluid Administration Strategy and Kidney Injury in Critically Ill Adults

Nor'azim Mohd Yunus, MD
Rinaldo Bellomo, MD, FCICM
Colin Hegarty, BSc
David Story, MD
Lisa Ho, MCLinPharm
Michael Bailey, PhD

THE ADMINISTRATION OF INTRAVENOUS chloride is ubiquitous in critical care medicine.^{1,2} In addition, many of the fluids used for hydration and resuscitation contain supraphysiological concentrations of chloride,^{3,4} which induce or exacerbate hyperchloremia and metabolic acidosis.^{6,7} may cause renal vasoconstriction and decreased glomerular filtration rate (GFR),⁸⁻¹⁰ prolong time to first micturition,¹¹ and decrease urine output in major surgery.¹² Recently, in a double-blind randomized controlled trial, 2 L of saline decreased cortical perfusion in human study participants compared with Plasma-Lyte.¹³ These effects of chloride on the kidney are of potential concern because acute kidney injury (AKI) is associated with high mortality¹⁴ and may require treatment with costly and invasive renal replacement therapy (RRT).^{15,16}

Given the high risk of AKI in critically ill patients and the experimental association between chloride administration and decreased renal function, we hypothesized that a chloride-restrictive intravenous fluids strategy in critically ill patients might be associated with

Context Administration of traditional chloride-liberal intravenous fluids may precipitate acute kidney injury (AKI).

Objective To assess the association of a chloride-restrictive (vs chloride-liberal) intravenous fluid strategy with AKI in critically ill patients.

Design, Setting, and Patients Prospective, open-label, sequential period pilot study of 760 patients admitted consecutively to the intensive care unit (ICU) during the control period (February 18 to August 17, 2008) compared with 773 patients admitted consecutively during the intervention period (February 18 to August 17, 2009) at a university-affiliated hospital in Melbourne, Australia.

Interventions During the control period, patients received standard intravenous fluids. After a 6-month phase-out period (August 18, 2008, to February 17, 2009), any use of chloride-rich intravenous fluids (0.9% saline, 4% succinylated gelatin solution, or 4% albumin solution) was restricted to attending specialist approval only during the intervention period; patients instead received a lactated solution (Hartmann solution), a balanced solution (Plasma-Lyte 148), and chloride-poor 20% albumin.

Main Outcome Measures The primary outcomes included increase from baseline to peak creatinine level in the ICU and incidence of AKI according to the risk, injury, failure, loss, end-stage (RIFLE) classification. Secondary post hoc analysis outcomes included the need for renal replacement therapy (RRT), length of stay in ICU and hospital, and survival.

Results Chloride administration decreased by 144 504 mmol (from 694 to 496 mmol/patient) from the control period to the intervention period. Comparing the control period with the intervention period, the mean serum creatinine level increase while in the ICU was 22.6 μ mol/L (95% CI, 17.5-27.7 μ mol/L) vs 14.8 μ mol/L (95% CI, 9.8-19.9 μ mol/L) (P = .03), the incidence of injury and failure class of RIFLE-defined AKI was 14% (95% CI, 11%-16%; n = 105) vs 8.4% (95% CI, 6.4%-10%; n = 65) (P < .001), and the use of RRT was 10% (95% CI, 8.1%-12%; n = 78) vs 6.3% (95% CI, 4.6%-8.1%; n = 49) (P = .005). After adjustment for covariates, this association remained for incidence of injury and failure class of RIFLE-defined AKI (odds ratio, 0.52 [95% CI, 0.37-0.75]; P < .001) and use of RRT (odds ratio, 0.52 [95% CI, 0.33-0.81]; P = .004). There were no differences in hospital mortality, hospital or ICU length of stay, or need for RRT after hospital discharge.

Conclusion The implementation of a chloride-restrictive strategy in a tertiary ICU was associated with a significant decrease in the incidence of AKI and use of RRT.

Trial Registration clinicaltrials.gov Identifier: NCT00885404

JAMA. 2012;308(15):1566-1572

www.jama.com

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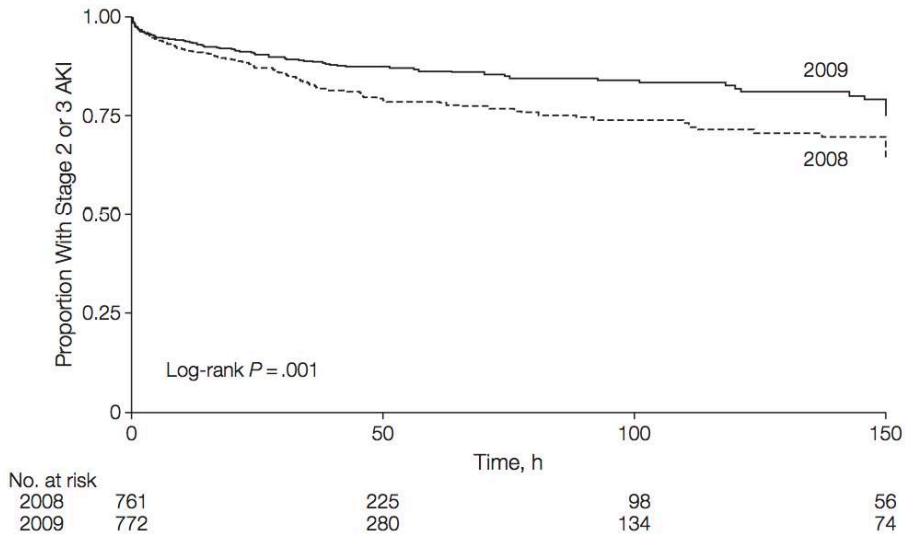
Intensive Care Research Centre, Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Australia (Dr Bellomo and Bailey). **Corresponding Author:** Rinaldo Bellomo, MD, FCICM, Austin Health, Heidelberg, Victoria 3084, Australia (rinaldo.bellomo@austin.org.au).

For editorial comment see p 1583.

1566 JAMA, October 17, 2012—Vol 308, No. 15

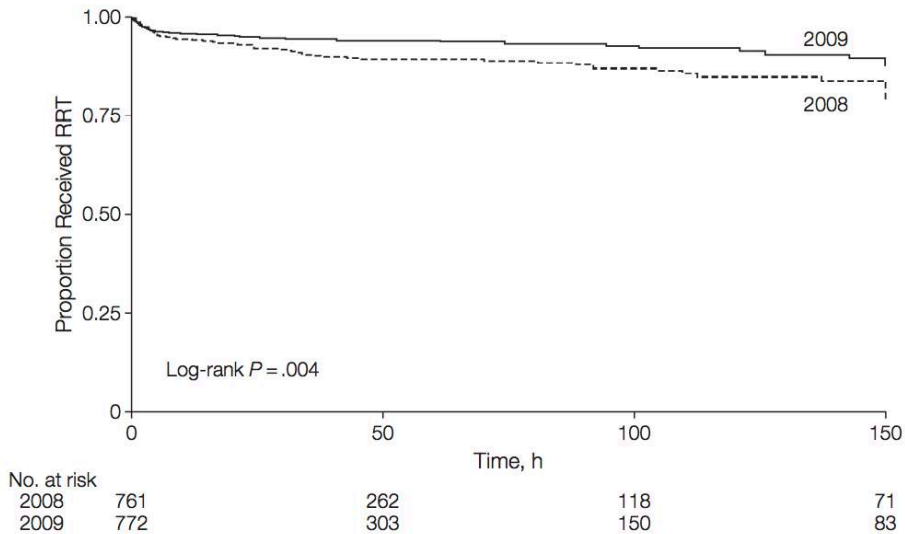
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Figure 1. Development of Stage 2 or 3 Acute Kidney Injury (AKI) While in the Intensive Care Unit (ICU)



