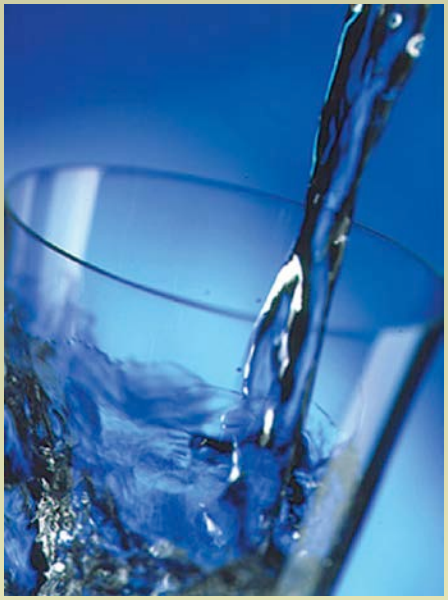
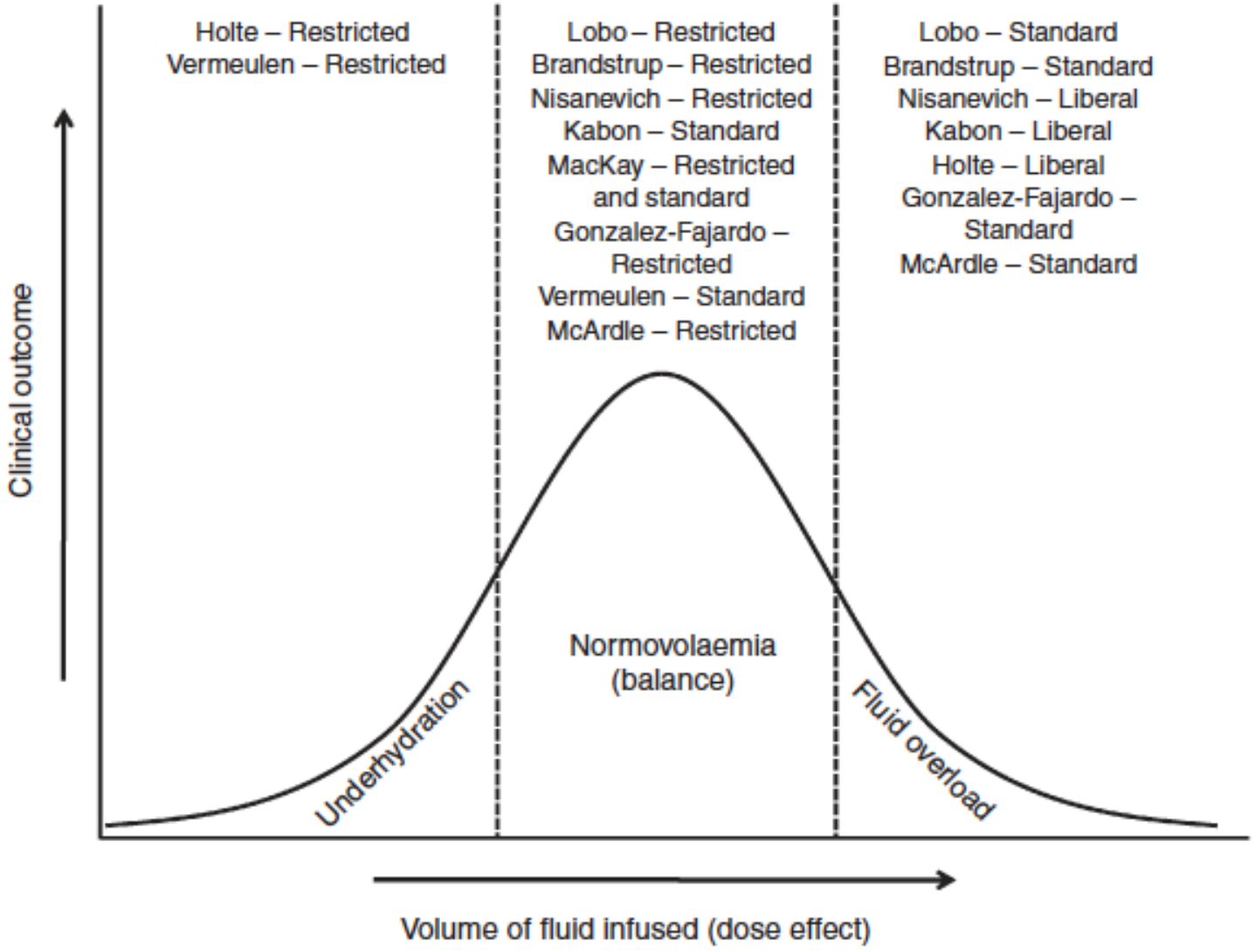


Hot topics 2015

Vätsketerapi + varför får man ödem av vätska?

Robert G. Hahn, MD, PhD
Research Director, Södertälje Hospital;
Professor of Anaesthesia, Linköping University,
Associate professor, Karolinska institute, Sweden.



Varadhan KK, Lobo DN. Proc Nutr Soc 2010; 69: 488-498.

Intraoperativ vätska

- 3-5 ml/kg/timme balanserad kristalloid vätska.
- 2 ml/kg/timme är för *lite*, ökar incidensen illamående.
- 1-2 ml/timme skall balanseras med flödes-styrd volymsoptimering eller (försöksvis) låg-dos noradrenalin-infusion.

British Journal of Anaesthesia **108** (6): 893–902 (2012)
doi:10.1093/bja/aes138

BJA

REVIEW ARTICLES

Supplemental intravenous crystalloids for the prevention of postoperative nausea and vomiting: quantitative review

C. C. Apfel[1]*, A. Meyer[1,2], M. Orhan-Sungur[3], L. Jalota[4], R. P. Whelan[1] and S. Jukar-Rao[1]

[1] Perioperative Clinical Research Core, Department of Anaesthesia and Perioperative Care, University of California—San Francisco, UCSF Medical Center at Mt Zion, 1600 Divisadero, C-447, San Francisco, CA 94115, USA
[2] Saint Louis University School of Medicine, Saint Louis, MO, USA
[3] Department of Anaesthesiology, Istanbul Faculty of Medicine, Istanbul University, Istanbul, Turkey
[4] Department of Internal Medicine, Reading Hospital and Medical Center, Reading, PA, USA

Surg Endosc. 2014 Dec 17. [Epub ahead of print]

Role of intraoperative fluids on hospital length of stay in laparoscopic bariatric surgery: a retrospective study in 224 consecutive patients.

Nossaman VE[1], Richardson WS 3rd, Wooldridge JB Jr, Nossaman BD.

⊕ Author information

Abstract

BACKGROUND: Studies are unclear regarding optimal intraoperative fluid management during laparoscopic bariatric surgery. The purpose of this 1-year study was to investigate the role of intraoperative fluid administration on hospital length of stay (hLOS) and postoperative complications in laparoscopic bariatric surgery.

