

HDL

(High density lipoproteins)

A novel
Septicemia biomarker

Sejad Al-Zaidawi

Sepsis

- It is SIRS plus confirmed or highly suspected blood infection.
- Every 3.5 second, a patient die due to sepsis

Sepsis Cases in the Developing World ⁷



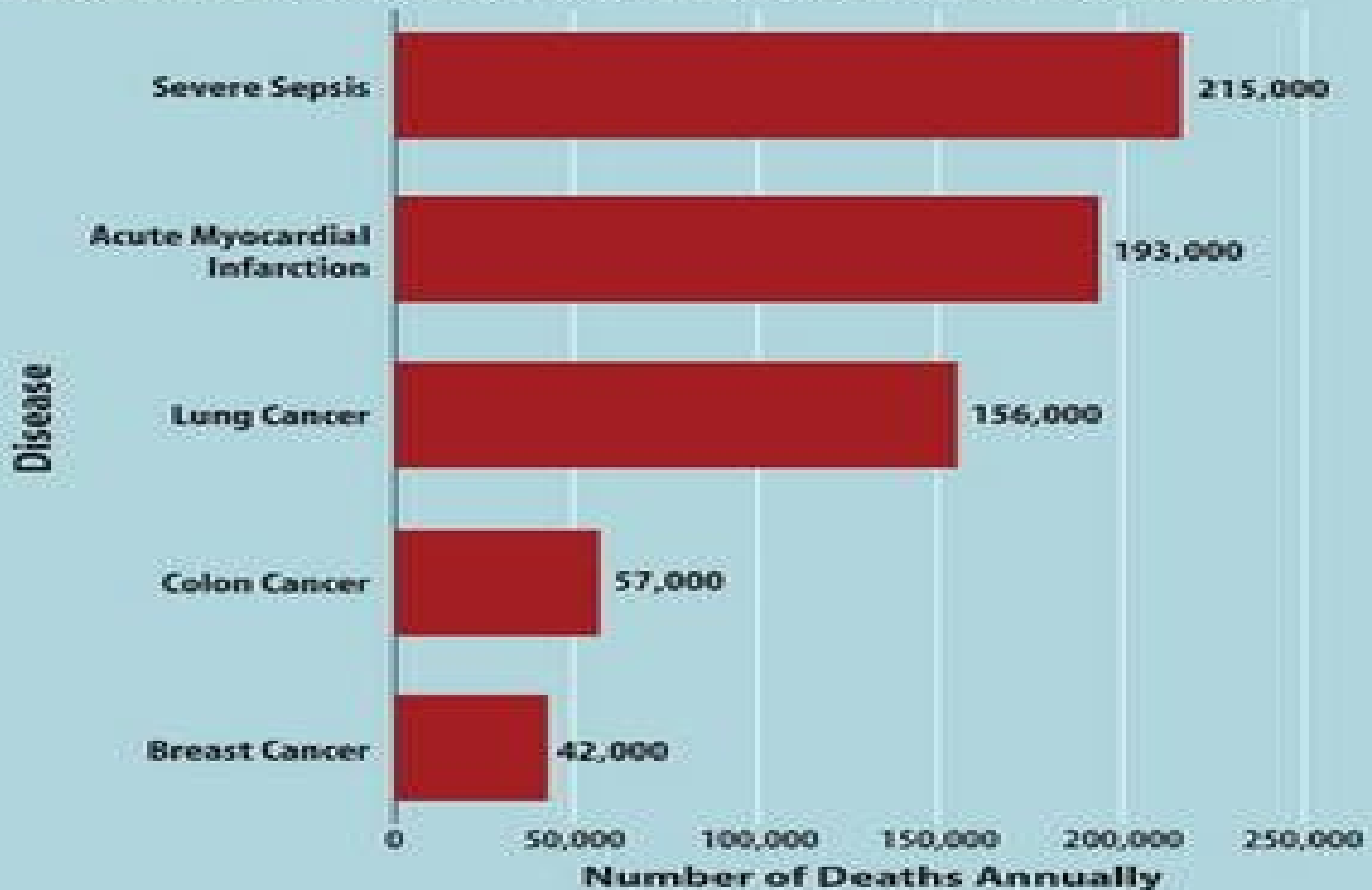
Sepsis kills

>6,000,000

*newborn and small children
every year in the Developing world*

How Deadly is Sepsis?

