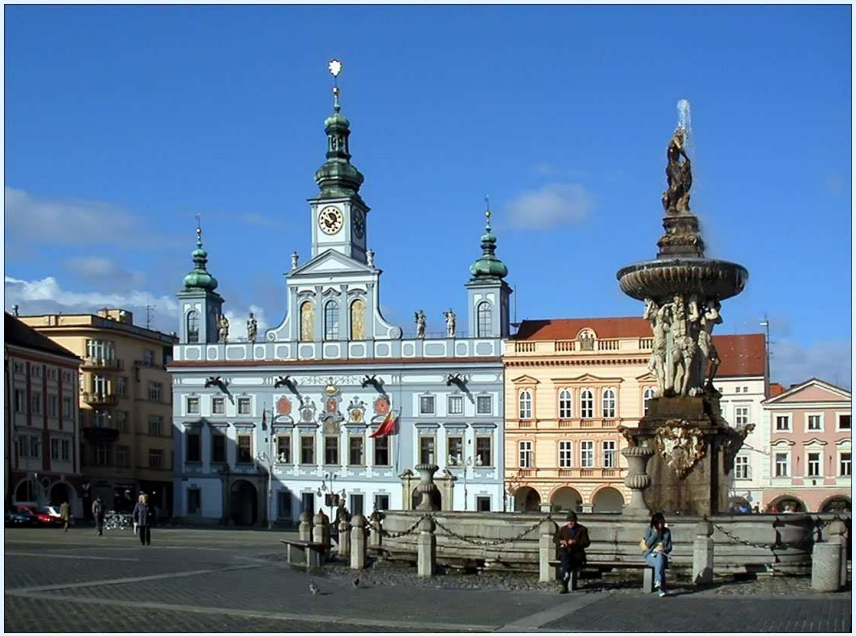
XVIth Congress
ČSARIM 2009
České Budějovice



Major bleeding -
Prevent Acidosis !

October 2nd 2009

R. Zander

Physioklin

www.Physioklin.de

Formerly:
Institute of Physiology and Pathophysiology
Mainz University, Germany

Spahn DR, Rossaint R (BJA 2005; 95: 130-139): Coagulopathy and blood component transfusion in trauma