METHODS: Patient data analyzed included previously reported demographics, comorbidities, and intraoperative fluid administration on the duration of hLOS and incidence of postoperative complications.

RESULTS: Logistic regression analysis of demographic and comorbidity variables revealed that BMI (P = 0.0099) and history of anemia (P = 0.0084) were significantly associated with hLOS (C index statistic, 0.7). Lower rates of intraoperative fluid administration were significantly associated with longer hLOS (P = 0.0005). Recursive partitioning observed that patients who received <1,750 ml of intraoperative fluids resulted in longer hLOS when compared to patients who received ≥1,750 ml (LogWorth = 0.5). When intraoperative fluid administration rates were defined by current hydration guidelines for major abdominal surgery, restricted rates (<5 ml/kg/h) were associated with the highest incidence of extended hLOS (>1 postoperative day) at 54.1 % when compared to 22.9 % with standard rates (5-7 ml/kg/h) and were lowest at 14.5 % in patients receiving liberal rates (>7 ml/kg/h) (P < 0.0001). Finally, lower rates of intraoperative fluid administration were significantly associated with delayed wound healing (P = 0.03).

CONCLUSIONS: The amount of intravenous fluids administered during laparoscopic bariatric surgery plays a significant role on hLOS and on the incidence of delayed wound healing.

< 1,750 ml vid överviktskirurgi ger längre vårdtid

Restrictive Deferred Hydration Combined with Preemptive Norepinephrine Infusion during Radical Cystectomy Reduces Postoperative Complications and Hospitalization Time

A Randomized Clinical Trial

Anesthesiology 2014; 120: 365-377

Patrick Y. Wuethrich, M.D., Fiona C. Burkhard, M.D., George N. Thalmann, M.D., Frank Stueber, M.D., Urs E. Studer, M.D.

166 patients – half treated with Ringer´s 6 ml/kg/hour
The others with 1-3 ml/kg/hour + norepinephrine.
Volumes given 1.7 and 4.3 L in the two groups.

Table 4. In-hospital Complications

Category	Complication	Low-volume Group (n = 83)	Control Group (n = 83)	RR	95% CI	*P* Value
Gastrointestinal		5 (6%)	31 (37%)	0.16	0.07–0.39	<0.001
	Ileus	0 (0%)	8 (10%)			0.001
	Constipation	2 (2%)	18 (22%)			<0.001

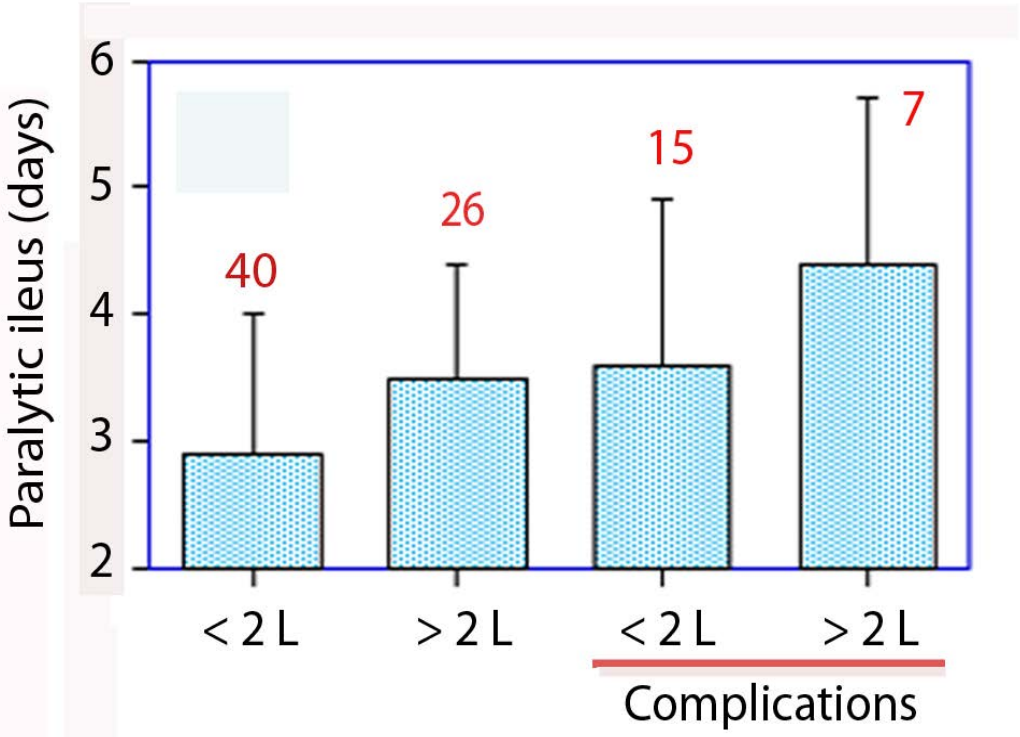
DOI 10.1186/s12871-015-0053-5

BMC Anesthesiology

RESEARCH ARTICLE Open Access

Ringer's lactate, but not hydroxyethyl starch, prolongs the food intolerance time after major abdominal surgery; an open-labelled clinical trial

Yuhong Li[1,2], Rui He[1], Xiaojiang Ying[3] and Robert G Hahn[4*]



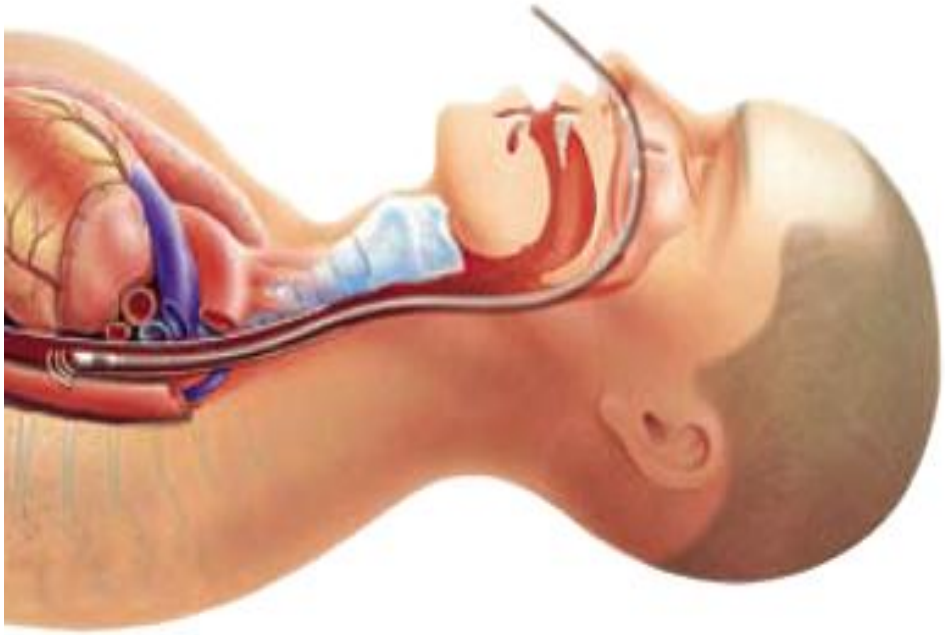
C:a 100 abdominella cancer-op.

