TRAINING UPDATE

Lab Location:	GEC, SGAH & WAH	**Date Distributed:**	5/12/2014
Department:	Mgmt, QA, Core Lab	**Due Date:**	5/31/2014
		Implementation:	**6/1/2014**

DESCRIPTION OF PROCEDURE REVISION

Name of procedure:
Carryover Studies GEC / SGAH / WAH. QDNQA723 v1.3
Description of change(s):
App B: update Xpand and Vista analytes, replace HMX with AcT10 `(remove LDI from Xpand list and add PTN to Vista)` This revised SOP will be implemented on June 1, 2014

Document your compliance with this training update by taking the quiz in the MTS system.

Approved draft for training all sites (version 1.3)

Non-Technical SOP

Title	**Carryover Studies**
Prepared by	National Quality Assurance – Clinical Pathology, Jill Hittinger Date: 3/26/2010

Laboratory Approval	**Effective Date:**	
Print Name and Title	**Signature**	**Date**
Refer to the electronic signature page for approval and approval dates.		

Review		
Print Name and Title	**Signature**	**Date**

Corporate Approval	
Owner	Ruthi Breazeale National Quality Assurance / CP
Signature	*Electronic signature* Date: 4/2/2010
Chief Laboratory Officer/Designee	Stephen Suffin, M.D.
Signature	*Electronic signature* Date: 4/2/2010
Corporate Issue Date	4/5/2010

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1. PURPOSE

Carryover studies are required under a variety of conditions for quantitative analytical methods performed in clinical laboratories. This document clarifies these requirements and describes the process for carryover evaluation.

2. SCOPE

Each laboratory must determine which methods and analytes require carryover evaluation. Quantitative methods that include automatic pipetting systems may require carryover studies. This applies to both stand-alone pipette systems and to sample pipettes integrated with analytic instruments. Analytes that use these pipetting systems must be evaluated if there is a wide range of analyte concentration, such that a small amount of carryover could have significant clinical implications. An analyte with a wide clinical range that requires carryover studies is defined as having a Clinically Reportable Range (CRR) of greater than or equal to 2 logs or a one hundred fold difference between the upper limit of the CRR and the lower limit of the CRR.

3. RESPONSIBILITIES

- The **Laboratory Medical Director** is responsible for:
  - Approval of the initial document and any subsequent revisions.
  - Approval of all carryover studies performed as part of the laboratory method validation prior to patient testing.
- The **Laboratory Medical Director or Designee** is responsible for the annual review of this document.
- The **Department Technical Supervisor** (or designated laboratory professional) is responsible for:
  - Ensuring compliance with this procedure in his/her department.

- Determining which analytes qualify for a carryover study.
- Ensuring carryover studies are performed at the required frequency.
- Documenting all steps of the process.
- Ensuring all staff is appropriately trained.

- **Testing Personnel** are responsible for:
  - Following the carryover study frequency.
  - Halting patient testing after major maintenance or repair of the pipette assembly until a carryover study has been performed.

4. DEFINITIONS

Allowable Total Error (TE_A): The amount of error that meets the laboratory's stated quality goals or quality requirement for that analyte.

Carryover: The increase in a quantitative test result due to remnants of a previously run sample. Carryover may occur when samples of low assay value are run after samples of high assay value using a method that includes an automatic pipetting system.

Clinical Reportable Range (CRR): The CRR is the range of analyte values that a method can report as a quantitative result, allowing for specimen dilution, concentration or other pretreatment used to extend the direct AMR. This definition applies only to quantitative tests. The Laboratory Director (with the Best Practice Team) will define the CRR for each analyte. The CRR, along with the associated dilution protocol (dilution criteria, diluent, dilution factor, minimum sample) must be specified in the Standard Operating Procedure (SOP).

Limit of Quantitation (LoQ): The lowest concentration at which performance meets the laboratory's stated quality goals or quality requirements for that analyte.

5. PROCESS

A. Identify any method performed in the laboratory that uses a specimen sampling system with a non-disposable sample probe or set of probes to sample patient specimens. Refer to Appendix B.

B. Examine the CRR specifications for each analyte performed by these methods. A carryover study is required if any analyte has a CRR greater than or equal to 2 logs or a one hundred fold difference between the upper limit of the CRR and the lower limit of the CRR.

   Note: Initial laboratory method validations also require carryover studies for these analytes.

C. Select one of these analytes to represent each automatic pipetting system. It is not necessary to include every qualifying analyte in the study.