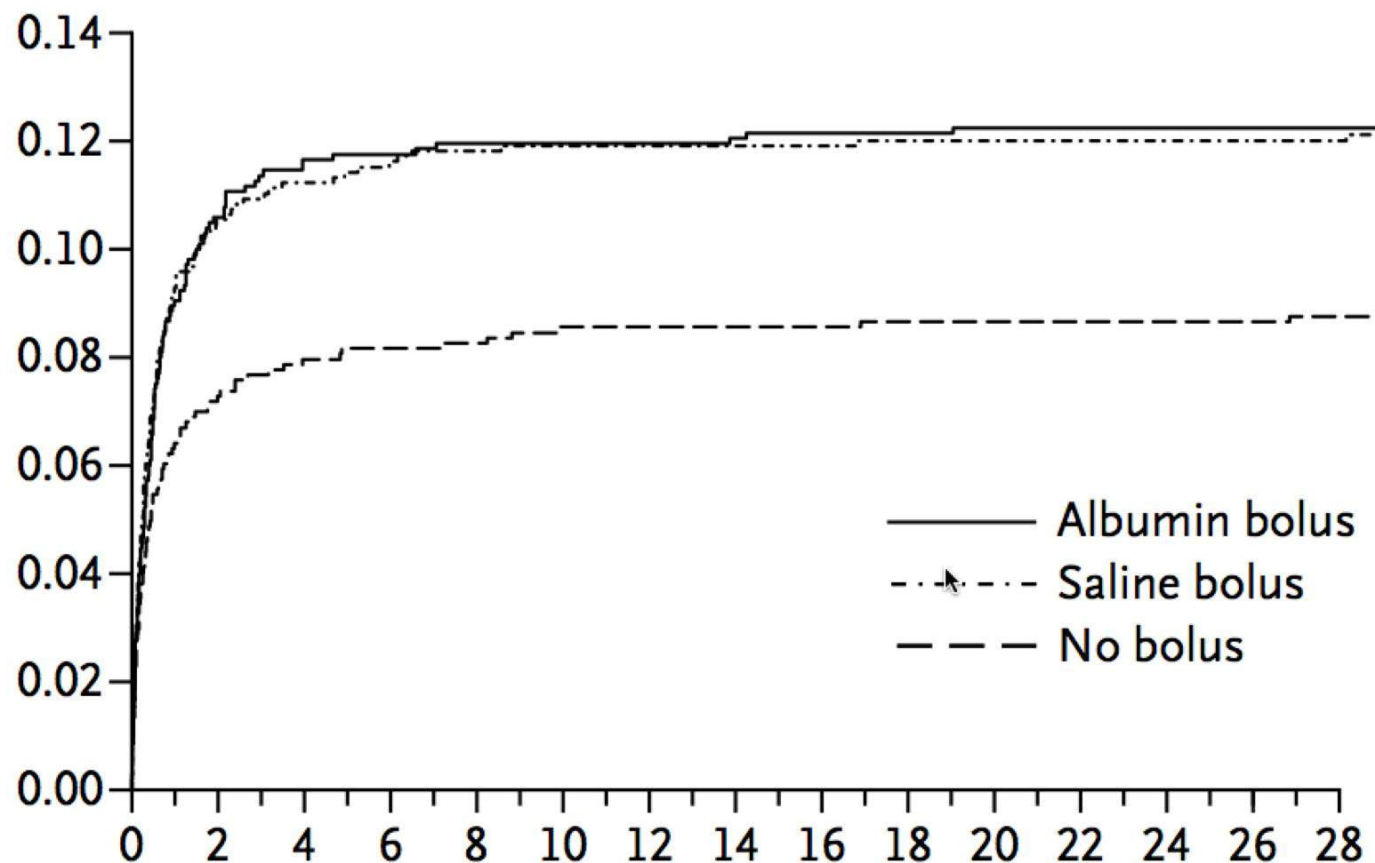
Stage 2 or 3 defined according to the Kidney Disease: Improving Global Outcomes clinical practice guideline.

Figure 2. Renal Replacement Therapy (RRT) in the Intensive Care Unit (ICU)



Mortality after Fluid Bolus in African Children with Severe Infection

Kathryn Maitland, M.B., B.S., Ph.D., Sarah Kiguli, M.B., Ch.B., M.Med.,
Robert O. Opoka, M.B., Ch.B., M.Med., Charles Engoru, M.B., Ch.B., M.Med.,
Peter Olupot-Olupot, M.B., Ch.B., Samuel O. Akech, M.B., Ch.B.,
Richard Nyeko, M.B., Ch.B., M.Med., George Mtove, M.D., Hugh Reyburn, M.B., B.S.,
Trudie Lang, Ph.D., Bernadette Brent, M.B., B.S., Jennifer A. Evans, M.B., B.S.,
James K. Tibenderana, M.B., Ch.B., Ph.D., Jane Crawley, M.B., B.S., M.D.,
Elizabeth C. Russell, M.Sc., Michael Levin, F.Med.Sci., Ph.D., Abdel G. Babiker, Ph.D.,
and Diana M. Gibb, M.B., Ch.B., M.D., for the FEAST Trial Group*



Totem and Taboo: Fluids in sepsis

Andrew K Hilton¹ and Rinaldo Bellomo^{*2}

FEAST will undoubtedly cause robust debate and anxiety as the totemic status of fluids in sepsis becomes undermined. This is a result that Sigmund Freud, the author of *Totem and Taboo* [21], would have anticipated. His and our answer is the need to confront and more fully investigate. To question the role of fluids in severe sepsis can no longer be considered taboo.



Quelle(s) macromolécule(s) s'accumule(nt)
dans le secteur extra-vasculaire ?

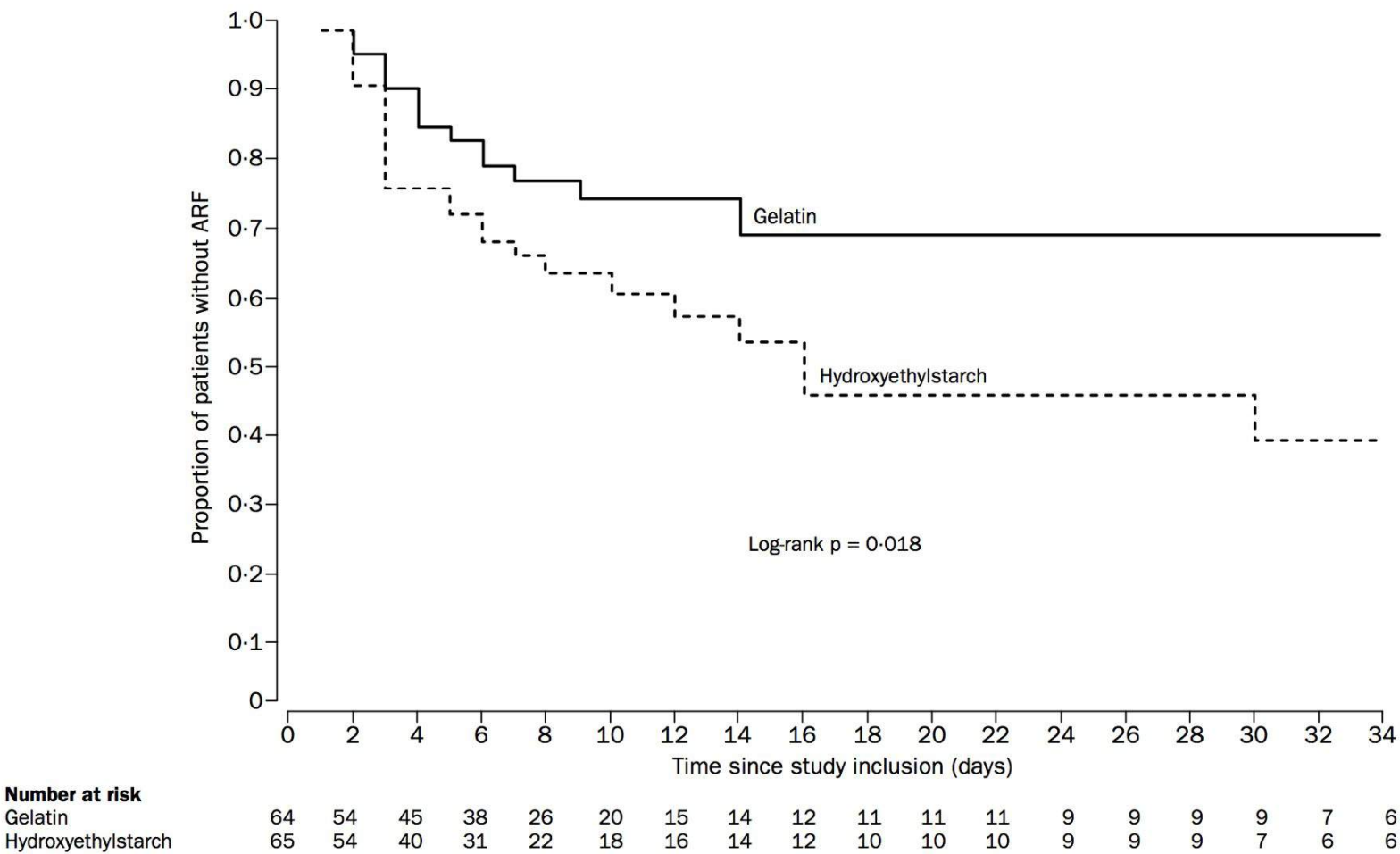
1. L'albumine à 4%
2. Les gélatines fluides modifiées
3. L'HEA 10% (200/0,5)
4. L'HEA à 6% (200/0,6)
5. L'HEA à 6% (130/0,4)

