

 Kantonsspital Aarau 125 Jahre
Medizinische Universitätsklinik

Sepsis

Pathophysiologie - Diagnose - Therapie



Prof. Dr. med. Beat Müller

Dank an Dr. Marc Michot, medIPS, KSA

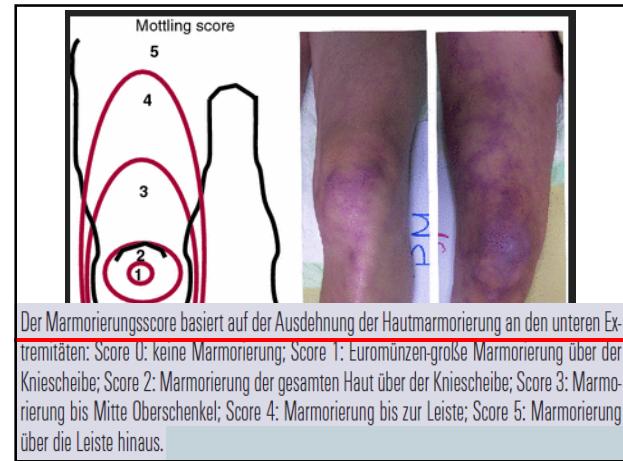
31. Mai 2012

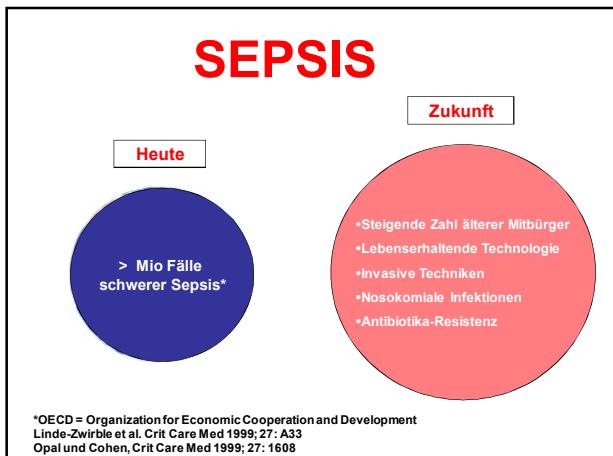
Sepsis - Fallvignette

Kantonsspital Aarau 125 Jahre

- 73j. M, Raucher, täglich Gartenarbeiten
- Seit 2 Tagen rechtsthorakale Schmerzen u. zunehmende Dyspnoe, etwas Fieber
- Akute Dyspnoe am Eintrittstag
- Rettung: bradykarder Rhythmus DD: PEA kurze mechan. REA Intubation vor Ort
- INZ: RR 70/40mmHg

pH	7.30 - 7.42	7.29
HC03	21 - 29 mMol/L	8.2
PaCO2	35 - 45 mmHg	18
BE	-2 bis +2 mMol/L	-16.6
PaO2	90 - 100 mmHg	110
SaO2	95 - 97 %	98
Gluk.(IPS)	3 - 8 mMol/L	14
Kalium	3.6 - 5 mMol/L	3.9
Lactat	0.63-2.44 mMol/L	10