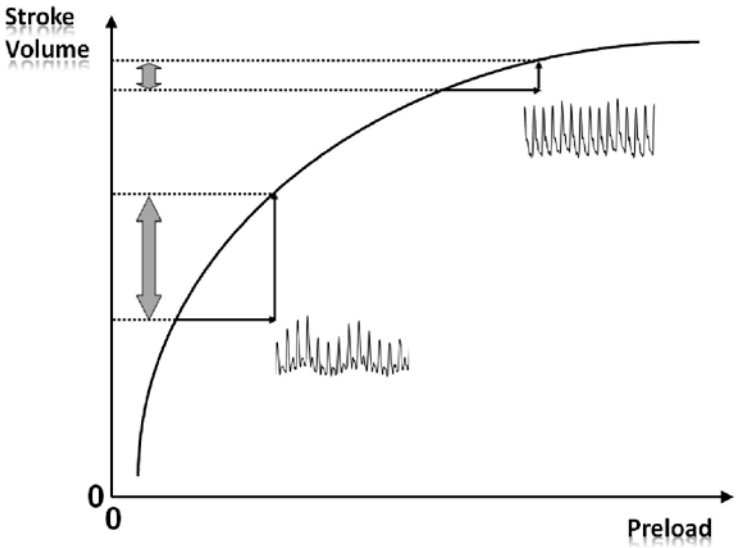
Kristalloid > 2 L ger förlängd tarmparalys.

Voluven har inte den effekten.

Clinicans who perform goal-directed fluid therapy usually continue to use starch

Stroke volume optimization by titration of colloid fluid





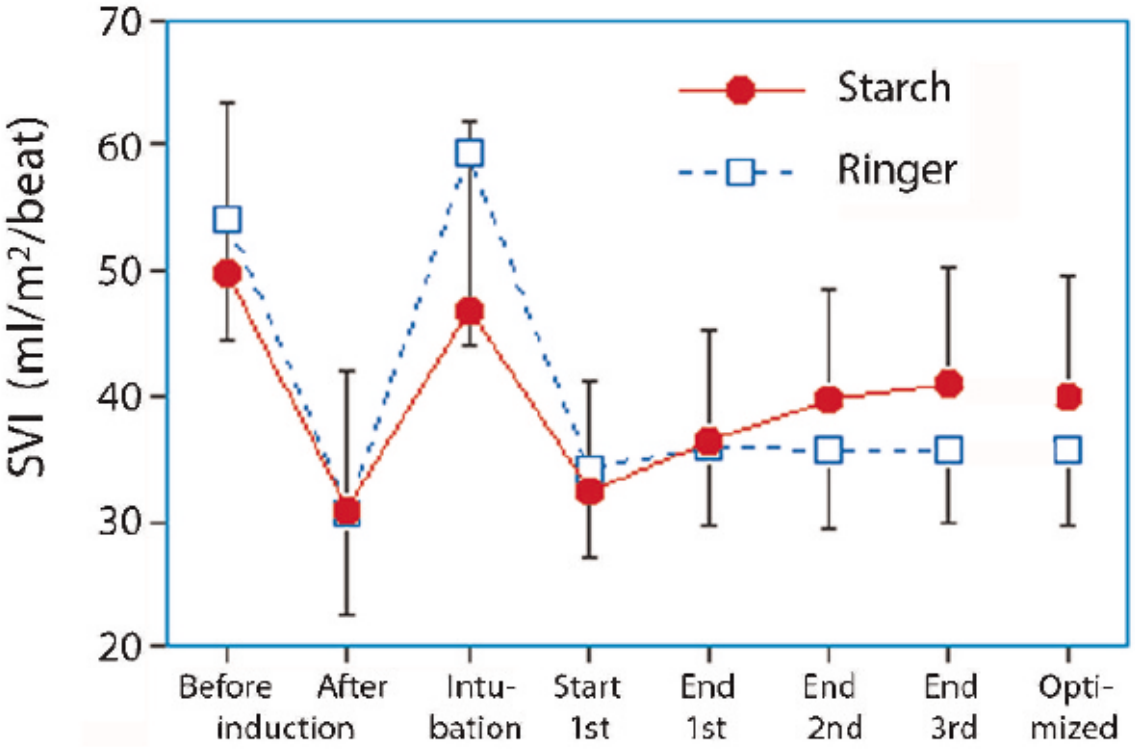
CLINICS

CLINICAL SCIENCE

Dehydration, hemodynamics and fluid volume optimization after induction of general anesthesia

Yuhong Li,[I,II] Rui He,[I] Xiaojiang Ying,[III] Robert G. Hahn[IV,V*]

[I]Shaoxing People's Hospital, Department of Anaesthesia, People's Republic of China. [II]Zhejiang University, The First Affiliated Hospital, Department of Anaesthesia, People's Republic of China. [III]Shaoxing People's Hospital, Department of Colorectal Surgery, People's Republic of China. [IV]Södertälje Hospital, Research Unit, Södertälje, Sweden. [V]Linköping University, Section for Anaesthesia, Sweden.