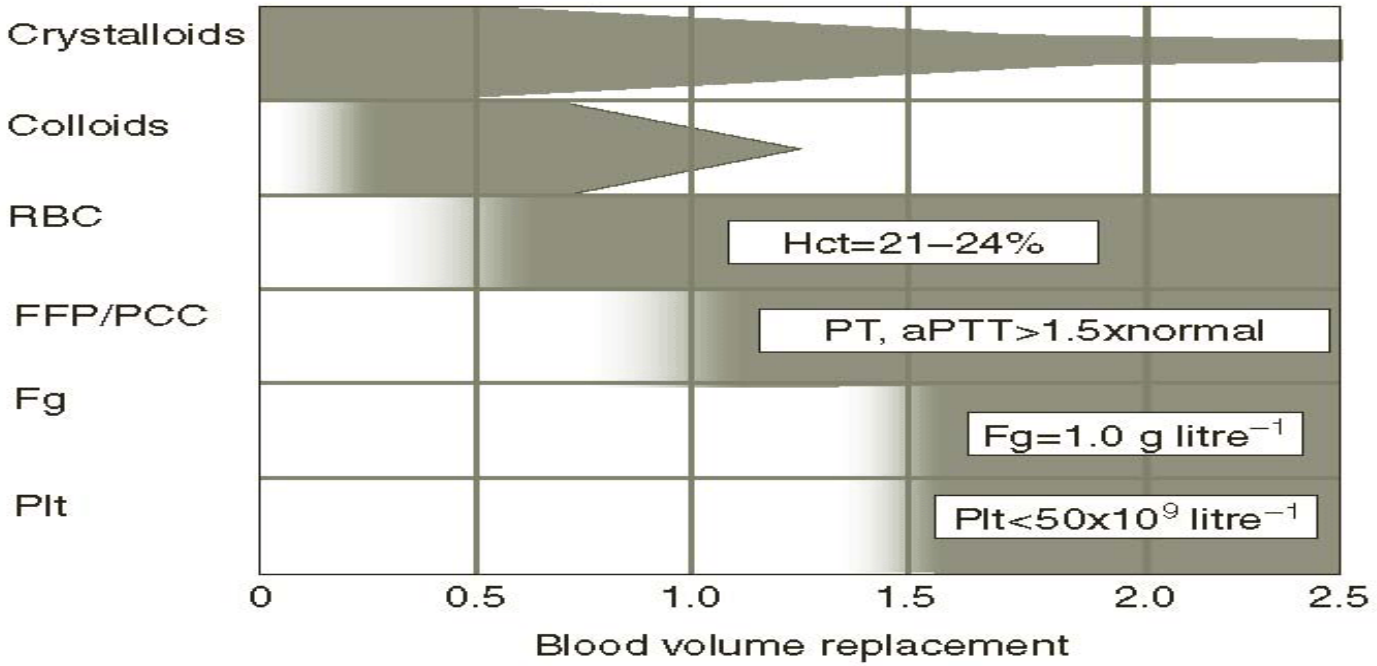
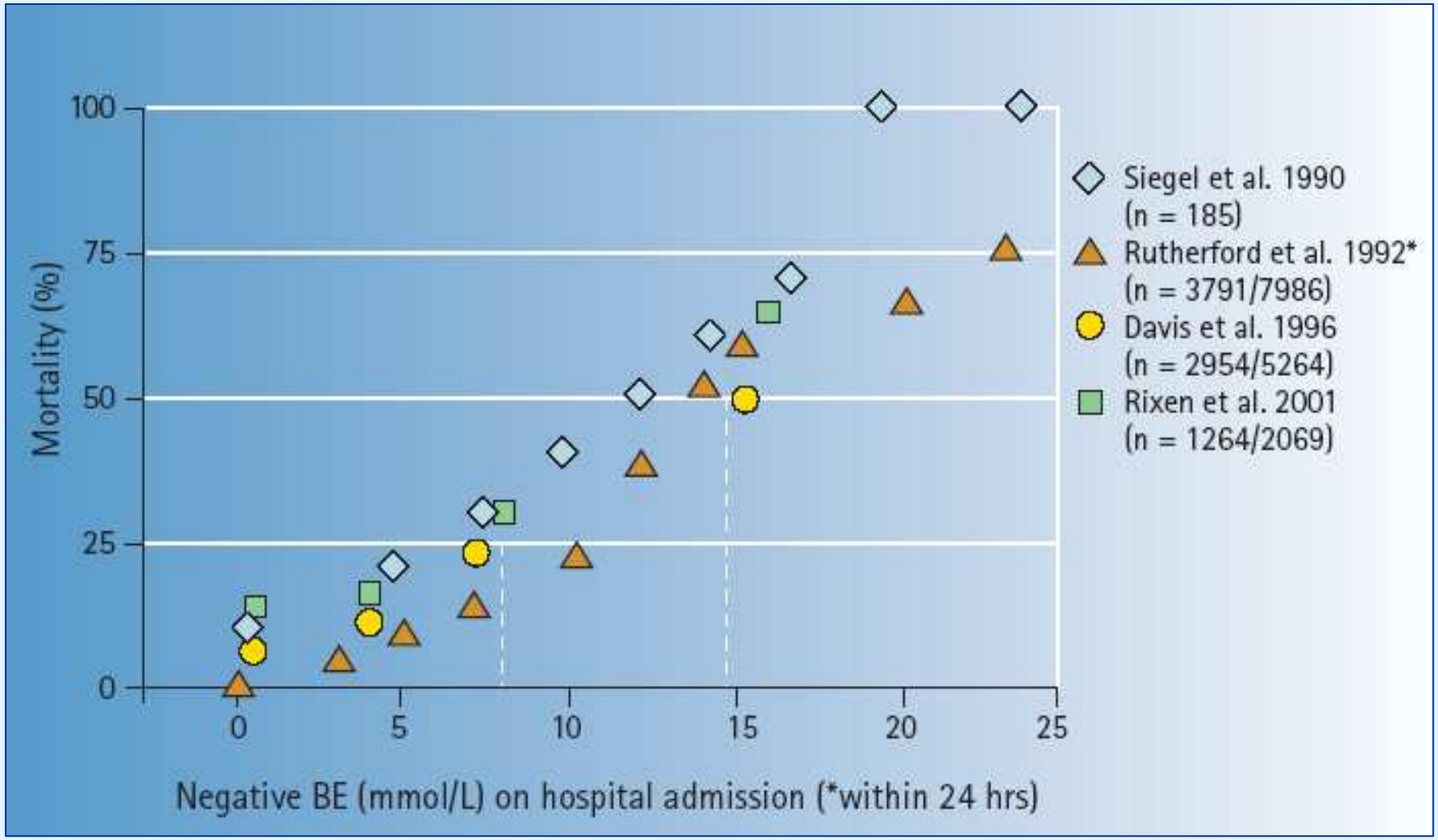


Fig 4 Fluid and blood component treatment in major bleeding (modified from reference 25, with permission from European Society of Haemapheresis). Values of various parameters represent trigger points at which relevant blood components should be transfused. **RBC**, red blood cells; FFP, fresh frozen plasma; PCC, prothrombin complex concentrate; Fg, fibrinogen; Plt, platelets; Hct, haematocrit; PT, prothrombin time; aPTT, activated partial thromboplastin time.