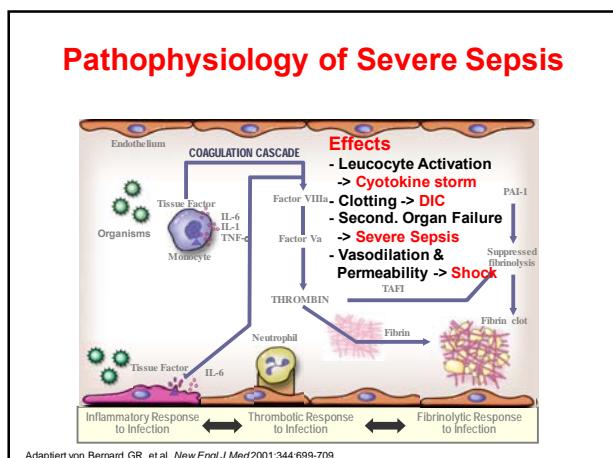


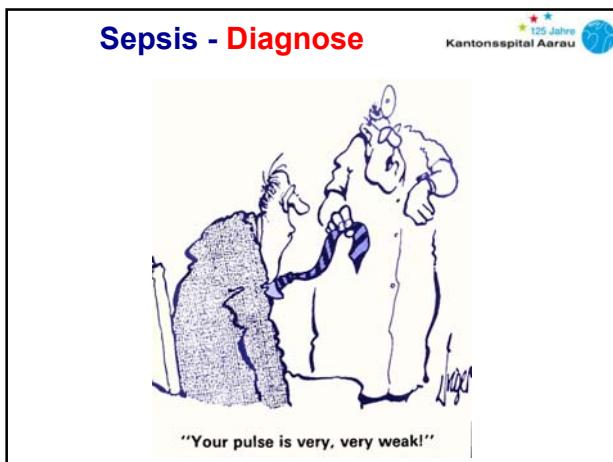
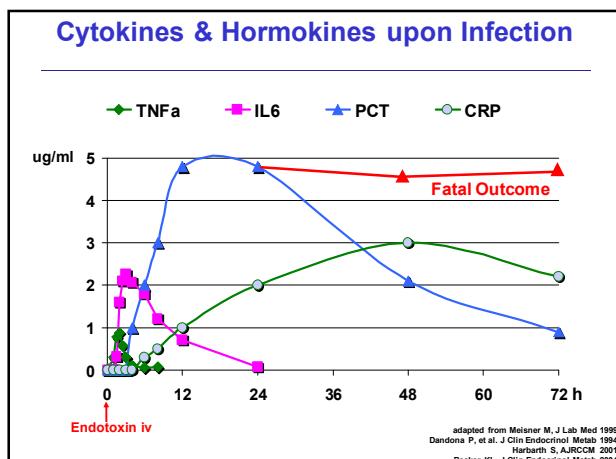
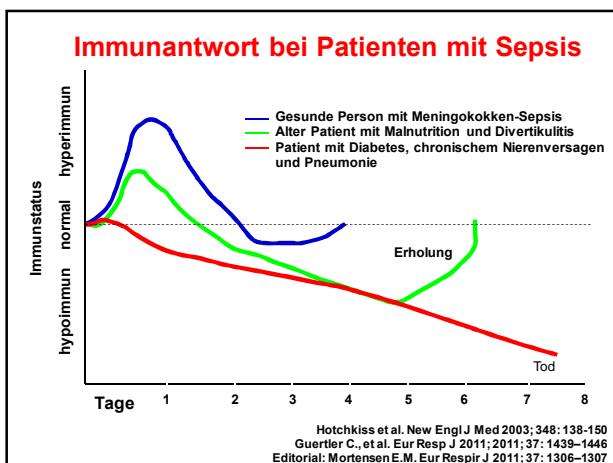
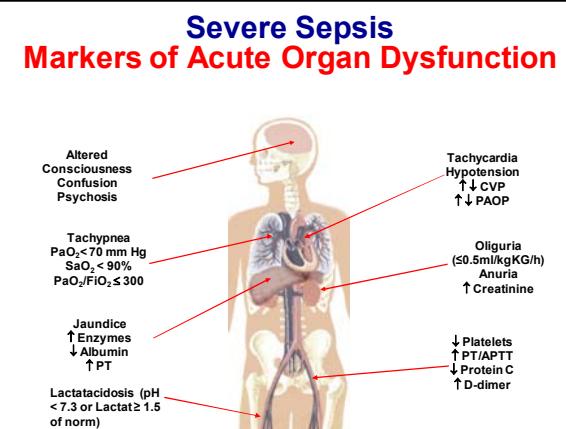
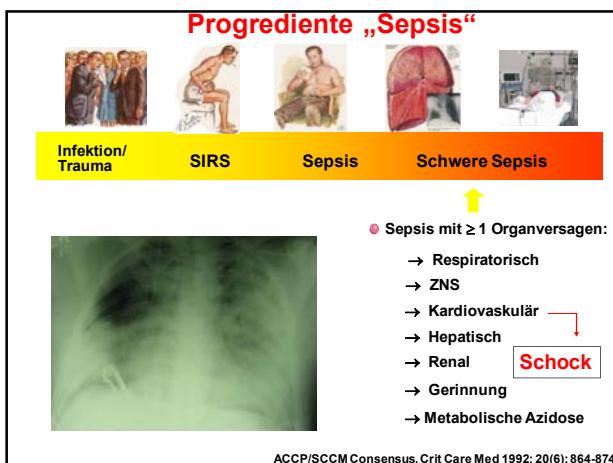