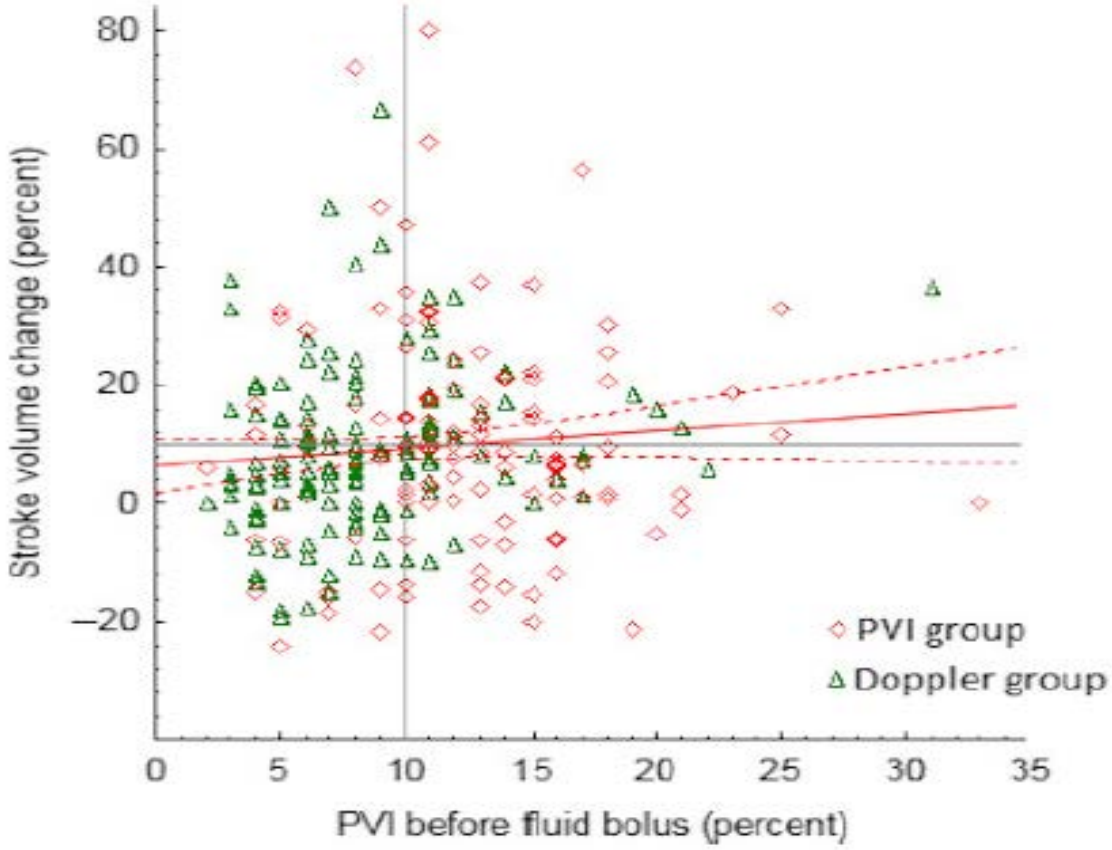


Clinics 2014; 69: 809-16.

Agreement between Pleth Variability Index and oesophageal Doppler to predict fluid responsiveness

H. Bahlmann[1,2], R. G. Hahn[3] and L. Nilsson[1,2]

[1]Department of Anaesthesiology and Intensive Care, Linköping University, Linköping, Sweden
[2]Department of Medical and Health Sciences, Linköping University, Linköping, Sweden
[3]Research Unit, Södertälje Hospital, Södertälje, Sweden



Cecconi *et al. Critical Care* 2013, 17:209
http://ccforum.com/content/17/2/209

CRITICAL CARE

REVIEW

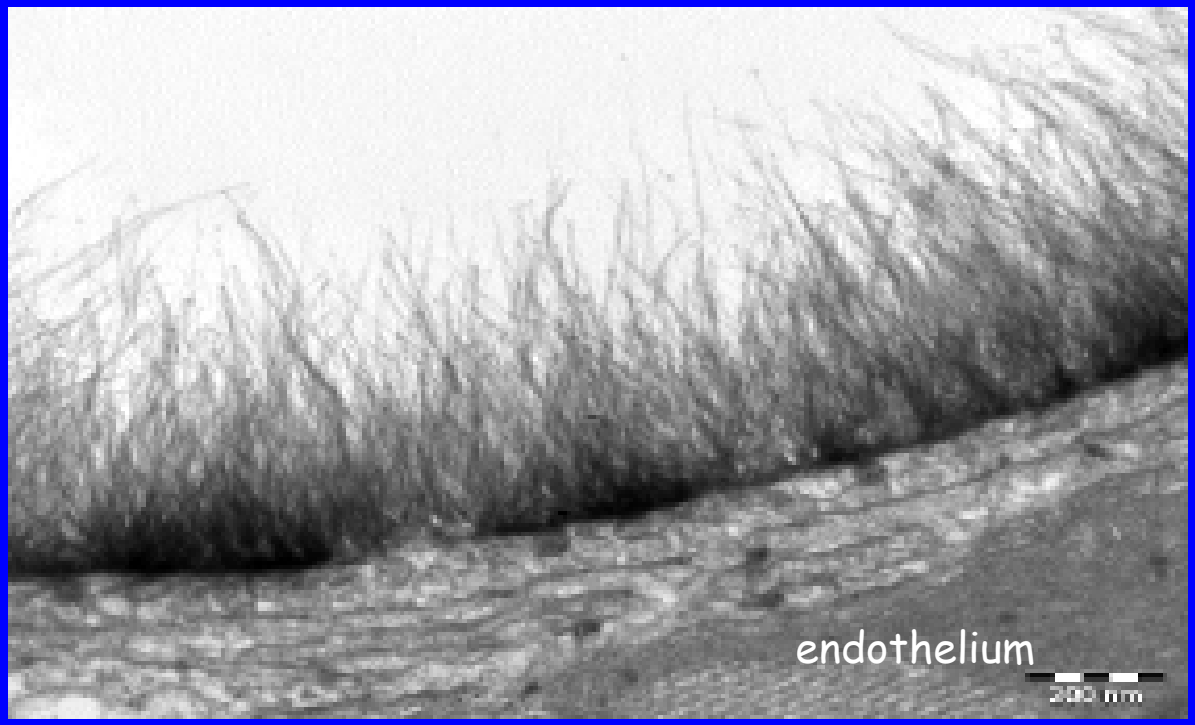
Clinical review: Goal-directed therapy - what is the evidence in surgical patients? The effect on different risk groups

Maurizio Cecconi*, Carlos Corredor, Nishkantha Arulkumaran, Gihan Abuella, Jonathan Ball, R Michael Grounds, Mark Hamilton and Andrew Rhodes

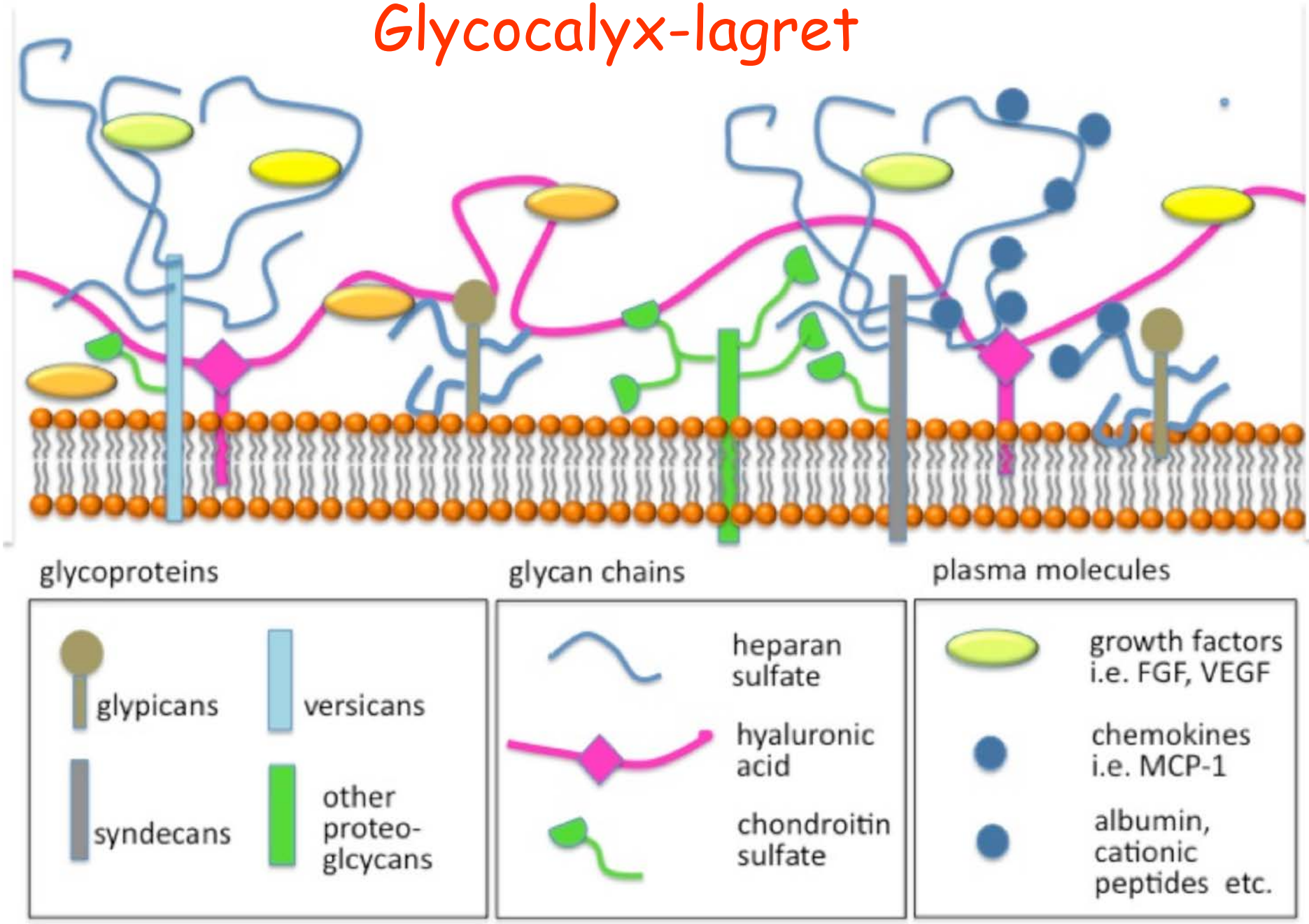
Extra hög risk (mortalitet > 20%): odds ratio 0.27
Hög risk (mortalitet 5-20%): odds ratio 0.56
Intermediär risk (mortalitet < 5%): odds ratio 0.43