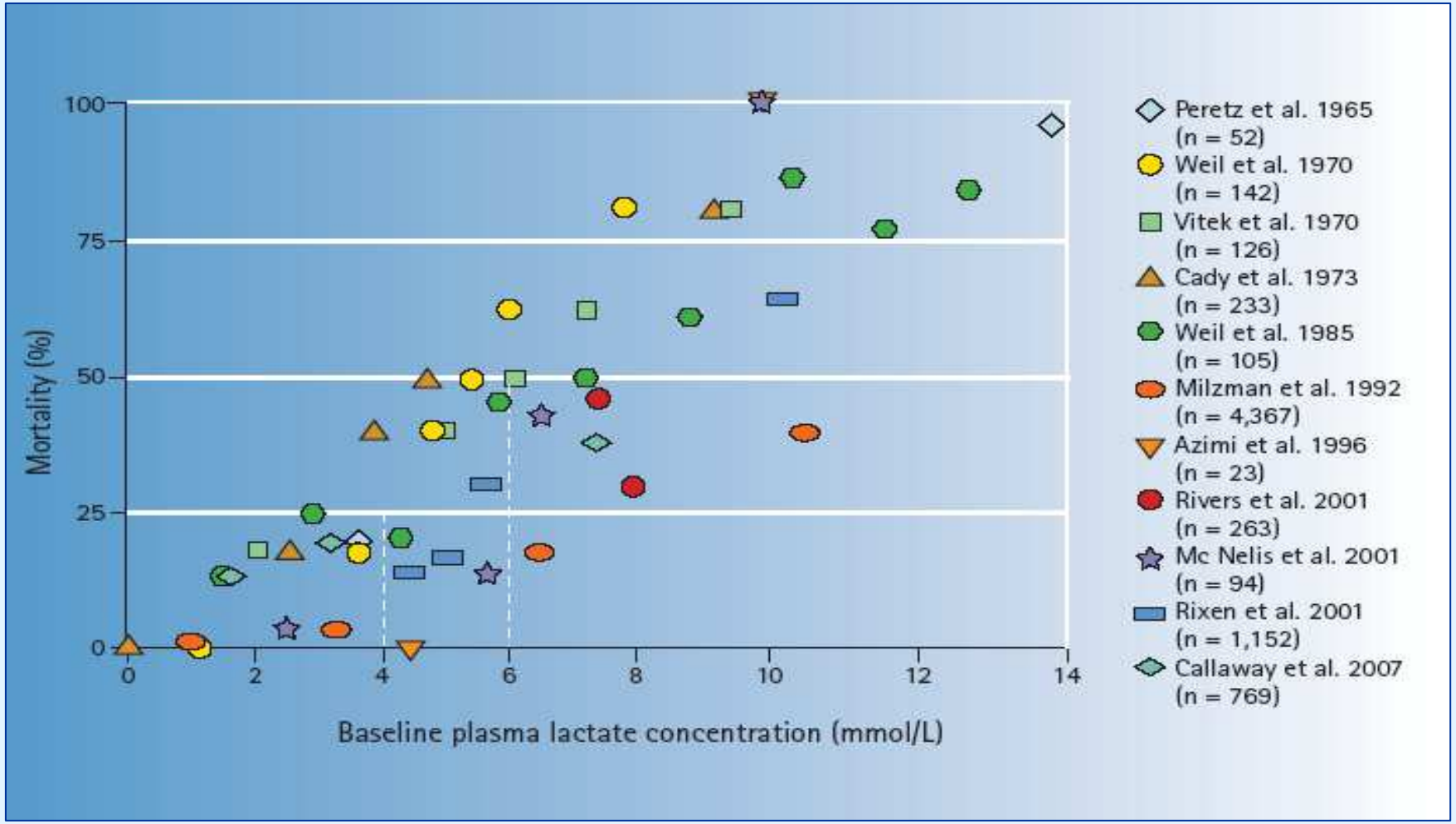
Physioklin

Metabolic acidosis (neg. BE) in ~ 8,200 multiple trauma patients causes high mortality