Despite advances in treatment of infectious diseases and clinical care, severe sepsis remains a major killer. U.S. mortality rates for severe sepsis exceed those for acute myocardial infarction and common cancers.



Old Biomarkers

- First clinical signs of sepsis, not sensitive nor specific
- More typical signs e.g. hypotension and shock are late signs
- Thus demand for better markers of sepsis for clinical applications
- Many biomarkers of sepsis is available
 - CRP, IL-6, IL-8, TNF
 - Procalcitonin

Complement factors
Sedimentation rate
IL-13
IL-2
LBP
LIF

>100 infection and sepsis markers proposed

IL-6
ELAM-1
MCP-1
IL-10
IL-12
IL-2 receptors
Procalcitonin
Endothelin-1
ICAM-1
IL-4
 α 1-antitrypsin
TGF- β
Fibrinogen
lactoferrin
MCP-1
IL-8
E-selectin
TNF
Elastase
PGE2
Neopterin
MCP-2
PAI-1
IL-1
NO
sCD14
sIL-1 receptors
IL-1ra
Phospholipase A2
PAF
Nitrites/nitrates
VCAM-1
IFN- γ
GM-CSF
IL-6 receptors
P-selectin
TyB2

Limitations of PCT as a marker of infection

- **Cut-off range depends on clinical setting**
 - **PCT does not replace the doctor** („pretest-probability“!)
 - Co-Morbidities? Setting? Site & Extent of Infection? Assay?

False positives & negative values occur ($\approx 10\%$)

- pos: SIRS, ARDS, „cytokine storm“, malaria, newborns...
- neg: early, localised, subacute, immunocompromised, fungal...

„Single“ PCT measurement is of limited value

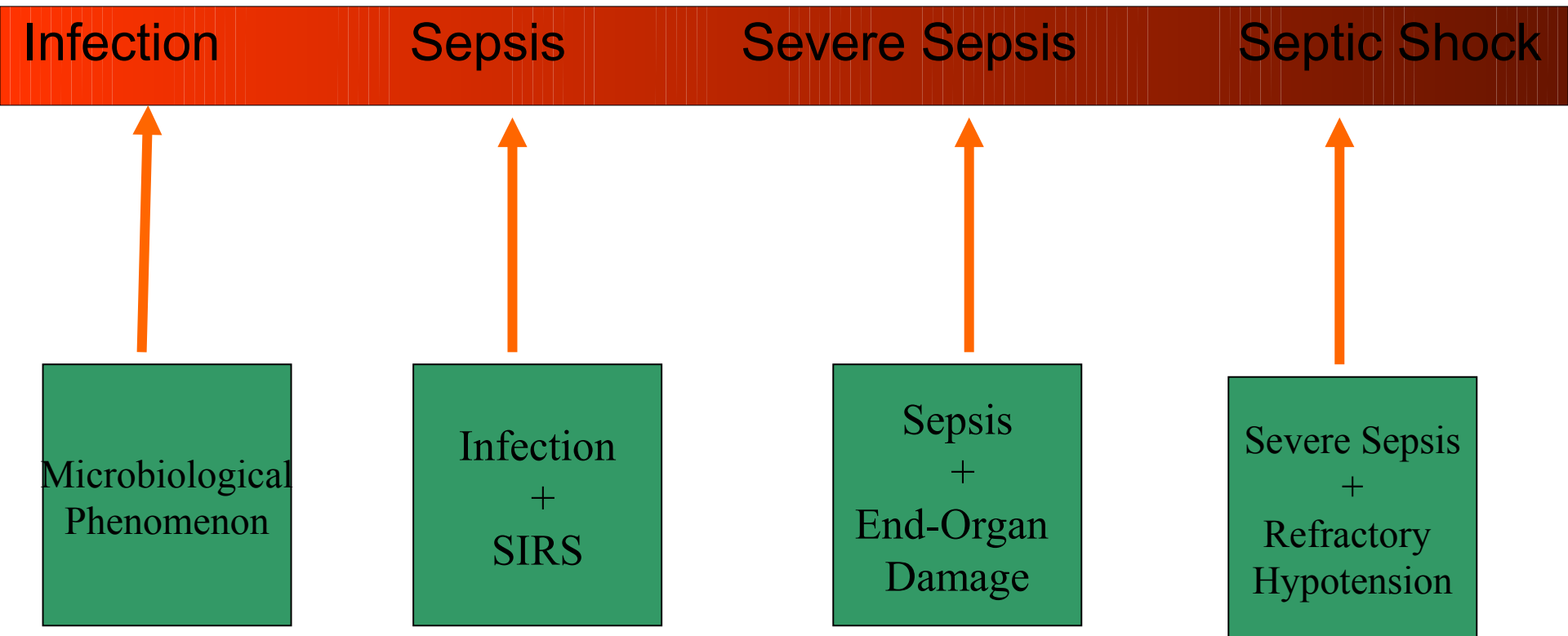
- Course & prognosis of disease?
- Withhold antibiotic therapy?