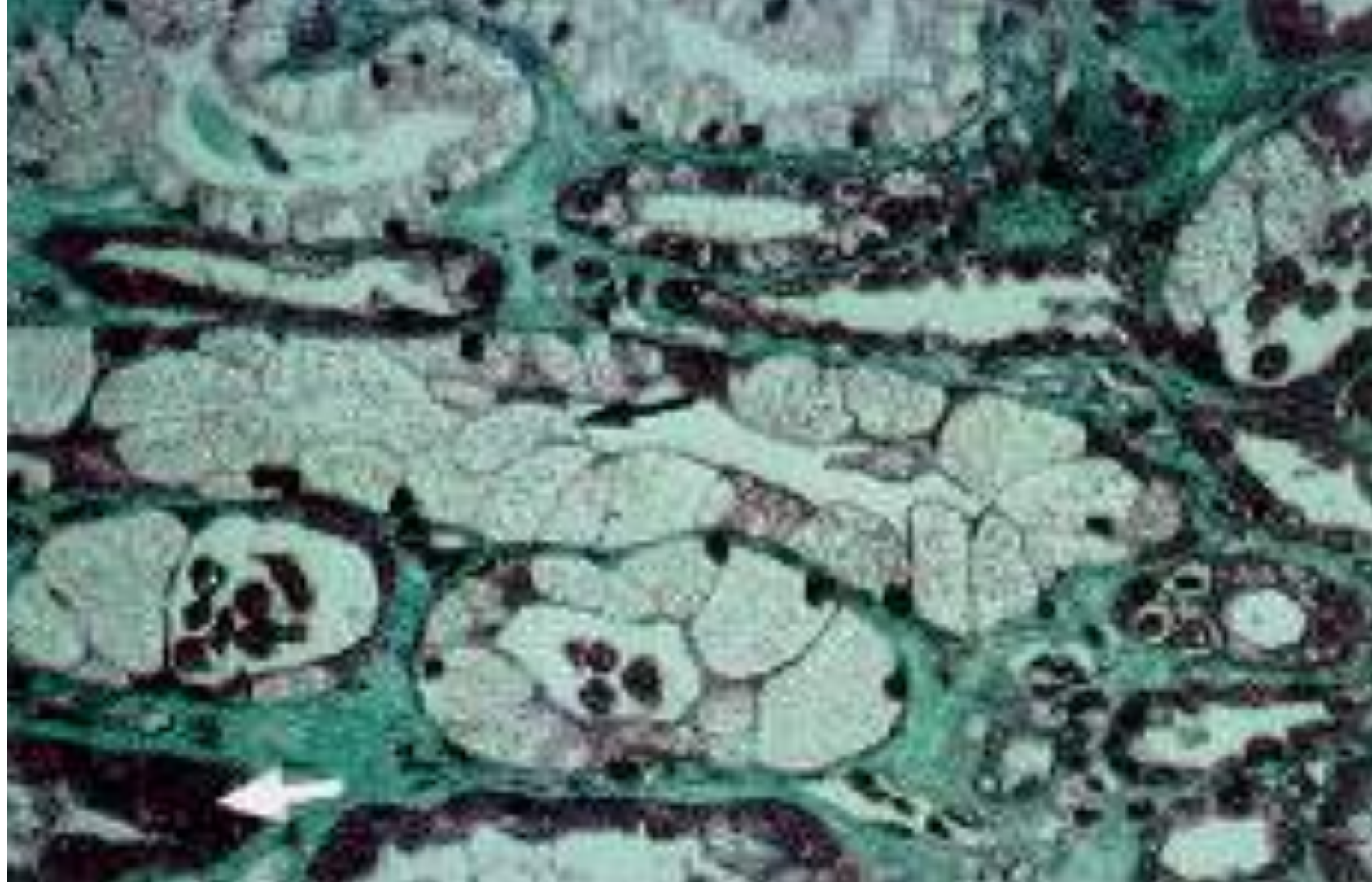
Quelle(s) macromolécule(s) s'accumule(nt)
dans le secteur extra-vasculaire ?

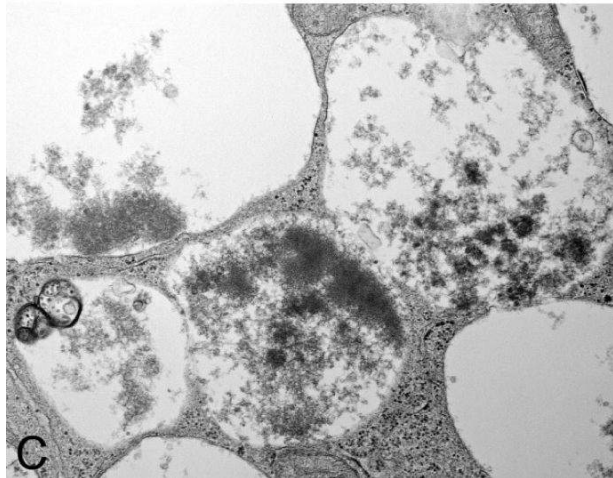
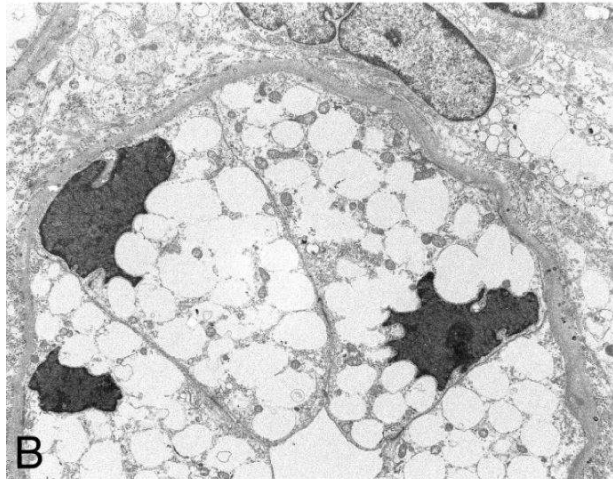
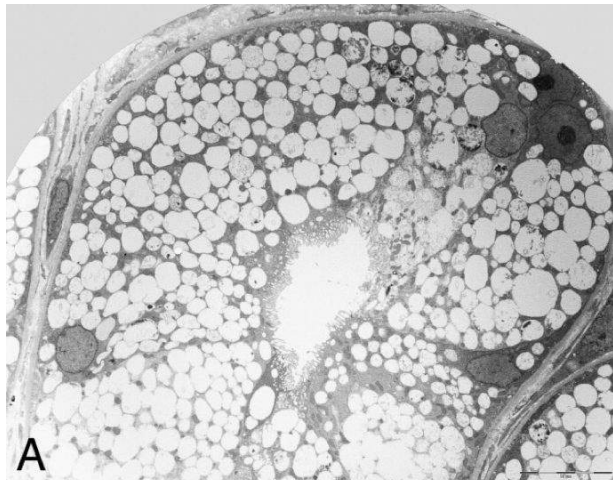
1. L'albumine à 4%
2. Les gélatines fluides modifiées
3. L'HEA 10% (200/0,5)
4. L'HEA à 6% (200/0,6)
5. L'HEA à 6% (130/0,4)