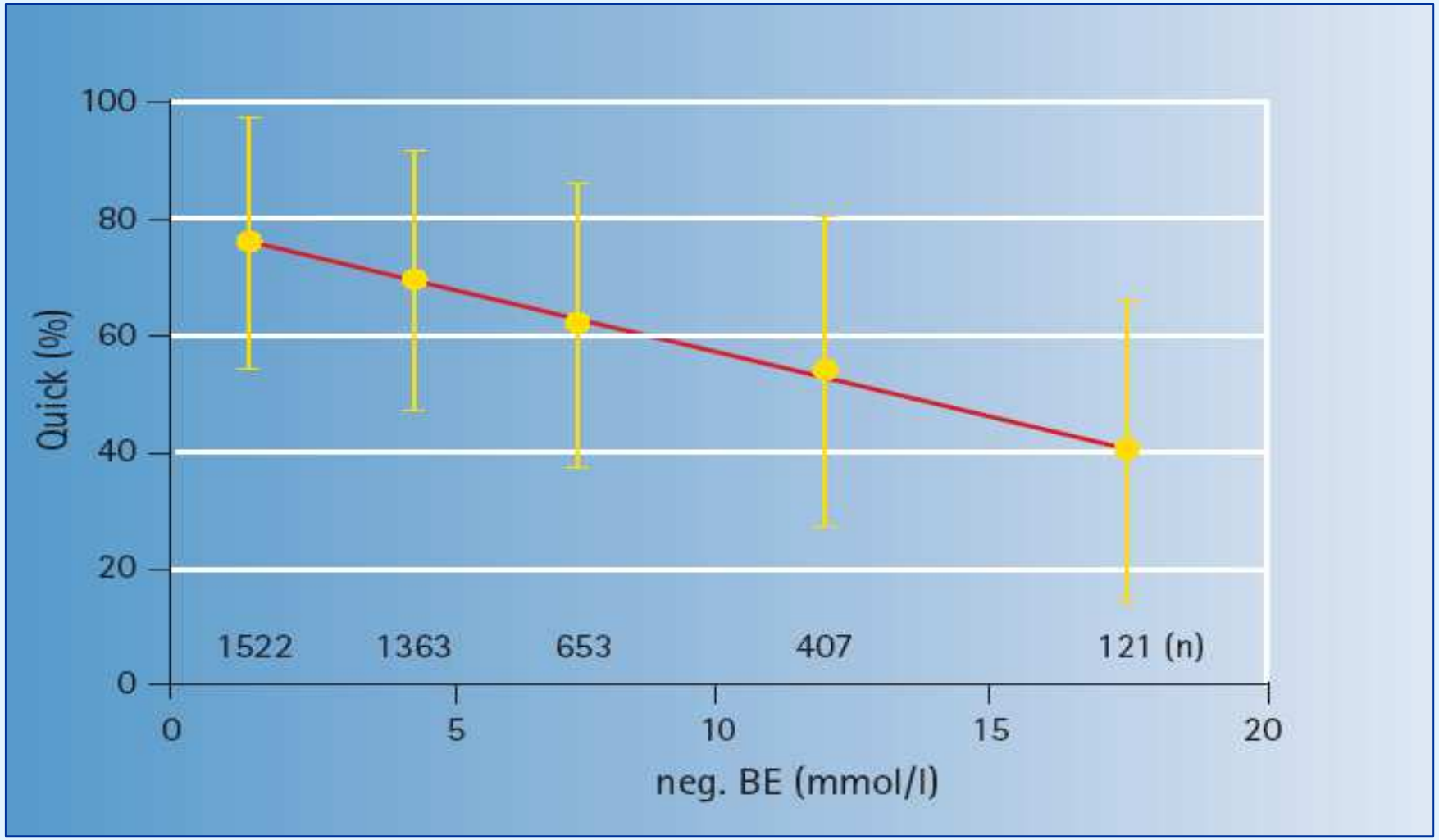
Physioklin

Lactic acidosis (baseline lactate) in ~ 7,300 shock patients (cardiac, hemorrhagic, sepsis) causes high mortality



