Syphilis in Pregnancy and Congenital Syphilis

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Kern Congenital Syphilis Elimination Summit
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California Department of PublicHealth

Disclosure:

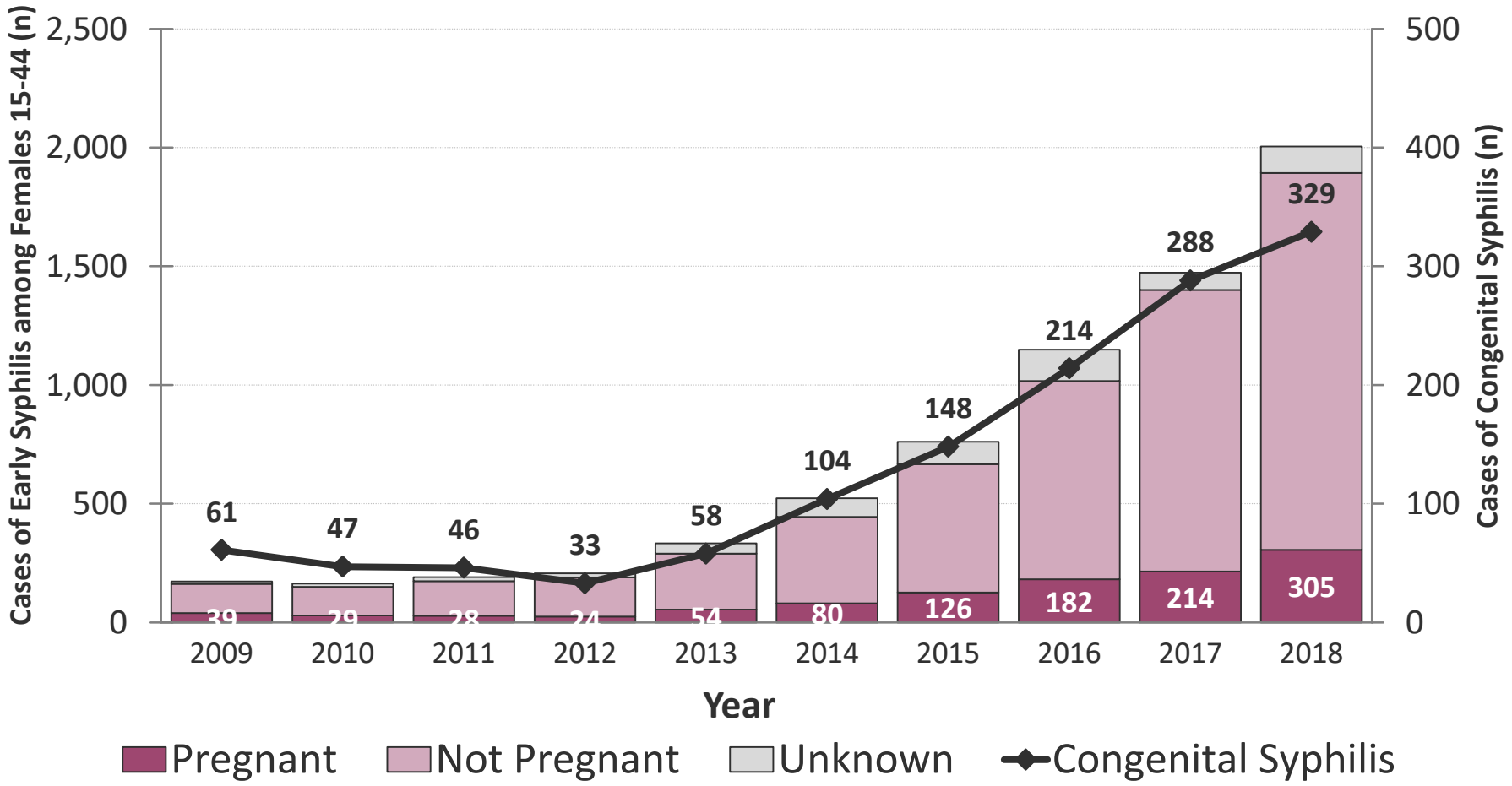
- Rosalyn Plotzker, MD, MPH has no relevant financial relationships with an entity producing, marketing, re-selling, or distributing health care goods or services consumed by, or used on patients.

Learning Objectives

- Discuss Pathophysiology of Syphilis in Pregnancy and CS
- Prevention of Congenital Syphilis
- Management of Infants Born to Mothers with Syphilis

One Slide on Epidemiology

Congenital Syphilis Cases vs Females of Childbearing Age (15-44) Early Syphilis* Cases by Pregnancy Status California, 2009–2018

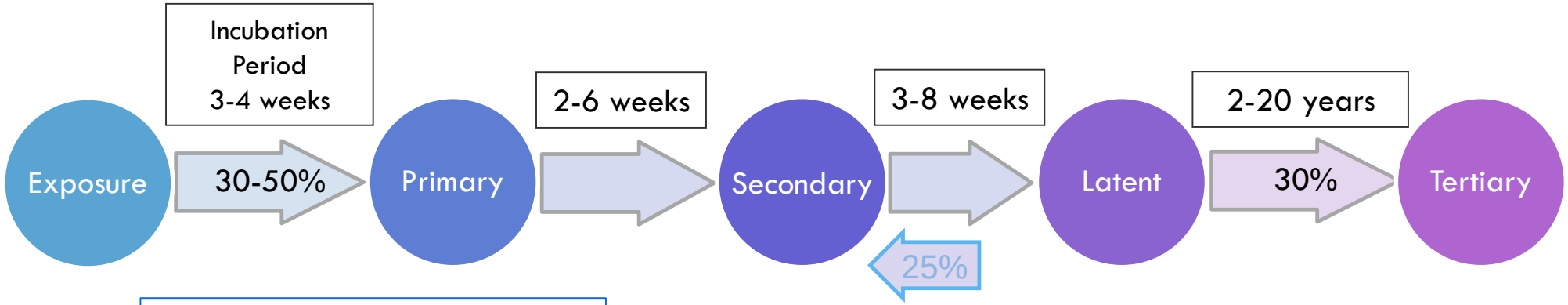


Pathophysiology

Syphilis staging: My most complicated slide.

For pts with a reactive non-treponemal test (RPR/VDRL) ≥ fourfold the previous titer
***PLUS** a positive confirmatory treponemal test (FTA-ABS, TPPA, EIA)*

} To be discussed in more detail soon…



Chancre (ulcer)
- Single, painless, indurated, clean-based lesion with rolled edges.
- Can go unrecognized, especially anal and vaginal
- Possible regional adenopathy (rubbery, bilateral, painless)four

Secondary signs
- Rash (75-90%),
  - Involving palms/soles (60%)
- Generalized lymphadenopathy (70-90%)
- Constitutional symptoms (50-80%)
- Mucous patches (5-30%)
- Condyloma lata (5-25%)
- Patchy alopecia (10-15%)
- Symptoms of neurosyphilis (1-2%)

Early latent
Latent w/evidence of infection within the past 12 months

Otherwise: Considered **Late-Latent or Unknown Duration**

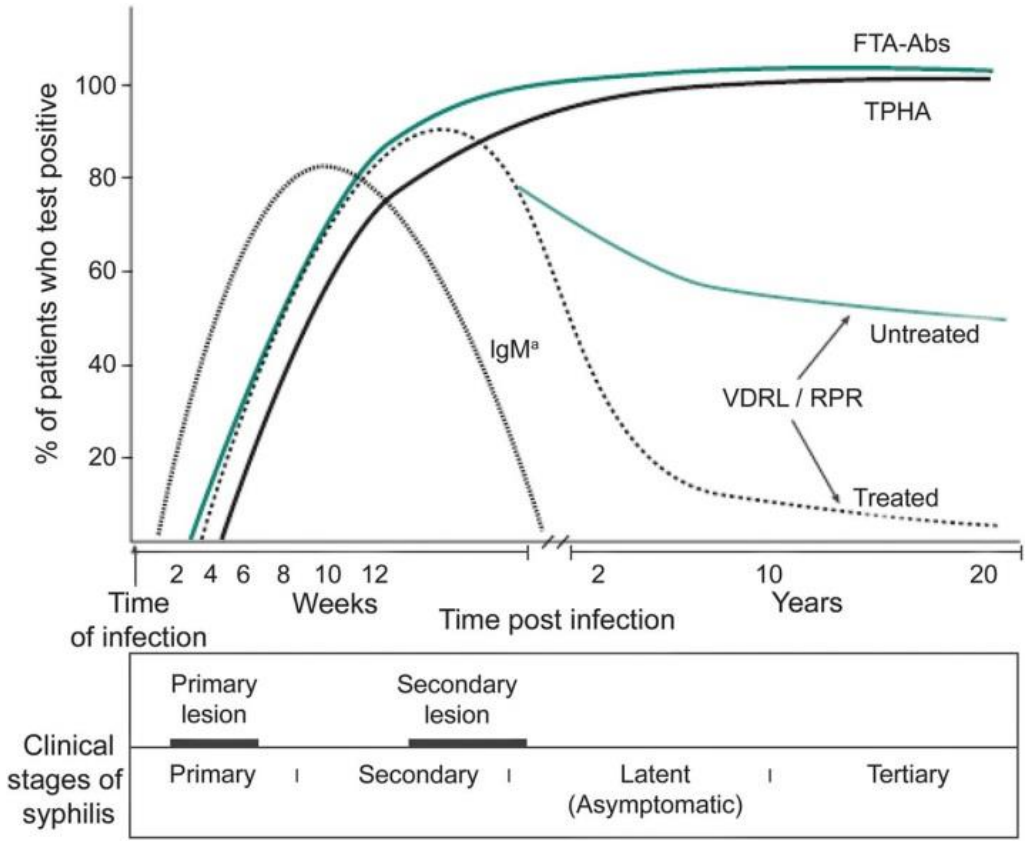
Neurosyphilis can occur at any stage

Transmission from mother to fetus can occur at any stage

More than two-thirds of pregnant women with syphilis were diagnosed with late syphilis or unknown duration