Effects of hydroxyethylstarch and gelatin on renal function in severe sepsis: a multicentre randomised study

Frédérique Schortgen, Jean-Claude Lacherade, Fabrice Bruneel, Isabelle Cattaneo, François Hemery, François Lemaire, Laurent Brochard



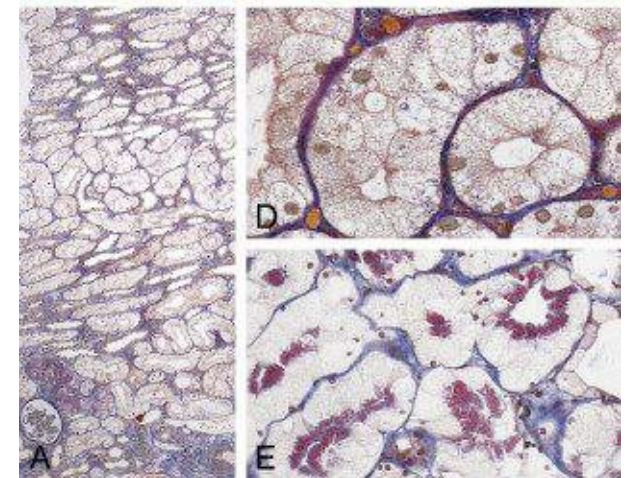
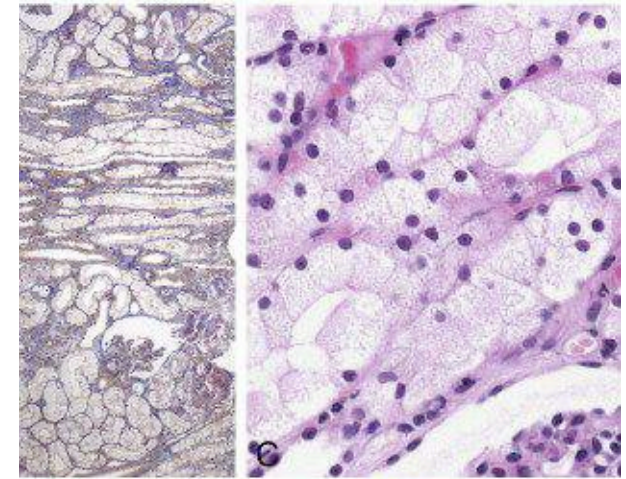
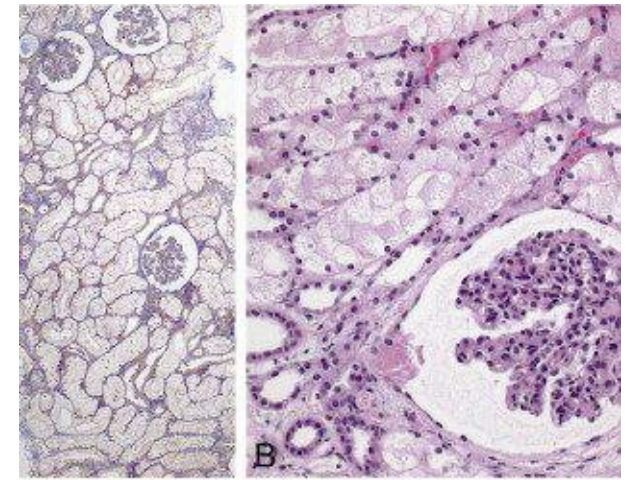




Osmotic Nephrosis



Dickenmann M et al.
AJKD. 2008;51(3):491-503.



Worsening of hepatic dysfunction as a consequence of repeated hydroxyethylstarch infusions

Christos Christidis¹, Frédéric Mal², Jeanne Ramos³, Agnès Senejoux¹, Patrice Callard⁴, Robert Navarro⁵, Jean-Claude Trinchet¹, Dominique Larrey⁶, Michel Beaugrand¹, Catherine Guettier^{7,*}

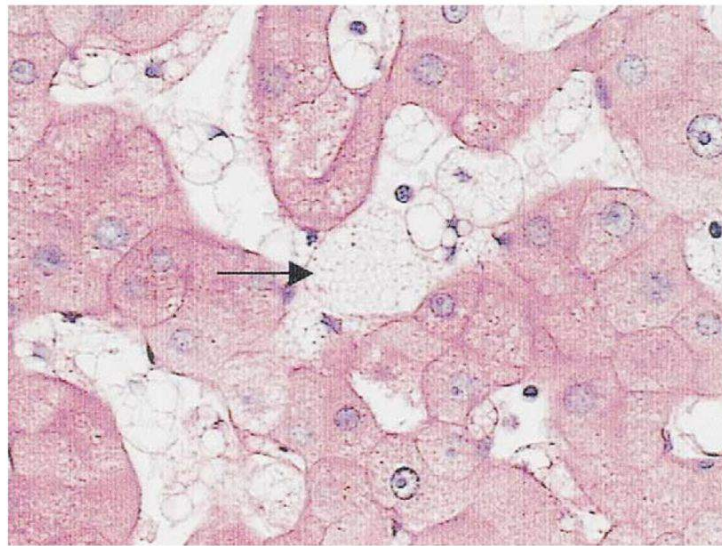


Fig. 1. Microvacuolization of Kupffer cells with pattern of sinusoidal obstruction (PAS, ×400).

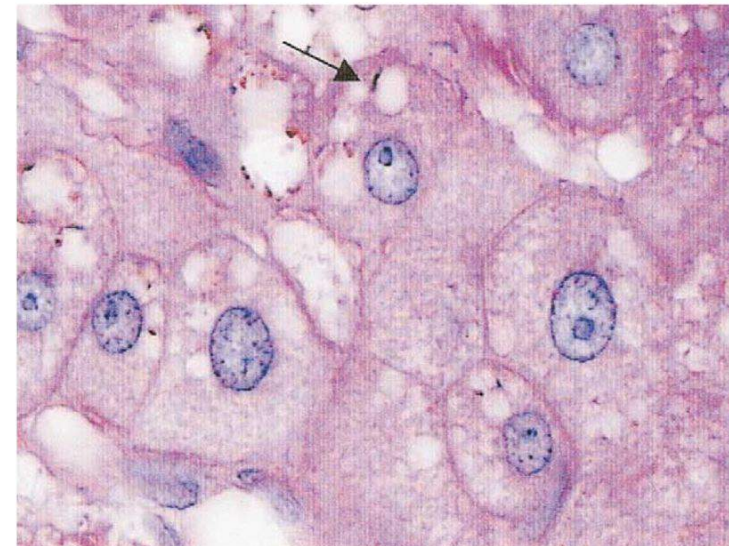


Fig. 2. PAS peripheral enhancement in hepatocyte vacuoles (PAS, ×1000).



RESEARCH

Open Access

Assessment of hemodynamic efficacy and safety of 6% hydroxyethylstarch 130/0.4 vs. 0.9% NaCl fluid replacement in patients with severe sepsis: The CRYSTMAS study

Bertrand Guidet^{1,2,3*}, Olivier Martinet⁴, Thierry Boulain⁵, Francois Philippart^{6,7}, Jean François Poussel⁸, Julien Maizel⁹, Xavier Forceville¹⁰, Marc Feissel¹¹, Michel Hasselmann⁴, Alexandra Heininger¹² and Hugo Van Aken¹³

Table 3 Efficacy outcomes.