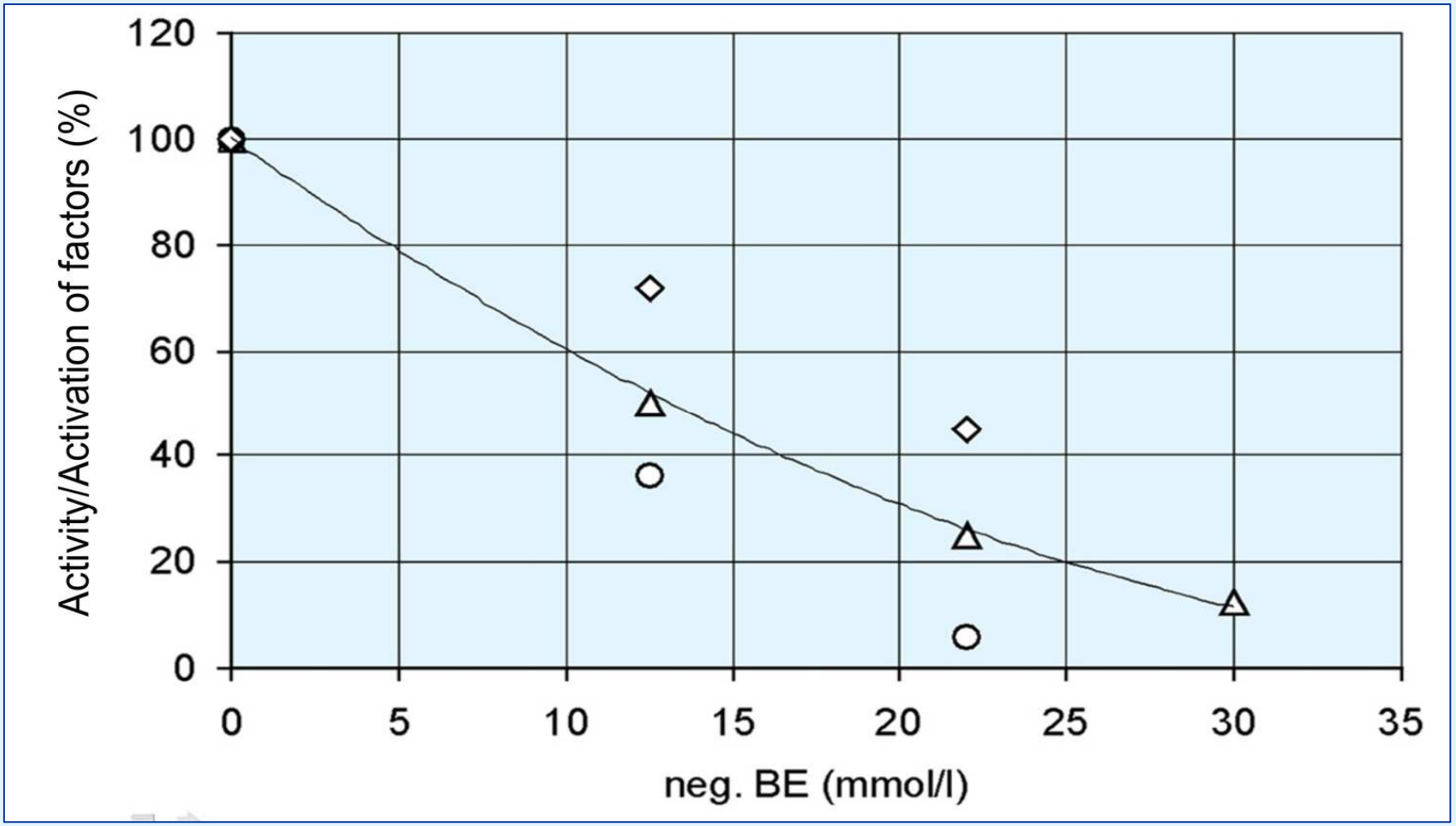
Physioklin

Neg. BE causes decreased Quick (prothrombin time)
(German Trauma Registry: ~ 4,000 polytrauma patients)