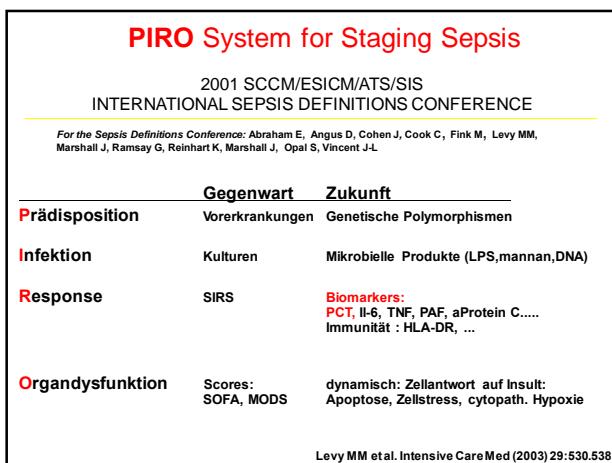
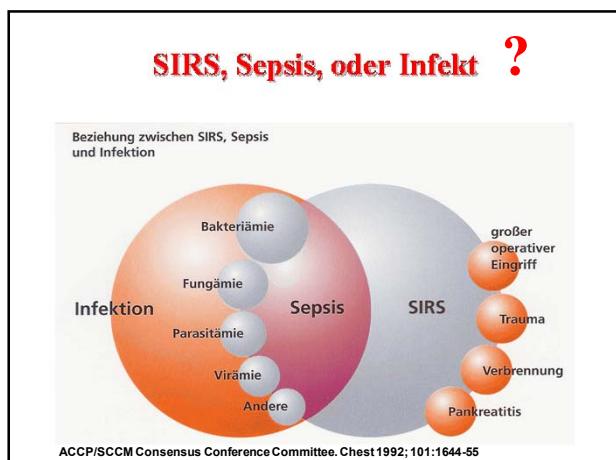
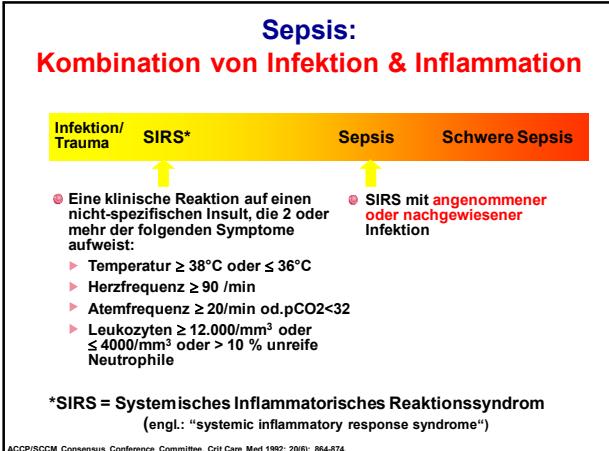
Sepsis-Inzidenz - Vergleich mit anderen Erkrankungen

Brustkrebs	110 / 100.000 Einw.¹
Kolonkarzinom	50 / 100.000 Einw.¹
AIDS	17 / 100.000 Einw.¹
schwere Sepsis	300 / 100.000 Einw.¹
Sepsis	240 / 100.000 Einw.²