	HES 130/0.4 (n = 88)	NaCl 0.9% (n = 86)	p
Mean volume of study drug used, ml (SD)	1,379 (886)	1,709 (1,164)	0.0185
Mean time to initial HDS, hours (SD)	11.8 (10.1)	14.3 (11.1)	NS
Number of patients prescribed intravenous catecholamines (%)	88 (88.0)	87 (90.6)	NS

HDS, hemodynamic stabilization; SD, standard deviation; HES, hydroxyethyl starch; NaCl, sodium chloride; NS, not significant.

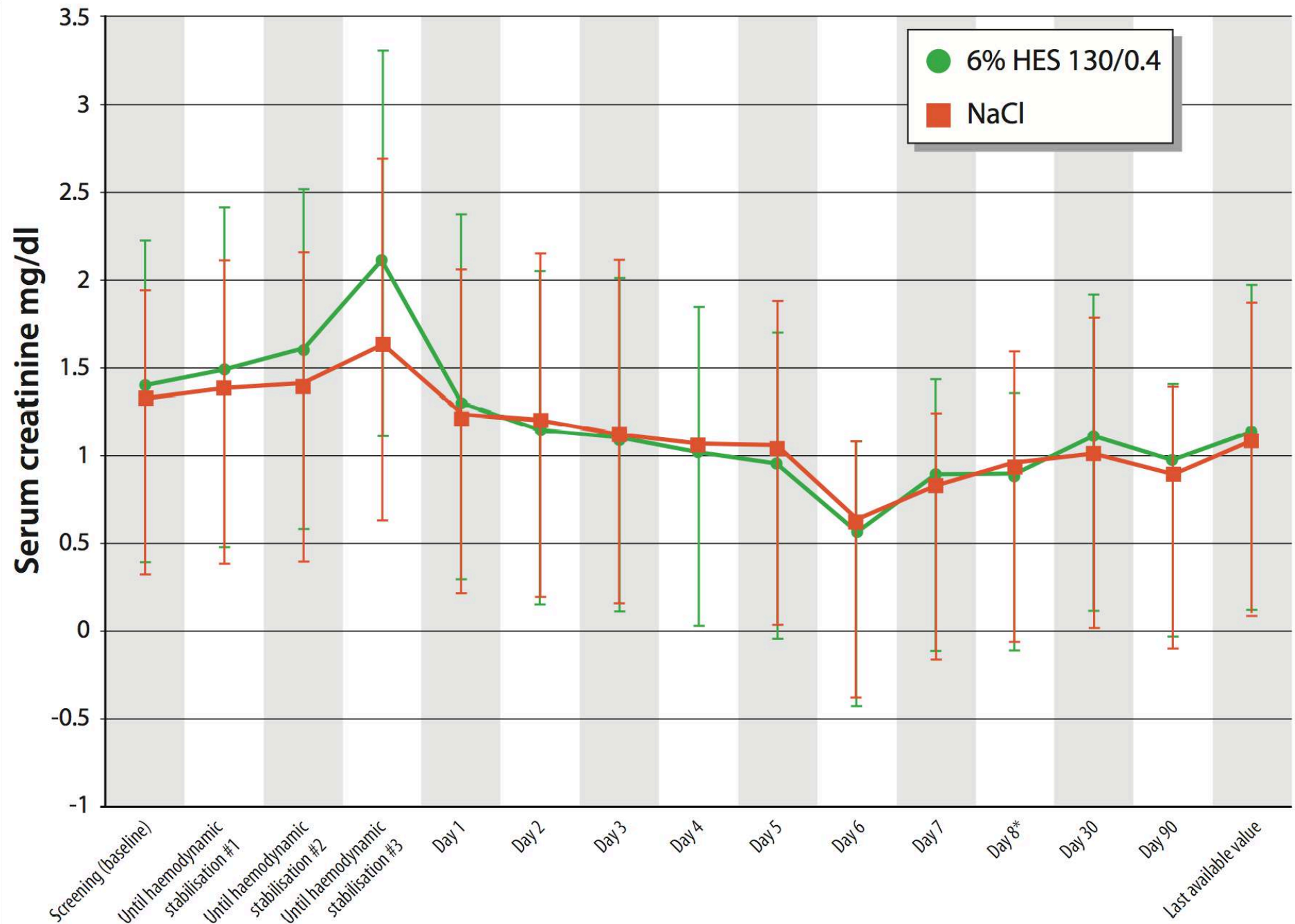


Figure 2 Evolution of mean serum creatinine (SCr) levels over time.

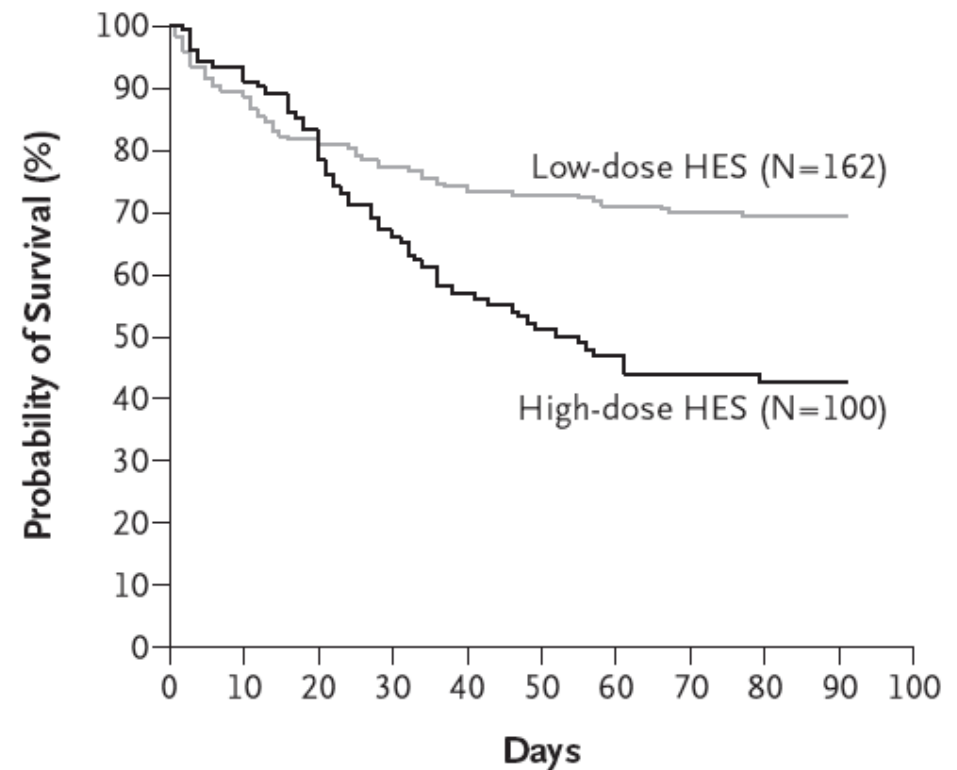
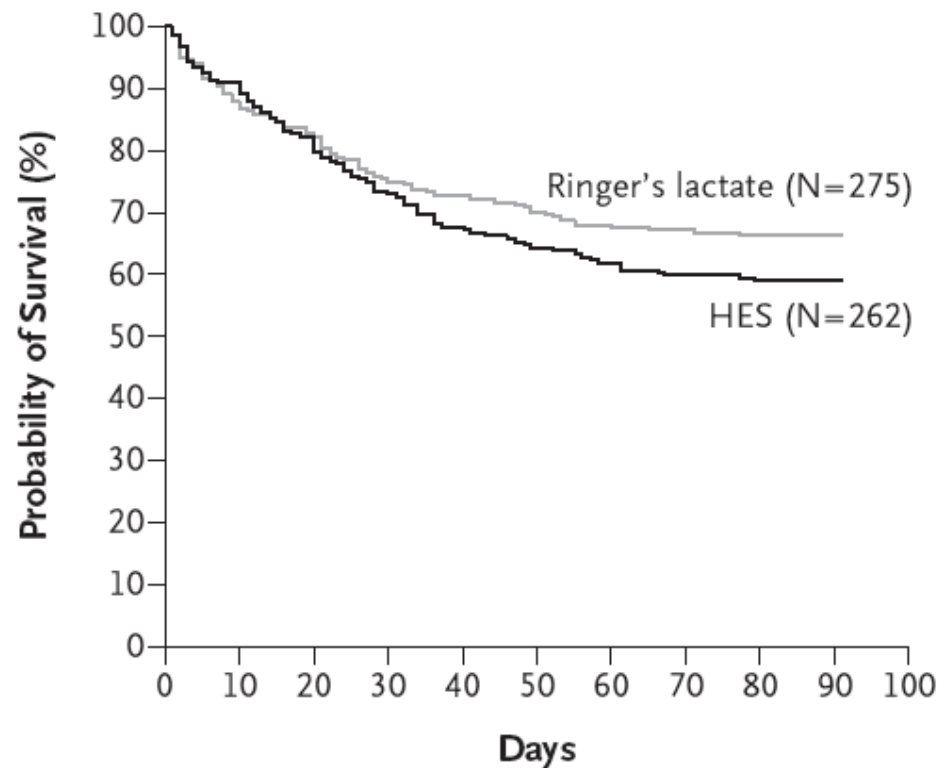
ORIGINAL ARTICLE