Målstyrd vätsketerapi är till störst nytta hos de sjukaste

Glycocalyx lagret ser ut som sjögräs och täcker insidan av endotelet



Glycocalyx-lagret



Glycocalyx-lagret

- Upptäcktes c:a 1990, lätt att skada, svårt att påvisa.
- Metabolt mycket aktivt.
- Reglerar vaskulär permeabilitet.
- Reglerar mikrovaskulära perfusionen via NO.
- Betydelse för komplementsystemet.
- Skadas lätt vid inflammation, ”shedding”
- Då ökar vaskulära permeabiliteten för stora molekyler och leukocyter kan adherera till kärlväggen.

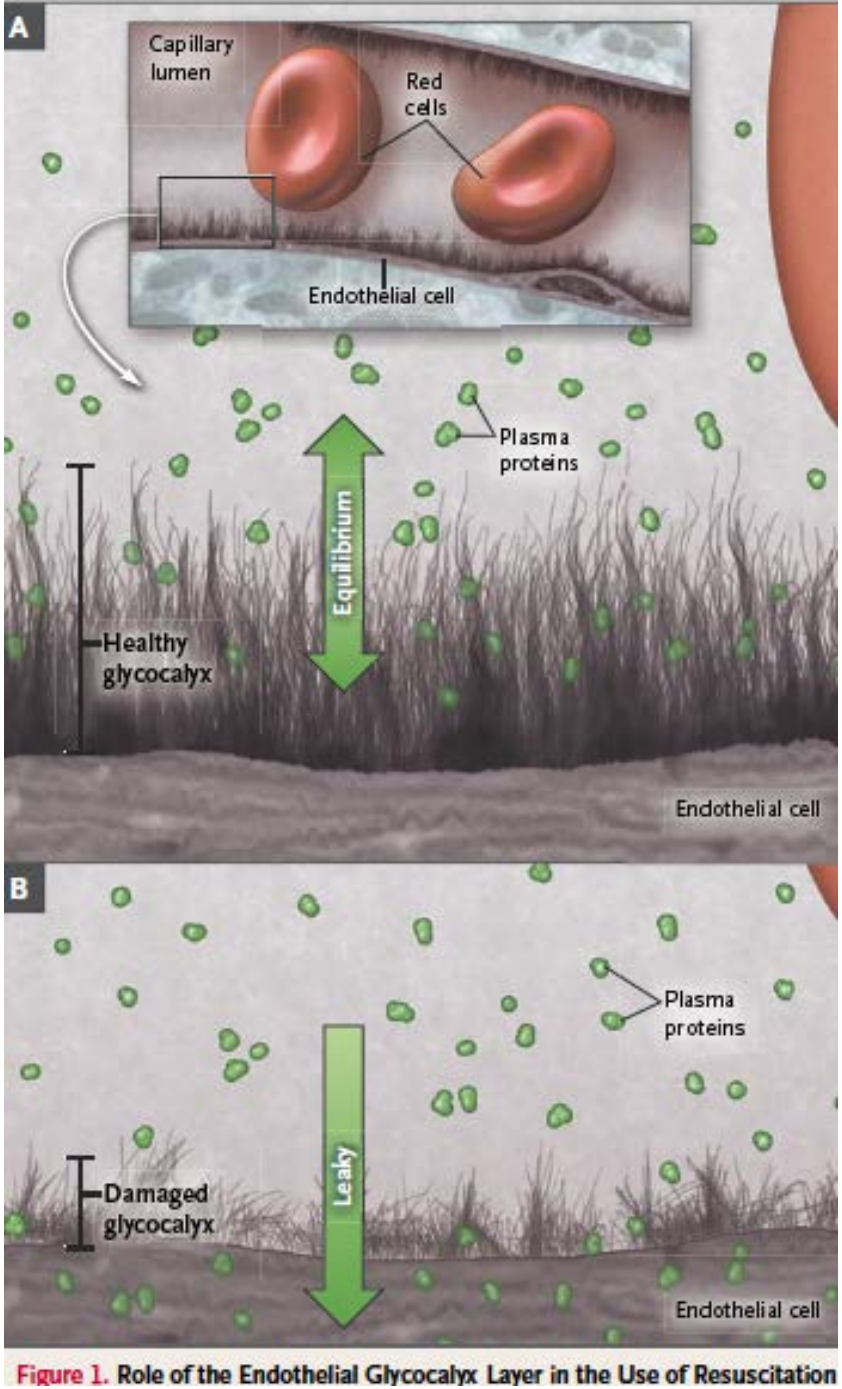


Figure 1. Role of the Endothelial Glycocalyx Layer in the Use of Resuscitation

Glycocalyx layer of the endothelium is a key determinant of vascular permeability for proteins.

New Engl J Med 2013; 369: 1243-51.