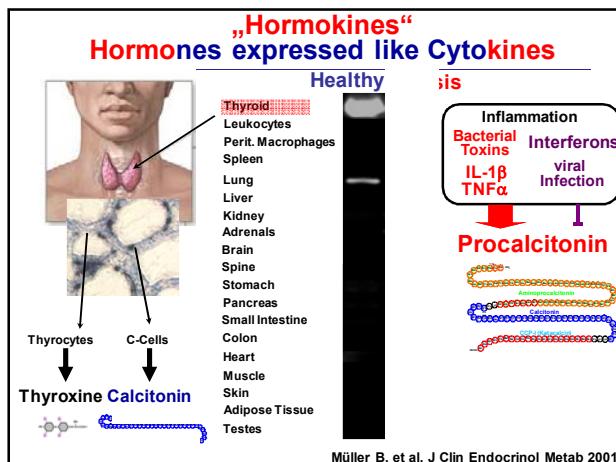
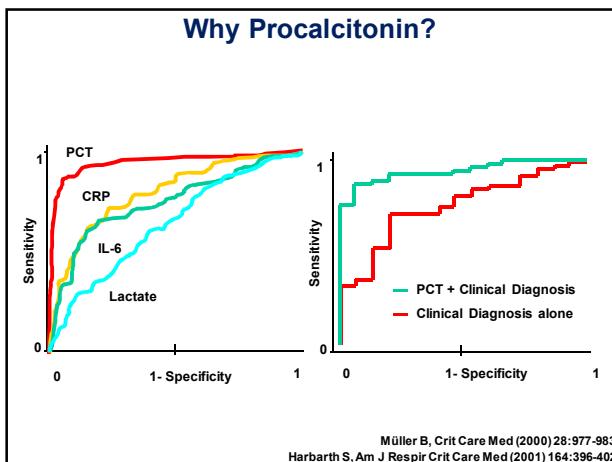
¹ Angus DC et al.; Crit Care Med 2001; 29: 1303-1310
² Martin GS et al.; N Engl J Med 2003; 348: 1546-54

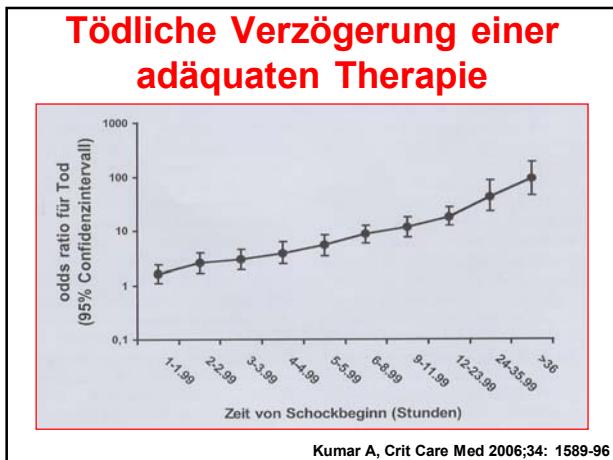
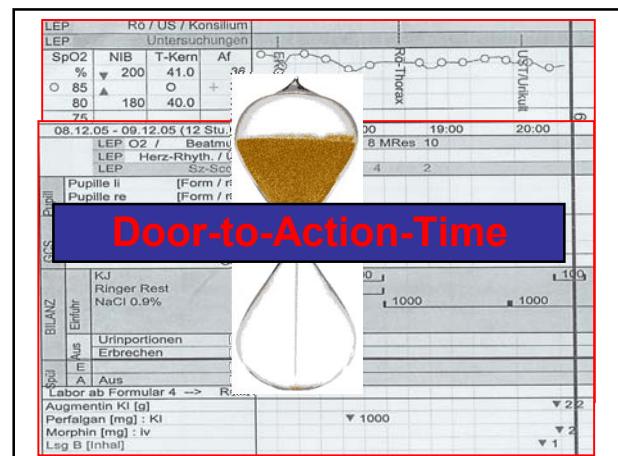
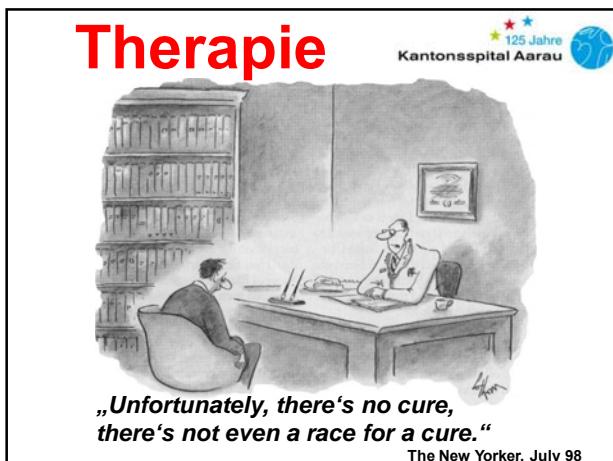






