

Instructional Objectives / Learning Outcomes
DMP 775, Veterinary Clinical Pathology
Department of Diagnostic Medicine/Pathobiology
College of Veterinary Medicine, Kansas State University

Chapter 1: Introductory concepts

1. Define *pathology* and use the noun appropriately in written and oral language.
2. Explain why laboratory tests are used to evaluate samples from patients.
3. Contrast and compare qualitative and quantitative laboratory assays.
4. Convert common units that use the prefixes including *milli*, *micro*, *nano*, *pico*, *femto*, and *deci*.
5. Define *normal* in the context of describing clinical laboratory data. Explain why a “*normal*” animal may have laboratory data outside of reference intervals. Explain why a sick animal may have laboratory data within reference intervals.
6. Define *reference individual*, *reference population*, *reference sample group*, *reference value*, *reference distribution*, *reference limit*, *reference interval*, and *observed value* and use the terms appropriately.
7. Describe how reference intervals are established and their purposes.
8. Explain what *reference intervals* represent and when parametric or non-parametric methods should be used to establish reference limits.
9. Explain factors or procedures that determine the quality of laboratory test results and give one example when erroneous results are produced if that factor or procedure is poor.
10. Explain why reference intervals published in textbooks may not be adequate for evaluating your patient.
11. Contrast and compare the analytical properties of assays (precision, accuracy, specificity, detection limit, and sensitivity), explain how these properties influence our interpretation of assay results, and use the terms appropriately to explain assay results that are outside of reference intervals.
12. Identify and classify the appropriate analytical property in clinical situations. For example:
 - a. Results of repeated analysis of the same sample do not give the same results. The different results represent _____.
 - b. Result of assay A was 100 mg/dL but that of assay B on the same sample was 80 mg/dL. If assay A was the “gold standard” assay, then assay B is _____.
 - c. Lipemia in a sample can increase the measured concentration of same analytes. Accordingly, this assay is _____.
 - d. Results of assay C indicate the analyte’s concentration is 10 µg/dL, but assay D indicates the concentration is 0 µg/dL. This difference may be due to _____.
 - e. Results of assay E indicate the analyte’s concentration is 100 mg/dL on both day 1 and day 2 samples. However, assay F values were 92 mg/dL and 105 mg/dL on the two samples. The differences in results may be due to _____.
13. Explain how knowledge of an assay’s analytical precision is used to determine if changes in laboratory data are due to biologic variation or analytical variation.
14. Contrast and compare a control solution and a standard solution.
15. Define coefficient of variation (CV) and explain why a CV of 10% may be very acceptable for one assay but very unacceptable for another assay.
16. Contrast *random error* and *systematic error* (bias).

17. In the context of predictive values, define *true positive*, *true negative*, *false positive*, and *false negative*. List or describe the two factors that must be known to classify data into the four categories.
18. Contrast and compare diagnostic sensitivity, diagnostic specificity, diagnostic accuracy, and predictive value of positive or negative test and explain how the concepts influence our interpretation of assay results.
19. Contrast and compare diagnostic sensitivity and PV(+). Contrast and compare diagnostic specificity and PV(-).
20. Given necessary clinical and laboratory information about a group of animals, calculate diagnostic sensitivity, diagnostic specificity, diagnostic accuracy, and predictive value of positive or negative test.
21. Explain how the following alter the calculated values for the diagnostic sensitivity, diagnostic specificity, and diagnostic accuracy of a test.
 - a. Prevalence of disease
 - b. Poor “gold standard”
 - c. Increasing or lowering the cut-off value
 - d. Using a healthy animal group as the “disease absent” group
 - e. Using a sick animal group with similar clinical signs but without the disease as the “disease absent” group
22. Recognize and list the diagnostic property that is most important for a:
 - a. Screening test
 - b. Confirmation test
23. Explain the purpose of constructing ROC curves for laboratory assays.
24. State the data that are plotted on the y-axis and x-axis of a ROC curve. Based on those facts, explain why the best ROC curve approaches the upper left corner of the graph.