Sex and Gender Differences

Sepsis

Clinical Presentation

» Cardiac
  » Females have better cardiac function in the face of sepsis
  » Estradiol improves cardiovascular function
  » Estradiol improves rapid restitution of blood volume

» Renal
  » 60-70% of those with septic shock develop Acute Kidney Injury
  » Women are less likely than men to receive dialysis

Pregnancy

» Sepsis is one of the 4 main causes of mortality during pregnancy

» Increased sepsis risk with
  » premature delivery
  » postpartum hemorrhage
  » emergency cesarean section

Sex Steroids

Sex Hormones Modulate the Immune Response: Is Female Sex Protective?

» Estrogens can be both immunosuppressive and immunostimulating in sepsis
  » High estrogen levels can increase the anti-inflammatory effect
  » Low estrogen levels can increase the pro-inflammatory effect

» Progestins are anti-inflammatory and beneficial to autoimmunity

» Prolactin has pro-inflammatory properties

» Postmenopausal women lose the estrogen advantage

» Androgens are generally immunosuppressive and beneficial to autoimmunity

Treatment

» Early Goal Directed Therapy (EGDT) reduces 29-day mortality rate in both sexes

» Women are less likely to receive EGDT

» Women are less likely to receive ventilation therapy in ICU

» Women are more likely to receive excessive tidal volumes if ventilated

» Women experience longer delay in initiating antibiotic therapy

Mortality

» In animal studies, male sex is consistently associated with adverse outcomes

» Conflicting data in humans: Does gender matter?
  » There may be disparities in care, database sources, or comorbidities
  » There are gender-based treatment disparities.