SWINE ZOONOSES

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Rabies

- Swine: very rare (1-2 cases/yr in USA)
- Symptoms
  - Behavioral changes: anxious, agitated
  - Pica, salivation, aggressiveness, auto-mutilation
  - Paralytic, weak, uncoordinated,
  - Vocalization, Pharyngeal paralysis
Influenza

- Swine, Avian species
- H1N1, H3N2
- Strong evidence that pigs play an important role as a reservoir of human viruses.
- Swine may also be infected with avian strains.

Japanese B Encephalitis

- Arbovirus (Flavivirus)
- South-East Asia, Korea, China, Mongolia
- Vector-borne (mosquito)
- Viral encephalitis
  - 45,000 cases annually worldwide
  - 1 of 20-1000 develops encephalitis
  - 25% fatal
- Swine important amplifiers of virus, cases in pigs precede human cases.
**Vesicular Stomatitis**

- Rhabdovirus (Vesiculovirus)
  - Indiana and New Jersey serotypes
- Vector borne
- Animal C/S = papules and vesicles on mouth, mammary glands, and hooves
- Human C/S = Incubation: 1-2 days, flu-like, small vesicles, rare
- Reportable Dz in CA

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**Swine Vesicular Disease**

- Enterovirus (Picornavirus)
- Close to Human Coxcackie B5 virus.
- Infect only swine and man.
- Animal C/S = incubation: 3-7 days, high fever, vesicles on coronary band (hooves), lameness.
- Human C/S = Incubation: 1-2 days, flu-like, meningitis, rare.
**Pseudorabies**  
*(Aujeszky’s disease)*  

Herpes virus  
- **Swine:**  
  - Abortion, neonatal mortality, CNS signs in piglets, pneumonia in fattening pigs,  
  - Mostly unapparent in adults  
- **Very rare Zoonosis in humans.**  
- **Symptoms:** pruritus (mad itch, incubation 1-2 days, last 3-5 days).  
- **Reportable in CA (stage III eradication),**  
  - Mainly in wild pigs in USA.

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**Hepatitis E**  

- **Emerging zoonosis in humans**  
- **RNA virus**  
- **Swine** may be a reservoir of virus. Swine and human viruses appear to be very closely related.  
- **20% of 295 US swine practitioners seropositive for HEV.**

![Geographic Distribution of Hepatitis E](image.png)  
![Hepatitis E Virus](image.png)
Hepatitis E

- Swine HEV isolates identified in the United States, Taiwan, and Japan are closely related to human HEV isolates obtained from the same geographic areas.

- Swine HEV isolates seem to be more similar to human HEV isolates from the same area than they are to swine HEV isolates from different geographic areas (Swine HEV isolates identified in Canada and the Netherlands have been clustered with previously described European and American human or swine isolates).

Hepatitis E

- Veterinarians and persons working with pigs have been shown to at a greater risk for HEV infection. (Swine veterinarians were one and a half times more likely to seroconvert to HEV infection, although clearly multiple sources of exposure can exist). (Clemente-Casares et al., Emerg. infect. Dis., 2003;9:448-454).


- Also a report from consumption of raw deer meat from Japan (Tei et al., Lancet. 2003;362:371-373).
**Hepatitis E**

- **Clinical Features**
  - Incubation period:
    - Average 40 days.
    - Range 15-60 days
  - Case-fatality rate: Overall, 1%-3%
    - Pregnant women: 15%-25%
  - Illness severity increased with age, abdominal pain, anorexia, dark urine, fever, hepatomegaly, jaundice, malaise, nausea, and vomiting.
  - Chronic sequelae: None identified

**Menangle virus**

- Emerging zoonosis in humans
- Paramyxovirus (RNA virus)
  - Isolated in 1997 from stillborn piglets with deformities in New South Wales, Australia. Mummified fetuses, low pregnancy rate. Two humans seropositive with flu-like symptoms and rash.
  - Fruit bats (Pteropid bats) more likely reservoir of the virus. Virus shed virus in urine?
Nipah virus, Malaysia, 1998

Menangle virus, Australia, 1997
Nipah virus

- Emerging zoonosis in humans and pigs caused by a Paramyxovirus (RNA virus)
- **Humans**: outbreak in pig workers and swine slaughterhouses in Malaysia and Singapore from Sept. 1998-April 1999: 265 human cases of febrile encephalitis, 105 deaths (letality: 40%). Some respiratory illnesses.
- **Pigs**: rapid and difficult breathing, non productive cough, neurologic changes lethargy or aggressiveness).
- Fruit bats (Pteropid bats) reservoir of the virus. Virus shed in urine?
Anthrax

- Historically a ‘feared’ zoonosis
- *Bacillus anthracis*
  - Aerobic, spore-forming, Gram+ rod, capsule
- Distribution - worldwide
- Human disease rare in US
- Pigs not very susceptible. Sub-acute or chronic form: “glossanthrax”. Rarely intestinal form (enteritis)
- Treatment: Penicillin