Source: 2016-2017 California surveillance data

Serology and stage



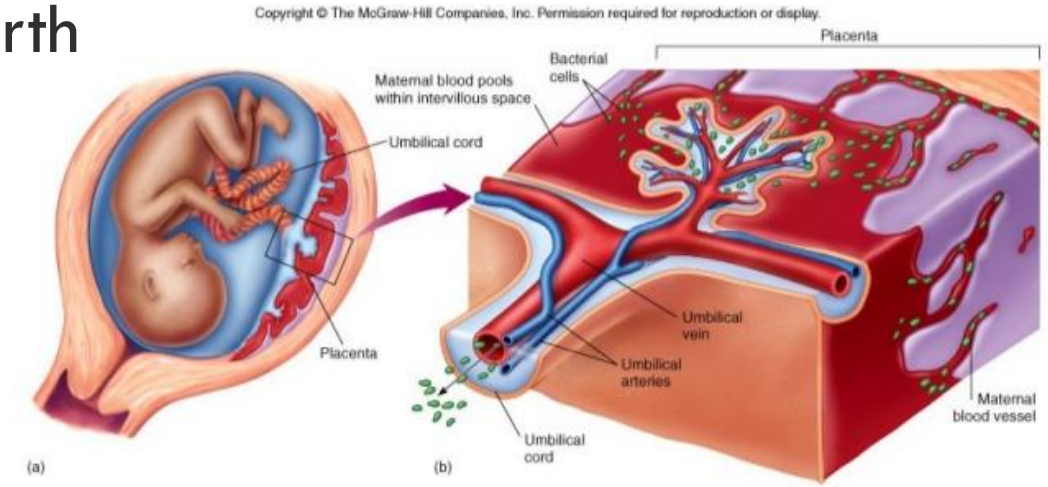
Non-treponemal titers (RPR/VDRL)

- Can be non-reactive for ~25% of patients with primary syphilis
- Typically peak in secondary stage
- Decline in latent disease, even if the disease is untreated.
- Are non-specific and measure disease *burden*

-Peeling, Rosanna W., and Htun Ye. "Diagnostic tools for preventing and managing maternal and congenital syphilis: an overview." *Bulletin of the World Health Organization* 82.6 (2004): 439-446.
-Santrock, John. *Children, 12th edition* McGraw Hill 2013

Mother To Child Transmission

- **Transplacental transmission**
  - rarely via contact of infectious lesions at birth
- Associated with…
  - Earlier maternal **stage** of disease
  - High maternal disease **titers** (VDRL, RPR)



How does the bacteria *T. pallidum* affect the fetus?

It's complicated….

- *T. Pallidum* **can vegetate in fetal tissues until appropriate biological conditions promote virulence** and pathogenicity
  - Includes late gestation infections, and post-partum CS cases
  - Contributing to factor to why some neonates are asymptomatic at birth
  - One reason treatment is important even late in pregnancy and in the post-partum period.

- Hypothesis of **protective apoptosis of infected cells** at the maternal-fetal interface

- **Virulence of *T. pallidum* may be modulated** by maternal immune response, and/or the conceptus' genetic background

Victoria Wicher, Konrad Wicher; Pathogenesis of Maternal-Fetal Syphilis Revisited, *Clinical Infectious Diseases*, Volume 33, Issue 3, 1 August 2001, Pages 354–363.
Kim, Chong Jai, et al. "Chronic inflammation of the placenta: definition, classification, pathogenesis, and clinical significance." *American Journal of Obstetrics & Gynecology*213.4 (2015): S53-S69.
Salyers, A. A., and D. D. Whitt. "Virulence factors that promote colonization." *Bacterial pathogenesis a molecular approach, ASM Press, Washington DC* (1994): 16-29.

Prenatal Diagnosis? Not Routinely Done

- The isolation of *T. pallidum* from up to **74% of amniotic fluid specimens** from women with early syphilis
- Suggests organism can traverse fetal membranes, and result in fetal infection.

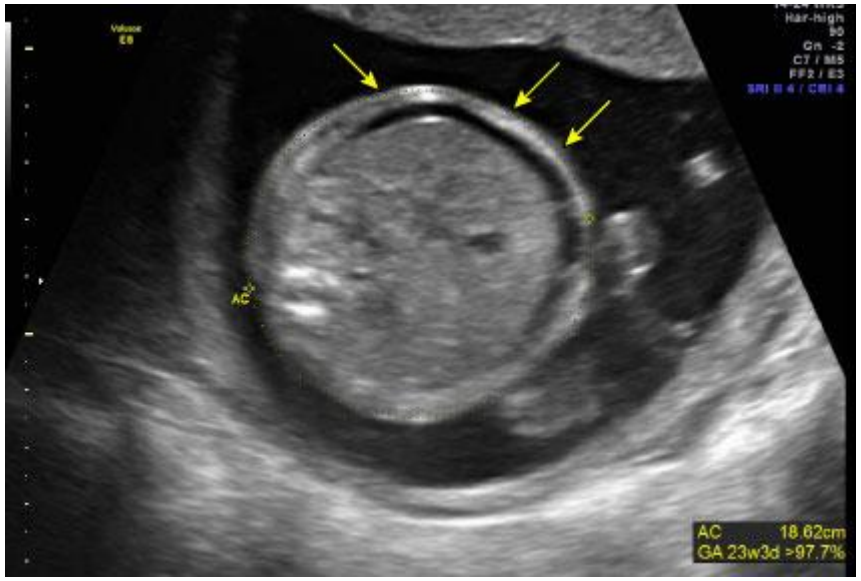
** Wendel et al. Obstet Gynecol. 1991;78:890*
Nathan et al. J Ultrasound Med 1993;2:97
Hollier et al. Obstet Gynecol. 2001;97:947

Sonography? Only if diagnosed after 20 weeks' gestation

*** Should not delay treatment in pregnancy**

Sonographic signs:

- hepatomegaly (70-80%)
- thickened placenta (25%)
- ascites (10%)
- Non-immune hydrops
- fetal anemia (25-30%)



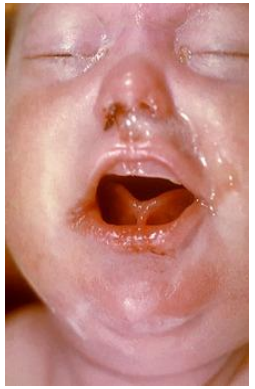
Cases accompanied by these signs should be managed in consultation with obstetric specialists. No specific regimens.

Manifestations of congenital syphilis

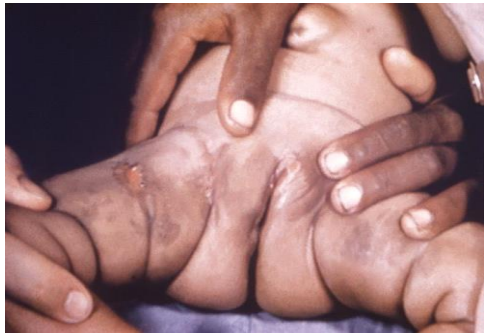
- **Early** manifestations
  - <2 years of age
  - Due to **hematogenous spread** (via blood) of *T. Pallidum* and resultant **inflammatory response** in various organs and tissues
  - Immune-mediated
- **Late** manifestations
  - >2 years of age
  - **Scarring or stigmata** from early disease
  - Reaction to **persistent inflammation**
  - Noninfectious

Early Manifestations (Birth – 8 weeks, but up to 2 years)

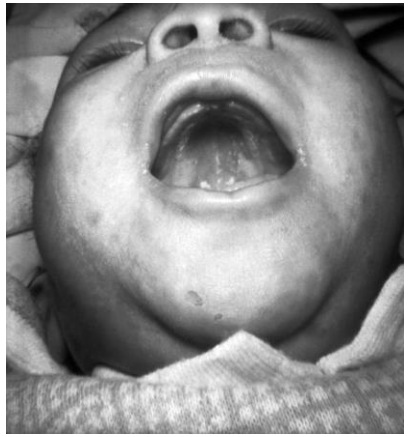
- **Hepatomegaly** (enlarged liver)
- **Splenomegaly** (enlarged spleen)
- **Snuffles** (copious nasal secretions – infectious!)
- **Mucocutaneous lesions** (infectious!)
- **Pneumonia Alba**
- **Osteochondritis**
- **Pseudoparalysis**
- **Edema**
- **Rash**
- **Hemolytic anemia or thrombocytopenia.**



