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# Quality Control Policy

## Responsibility for Monitoring

The Laboratory monitors the analytical systems of its departments to ensure the quality and correctness of patient results.

## Sample Testing

### Control specimens are tested in the same manner and by the same personnel as patient samples. Quality control data is organized and presented so that it can be evaluated daily by the technical staff to detect problems or trends. Tolerance limits are defined by the manufacturer and verified by the lab or established by repetitive analysis. Results of controls are verified for acceptability before reporting patient results. Corrective action for control values that exceed the defined tolerance limits is documented. Following corrective action, the testing system is reevaluated to ensure the system is in control and patient results are accurate.

### For quantitative tests, control material at more than one concentration is used each day of testing. For qualitative tests, a positive and negative control (internal or external) is included with each run of patient specimens.

# Cancellation of Laboratory Specimens

## Policy

### The Laboratory will make every effort to perform any testing requested by a licensed caregiver with the authority to order laboratory tests. In the event a test must be cancelled, the caregiver will be promptly notified via telephone as to the reason for the cancellation. This includes samples that have been cancelled for the following reasons:

#### Quantity not sufficient to perform the testing

#### Improper specimen type submitted

#### Clotting of anti-coagulated specimens

#### Improper specimen collection (ex. drawn above an IV line) or transport

#### Questionable results

#### Improperly labeled specimens

### Samples that are cancelled by Laboratory staff will include documentation in the cancellation comments in LIMS regarding the reason for cancellation as well as the caregiver who was notified.

# Assay Validation Protocol: Qualitative

## Purpose

To define the protocol for validating new assays or replacement assays that produce a qualitative result.

## Scope

### The following protocols are to be followed whenever a FDA cleared method is being considered as a for replacement method for an established method, or as a new procedure to be incorporated into the RCA Laboratories test menu. The protocol may also be used for assays that are labeled as RUO/IUO by the manufacturer. CLIA’88 §493.1213 is explicit in detailing those test parameters that must be verified prior to reporting patient results. The regulation applies to both quantitative and qualitative tests placed in use after September 1, 1992. They include:

### Precision

### Accuracy

### Analytical Sensitivity

### Analytical Specificity to include interfering substances

### Reportable Range of Patient Results

### Reference Range

### Any other performance characteristics required for test results

## Scope

The following protocols are designed to be a minimum requirement for the initial validation. More rigorous protocols may be substituted where deemed appropriate to meet the objectives of the evaluation study. This SOP is intended to be a guide to ensure that all validation studies 1) are carried out using a statistically significant number of samples and that 2) CLIA requirements for such validations are met. Thus, the substitution of alternate protocols that meet the above criteria would be appropriate under specific circumstances.

## Definitions

### The “*established*” refers to the method that is in present use or the method used at a referral laboratory or the laboratory of the manufacturer.

### The “*test*” method refers to the method under consideration for adoption.

### Note: Validation records should be maintained at each site for 2 years beyond the time the method is removed from active use; 5 years for Immunohematology studies.

## Precision (Intra-Assay)

### Two of three levels, at least one of which should be a patient specimen (a specimen pool is acceptable), may be chosen depending on the medical decision points.

### Note: If the initial precision studies do not meet or exceed the manufacturer’s package insert specifications or are less desirable than the established method do not perform additional studies until the reason for the imprecision is determined and resolved.

### Assay twenty (20) patient samples in a single run.

### Data Reduction

#### Expected result

#### Reported result

#### Concordance

### Evaluation Criteria

#### The concordance between the expected result and the reported result must be >90%

## Precision (Inter-Assay)

### Specimen types

### Control or patient specimens may be selected. If the initial precision studies do not meet or exceed the manufacturer’s package insert specifications, do not perform additional studies until the reason for the imprecision is determined and resolved.

### Procedure

#### Assay 5 aliquots of each level over 3 different runs. Only one (1) determination is recorded per run. At least one (1) re-calibration should be performed during this evaluation. If more than one sample at each level is analyzed with in a single run, within run bias is introduced.

#### Data Reduction

##### Expected result

##### Reported result

##### Concordance

#### Evaluation Criteria

##### The concordance between the expected result and the reported result over the three runs must be >90%.

## Accuracy

### Procedure: The relative accuracy of a method may be established by direct comparison of results with those generated by the established or test method. A total of 50 different specimens are run.

### Data Reduction

#### Expected result

#### Reported result

#### Concordance

### Evaluation Criteria

#### The concordance between the expected result and the reported result for all samples must be >90%

## Analytical Sensitivity

### Procedure The lower limit of detection (LLD) may be evaluated using 3 aliquots of control or known patient sample diluted by serial dilution (may be 2 fold, 5 fold, 10 fold or 100 fold depending on test. These determinations may be performed in a single run.