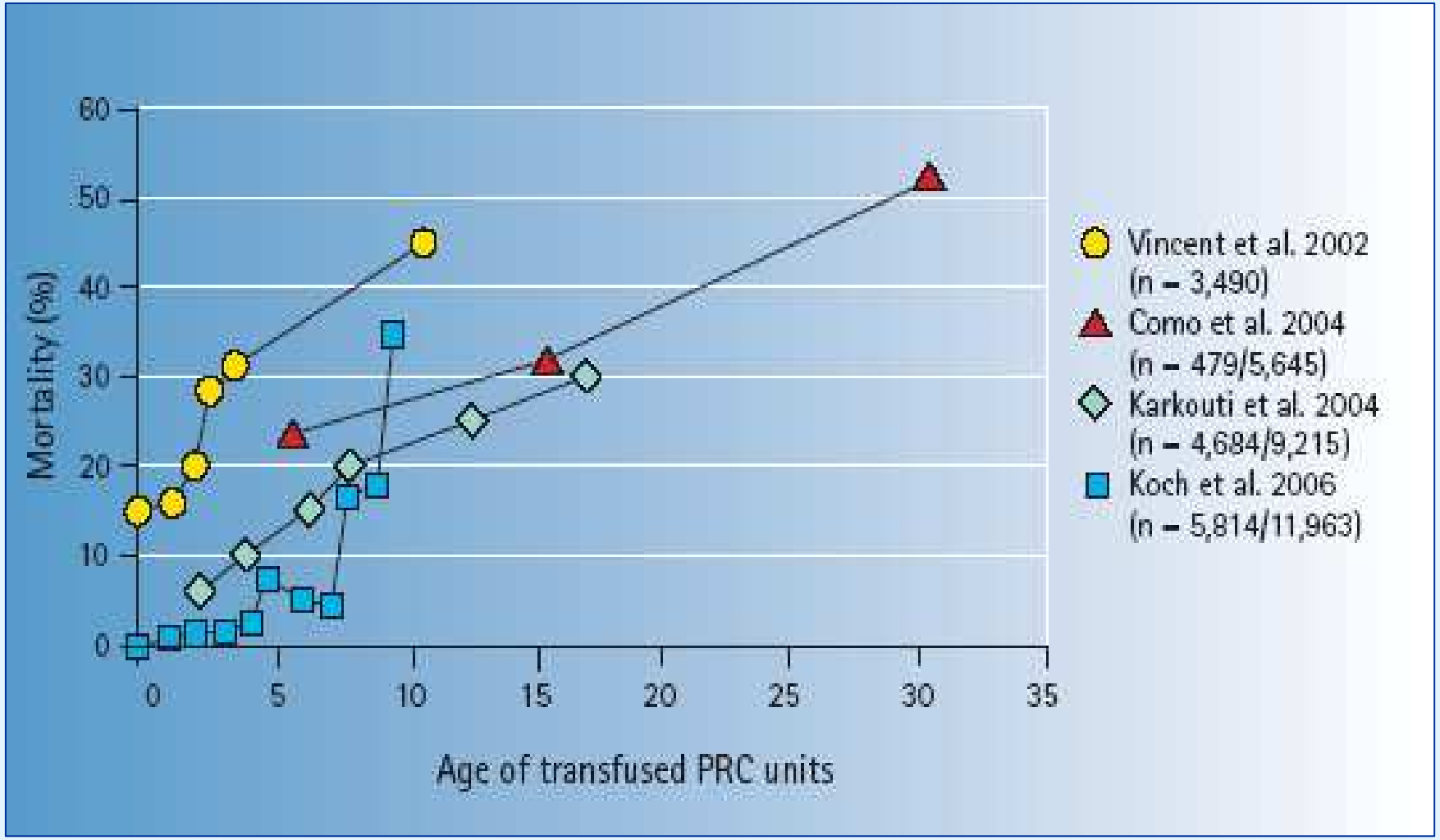
Physioklin

Neg. BE decreases activity of clotting factors IIa, VIIa, Xa (Meng et al., 2003)