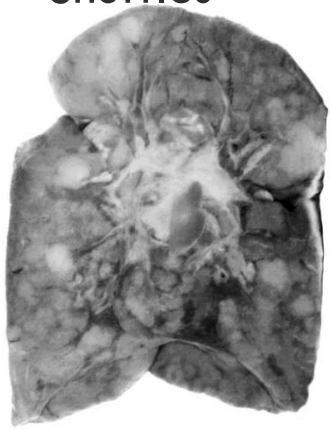
Snuffles



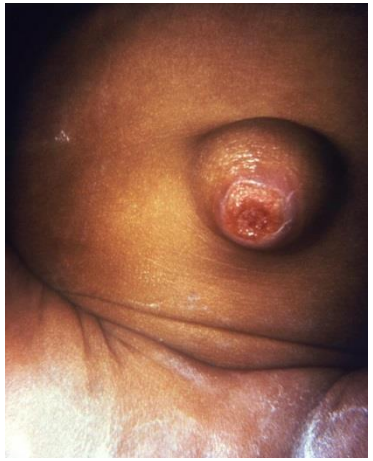
Cutaneous lesion



Mucous patches



Pneumonia Alba

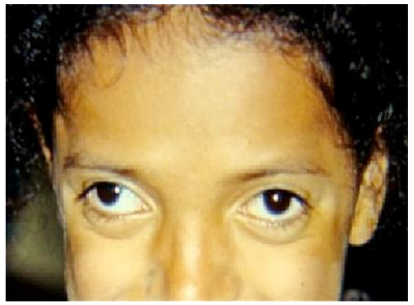


Umbilical lesion

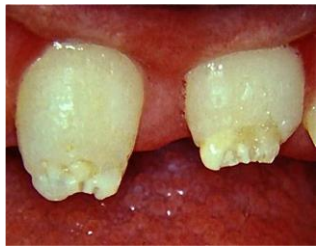
Courtesy CDC Public Health Image Library

Late Manifestations (2 years +)

- **Ophthalmic and Neurologic**
  - **Interstitial keratitis** (5–20 years; corneal scarring due to chronic inflammation of the stroma)
  - **Eighth cranial nerve deafness** (10–40 years)
- **Dental**
  - **Hutchinson teeth** (peg-shaped, notched central incisors)
  - **Mulberry molars**
- **Skeletal**
  - **Anterior bowing of the shins**
  - **Frontal bossing**
  - **Clutton joints** (symmetric, painless swelling of the knees)
- **Facial**
  - **Saddle nose**
  - **Rhagades** (perioral fissures)

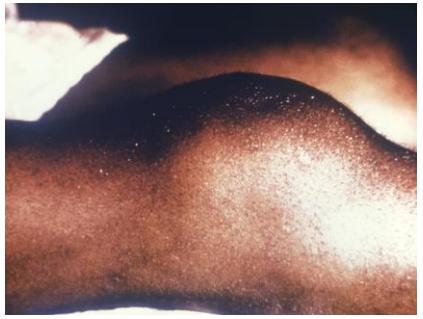


Interstitial keratitis

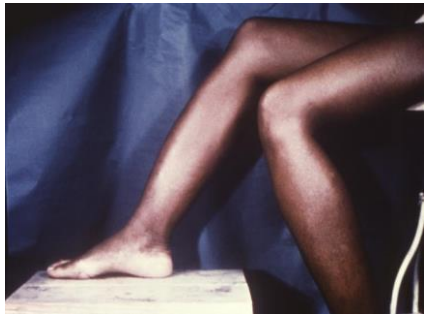


Hutchinson's teeth

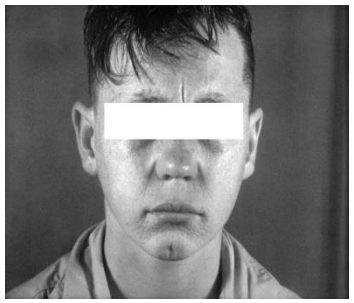
Frontal bossing



Clutton's joints



"Saber shins"



Rhagades

Courtesy CDC Public Health Image Library

Citation: 1. L. Pessoa and V. Galvao, "Unusual presentation of more common disease/injury: clinical aspects of congenital syphilis with Hutchinson's triad," BMJ Case Reports, vol. 2011, pp. 1–3, 2011.

CS Mortality, 1999-2013

- 6383 cases of CS – defined by surveillance
  - (decrease from 14,627 cases in 1992-1998; 56% decline)
- Neonatal mortality: 11.6/1000 live births
- 418 deaths, **342 (82%) stillbirths**
- Case fatality rate: 6.5% (stable)
- 89% of deaths: **untreated (73%) or inadequately treated** during pregnancy

Less prenatal care: ↑ risk of death

- 59% of deaths occurred by **31 weeks** of gestation

Su et al. *Am J Obstet Gynecol* 2015

Mortality of Congenital Syphilis: Case Fatality Rate

- Of 191 Confirmed CS Cases….
  - **Mortality was found to be 35%** (67/191)
    - Stillbirths: 79% of deaths (53/67)
      - The majority of stillbirths were <28 weeks' gestation (74%, 39/53)