It cannot identify the pathogen

Cave misuse without therapeutic impact

- only then possibly cost-effective

Progressive Disease



High density lipoproteins(HDL)

- Superior to clinical signs of sepsis
- Uses include -
 - Dx of bacterial infection
 - Progression of infection/SIRS into sepsis, severe sepsis, or septic shock
 - Assess response to treatment
 - May be used to guide AB therapy

High density lipoproteins(HDL)

- play a major role in the binding and clearance of circulating endotoxin to the bile and thereby inhibits endotoxin-induced cellular activation, resulting in potent anti-infectious activity
- The majority of the LPS and LTA are bound to HDL. This binding to HDL inhibits the ability of LPS and LTA to interact with toll-like receptors (TLR) and activate macrophage.

Aims of the study

- 1- to evaluate the relationship between sepsis and lipid profile
- 2- to create new biomarker for sepsis; more easy, practical and sensitive.
- 3- to decrease the abuse of antibiotics

Methods & materials

- 75 patients were enrolled in this study
- At Al-Sadr teaching hospital, Maysan, Iraq
- From April through September 2013.
- Blood samples are collected for:
- Biochemical tests: 2 days
- CBC test: every 2 days
- Blood culture : every 3 days

Exclusion criteria

- **1-** patients died or referred into other center during first 48 hours
- **2-** patients with history of atherosclerosis and or lipid profile problem.

