VET 433A: Diagnostic Testing

Screening vs Diagnostic Tests

- Screening tests are used for healthy populations
  - Needs to be sensitive (few false negatives)
  - May lack specificity (false positives may occur)

Point of care tests *know what you are testing for!

- Organism-detection tests
  - Detects antigen or nucleic acid
- Antibody-detection tests

Immunoassays

- Detect antibody or antigen in specimens
- ELISA-based or Colloidal gold immunochromatographic assays (GICA)

POC Isothermal PCR is

Less sensitive *fewer proportion of true positives being positive

What tests detect pathogens?

Cytology or histopathology

Culture

Nucleic acid amplification tests (PCR)

Antigen-detection immunoassay

What tests detect antibodies?

IFA

Antibody-detection immunoassays

4Dx testing example

Heartworm – Antigen

Ehrlichia – Antibody

Borrelia – Antibody

Anaplasma – Antibody

Analytical sensitivity vs clinical sensitivity

Analytical sensitivity: achieved through serial dilutions

Clinical sensitivity: applied to a population of animals (GOLD Standard)

Can I rely on my test result?

If it is negative, can I really rule out the disease?

- Need to consider
    - Sample size
    - Time of sample
    - Anatomic site
    - Potential for atypical strains
    - Assay inhibitors
    - Specimen degradation
    - Low organism burden
    - Immunocompromise
    - Prozone effect and antibody interference
        - Cryptococcal test
        - Antigen in sample binds up all the antibodies in the detection kit creating a false negative result
        - When the sample is diluted out you get a positive
        - Heartworm
            - Antibodies from the patient binds up the antigen
            - SNAP test is negative

If the test is positive, can I rule in the infection?

Specificity > positive rules it in

Consider

- Cross-reactivity
- Previous vx
- Previous exposure
- Maternal antibodies
- Do antibodies = infection?
- Prevalence of infection in the population

Negative predictive value

- Ability of a test to accurately predict true negative status
- If there is a **low prevalence** of infection the **negative predictive value is high**

Etiologic predictive value

- Likelihood that a true positive test result correlates with diagnosis of disease of interest
- Feline Herpesvirus is a good example, lots of cats have this
- Giardia antigen test, giardia is almost commensal in the GIT

Positive predictive value

- Ability of a test to accurately predict true positive status
- If there is a **low prevalence** of infection the **positive predictive value is low**
- Retesting results reduces the chance of positive predictive value problems