INCREASED VASCULAR PERMEABILITY: A MAJOR CAUSE OF HYPOALBUMINAEMIA IN DISEASE AND INJURY

A. FLECK*
FELICITY HAWKER‡
P. I. WALLACE||
GAIL RAINES†
J. TROTTER§
I. MCA. LEDINGHAM¶
K. C. CALMAN**

Departments of Pathological Biochemistry, Anaesthetics, and Surgery and Oncology, Western Infirmary, Glasgow G11 6NT

Summary The rate of loss of albumin to the tissue spaces (measured as transcapillary escape rate) rose by more than 300% in patients with septic shock, and the average increase within 7 h of cardiac surgery was 100%. The transcapillary escape rate in cachectic cancer patients was twice that of a group of healthy individuals. The rate of loss of albumin to the tissue spaces is normally 5%/h, which is more than 10 times the rates of synthesis and catabolism, and these large rate increases indicate that increased vascular permeability is an important cause of the lowered concentratioin of albumin commonly seen in acute and chronic disease.

Leakage of macromolecules (albumin) increases by a factor of 3 in septic shock

Lancet 1985; 325: 781-784

British Journal of Anaesthesia **108** (3): 384–94 (2012)
Advance Access publication 29 January 2012 · doi:10.1093/bja/aer515

BJA

Revised Starling equation and the glycocalyx model of transvascular fluid exchange: an improved paradigm for prescribing intravenous fluid therapy

T. E. Woodcock[1]* and T. M. Woodcock[2]

[1] Critical Care Service, Southampton University Hospitals NHS Trust, Tremona Road, Southampton SO16 6YD, UK
[2] The Australian School of Advanced Medicine, Macquarie University, NSW 2109, Australia

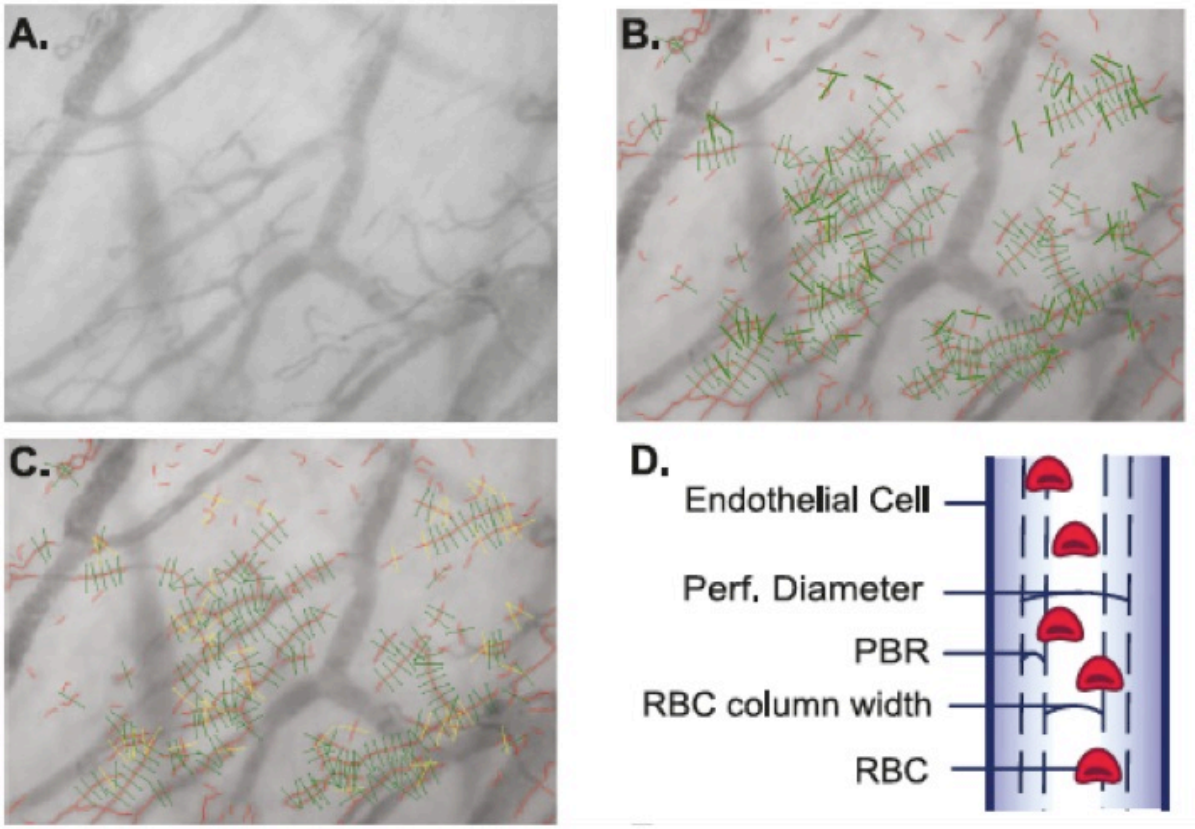
* Corresponding author. E-mail: tom.woodcock@me.com

Editor's key points

- The classic Starling principle does not hold for fluid resuscitation in clinical settings.
- The endothelial glycocalyx layer appears to have a major role in fluid exchange.
- A revision of Starling incorporating the glycocalyx model appears to explain better the responses seen clinically.

Summary. I.V. fluid therapy does not result in the extracellular volume distribution expected from Starling's original model of semi-permeable capillaries subject to hydrostatic and oncotic pressure gradients within the extracellular fluid. Fluid therapy to support the circulation relies on applying a physiological paradigm that better explains clinical and research observations. The revised Starling equation based on recent research considers the contributions of the endothelial glycocalyx layer (EGL), the endothelial basement membrane, and the extracellular matrix. The characteristics of capillaries in various tissues are reviewed and some clinical corollaries considered. The oncotic pressure difference across the EGL opposes, but does not reverse, the filtration rate (the 'no absorption' rule) and is an important feature of the revised paradigm and highlights the limitations of attempting to prevent or treat oedema by transfusing colloids. Filtered fluid returns to the circulation as lymph. The EGL excludes larger molecules and occupies a substantial volume of the intravascular space and therefore requires a new interpretation of dilution studies of blood volume and the speculation that protection or restoration of the EGL might be an important therapeutic goal. An explanation for the phenomenon of context sensitivity of fluid volume kinetics is offered, and the proposal that crystalloid resuscitation from low capillary pressures is rational. Any potential advantage of plasma or plasma substitutes over crystalloids for volume expansion only manifests itself at higher capillary pressures.

