Abbott i-STAT

- Portable clinical analyzer
- Measures various analytes and blood gases
- 2-3 drops of sample added to cartridge
- Insert into analyzer
- Connectivity to LIS
Sample Collection and Procedure

- Fresh whole blood
- Acid/base balance
- Electrolytes
- Metabolic status
- Coagulation
- Hematology

Order of Draw

- No additive (red top)
- Citrate (blue top)
- Heparin (green top)
- EDTA (purple top)
- Oxalate-fluoride (gray top)
Theory of Operation

- Microprocessor
- 3 types of memory
  - Flash (software)
  - RAM (storage of test records)
  - EEPROM (stores factory calibration info)

Measurements

- Electrochemical
- Direct vs. indirect
- 3 types of electrodes:
  - Potentiometric
  - Amperometric
  - Conductometric
Potentiometric Sensors

- Difference in potential (indicator/reference)
- ISE (ion selective electrode)
- Indicator designed to be sensitive to a particular ion

Amperometric Sensors

- Potential applied to a measuring electrode
- Current is generated by the ox/red reaction
- Current generated is directly proportional to [ ] of the analyte
Conductometric Sensors

- Alternating current applied between two electrodes in contact with test soln
- Resulting voltage difference is measured
- Conductivity of the soln is proportional to the magnitude of the voltage difference

Analyte [ ] Determination

- Known value of analyte [ ] in calibrant soln
- Measured voltage (potentiometric) or current (amperometric) signal generated by analyte in calibrant
- Measured signal generated by the analyte in test soln
Determination of Cell

- Known electrolyte of calibrant
- Measured electrolyte of sample
- Measured conductivity of calibrant
- Measured conductivity of sample
- Hematocrit measurement: non-conducting excluded fraction of sample

PT/PTT Measurement

- Results obtained when coagulation occurs
- Traditionally, ↑ blood viscosity (START4) or plasma turbidity (MDA)
- Electro-active marker detected with an amperometric or potentiometric sensor
- As coagulation marker ↑, ↑ in signal @ the sensing electrode
Quality Control (QC)

- Important! Monitors performance of instrumentation
- iSTAT QC focuses on the user and cartridge technology
- Automatically monitors the measurement process that is likely to impact quality (sensors and operator action)

QC (cont.)

- Monitors fluidics and sensors with each test
- Automated checks that monitors user with each test
- Liquid material used to check quality of the cartridge batch (storage)
- Independent device used to stress sensors
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<tr>
<th>QC Advantages</th>
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<td>- No interpretation of control results by non-laboratory personnel</td>
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<td>- Allows for tight QC limits</td>
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<td>- Most important: quality results in the hands of individuals not trained in Laboratory Science</td>
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<td>- Analyzer controls all fluid motions</td>
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<td>- User does not impact on quality of the analytical process</td>
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<td>- Fluid sensor</td>
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<td>- Each device is sealed in a separate pouch</td>
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Cartridge Specifications

- 2-8°C until expiration date
- Room temp (RT) for 2 weeks
- Use after 5 minutes at RT (cartridge) or 1 hour at RT (box)
- Use immediately after opening pouch
- Fresh whole blood (WB) from arterial, venous or skin punctures
- Sample volume depends on cartridge used (17-95 ul)

Test Specifications

- cTnI and CKMB use heparinized blood
- Skin puncture not recommended for: ACT, cTnI, CKMB, BNP
- Immediately test for: ACT, PT/INR, lactate
- Within 3 minutes test: samples collected in evacuated tubes and syringes w/out anti-coagulant
- Within 10 minutes: any anti-coag. Tube for pH, pCO2, pO2, and iCa
- Within 30 minutes: lytes, glu, bun/creat, hct, cTnI, CKMB and BNP
Analysis Time

- ACT - 16.7 minutes
- PT/INR - 5 minutes
- cTnl and BNP - 10 minutes
- CKMB - 5 minutes
- Other tests - 130-200 seconds

References