Courtesy of Pablo Sanchez, MD

Meta-analysis:
Prenatal Treatment Dramatically Reduces the Risk CS Stillbirth

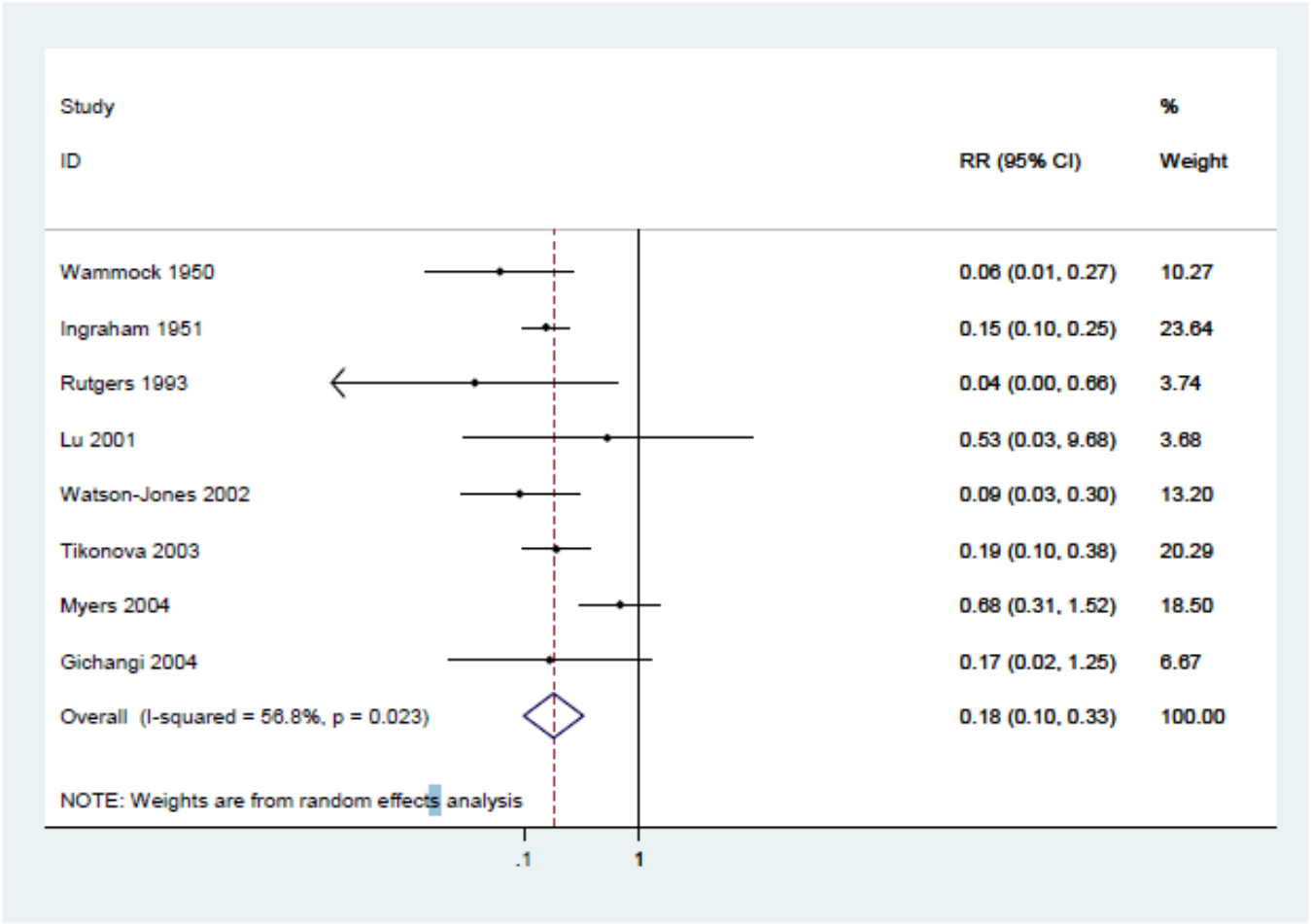


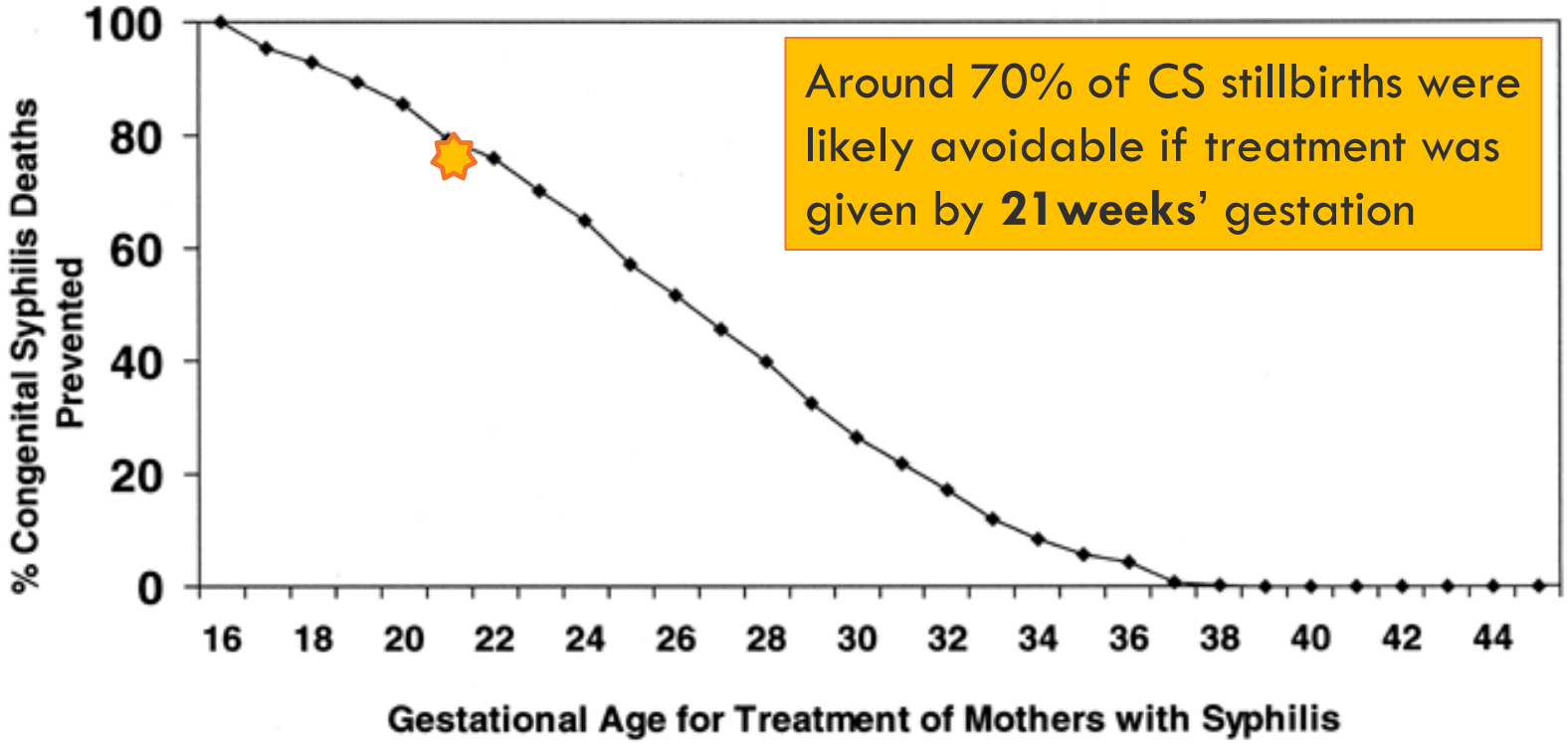
Figure 3 Meta analysis of 8 observational studies showing effect of penicillin on stillbirth in pregnant women with active syphilis.

Adjusted Risk Ratio = **0.18**
(95% CI 0.10-0.33)

Blencowe, Hannah, et al. "Lives Saved Tool supplement detection and treatment of syphilis in pregnancy to reduce syphilis related stillbirths and neonatal mortality." *BMC public health* 11.3 (2011): S9.

Mathematical model: Early Rx = Fewer CS Infant Deaths

% CS deaths preventable by treating pregnant women with syphilis at a given gestational age.

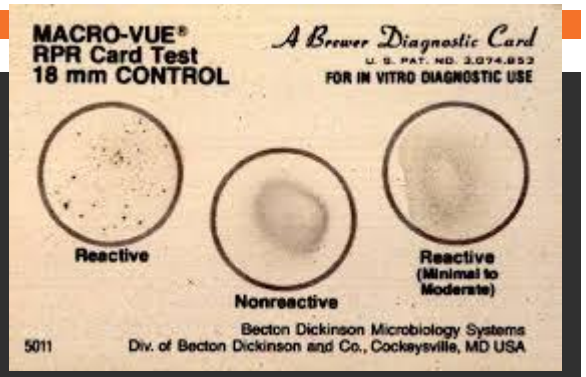


(Gust DA, Levine WC, St. Louis, M, *et al*. Mortality associated with congenital syphilis in the United States, 1992-1998. Pediatrics, 2002; 109(5):E79-9.)

Prenatal Screening & Maternal Treatment

California Department of PublicHealth

Serology: Nontreponemal Tests – RPR/VDRL

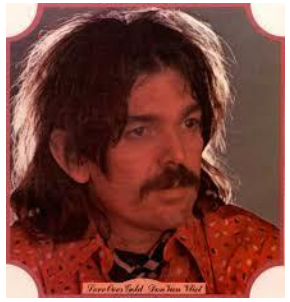


- **Antigen:** detects an antibody against cardiolipin (e.g. NOT specific to T. Pallidum), present in blood of patients with syphilis

- **Quantitative:** Useful to assess burden of disease, adequacy of treatment, and detect maternal reinfection (fourfold difference, e.g. 1:8 vs. 1:32)

- **RPR more sensitive** than VDRL; preferred for screening of pregnant women

Fun fact: VDRL and RPR use beef heart extract

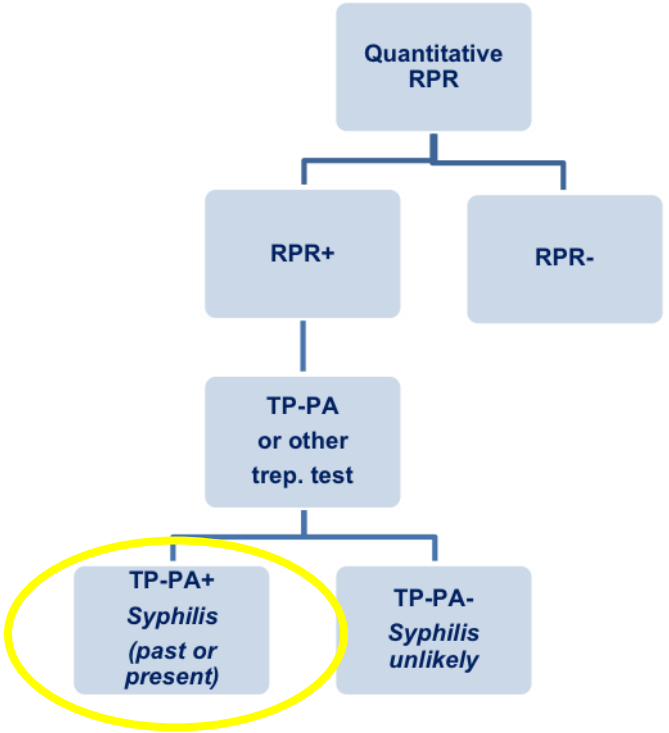


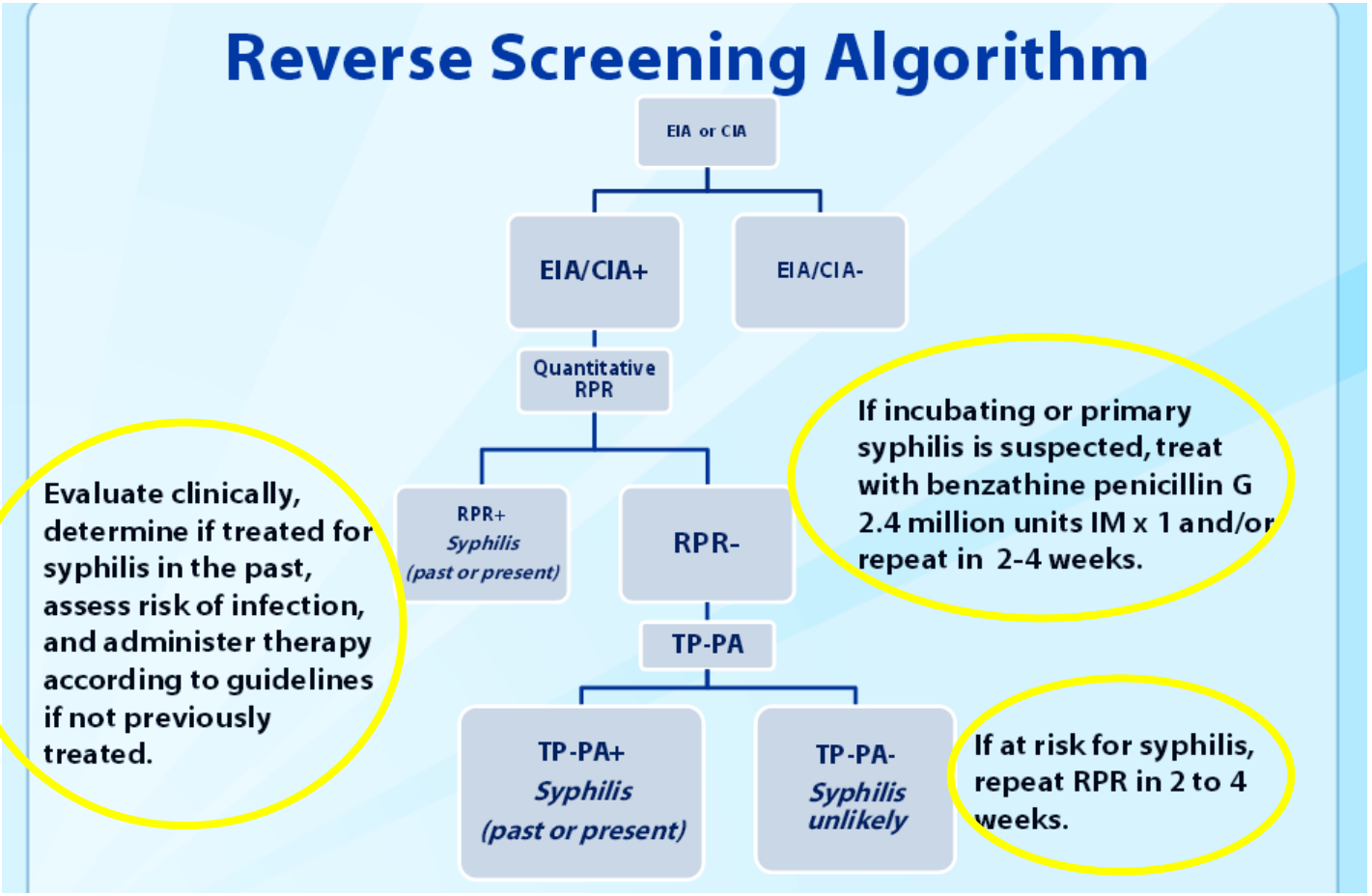
Serology: Treponemal Tests – TP-PA, FTA-ABS, EIA/CIA