Keywords: fluid therapy; intensive care



Två metoder kan bestämma glycocalyx in vivo:

1.Filmning sub-lingualt

2.Mätning av "shedding"-produkter i plasma/urin

(syndecan-1, heparan sulfat, hyaluronsyra)

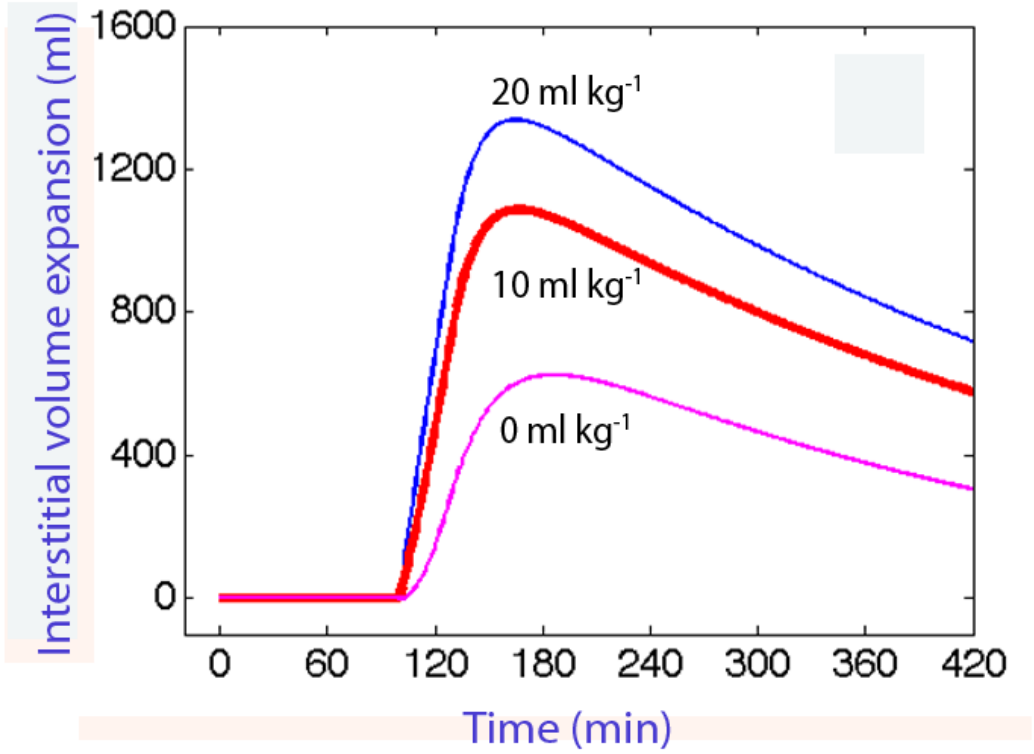
Hahn *et al. Critical Care* 2013, **17**:R104
http://ccforum.com/content/17/3/R104

CRITICAL CARE

RESEARCH Open Access

Interactions between the volume effects of hydroxyethyl starch 130/0.4 and Ringer´s acetate

Robert G Hahn[1,2*], Christian Bergek[1], Tobias Gebäck[3] and Joachim Zdolsek[1]

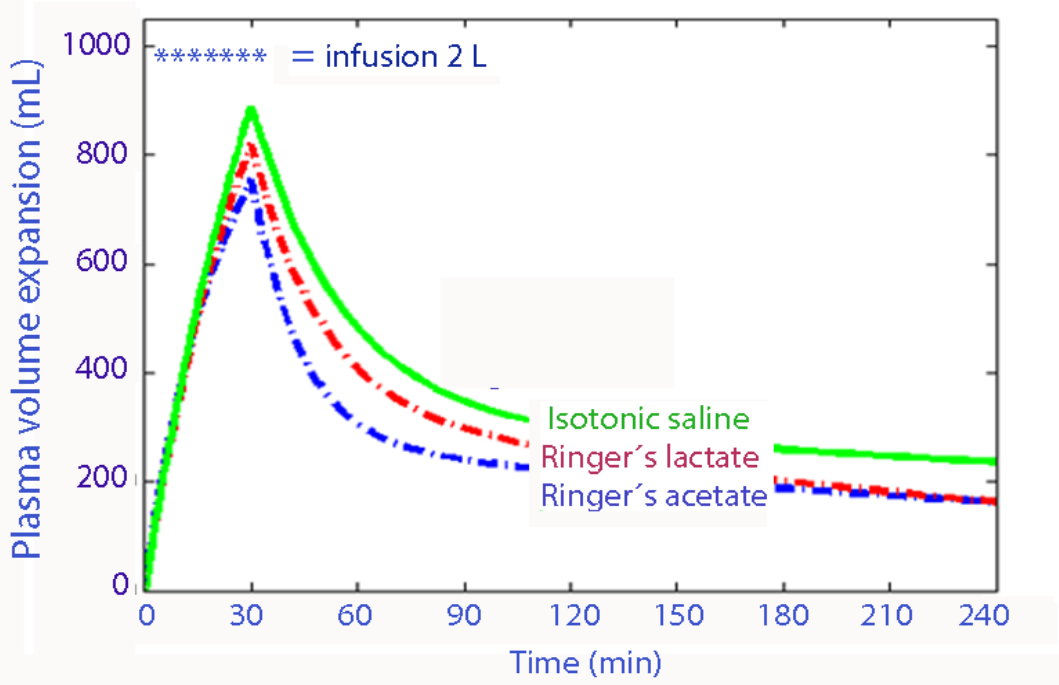


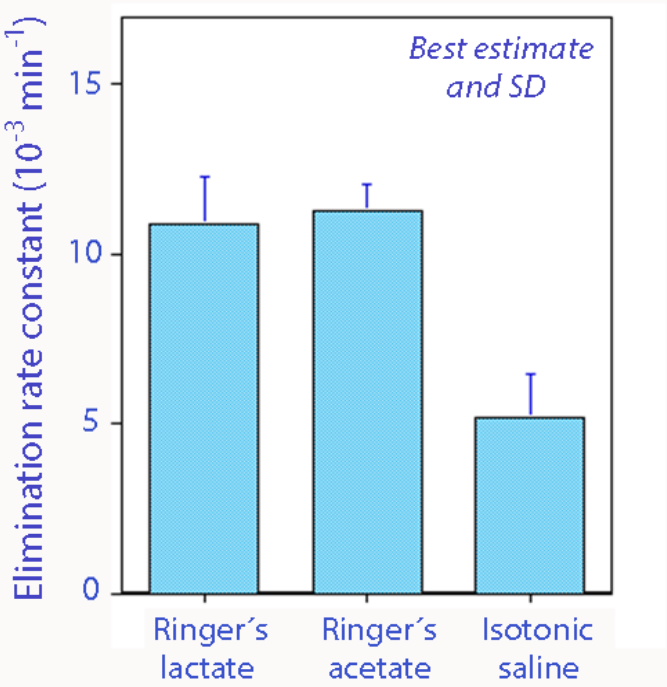
Interstitell vätska efter infusion av 20 ml/kg Ringer på 30 min vid 100 min beroende på hur mycket Voluven som givits mellan 0 och 30 min