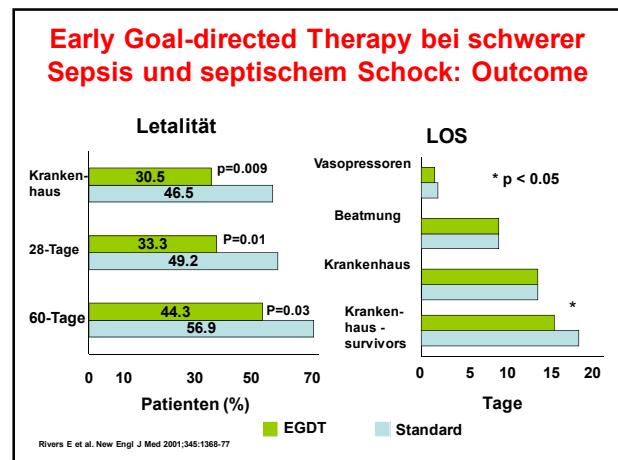
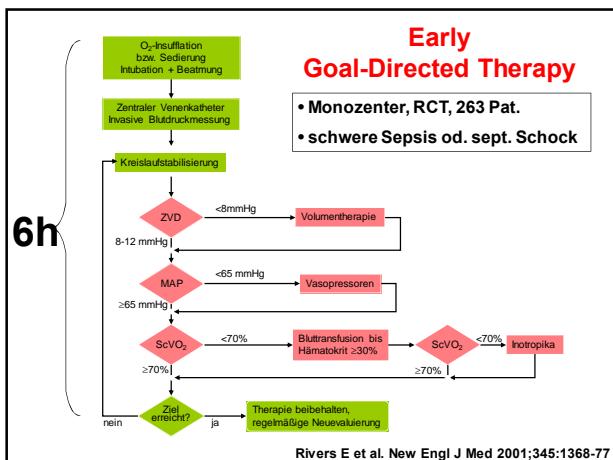
Complement factors	IL-13	LBP
Sedimentation rate	IL-2	LIF
>100 infection and sepsis markers proposed		
IL-6	TGF- β	Fibrinogen
ELAM-1		lactoferrin
IL-10	MCP-1	PAI-1
IL-12	IL-4	IL-1
	NO	VCAM-1
		IFN- γ
	CRP	sCD14
	IL-8	GM-CSF
	E-selectin	sIL-1 receptors
	IL-2 receptors	TNF
		IL-6 receptors
Endothelin-1	Elastase	IL-1ra
ICAM-1		Phospholipase A2
IL-4	Neopterin	PGE2
		PAF
		P-selectin
	MCP-2	α 1-antitrypsin
		Nitrites/nitrates
		TxR2



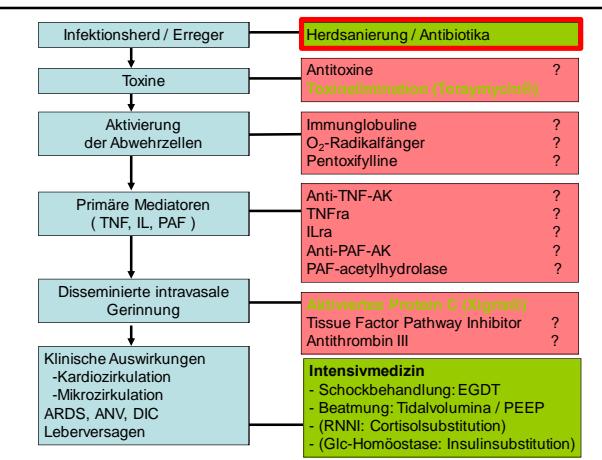
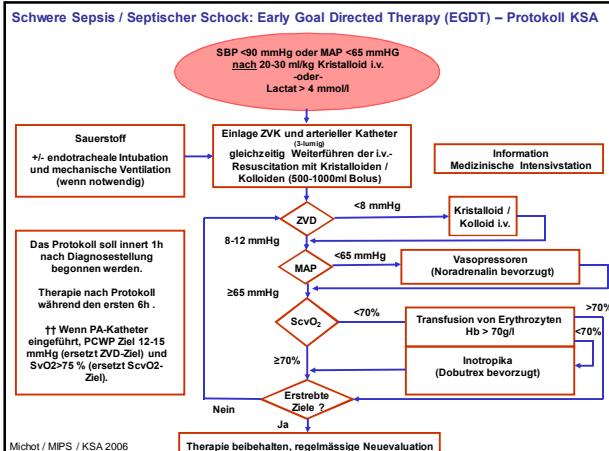
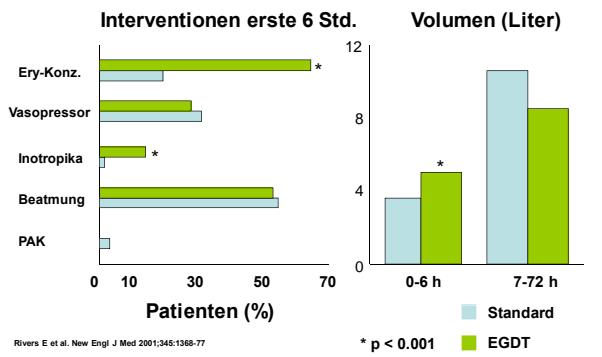


