12-lead ECG Course Outline

1. Electrical System of the Heart
   a. Anatomy
   b. Concept of Automaticity
   c. Components of the P-QRS-T Complex
   d. Intervals and their Normal Range: PR Interval, QRS Duration, QT Interval

2. Attachment of the Leads
   a. Limb Leads and Einthoven’s Triangle
   b. Precordial Leads

3. Vector Concepts
   a. Frontal Plane
   b. Transverse Plane

4. Predicting the waveshape of the Normal 12-Lead ECG
   a. Polarity of deflection on the ECG
   b. Depolarization sequence and direction of the normal heart
   c. Leads associated with areas of the heart
   d. Parameters defining the normal 12-Lead ECG
   e. Development of the predicted waveshape of the normal 12-Lead ECG
   f. R-wave progression and the transition zone

5. Characteristic of the T-wave
   a. Asymmetrical wave
   b. HyperAcute T-wave
   c. Inversion vs. upright

6. Characteristic of the ST-segment
   a. ST-segment baseline
   b. ST-segment elevation: (1). concave down, (2). concave up
   c. ST-segment depression

7. ECG changes of ischemia
8. ECG changes of injury (acute myocardial infarction)
9. Concept of Reciprocity
10. ECG changes of old infarction
11. Locating the STEMI
    b. Location of Reciprocal Leads
    c. Right ventricular infarction
    d. Posterior infarction
12. Development of the Patterns of the Following Aberrant Conduction
    a. RBBB
    b. LBBB
c. Left Anterior Fascicular Block (LAFB)
d. Bifascicular Block
e. Preexcitation Syndrome (WPW)
f. Left Posterior Fascicular Block (LPFB)
g. Primary and Secondary T-wave changes of RBBB and LBBB

13. Hexaxial System
a. Definition of Axis of Frontal Plane
b. Categories: (1). Normal Axis, (2). Right axis deviation, (3). Left axis deviation, (4). Severe right axis deviation
c. Calculation of axis (examples)
d. Rapid method to recognize axis more negative than -30 degrees

14. Concept of Hypertrophy

15. Criteria of LVH

16. Waveshape Distortion Due to LVH (STEMI Mimic)
   a. ST-T changes of repolarization (strain)
   b. Precordial Q-waves and ST-segment elevation (pseudoinfarction patterns)

17. Concept of Sensitivity and Specificity

18. Hypertrophy Criteria Related to Age of the Patient

19. Systematic approach to 12-Lead Analysis
   a. Mnemonic with utilization of the acronym H-E-A-R-T to apply to every ECG
   b. Example tracings interpreted with use of acronym and “Stanley’s Heart Rule"

20. Putting it all in perspective
   a. The LVH pattern and its associated ST-T changes and Q-waves
   b. The LBBB pattern and its associated ST-T changes and Q-waves.
      Emphasis on the hazard (virtual impossibility) of diagnosis of the acute MI
   c. ECG changes of ventricular aneurysm

21. Revisiting ST-segment Elevation

22. Revisiting ST-segment Depression

23. Revisiting T-wave Inversion

24. Revisiting Q-waves

25. Important Truisms: One-liners frequently misunderstood by the practitioner