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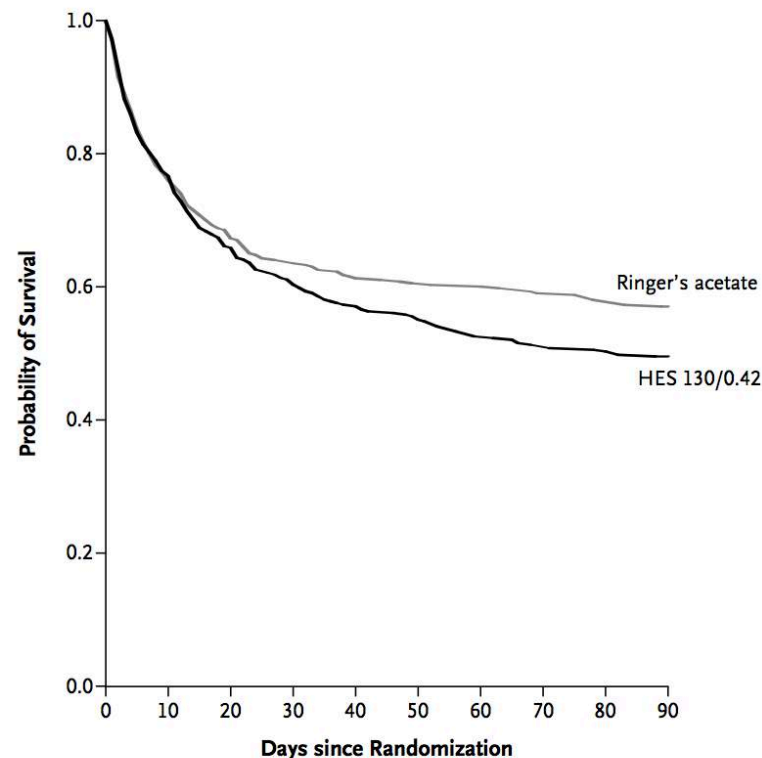
- L'HEA 10% (200/0,5)
- RL



ORIGINAL ARTICLE

Hydroxyethyl Starch 130/0.42 versus Ringer's Acetate in Severe Sepsis

Anders Perner, M.D., Ph.D., Nicolai Haase, M.D.,
Anne B. Guttormsen, M.D., Ph.D., Jyrki Tenhunen, M.D., Ph.D.,
Gudmundur Klemenzson, M.D., Anders Åneman, M.D., Ph.D.,
Kristian R. Madsen, M.D., Morten H. Møller, M.D., Ph.D., Jeanie M. Elkjær, M.D.,
Lone M. Poulsen, M.D., Asger Bendtsen, M.D., M.P.H., Robert Winding, M.D.,
Morten Steensen, M.D., Pawel Berezowicz, M.D., Ph.D., Peter Søb-Jensen, M.D.,
Morten Bestle, M.D., Ph.D., Kristian Strand, M.D., Ph.D., Jørgen Wiis, M.D.,
Jonathan O. White, M.D., Klaus J. Thornberg, M.D., Lars Quist, M.D.,
Jonas Nielsen, M.D., Ph.D., Lasse H. Andersen, M.D., Lars B. Holst, M.D.,
Katrín Thormar, M.D., Anne-Lene Kjældgaard, M.D., Maria L. Fabritius, M.D.,
Frederik Mondrup, M.D., Frank C. Pott, M.D., D.M.Sci., Thea P. Møller, M.D.,
Per Winkel, M.D., D.M.Sci., and Jørn Wetterslev, M.D., Ph.D.,
for the 6S Trial Group and the Scandinavian Critical Care Trials Group*