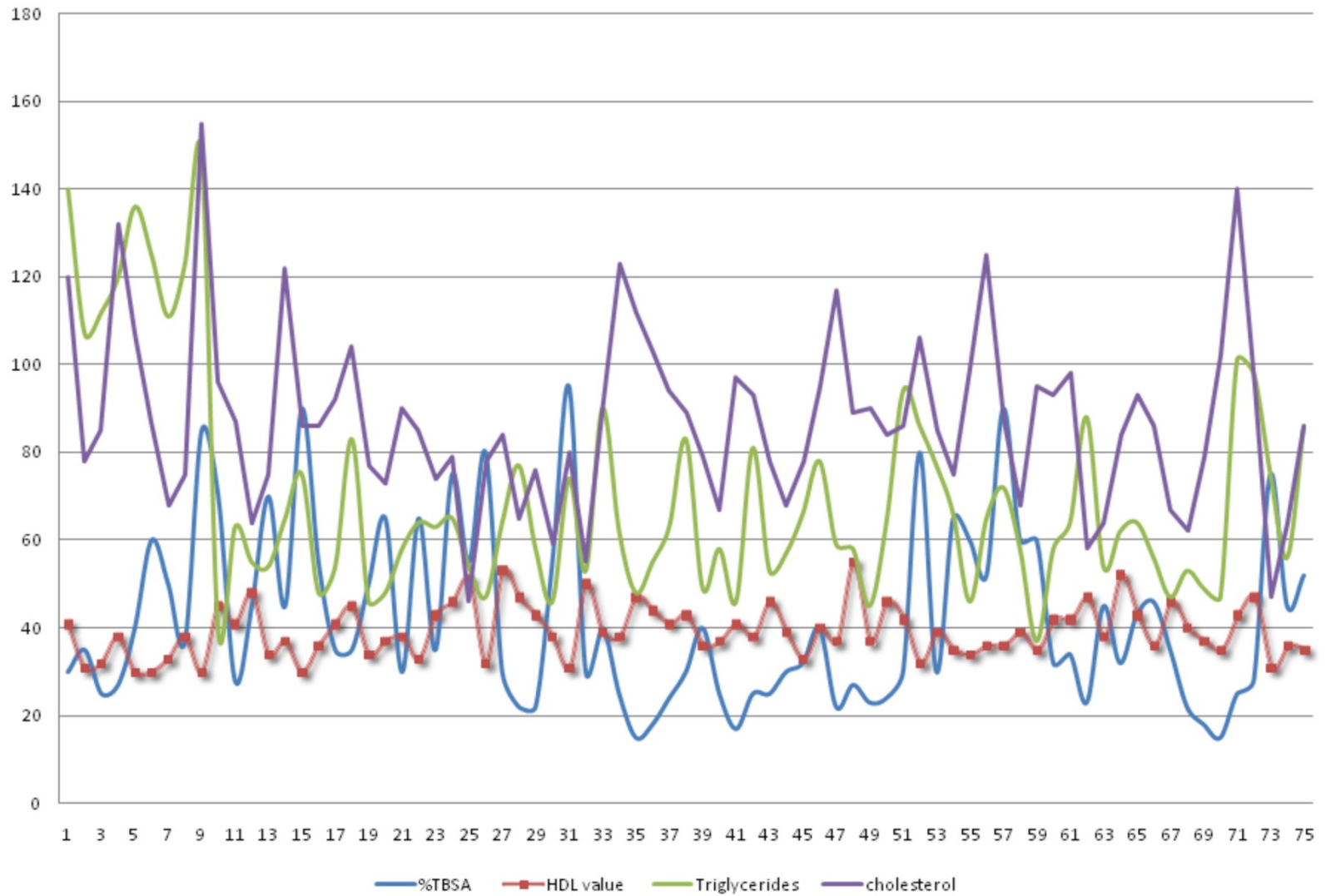
Results

	Average			Range
Age (years)	17			1- 85
%TBSA	33.5%			15%- 95%
Sex	Female (61%)			Male (39%)
Burn types	Scalds : 45%	Flame : 49%		Electricity: 6%

lipid profile for all 75 patients at the onset of burns injury with normal range

Lipid profile	Range (mg/dl)	Average(mg/dl)	Mode(mg/dl)	Normal range (mg/dl)
High density lipoproteins (HDL)	30- 56	39	38	39-59
triglycerides	37- 148	70	58	0-149
Cholesterol	46- 155	78	86	0- 199