- Detect antibody (IgG) to *T. pallidum*, Confirm reactive non-treponemal test result
  - TP-PA: hemagglutination test (lysate of *T. pallidum*)
  - FTA-ABS: (uses lyophilized – AKA freeze dried – *T. pallidum*)
  - EIA/CIA: Enzyme / chemi luminescence immunoassays

Screening for syphilis: Traditional vs. Reverse Screening

TRADITIONAL





How to interpret non-treponemal (VDRL/RPR) titers?

- Higher numbers correspond to higher level of antibodies in patient's serum
- **Two-fold change** Generally considered within margin of test error
- **Four-fold change** Sustained for at least 2 weeks considered to be significant
- Compare titer using **same** serologic test: *RPR often higher than VDRL*

1:1024
1:512
1:256
1:128
1:64
1:32 } 2-fold change
1:16
1:8
1:4 } 4-fold change
1:2
1:1

Diagnostic Challenges

False negatives

- Early primary and late latent stages
  - Serology may be negative in up to 25% of primary syphilis cases
- Prozone reaction (RPR/VDRL)

Biologic False Positives

- RPR or VDRL test positive with confirmatory Treponemal test negative
- Viral illnesses including HIV, recent immunizations, autoimmune and chronic diseases

Discordant serology

- EIA or CIA + and RPR –

Jurado RL et al. *Arch Intern Med* 1993, **153:**2496–2498.
Geisler MG. *South Med Jour* 2004, **97**: 327-328.

Syphilis Screening During Pregnancy: CDC recommendations

- Screen all pregnant women at the **first prenatal visit,** ideally during the first trimester
  - When access to prenatal care is not optimal, screen with RPR (and treat if reactive) at the time pregnancy is confirmed

- Screen again at **third trimester (28-32 weeks' gestation)** AND at delivery if patient is:
  - At high individual risk for infection
  - Living in communities with a high prevalence of syphilis

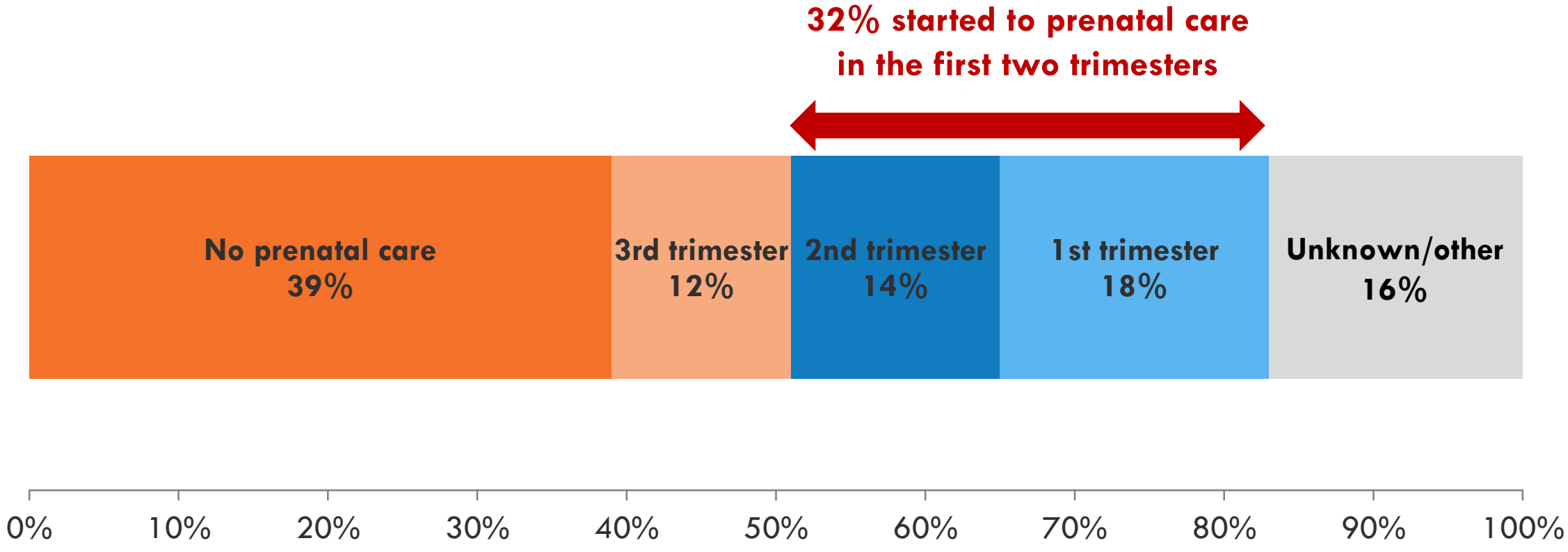
- Screen **all women who have a still birth** (fetal death after 20 weeks' gestation)

"No mother or neonate should leave the hospital without maternal serologic status having been determined at least once during pregnancy, and again at delivery, if at high risk"

CDC 2015 STD Treatment Guidelines

First prenatal care visit, mothers of CS infants

California, 2016-2017 (n=499)



Source: 2016-2017 surveillance data

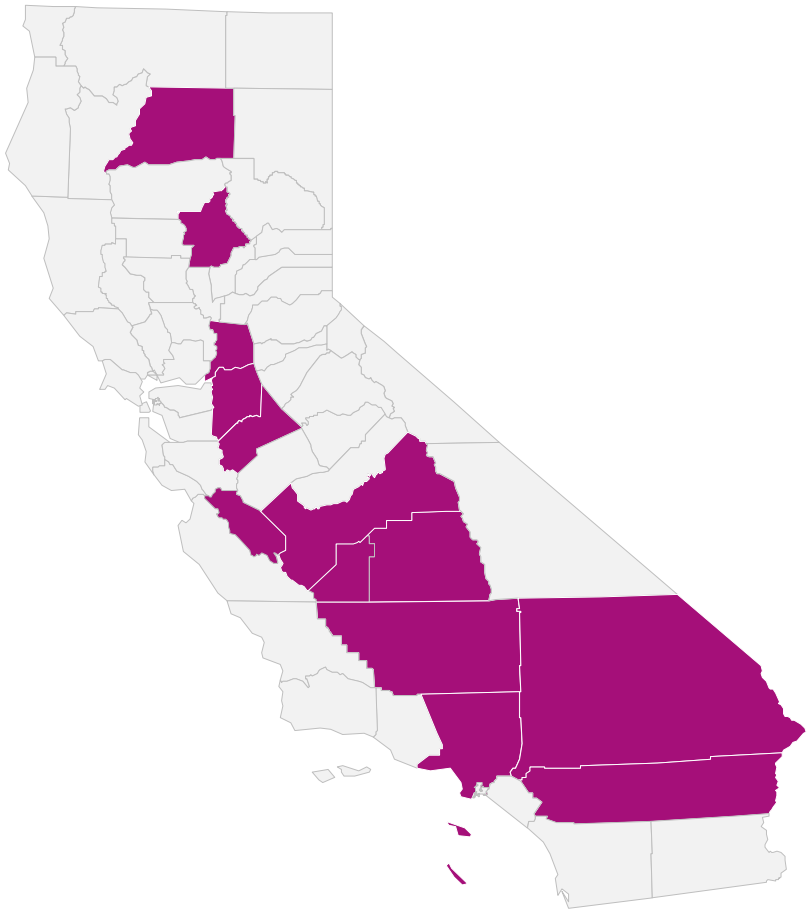
Who should be tested at third trimester and delivery?