SPLIT-studien

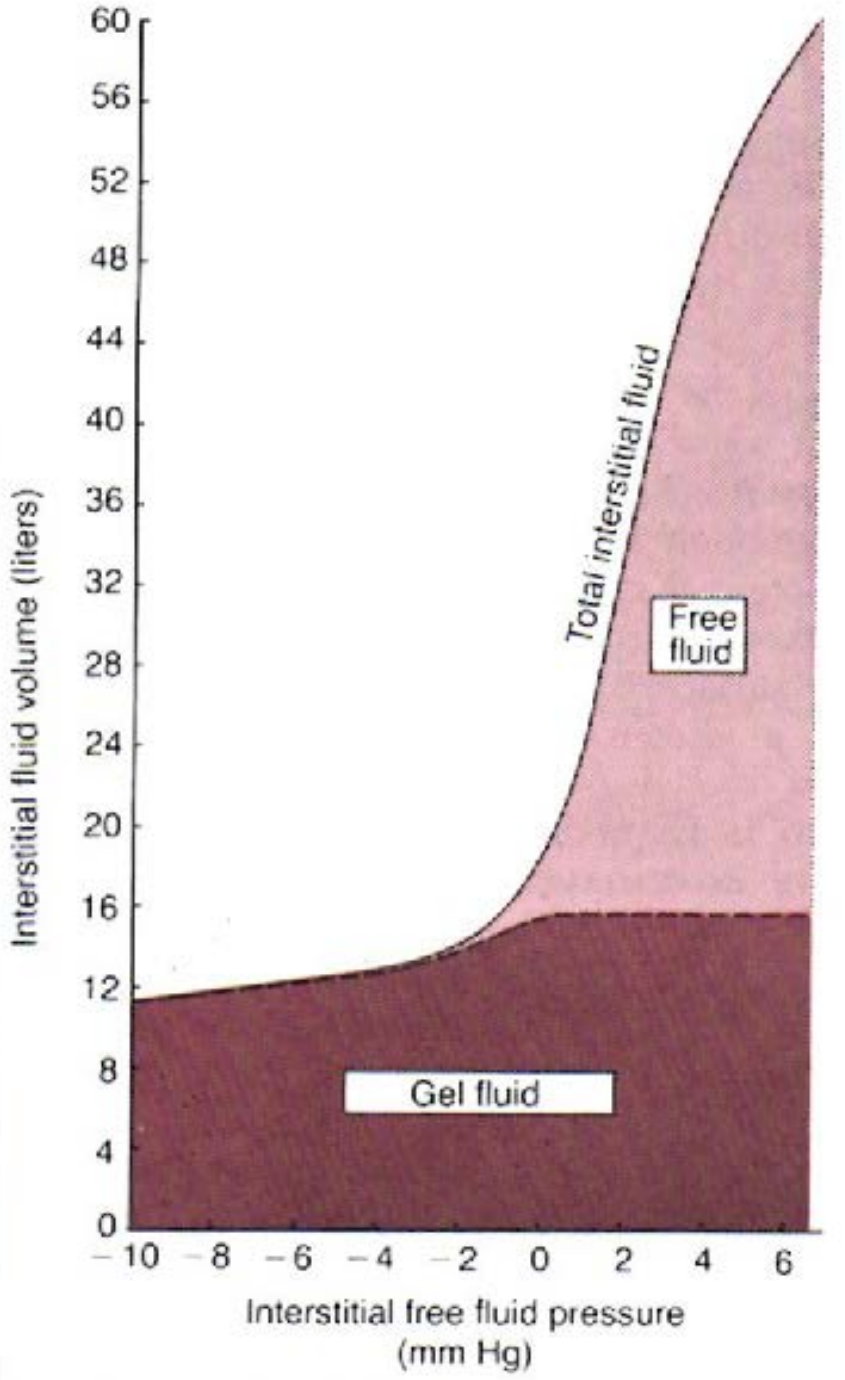
Australien och Nya Zeeland

- Jämför NaCl med Plasma-Lyte hos patienter både inom kirurgi och IVA.
- 10.000 patienter.
- Fokus på serum-kreatinin, njurskada (AKI), andra komplikationer, samt mortalitet.
- Resultat vid ESICM i Berlin 3-6 oktober.





Drobin-Hahn: *Anesthesiology* 2002

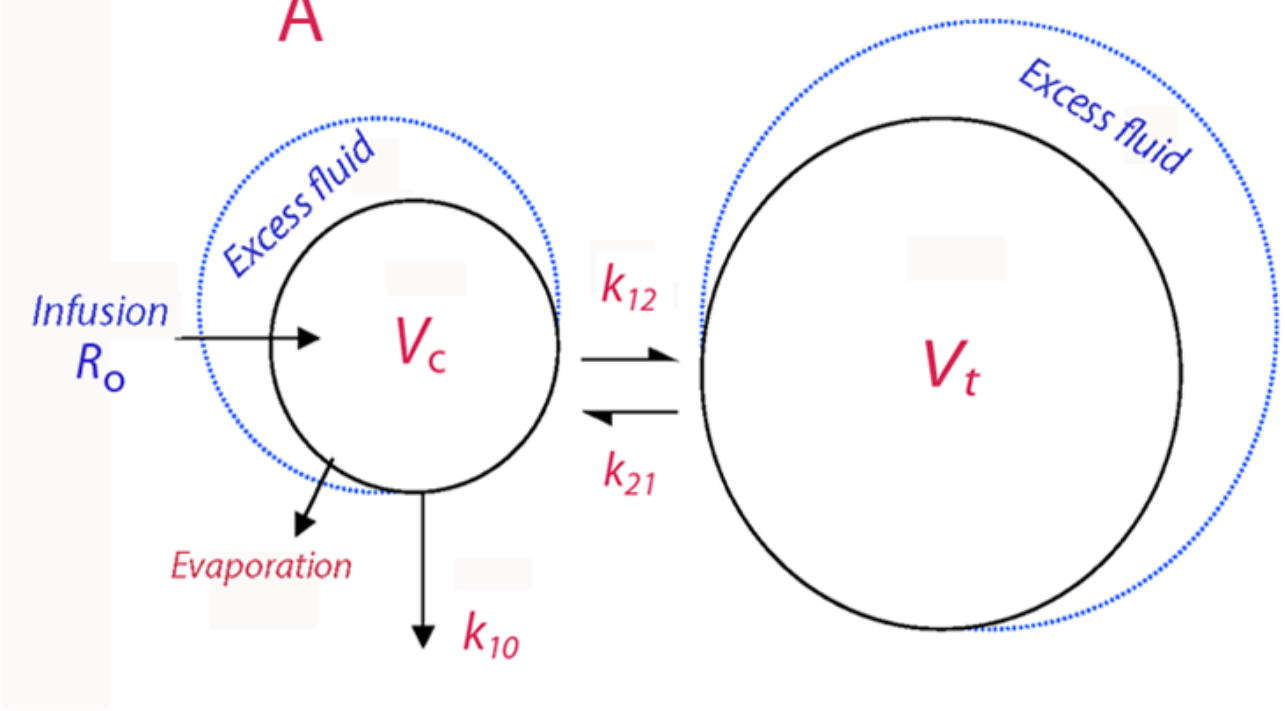


Guyton´s textbok

Interstitiet är en gel som initialt ger högt motstånd mot volyms expansion.

Vatten förflyttas långsamt, näring snabbt.

När interstitiets gel spänns ut förlorar det *elasticitet*.



Vätskekinetisk analys säger att
Ringer-acetat har svårare att
återvända till plasman
ju snabbare infusionen går.