### Data Reduction

#### Expected result

#### Reported result

#### Concordance

### Evaluation Criteria

#### The concordance between the expected result and the reported result for all samples must be >90%

#### The lower limit of detection is determined by the value generating a valid result as compared to the known genotype. This result should be equal to or less than the stated LLD for the established method.

## Analytical Specificity

### Analytical specificity may be derived from the manufacturer’s package insert of other literature references and should be transcribed into the Method SOP. Consideration should be given to performing specificity studies where warranted. If specificity studies are performed, % recovery of the analyte of interest is assessed against the presence of interferants common to that analyte. Different sample matrices (blood vs buccal) may also be used as an interfering substance.

### Data Reduction

#### Expected result

#### Reported result

#### Concordance

### Evaluation Criteria

#### The concordance between the expected result and the reported result for all samples must be >90%.

# Assay Validation Protocol: Quantitative

## Purpose

To define the protocol for validating new assays or replacement assays that produce a quantitative result.

## Protocol

### The following protocols are to be followed whenever a FDA cleared method is being considered replacement method for an established method, or as a new procedure to be incorporated into the test menu. The protocol may also be used for assays that are labeled as RUO/IUO by the manufacturer.

#### Precision

#### Accuracy

#### Analytical Sensitivity

#### Analytical Specificity for interfering substances

#### Reference Range – refer to SOP and Reference Range Review

#### Any other performance characteristics required for test results

### The following protocols are designed to be a minimum requirement for the initial validation. More rigorous protocols may be substituted where deemed appropriate to meet the objectives of the evaluation study. In addition, some semi-quantitative assays may require alternate protocols. This SOP is intended to be a guide to ensure that all validation studies 1) are carried out using a statistically significant number of samples and that 2) CLIA requirements for such validations are met. Thus, the substitution of alternate protocols that meet the above criteria would be appropriate under specific circumstances.

### The “*established*” refers to the method that is in present use or the method used at a referral laboratory or the laboratory of the manufacturer.

### The “*test*” method refers to the method under consideration for adoption.

Note: Validation records should be maintained at each site per the Document Retention Policy (Refer to policy QP 600)

## Precision (Intra-Assay)

### At least 20 patient specimen (a specimen pool is acceptable), may be chosen depending on the medical decision points. For example, if low values are just as medically important as high values (K), a low, normal, and high value should be selected. If only low or high values are medically important (BUN, a normal and low/high value will be adequate.

### Note: If the initial precision studies do not meet or exceed the manufacturer’s package insert specifications or are less desirable than the established method do not perform additional studies until the reason for the imprecision is determined and resolved.

### Procedure

### Assay twenty (20) aliquots of each level in a single run.

### Data Reduction

#### Mean

#### SD

#### CV

### Evaluation Criteria

The CVs of each level should meet or exceed the CVs of the established method, manufacturer’s specifications or literature reference.

## Accuracy

### Procedure

The relative accuracy of a method may be established by direct comparison of results with those generated by the established or test method. A minimum amount of 20 specimens are run. Specimens are selected to cover a broad analytical range and are run by the test method and the established method.

### Data Reduction

#### XY plot

#### Linear regression analysis

#### Correlation coefficient

### Evaluation Criteria

#### r ≥ 0.975 (decade range) or ≥ 0.99 (3 decade range)

#### slope bias of ≤ 10% (slope between 0.9 –1.1)

#### paired t-test to determine if the means of x and y are significantly different.

**Note**: If the reportable range is limited (e.g. Na) evaluation using a bias plot and percent Bias may be more appropriate. The mean bias should be ≤ 10%.

## Analytical Sensitivity

The lower limit of detection is the lower limit of the AMR.

## Analytical Specificity

Analytical specificity may be derived from the manufacturer’s package insert of other literature references and should be transcribed into the Method SOP. Consideration should be given to performing specificity studies where warranted.

## Interfering Substances (Obtain from the Manufacturers recommendations)

To determine whether hemolysis, and/or bilirubin and/or lipemia present in clinical samples interfere significantly with the measurement of the test analyte, obtain the data from the manufacture’s package insert to fulfill the CAP regulation.

**Revision History**

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| --- | --- | --- | --- |
| Revision Number | Reason for Revision | Author | Effective Date |
| 0 | Original SOP | Bill Miller | Upon Signature |
| 1 | Change company name, reformat Quality System, Add CEO signature Line, addition of quantitative validation requirements, | Sarah Jacobs-Helber | Upon Lab Director Signature |

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| --- | --- | --- |
| **Review & Approval History** | | |
| **Printed Name** | **Signature** | **Date** |
| Sarah Jacobs-Helber, PhD HCLD(ABB), Laboratory Director |  |  |
| William Miller, HTL, MBA Chief Executive Officer |  |  |

**Reviewed by:**

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