- Have signs and symptoms of syphilis infection
- Were diagnosed with any STD during pregnancy
- Have a history of syphilis infection
- Receive late, limited, or no prenatal care
- Use methamphetamine, IV drugs, or other illicit drugs
- Are homeless or have unstable housing
- Have history of incarceration or partners with history of incarceration
- Have partners that may have other partners, or partners who are MSM
- Exchange sex for money, housing, drugs, etc.
- **Live in areas with high rates of syphilis, particularly among females**
- **Live in areas of high rates of congenital syphilis**

Slide courtesy of Eric Tang

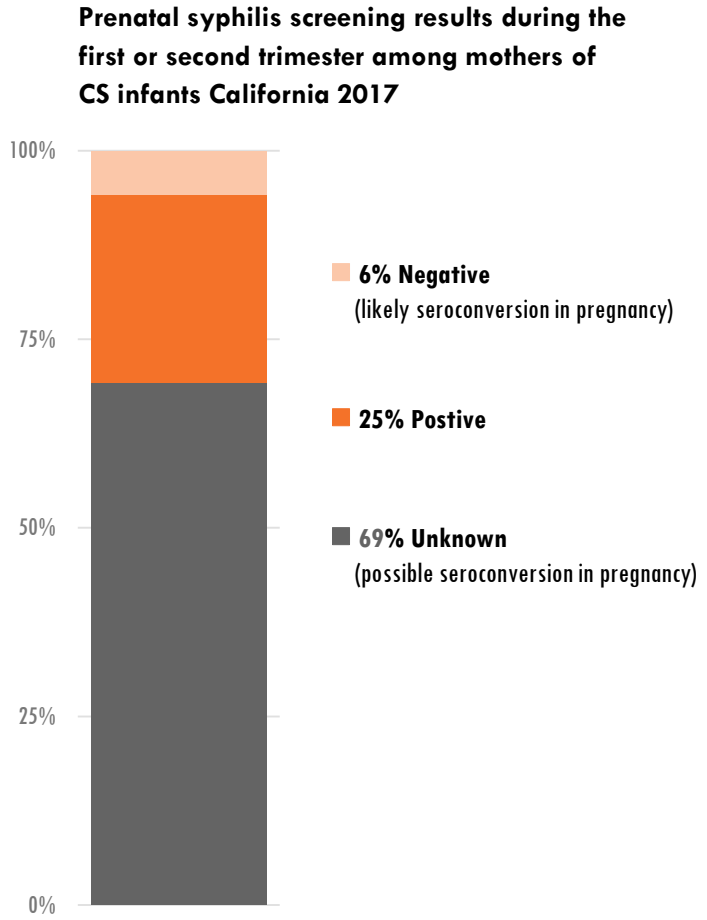
CA counties w/third trimester screening recommendation, 2018

Shasta
Butte
San Joaquin
Stanislaus
Sacramento
San Benito
Fresno
Kings
Tulare
Kern
Los Angeles
San Bernardino
Riverside



Benefits of *routine* third trimester screening, regardless of risk?

- In California 2017, only 25% of mothers of CS cases had a + syphilis screen in the first or second trimester, suggesting 75% might have benefited from 3rd trimester screening
- 6% of mothers of CA CS cases had a ***negative*** initial first or second trimester screening, suggesting **seroconversion** during pregnancy
- May identify syphilis in pregnant patients who:
  - Did not receive first/second trimester screening
  - Tested at first prenatal screening but treatment was not completed
- Routinized screening is **not** dependent on:
  - Provider to assess risk
  - Patient to disclose potentially stigmatized risk factors
  - Patient to be aware of risk (of partners)



Additional opportunities for screening outside of prenatal settings:

- **Emergency Departments** can consider confirming the syphilis status of all pregnant patients prior to discharge, either:
  - Via documented test results in pregnancy
  - Screening in the ED if documentation is unavailable
  - *A CDPH review of 62 mothers who delivered CS infants in a high-CS morbidity county found: 16% (10/62) were seen in an emergency department (ED) during their pregnancies, 90% (9/10) of whom lacked any prenatal care.*

- Screen **people who could become pregnant**
  - At the time of each HIV test
  - When entering a correctional facility at intake

Expanded Syphilis Screening Recommendations for the Prevention of Congenital Syphilis

Guidelines for California Medical Providers

2019

DRAFT

These guidelines were developed by the California Department of Public Health (CDPH) Sexually Transmitted Diseases (STD) Control Branch in conjunction with the California STD/HIV Controllers Association, and the California Prevention Training Center.

Pending CDPH Approval

Treatment of Syphilis in Pregnancy

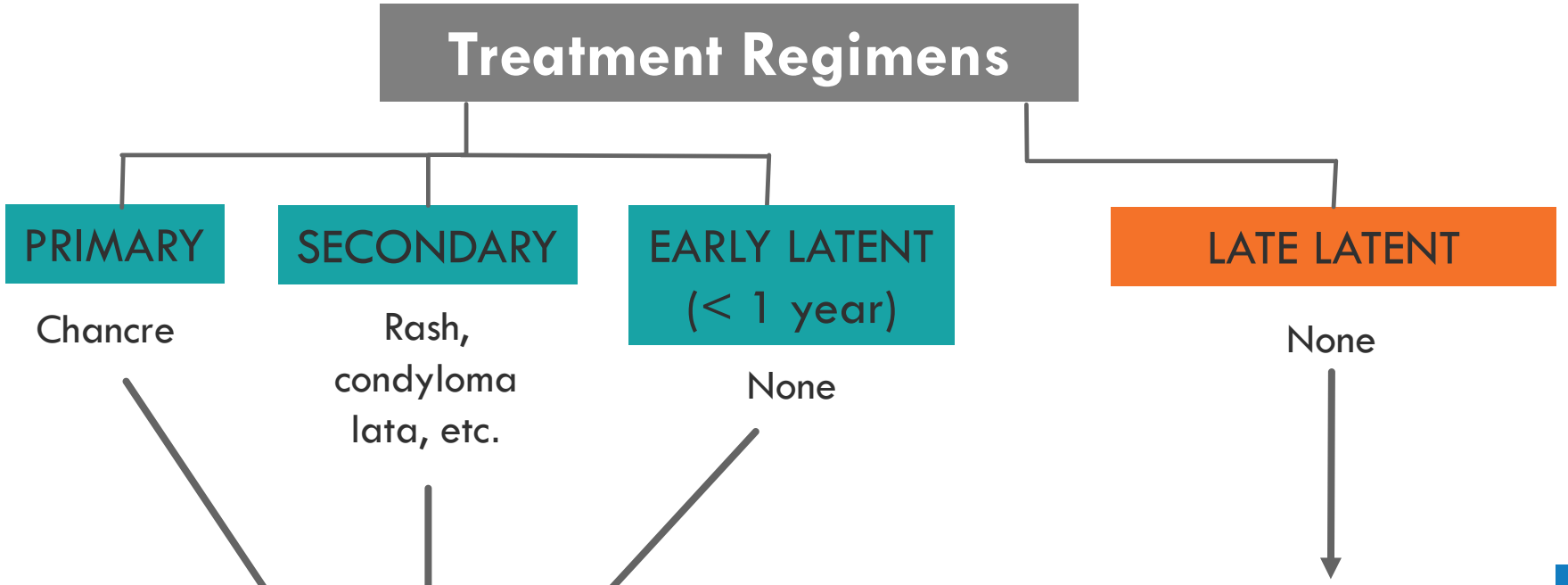
- **The only treatment of syphilis in pregnancy is penicillin.**

- Pregnant women should be treated with the penicillin regimen appropriate for their stage of infection.

- Pregnant women with a type-1 penicillin allergy should be desensitized in collaboration with an allergist in the hospital and treated with **penicillin**.
  - Type-1 allergy can be confirmed with skin testing; consult an allergist

- Women treated during second half of pregnancy are at risk for premature labor and/or fetal distress as part of Jarisch-Herxheimer reaction.
  - In these cases, some providers will consider administering treatment on L&D
  - Concern for this complication should not delay treatment

Prenatal Syphilis Treatment



Benzathine penicillin
2.4 million units
IM x 1

Benzathine penicillin
2.4 million units
IM every week x 3
7 days apart

Some experts recommend a 2nd dose of benzathine penicillin G be given a week after the initial dose in early syphilis

A 6-8 day interval *may* be acceptable; consult your local STD controller

Overall, maternal treatment is highly effective (98.2%) in the prevention of CS

Table 3. Success of Maternal Treatment to Prevent Congenital Syphilis by Stage of Infection

Stage	Success/Total treated	Percentage (95% CI)
Primary	27/27	100 (87.2, 100)
Secondary	71/75*	94.7 (86.9, 98.5)
Early latent	100/102	98 (93.1, 99.8)
Late latent	136/136	100 (97.3, 100)
Total	334/340	98.2 (96.2, 99.3)

CI = confidence interval.
* $P = .03$ compared with other groups, χ^2.

Table 4. Success of Maternal Treatment in Preventing Congenital Syphilis by Gestational Age

Gestational age	Success/Total treated	Percentage (95% CI)
≤20 wk	152/153	99.4 (96.4, 100)
21–25 wk	51/51	100 (93.0, 100)
26–30 wk	58/59	98.3 (90.9, 100)
31–35 wk	44/46	95.6 (85.2, 99.5)
36–40 wk	26/28	92.9 (76.5, 99.1)
41–42 wk	3/3	100 (29.2, 100)
Total	334/340	98.2 (96.2, 99.3)

CI = confidence interval.
P = not significant, χ^2.