Early goal directed therapy

- Früher und aggressiver Therapie-Beginn ist entscheidend
(Ziel: Ausgleich von O2-Angebot (DO2) und O2- Nachfrage (VO2) innerst 6h)
- Start der Sepsis-Kaskade kann verhindert / verhindert werden
(vgl frühere Studien: sobald Sepsis Kaskade läuft, ist aggressive Hämodynamikkorrektur sogar kontraproduktiv)

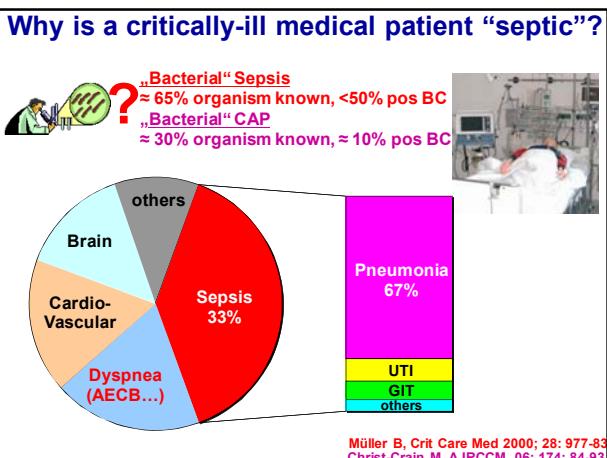


Early Goal-directed Therapy bei schwerer Sepsis und septischem Schock: Interventionen