Brucellosis

- *Brucella suis*
- Swine disease controlled by eradication
- Re-emerging zoonosis: wild pigs/wild boars
- C/S: Abortion, infertility, orchitis, epididymitis, arthritis, abscesses
Enteric Pathogens

- *Salmonella* spp.
  - Meat products or direct contact
  - Fever, nausea, diarrhea

- *Campylobacter* spp.
  - Undercooked meat products
  - GI signs, fever

- *Yersinia enterocolitica* (and *Y. pseudotuberculosis*)
  - Meat products (pig tongue in Europe) or direct contact (less frequently)
  - Fever, nausea, diarrhea, pseudo-appendicitis

- *Listeria monocytogenes.*
  - Meat products (pig tongue in Europe)
  - Fever, nausea, diarrhea, abortion, miscarriage, stillbirth, (2,500 cases/yr in USA, 500 deaths)
Enteric Pathogens

- Frequent human exposure
- Low risk to immune competent
- Most often host adapted asymptomatic carriers
- Higher risk from young and sick animals

Erysipelas

- *Erysipelothrix insidiosa*
- Swine Disease controlled by vaccination
- C/S
  - Fever, anorexia
  - Red urticarial plaques (Diamond disease)
  - Chronic form = endocarditis, arthritis
- Humans - processing/necropsy
  - Edematous, itchy rash, +/- arthritis
Erysipelothrix rhusiopathiae Infection (Erysipela)

**ERYSPELOID (BAKER-ROSENBACK)**

- Inoculation

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**Leptospira**

- *L. pomona* - Prolonged leptospiruria in swine. Abortion in sows
- *L. grippotyphosa* - *L. canicola* –
- *L. Icterohemorrhagia* –
- Agent shed in urine
- Meningitis in humans when infected by *L. pomona*
- Treatment: Doxycycline, Penicillin
Leptospira

- Found in wet environments
- Wide variation in c/s
- Humans - incubation 3-20 days
- Vaccines - variable efficacy
  - Credit for reducing human disease
  - Cross-protection poor
  - May not eliminate shedding

Streptococcal infections

- Several human infections caused by *S. suis* (Northern Europe: Netherlands, Asia: Hong Kong; Taiwan)
  - Associated with meningitis, septicemia and endocarditis in pigs. Commonly isolated from pig tonsils.
- Meningitis, arthritis, bronchopneumonia and endocarditis in humans.
- Sequelae: hearing loss and deafness.
- Treatment: Penicillin, ampicillin.
Swine Streptococcosis (Streptococcus suis 2)

- septicemia, meningitis, pneumonia, endocarditis
- Frequent carriage (tonsils, mucosae)
- Contamination of cutaneous abrasions, cuts
  farmers,
  Slaughterhouse employees, butchers...

- meningitis
- and septicemia

Pasteurella and Pig bites

- Present in most on farm species
  Associated with respiratory conditions
- Infrequent systemic infections in humans.
- Pig bites: *P. multocida, P. aerogenes*
  Cuts, scratches
- *Bacteroides, E. coli*...
Trichinosis

- Consumption of undercooked pork
- Feral swine
- Inapparent infection in swine
- Humans
  - GI signs associated with migration
  - Lid edema, myalgia, CNS signs, Eosinophilia
- Risk eliminated by proper cooking

Cysticercosis

- *Cysticercus cellulosae* (larval stage of adult human worm: *Taenia solium*)
- consumption of undercooked pork
- Feral swine
- Inapparent infection in swine
- Humans
  - GI signs associated with presence of *Taenia*
  - Neurocysticercosis very severe
- Risk eliminated by proper cooking
Protozoan infections

- **Toxoplasmosis**: source of human infection when consuming undercooked pig meat.
- Not species specific
- **Balantidiasis**: Chronic enteritis with diarrhea and ulcerative colitis. Reported mainly in Papua-New Guinea
- Contamination: fecal-oral route.
**Protozoonoses**

- **Sarcosporidiosis**: source of human infection when consuming undercooked pig meat infested with cysts of *S. suihominis*. Usually asymptomatic. Abdominal pain, diarrhea, intestinal obstruction reported. Rare cases of muscular sarcocystosis.

- **Entamoebiosis**: caused by *Entamoeba polecki* subclinical in humans. Severe cases: dysenteric disease with diarrhea and abdominal pain. Reported mainly in Papua-New Guinea

- Contamination: fecal-oral route.

**Cryptosporididia and Giardia**

- Protozoal parasites
- Not species specific
- Enteric disease in young animals
- **Sporozoites**
  - Infective when shed in feces
  - Highly resistant to disinfectants
- Fecal-oral transmission
Dermatophytoses (Ringworm)

- *Microsporum nanum*
- In pigs: wrinkled area covered with a thin, brown scab, that easily becomes detached.
- Rare human cases. Small papules. Hair becomes brittle.