Higher risk of treatment failure during early syphilis and later in pregnancy

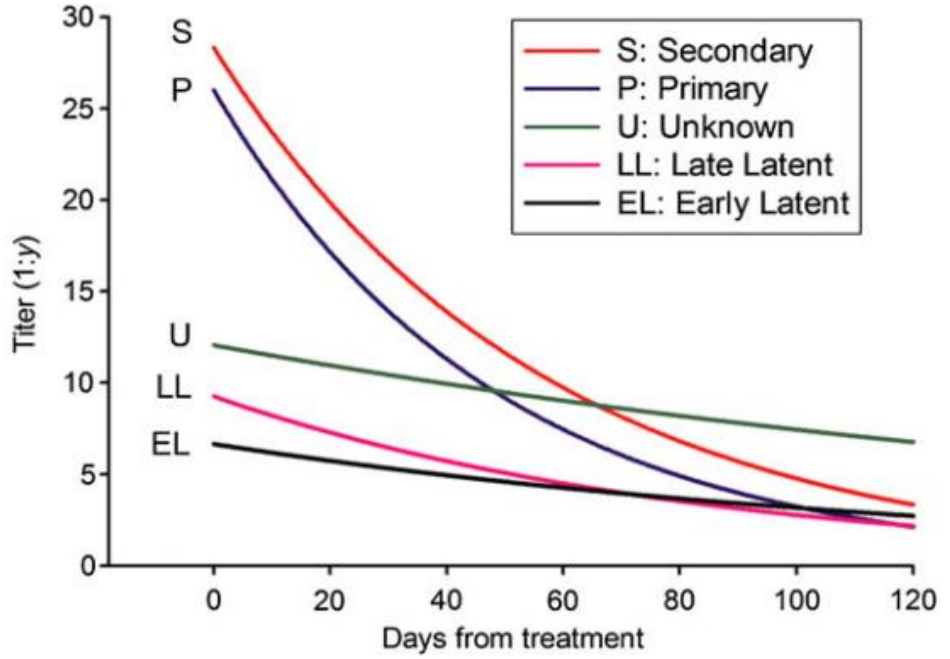
Slide Courtesy of Dr. Juliet Stoltey, CDPH

Alexander JM, Sheffield JS, Sanchez PJ, et al.. Efficacy of treatment for syphilis in pregnancy. Obstet Gynecol 1999;93:5–8.

Treatment of syphilis in pregnancy: **Follow-up** (All stages)

- Repeat follow-up titers at 28-32 weeks and delivery
  - Consider monthly titers until delivery if at high risk for reinfection.
  - Baby should obtain (same) non-trep test at delivery
- Post-treatment serologic response during pregnancy varies widely.
  - Many women do not experience a fourfold decline by delivery.
- If sustained fourfold increase occurs after treatment completion, evaluate for reinfection and neurosyphilis.

Maternal Titer Decline After Adequate Syphilotherapy, by Stage



Rac, Martha WF, et al. "Maternal titers after adequate syphilotherapy during pregnancy." *Clinical Infectious Diseases*. 60.5 (2014): 686-690.

Additional Management Considerations

- Patients should receive a neurologic exam including ophthalmic and otic
  - Lumbar puncture is recommended if signs/ symptoms present
- All patients with syphilis should be tested for HIV
- Presumptively treat partners
- If diagnosed during the second half of pregnancy, perform obstetric ultrasound
- Repeat HIV, Chlamydia, and Gonorrhea screen in 3rd trimester

Management of Infants Born to Mothers Who Had Syphilis During Pregnancy

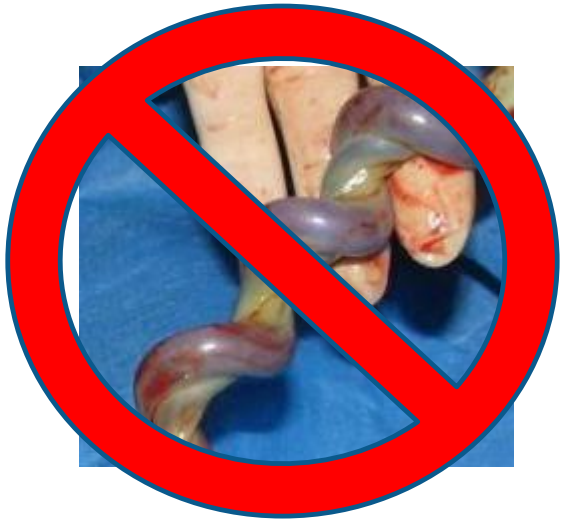
California Department of PublicHealth

Serology for Infants

- **Non-treponemal (RPR/VDRL)**
  - Need both mother and infant titers at delivery
  - Perform the **same test** on the infant that was performed on the mother (e.g. compare RPR with RPR)
- **Treponemal (FTA-ABS/TP-PA EIA)**
  - Maternal TP-PA can stay positive in Infant serum for up to 15 months.
  - ***NOT NEEDED IN INFANT SCREENING***

Which specimen? Umbilical Cord or Serum?

- **AAP: Serum**
  - UCB: false ⊕ (5-10%) and false-neg (5-20%) results can occur
- **CDC: Serum**
  - UCB: contamination with maternal blood may yield a false ⊕ result



CONGENITAL SYPHILIS (CS)

Evaluation and treatment of infants (<30 days old) born to women with syphilis during pregnancy*

ALL INFANTS AND MOTHERS SHOULD HAVE SERUM RPR OR VDRL TITER DRAWN AT DELIVERY

Infant and Maternal Criteria

Infant:
- CS findings on physical exam
- Infant titer ≥4 fold higher than MOB titer
- + darkfield or PCR of lesion/body fluid

No to all

Maternal Criteria:
- Not treated
- Inadequately treated
- Treatment undocumented
- Treated with a non-penicillin G regimen
- Received treatment <4 weeks before delivery

No to all

Additional Maternal Criteria:
- Adequately treated with stage appropriate penicillin G, received ≥4 weeks before delivery

AND

- No concern for reinfection or treatment failure

Yes to any

Scenario 1: Proven or highly probable CS

Yes to any

Scenario 2: Possible CS

Yes to both

Scenario 3: Less Likely CS

Infant Evaluation

- **CSF analysis** ‡ VDRL, cell count, and protein
- **Complete blood count (CBC),** differential and platelet count
- **Long-bone radiographs**
- **Tests as clinically indicated**

- **CSF analysis** ‡ VDRL, cell count, and protein
- **CBC,** differential, and platelet count
- **Long-bone radiographs**

No additional evaluation

Maternal Titer and Stage:
- ≥4fold decrease in titer after treatment for early syphilis

OR

- Stable titer for low-titer, latent syphilis (RPR < 1:4 or VDRL<1:2)

Any abnormalities, results not available, *OR*, follow-up uncertain

No abnormalities *AND* follow-up certain

No to both

Yes to either

Infant Treatment

Aqueous crystalline penicillin G†
100,000–150,000 units/kg/day, administered as 50,000 units/kg/dose IV every 12 hours during the first 7 days of life and every 8 hours thereafter for a total of 10 days

Benzathine penicillin G
50,000 units/kg/dose IM in a single dose

No treatment indicated
with close follow-up of infant serologic follow-up every 2-3 months for 6 months

* Scenario 4 – in which an infant at delivery has a normal physical exam and titer < 4 fold mother's titer, AND the mother was adequately treated prior to becoming pregnant and sustains RPR titers <1:4 or VDRL<1:2 throughout pregnancy – is not included.
† Benzathine Penicillin G (BPG or Bicillin-LA), administered according to stage of disease and initiated at least 4 weeks prior to delivery is the only adequate treatment for syphilis during pregnancy.
‡ Alternative: Procaine penicillin G 50,000 units/kg/dose IM in a single daily dose for 10 days
§ CSF test results obtained during the neonatal period can be difficult to interpret; normal values differ by gestational age and are higher in preterm infants.
ll All neonates with reactive nontreponemal tests should receive careful follow-up examinations and serologic testing (i.e., a nontreponemal test) every 2–3 months until the test becomes nonreactive. Neonates with a negative nontreponemal test at birth whose mothers were seroreactive at delivery should be retested at 3 months to rule out serologically negative incubating congenital syphilis at the time of birth.
FOR MORE INFORMATION ABOUT SCENARIO 4 MANAGEMENT, TREATMENT OF SYPHILIS IN PREGNANCY, NEONATAL CSF INTERPRETATION, AND CS INFANT FOLLOW-UP, PLEASE REFER TO THE 2015 CDC STD TREATMENT GUIDELINES.