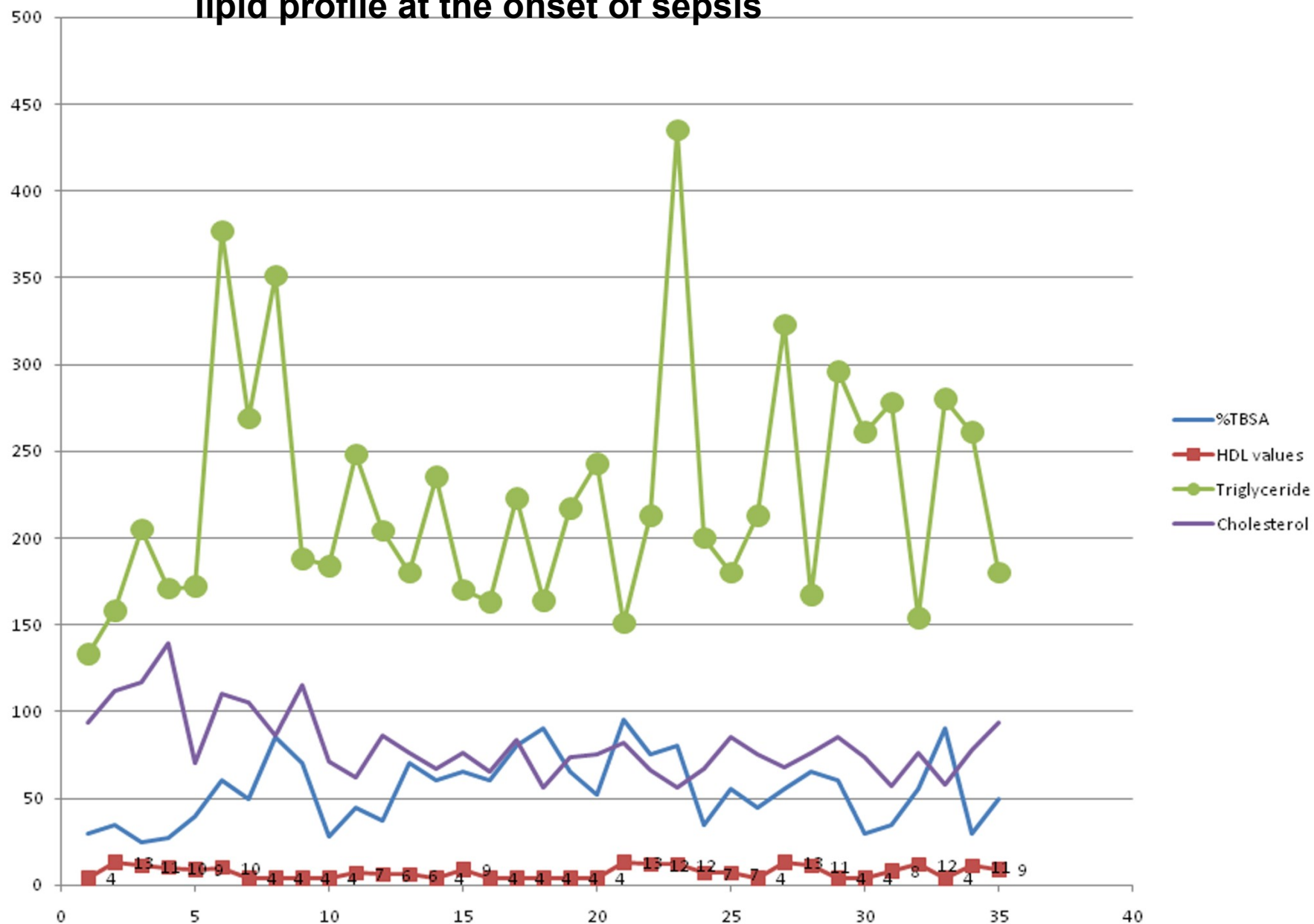
lipid profile at the onset of trauma (burns)



