

# Sepsis: The Clinical Picture

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# Learning Outcomes

- Review pathophysiology of Sepsis/SIRS
- List clinical signs and symptoms of Sepsis
- Explain the progression of Sepsis, Severe Sepsis, and Septic Shock
- Discuss treatments for Sepsis

# Normal Inflammatory Response

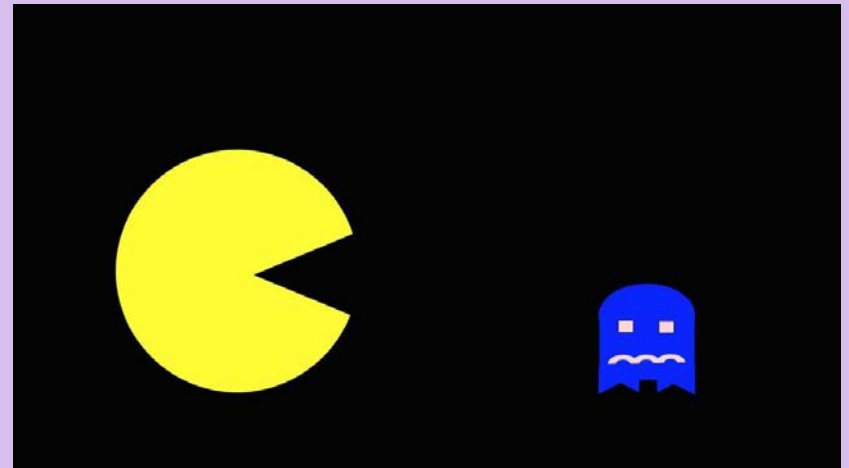
- Usually occurs locally at site of insult
  - Injury
  - Infection
  - Foreign body
  - Chemical or toxin
  - Allergic reaction
  - Extremes of hot or cold
- Vascular Phase
- Cellular Phase

# Vascular Phase

- Vasodilation increases capillary blood flow
- Vascular permeability allows fluid to fill into extravascular space
- Fluid collects in space
- Blood clots and decreases flow, which keeps injury/ infection localized
  - Platelets activated to promote clotting

# Cellular Phase

- Leukocytes – mainly neutrophils – migrate to area and attack/destroy invading microbes and damages tissue cells



# Localized Signs of Inflammation

- Rubor (Redness)
- Tumor (Swelling)
- Calor (Heat)
- Dolor (Pain)
- Functio laesa (loss of function)



# Systemic Response

- Localized injury can create systemic acute-phase response
- Cytokines released into circulation:
  - Increase in neutrophils released from bone marrow
  - Catabolism of muscle
  - Generalized vasodilation
  - Increased vascular permeability
  - Intravascular fluid loss

# Symptoms of Systemic Inflammation

- Fever
- Increased heart rate
- Hypotension
- Anorexia
- Malaise
- Fatigue
- Headache



# Stages of Severity

- Degree of severity is based on signs and symptoms and effects on organ systems
- Recent new guidelines from Surviving Sepsis Campaign
  - CMS based on 2012 guidelines

# 2012 Guidelines

Septicemia or  
exposure/  
injury

## SIRS

Temp >100.8 F or  
<96.8 F

HR >90

RR >20

WBC >12,000 or  
<4,000 or  
>10% bands

## SEPSIS

2 SIRS criteria

and

infection  
(confirmed or  
suspected)

## Severe Sepsis

Sepsis

**And**

Lactate > 2 mmol

**And**

End Organ Damage

## Septic Shock

Sepsis

**And**

Lactate > 2 mmol

**And**

End Organ Damage

**With**

Hypotension  
requiring  
vasopressors

# 2018 Sepsis-3 Guidelines

Septicemia or  
exposure/  
injury

## SEPSIS

infection (confirmed  
or suspected)

AND

**Temp** >100.8 F or  
<96.8 F

**HR** >90

**RR** >20

**WBC** >12,000 or  
<4,000 or  
>10% bands

## SEPTIC SHOCK

Sepsis

And

Lactate > 2 mmol

And

Hypotension requiring  
vasopressors

I remember when they  
invented Severe Sepsis...



# Organ Dysfunction

## Organ System

- Central Nervous System
  - Encephalopathy
  - Delirium
- Respiratory
  - Acute Respiratory Failure

## Laboratory Studies/ Clinical Data

- Glasgow Coma Score  $\leq 12$
- CAM-ICU
- RR  $> 20$
- PaO<sub>2</sub>  $< 90$  despite O<sub>2</sub>
- Requiring mechanical support
- pH  $< 7.35$

# Organ Dysfunction

## Organ System

- Cardiovascular
  - Hypotension, shock
  - Tachycardia
  - Dysrhythmia
  
- Renal
  - Acute Renal Injury
  - Acute Tubular Necrosis
  - Oliguria/ Anuria

## Laboratory Studies/ Clinical Data

- MAP  $\leq$  65 or SBP  $<$  90
- Requiring fluid resuscitation
- Requiring vasopressors
- Telemetry or ECG
  
- Creatinine  $>$  2.0 mg/dl
- Urine output  $<$  30 ml/hr
- Proteinuria
- Requiring Dialysis or CRRT

# Organ Dysfunction

## Organ Dysfunction

- Hematological
  - Disseminated Intravascular Coagulopathy (DIC)
  - Thrombocytopenia
  - Neutropenia
  - Anemia
- Generalized Inflammation/  
Sepsis Markers

## Laboratory Studies/ Clinical Data

- CBC
- WBC
- Neutrophils, bands
- Platelets
- RBC
  
- C-Reactive Protein
- Procalcitonin
- Cultures (blood, urine, sputum, etc)

# Treatments

- Sepsis Bundles
  - Antibiotics – broad spectrum vs targeted to pathogen
  - IV Fluids – boluses and continuous infusion
  - Frequent monitoring and assessment
  - System support
  - Patient Comfort (anti-pyretics, etc)



When I hear “Urosepsis”