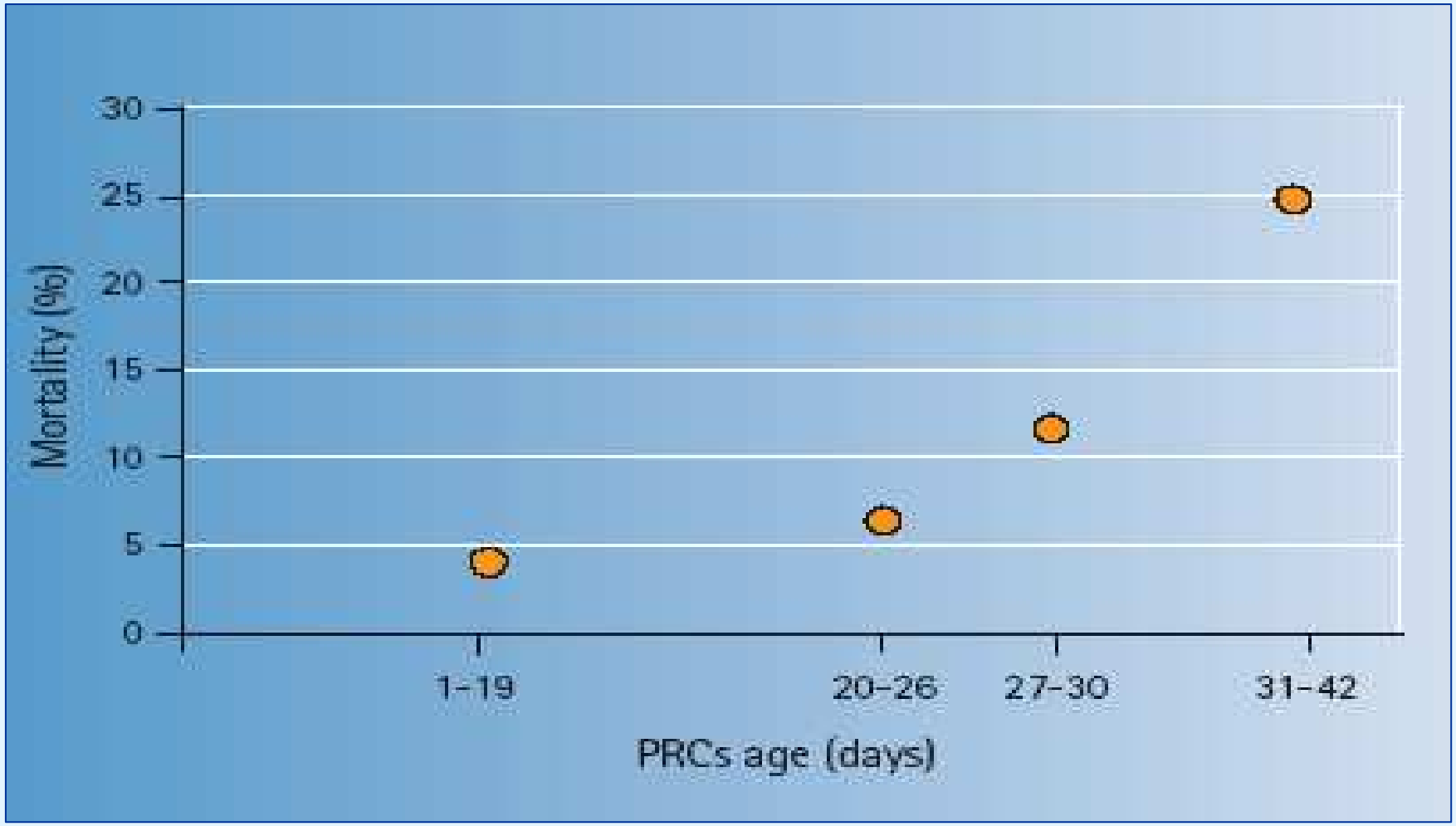
Physioklin

The units of transfused red cell concentrates (PRCs) is related to increasing mortality of ~ 14,500 patients