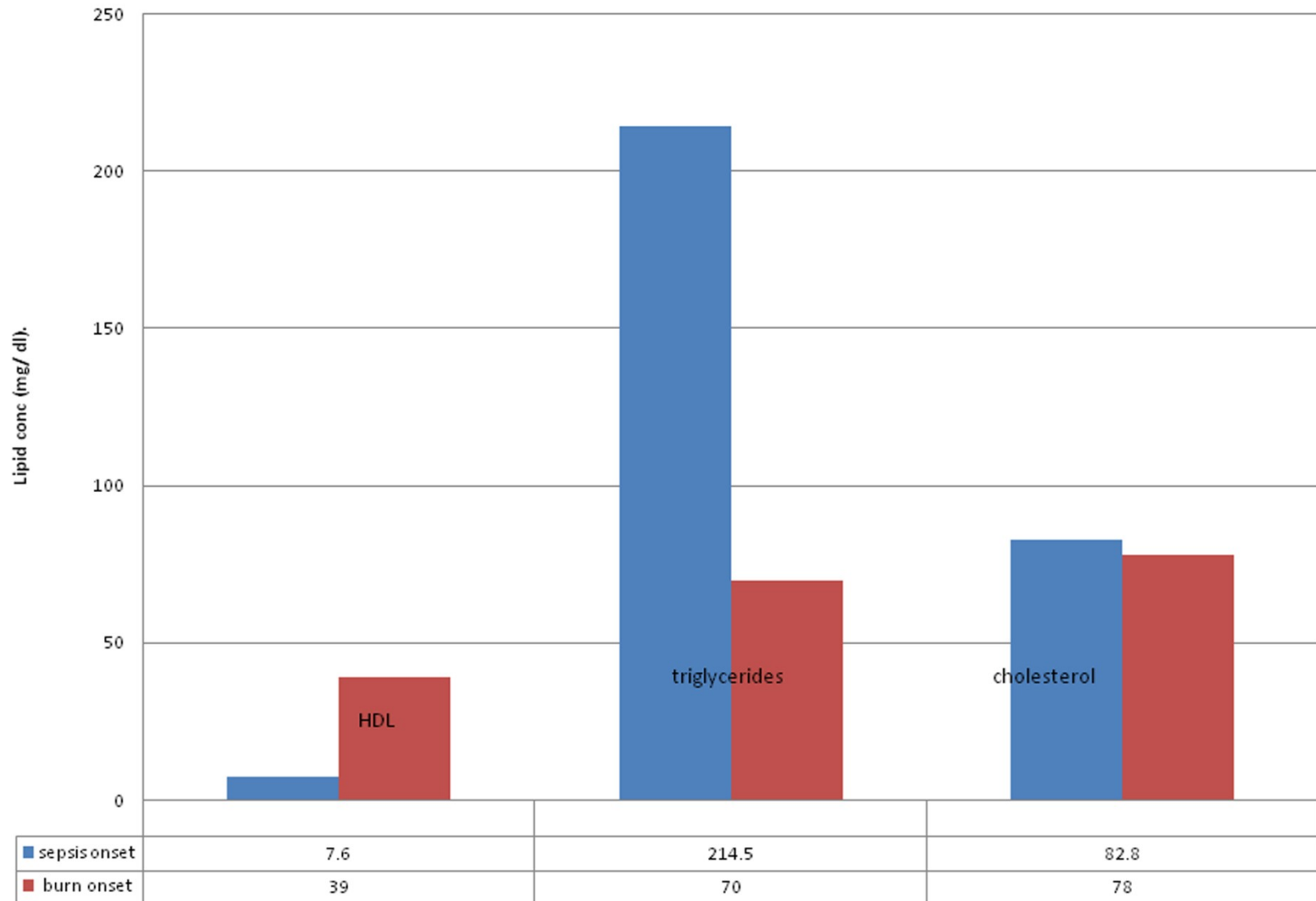
lipid profile at the onset of sepsis.

Lipid profile	Range (mg/dl)	Average(mg/dl)	Mode(mg/dl)	Normal range (mg/dl)
High density lipoproteins (HDL)	4- 13	7.6	4	39- 59
triglycerides	133- 435	214.5	180	1. 149
Cholesterol	56- 139	82.8	76	1. 199

lipid profile at the onset of sepsis



lipid profile at burns onset and sepsis onset



30-40 mg/dl

- HDL value (30 – 40 mg/dl)
- On clinical evidence of infection
- No need for antibiotics use.

15-29 mg/dl

- HDL value (29 - 15 mg/dl)
- Clinical evidence of infection.
- Blood culture negative.

< 15 mg/dl

- HDL value (< 15mg /dl)
- Blood culture positive.
- No clinical evidence of SIRS

< 5 mg/dl

- HDL value < 5 mg/dl
Septic shock

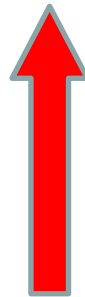
HDL less than 15 mg/dl (1-7 days)

HDL < 5 mg/dl

HDL 0 .0 mg/dl



NO SEPSIS



SEPSIS

conclusions

- There is a close relationship between sepsis and HDL level.
- HDL can be considered as a natural antibiotic.
- Lipid profiles are very sensitive to the bacterial infection specially sepsis
- HDL level can be used to predict the exact time of initiation or stopping antibiotics

Recommendations

- HDL should be used as a biomarker for sepsis

Thank you