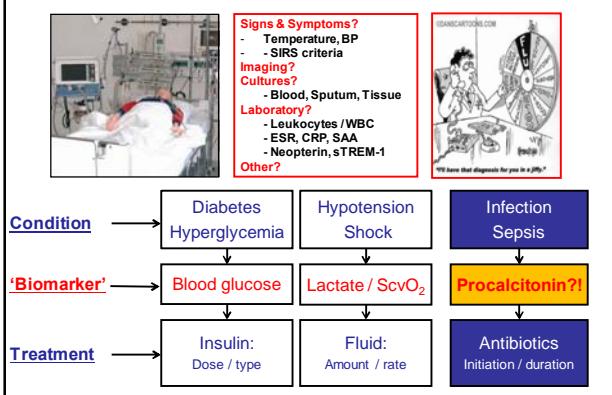


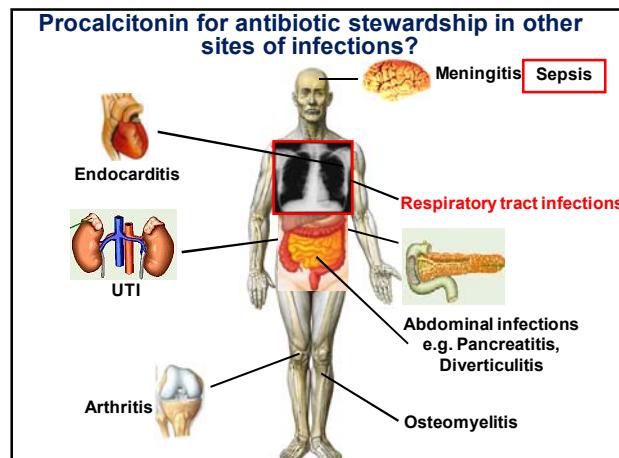
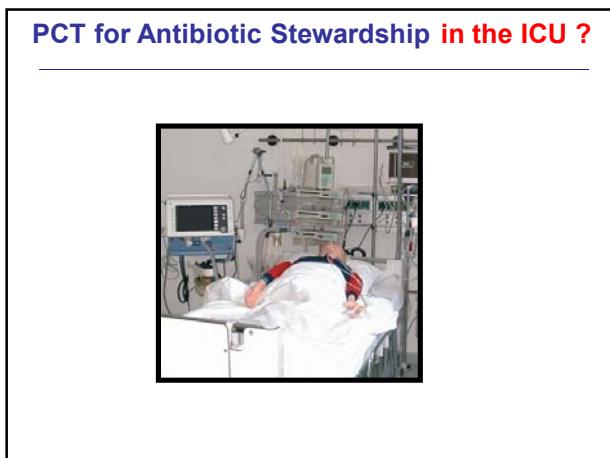
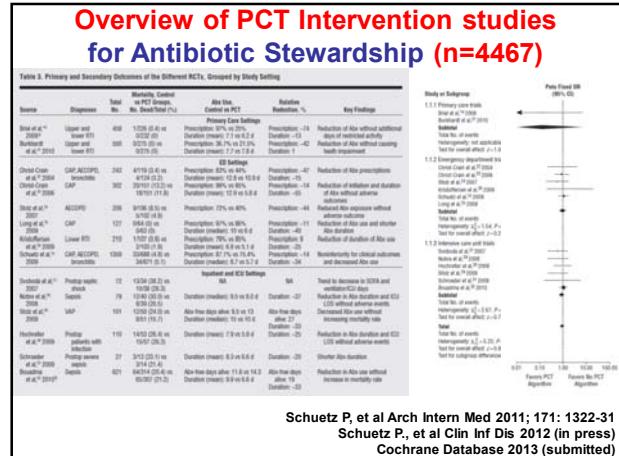
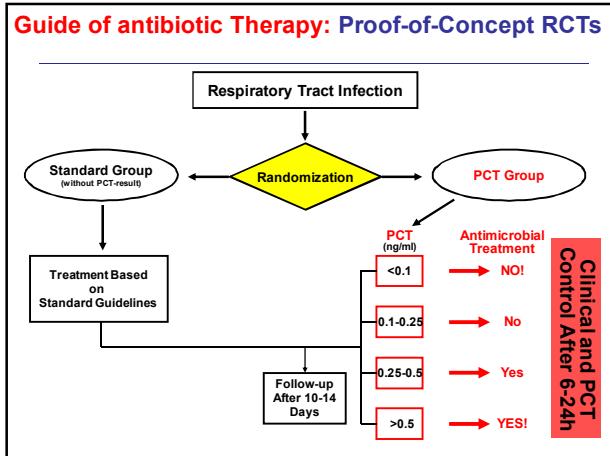
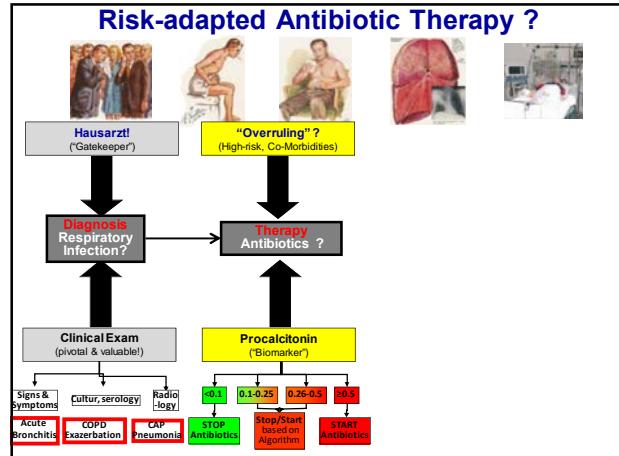
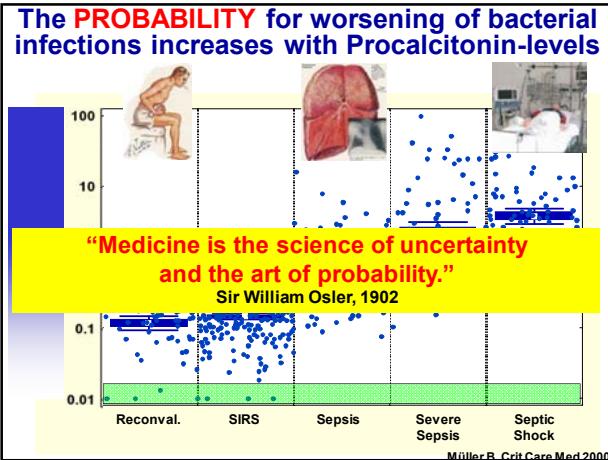
Herdsanierung / Antibiotika