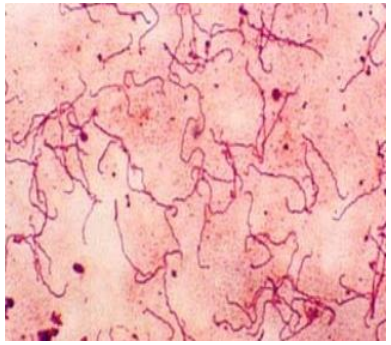
Laboratory criteria for diagnosis: T. pallidum

Demonstration of *Treponema pallidum* by one of the following:

Darkfield microscopy
lesions, body fluids, or neonatal discharge

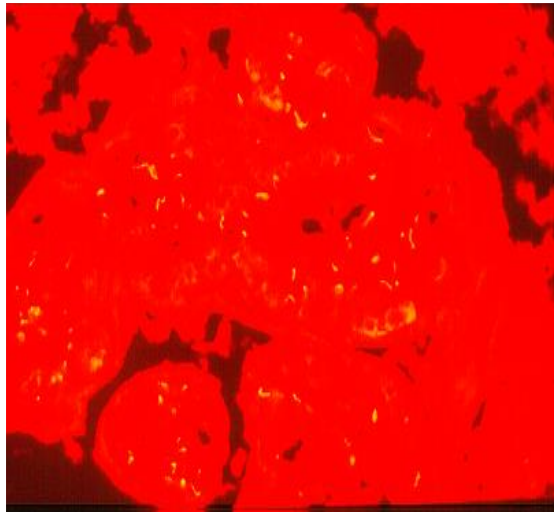
Polymerase chain reaction (PCR) or other equivalent direct molecular methods
lesions, neonatal nasal discharge, placenta, umbilical cord, or autopsy material

Immunohistochemistry (IHC), or special stains
lesions, placenta, umbilical cord, or autopsy material.



https://www.cdc.gov/std/stats16/appendix-c.htm

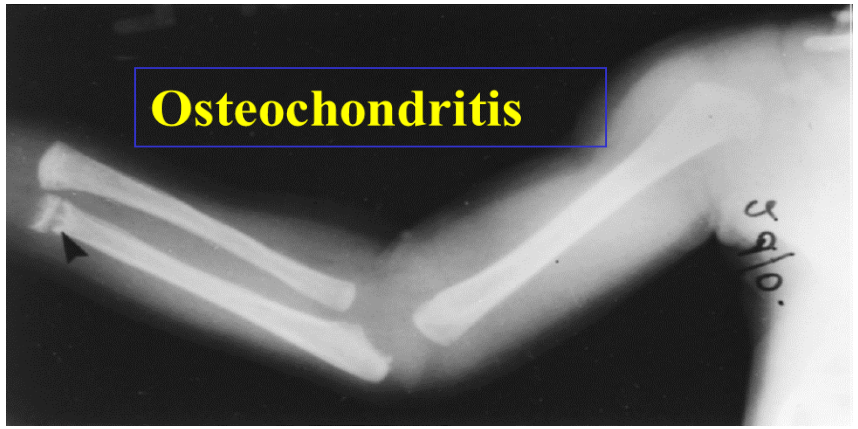
Laboratory criteria for diagnosis: Placental pathology



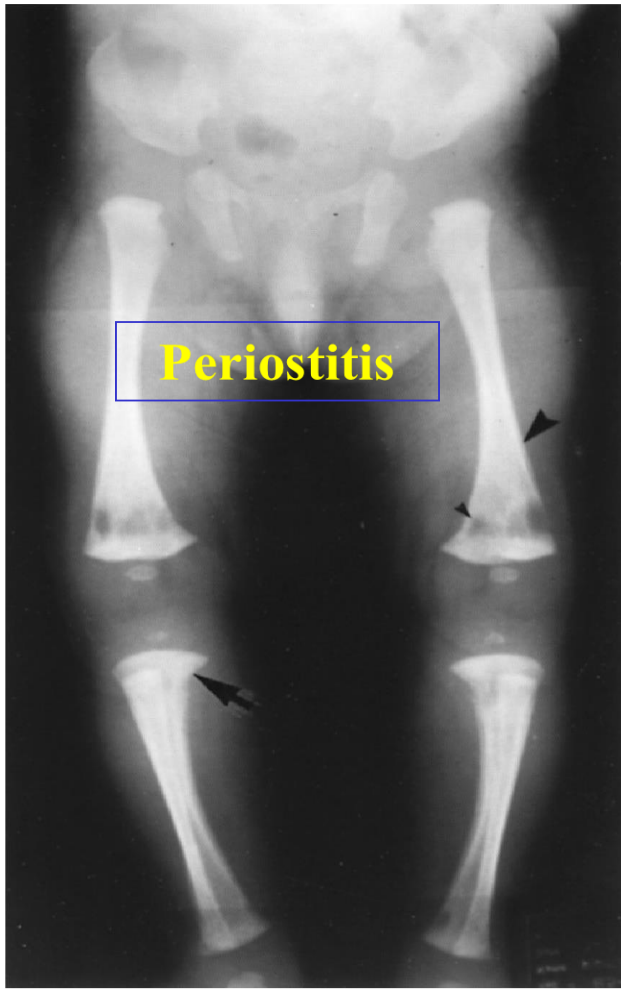
- **Histopathology:** necrotizing funisitis, villous enlargement, acute villitis, possible chorioamnionitis
- **Increased detection** of congenital syphilis from 67% to 89% in live-born infants, and 91% to 97% in stillborns (Obstet Gynecol 2002:100:126)

Courtesy of Pablo Sanchez, MD

Long-bone radiographs



Courtesy of Pablo Sanchez, MD



CSF evaluation
76 CS INFANTS, CSF RIT: 17 (22%) POS, 59 NEG

CSF Test	Sensitivity	Specificity
VDRL	53%	90%
Elevated WBC	38%	88%
Elevated Protein	56%	78%

Michelow et al. NEJM, 2002

Courtesy of Pablo Sanchez, MD

Scenario 4: "Congenital Syphilis Unlikely"

Normal physical exam, Nontrep Titer = or < 4-Fold Maternal Titer

AND…

<u>Maternal factors:</u>

- Treated adequately before pregnancy AND
- Low stable nontrep titers before and during pregnancy and at delivery
  - (VDRL < 1:2, RPR < 1:4)

<u>Work-up/Rx:</u>

- No evaluation needed
- No Rx required
  - some experts would give single dose benzathine PCN G 50,000 U/KG IM, particularly if follow-up uncertain

Courtesy of Jessica Kim, MD UCSF

Congenital Syphilis Treatment: IV Penicillin

- **Aqueous crystalline penicillin G**

100,000–150,000 units/kg/day,

administered as 50,000 units/kg/dose IV

  - Every 12 hours during the first 7 days of life
  - Every 8 hours thereafter for a total of 10 days

Appropriate for:

- **Scenario 1**
- **Scenario 2 with any abnormalities, results not available, or follow-up uncertain**

  - *Alternative: Procaine penicillin G 50,000 units/kg/dose IM in a single daily dose for 10 days, only for neonates; Current drug shortage*

Congenital Syphilis Treatment: IM Penicillin

- **Benzathine penicillin G**

50,000 units/kg/dose IM in a single dose

Appropriate for:

- **Scenario 2 who do not meet criteria for IV aqueous crystalline penicillin G**
- **Scenario 3 with either:**
  - Mother with early syphilis who did not achieve ≥4fold decrease in titer post-treatment

    or
  - Mother with latent syphilis who did not have a stable low titer (RPR < 1:4 or VDRL<1:2) throughout pregnancy

Evaluation and treatment of infants and children >=1 month*

Get an RPR!

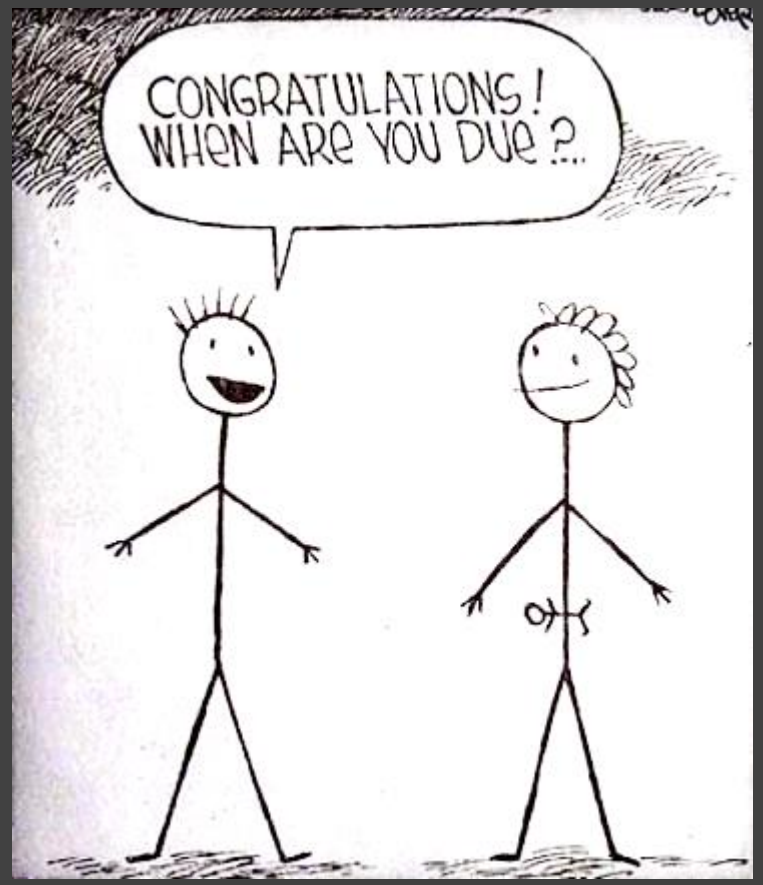
If RPR positive

- CSF analysis
- CBC, differential
- HIV screen
- Other tests as indicated (long bone xray, CXR, LFT, Abd U/S, etc).

Treatment:

Aqueous crystalline penicillin G **200,000-300,000** units/kg/day IV, administered as 50,000 units/kg IV q4-6 hours x 10 days

If all tests normal, can consider BPG 50,000 U/kg IM x 3 in weekly intervals



Thank you

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Questions? Comments?

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