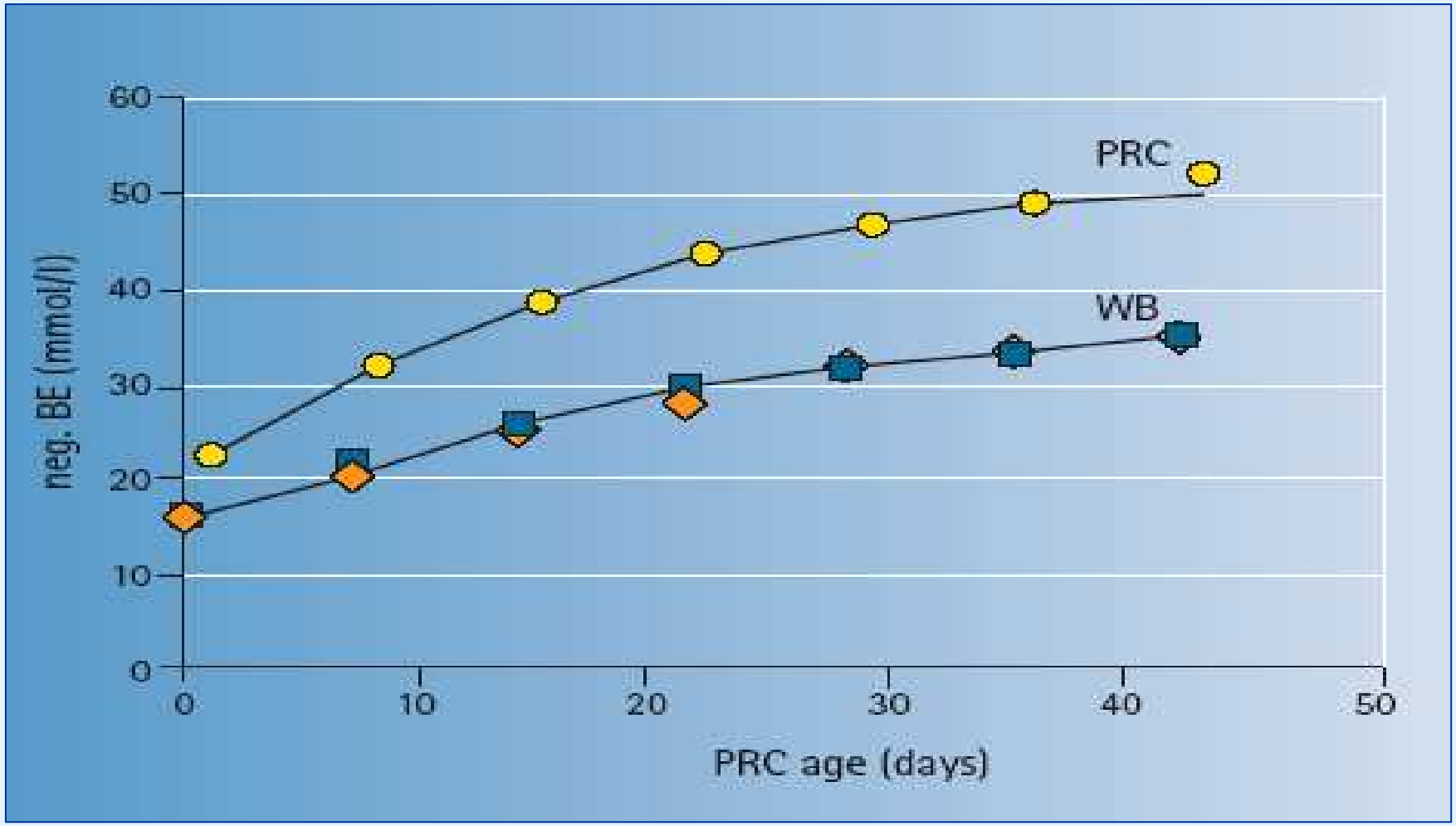
Physioklin

The age of transfused red cell concentrates (PRCs) causes increasing mortality of 321 patients (cardiac surgery)



Physioklin

Storage time of red cell concentrates (PRCs) increases neg. BE of PRCs and whole blood (WB)



Physioklin

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Duration of Red-Cell Storage and Complications after Cardiac Surgery

Colleen Gorman Koch, M.D., Liang Li, Ph.D., Daniel I. Sessler, M.D., Priscilla Figueroa, M.D., Gerald A. Hoeltge, M.D., Tomislav Mihaljevic, M.D., and Eugene H. Blackstone, M.D.

CONCLUSIONS

In patients undergoing cardiac surgery, transfusion of red cells that had been stored for more than 2 weeks was associated with a significantly increased risk of postoperative complications as well as reduced short-term and long-term survival.

EDITORIALS

New Blood, Old Blood, or No Blood?

John W. Adamson, M.D.

N Engl J Med 2008;358:1229-39.

Acidic red cell concentrates (PRCs) (lactate) increase - alkaline FFP (citrate) decrease mortality of patients

Maegele et al.: Vox Sang 2008; 95: 112-119

German Trauma Registry: 2002-2006

(polytrauma, ISS >16, massive transfusion > 10 PRCs)

n	PRCs : FFP	Mortality (%)		
		< 6 h	24 h	30 d
484	> 1,1	25	33	46
114	1:1	10	17	35
115	< 0,9	4	11	24

Summary

In case of major uncontrolled bleeding
only balanced (i.e. physiological) solutions
for intravascular volume replacement
e.g. HES 130/0.4 – colloidal, isotonic, isooncotic

Advantages

normal electrolyte status (Na, K, Ca)

Acetate instead of lactate (binding of ionized Ca^{++})

normal acid base status (BEpot of ~ 0 mmol/l) in vivo

Prevention of any acidosis which causes
coagulopathy and, therefore, further bleeding