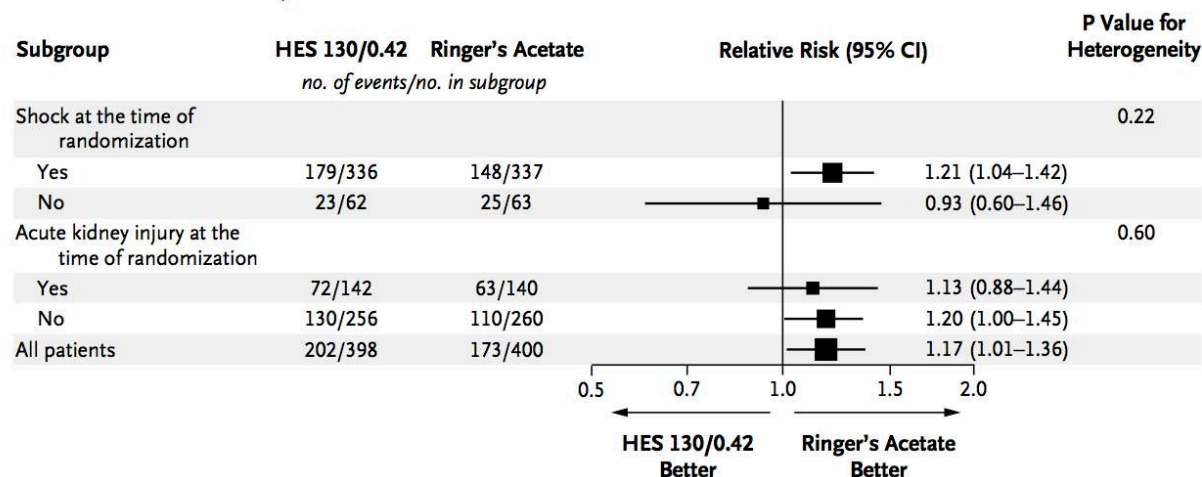


No. at Risk				
HES 130/0.42	398	240	209	197
Ringer's acetate	400	254	240	228

- Sepsis
- 6% HES 130/0.42
- Ringer acetate



B Relative Risk of the Primary Outcome



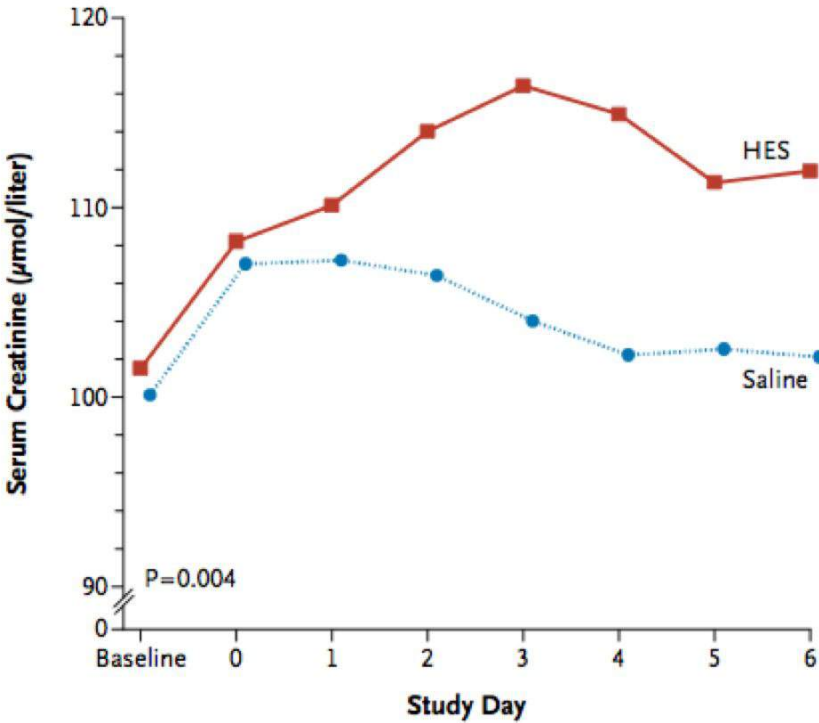


Hydroxyethyl Starch or Saline for Fluid Resuscitation in Intensive Care

John A. Myburgh, M.D., Ph.D., Simon Finfer, M.D., Rinaldo Bellomo, M.D., Laurent Billot, M.Sc., Alan Cass, M.D., Ph.D., David Gattas, M.D., Parisa Glass, Ph.D., Jeffrey Lipman, M.D., Bette Liu, Ph.D., Colin McArthur, M.D., Shay McGuinness, M.D., Dorrilyn Rajbhandari, R.N., Colman B. Taylor, M.N.D., and Steven A.R. Webb, M.D., Ph.D., for the CHEST Investigators and the Australian and New Zealand Intensive Care Society Clinical Trials Group*

- 7000 pts
- 6% HES 130/0.42
- SSI
- Mortality (90d) p=0.26

A Serum Creatinine

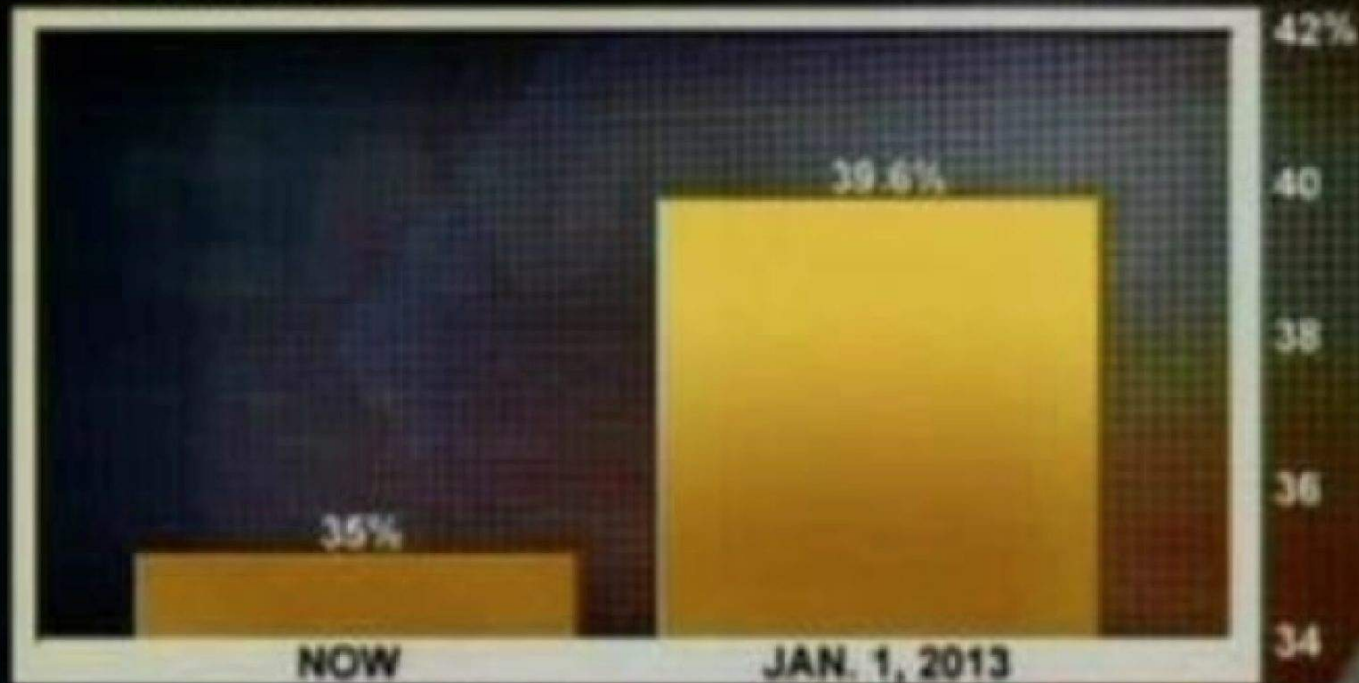


No. at Risk

HES	3260	2197	2899	2111	1576	1238	998	851
Saline	3283	2253	2916	2196	1614	1291	1026	857

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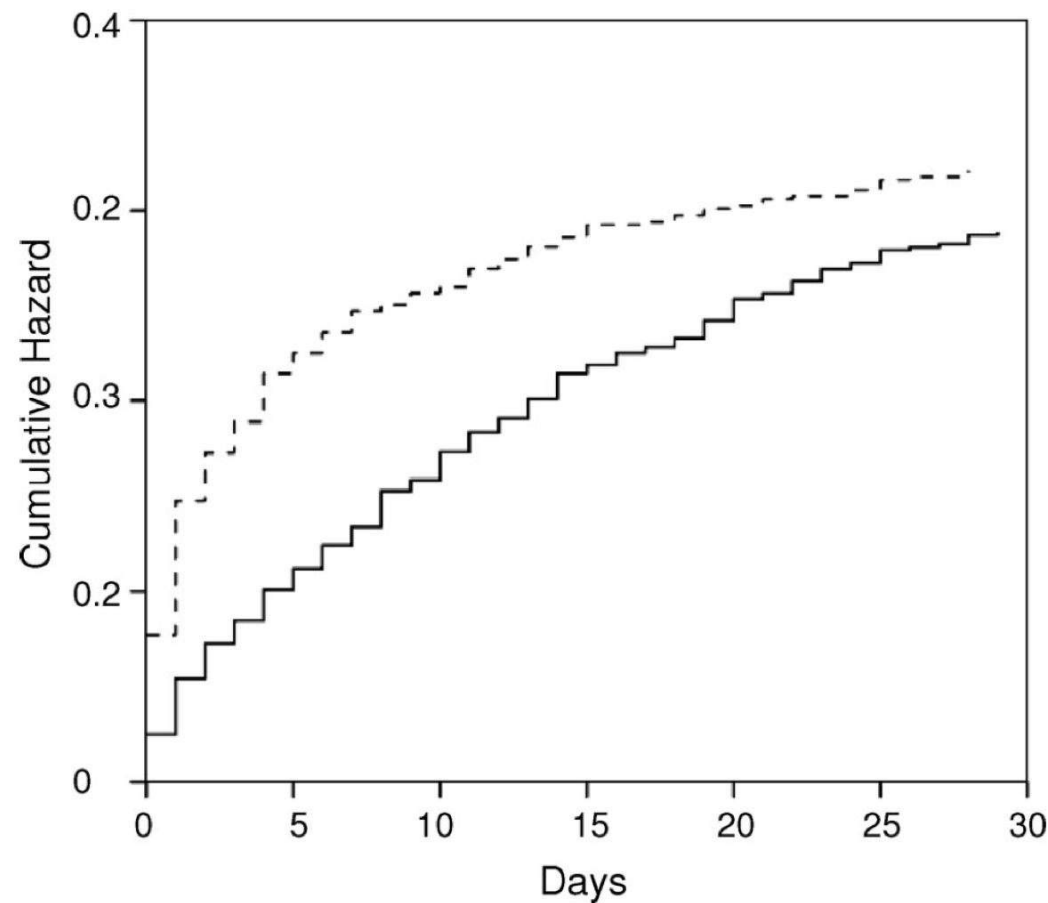
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NASDAQ 2939.52 ▼ 6.32

Are Blood Transfusions Associated with Greater Mortality Rates?