Infektfokus suchen
Kultivieren
Antibiotika
Sanieren



Biomarker guided therapy in the ICU



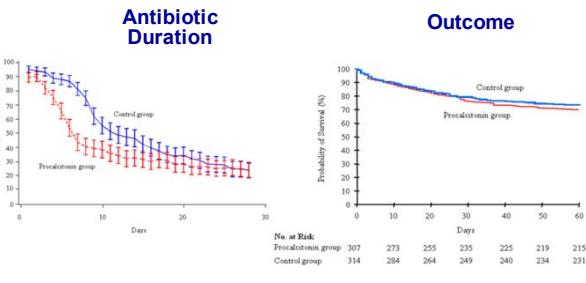


Limitations in the ICU setting

- Low adherence to algorithm (around 50%)**
 - PCT does not replace clinical intuition
- Main focus CAP/ED, mostly European**
 - Future research is needed to validate this concept in the ICU setting
- False positives & negative values occur**
 - pos:** Surgery, cardiac shock, „cytokine storm“...
 - neg:** early, localised, subacute...
 - ICU: Guide duration, rather than prescription
- „Single“ PCT measurement is of limited value**
 - Consider the course of PCT over time

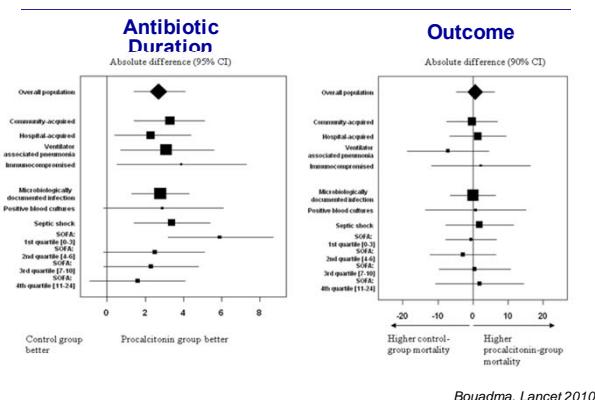
The PRORATA Study: Multicenter, ICU, Sepsis

n = 621



23% more antibiotic free days alive

The PRORATA Study – Subgroups



Guidelines (2011 / 2012)

...Recently, biomarkers have been described as useful tools to safely reduce antibiotic treatment duration. Biomarkers can guide treatment duration by the application of predefined stopping rules for antibiotics. It has been shown that such rules work even in most severe cases, including pneumonia with septic shock, and even if clinicians are allowed to overrule the predefined stopping rule ... “

Woodhead, Clin Microbiol Infect 2011; 17(Suppl. 6): E1-E59

We suggest the use of low procalcitonin to assist the clinician in the discontinuation of empiric antibiotics when no evidence of infection is found (grade 2C)

Update Surviving Sepsis Campaign, Dellinger P, SCCM, Houston 2012

Procalcitonin Guided Antibiotic Therapy



RTI Setting	„Common Cold“ Primary Care	Bronchitis Emergency Room	Pneumonia Hospital	Sepsis ICU
Mortality	<<1%	<1-3%	5-20%	30-70%
AB-Initiation ↓	75%	44%	40%	14%
Duration ↓			12→5d	10→6d
AB exposure ↓	75%	44%	40%	64%

Christ-Crain et al., Lancet 04
Christ-Crain et al., AJRCCM 06 & 08
Stoll et al., AJRCCM 07
Nobre, AJRCCM 07
Briel et al., Arch Int Med 08
Schütz et al., JAMA 08
Stolz et al., ERJ 2010
Bouadma, Lancet 2010

The less antibiotic exposure, the less resistance & side-effects!

If the Swiss would rule the world ... If PCT would rule the world ...