Results of the Sepsis Occurrence in Acutely Ill Patients Study

Jean-Louis Vincent, M.D., Ph.D.,* Yasser Sakr, M.B., B.Ch., Ph.D.,† Charles Sprung, M.D.,‡ Svein Harboe, M.D.,§
Pierre Damas, M.D.|| on behalf of the Sepsis Occurrence in Acutely Ill Patients (SOAP) Investigators

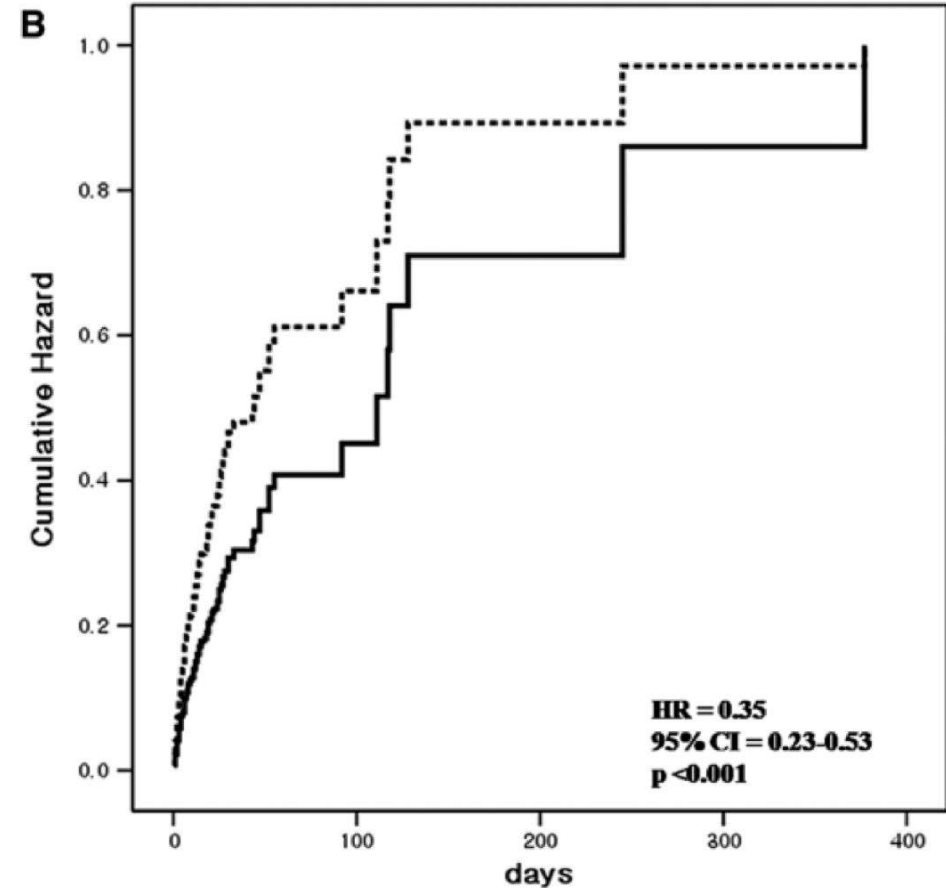
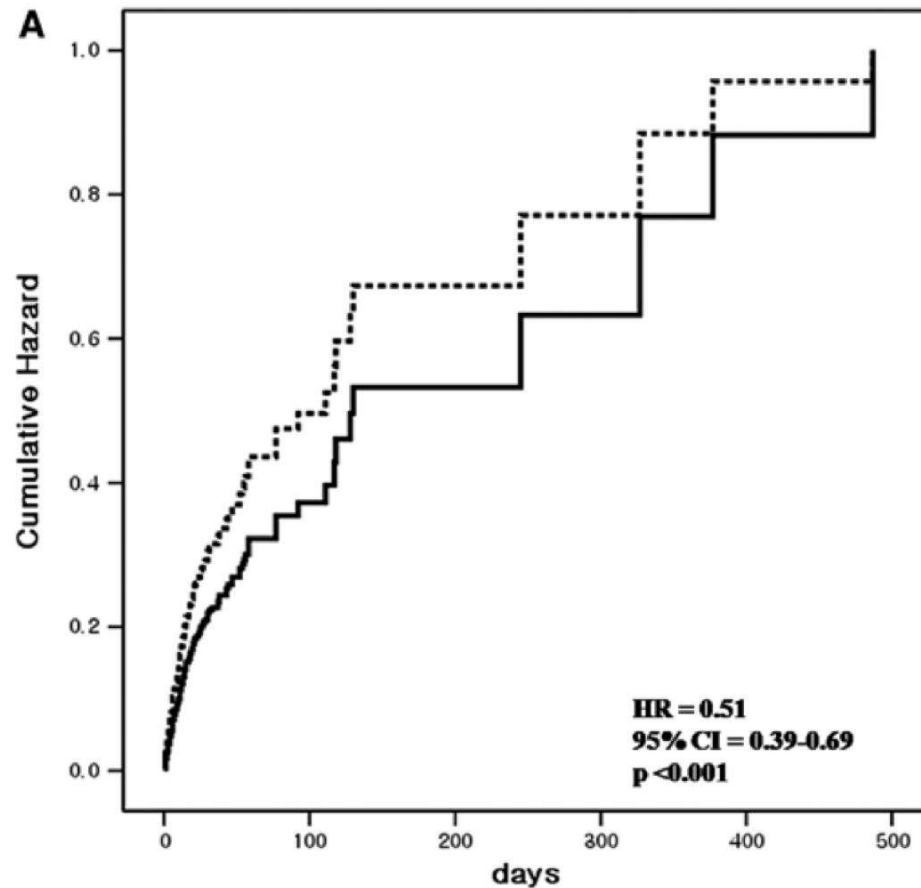


- 3,147 patients,
- 1,040 (33.0%) received a blood transfusion
- Propensity (matching score)

Red blood cell transfusions are associated with lower mortality in patients with severe sepsis and septic shock: A propensity-matched analysis*



Dae Won Park, MD, PhD; Byung-Chul Chun, MD, PhD; Soon-Sun Kwon, PhD; Young Kyung Yoon, MD, PhD; Won Suk Choi, MD, PhD; Jang Wook Sohn, MD, PhD; Kyong Ran Peck, MD, PhD; Yang Soo Kim, MD, PhD; Young Hwa Choi, MD, PhD; Jun Yong Choi, MD, PhD; Sang Il Kim, MD, PhD; Joong Sik Eom, MD, PhD; Hyo Youl Kim, MD, PhD; Hee Jin Cheong, MD, PhD; Young Goo Song, MD, PhD; Hee Jung Choi, MD, PhD; June Myung Kim, MD, PhD; Min Ja Kim, MD, PhD



L'avenir ?

Volume

- Amélioration de la logistique de prise en charge
- Visée hémodynamique non oncotique = volume
 - Solutés « globulaires »

Cristalloïdes à réviser

- Quantité
- Composition
- Température, débit

Mise à l'écart des solutés oncotiques

Approches complémentaires

- Précocité du traitement vasoconstricteur
- Optimisation de la sédation
- Drainage lymphatique

Respect de la physiologie endothéliale

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