D. Obtain the current TEa for the analyte to be evaluated. This may be obtained on the Medical Quality Website.

E. Perform the carryover validation steps below:

Step	Action
1	**Specimen Selection.** • Obtain a patient specimen of very high concentration (near the highest value that can occur in the human body) • Obtain a specimen at a very low concentration, but above LoQ (it must be measureable). Pooled serum is acceptable but MUST be WELL-MIXED!
2	**Specimen volume** • Sufficient volume to perform at least 6 assays of the high sample • Sufficient volume to perform at least 15 assays of the low sample
3	**Perform the carryover test at least 3 separate times in the following sequence.** L1, L2, H1, H2, L3, L4, L5 The same day and run is acceptable.
4	**Enter the data in the Excel file for Carryover Studies template, Appendix A.** This template may be obtained on the Medical Quality/National Quality Assurance Website.
5	The template for Carryover Studies performs the following calculations: For each run, the following are calculated: • The average expected baseline value for the low sample will be the average of L1 and L5 • The average of the expected value for the high sample will be the average of H1 and H2 • The difference in the first sample after the high samples relative to the expected baseline • The difference in the second sample after the high samples relative to the expected baseline • The difference in the sample just before the high samples relative to the expected baseline to check for pre-carryover. Average across runs: • The average carryover of the first low sample (L3) after the high samples • The average carryover of the second low sample (L4) after the high samples • The average pre-carryover of the low sample (L2) just before the high samples

F. Review the calculation results generated from the template. Compare the average differences to allowable difference TEa/4.

If Carryover is not observed, then no action needs to be taken. Patient testing can be resumed.

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If Carryover is observed and is not expected, do not perform patient testing. Perform troubleshooting procedures and/or contact the manufacturer to ensure that all systems are in order.

If Carryover is observed and is expected according to known limitations, patient testing can be resumed using previously established retesting protocols for samples that follow high samples.

G. Write a conclusion as to the acceptability of carryover performance.

H. Obtain appropriate signatures of approval.

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6. FREQUENCY

Carryover studies must be performed:

A. For initial method validation
B. After major maintenance or repair of the pipetting assembly. See Appendix B.
C. For cause (i.e. imprecision or unexpected results observed for the test system.

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7. RECORDS MAINTENANCE

Records are maintained according to the requirements available on-line in the Quest Diagnostics *Records Management Program.*

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8. RELATED DOCUMENTS

- Quest Diagnostics *Laboratory Method Validation for Quantitative and Semi-Quantitative Methods procedure*, current version.

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9. REFERENCES

- College of American Pathologists Laboratory Accreditation Program http://www.cap.org/apps/cap.portal?_nfpb=true&_pageLabel=accreditation
- Federal Register, Friday, January 24, 2003 (42 CFR Part 493), Subpart M – Quality Systems for Non-Waived Tests

10. REVISION HISTORY

Version	Date	Reason for Revision	Revised By	Approved By
1.0	3/29/2011	Minor format changes to header / footer Section 10: add approver column Section 12: specify location of file, add App B	L. Barrett	C. Bowman
A	6/4/2012	App B: update analyzer list	R. SanLuis	C. Bowman
B	4/22/2014	App B: update Xpand and Vista analytes, replace HMX with AcT10 Footer: New local version numbering adopted per corporate policy change	L. Barrett R. SanLuis	C. Bowman

11. PROCESS DOCUMENT RETIREMENT

Version	Date	Reason for retirement/superseded by	Name

12. APPENDICES

Appendix	Title
A	QDNQA723TEM_Carryover Template (see Attachment tab)
B	Analyzer Specifications

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Appendix B

Analyzer Specifications

A. Dimension chemistry analyzers (EXL/Xpand)
   1. Major maintenance is defined as change R1 sample arm assembly, change syringe or if recommended by field service representative.
   2. Analytes to be tested: BHCG, CREA

B. VISTA chemistry analyzers
   1. Major maintenance is defined as replacement of sample or reagent arm assembly, change syringe or recommended by field service representative.
   2. Analytes to be tested: Vista 500 (BHCG, CREA, LDI, PTN)
      Vista 1500 (Server 1: BHCG, CREA, LDI, PTN)
      Vista 1500 (Server 2 and 3: CREA, LDI)

   3. **Vista 1500 Server Configuration Modification and Programming:**
      a. Navigate to **Advanced>Configurations>Reagent Flex Configuration**. Select **Modify Reagent Flex Configuration** from the Action menu. (Vista 1500 only)
         1) Select the server location(s) for the method(s) to study, then confirm or configure the selected methods into these servers for the duration of this study.
         2) Highlight the Flex reagent cartridge to move, select local server, select the new server, and save changes.
         3) Document the pre-study server locations for any methods moved specifically for this study and change back at the study conclusion.
      b. Navigate to **Advanced>Internal Use>System Configuration (Internal Use)>Modify System Configuration>Method Processing Order**. Configure the system to run tests by changing the Method Processing Order to "As Entered." Document the pre-study processing order before changing and change back at the conclusion of this study.
      c. Any method moved to new server locations must be calibrated and QC within control limits before proceeding.

   Notes:
   - BHCG, CREA, and LD are analytes in a sample carryover kit sold by the College of American Pathologists (CAP).
   - Patient samples will be used for PTN testing. Samples with high abnormal values will be frozen and / or samples will be requested from the reference lab.

C. Centaur (Not indicated – Disposable pipette tips)

D. Coagulation analyzers (Stago)
   1. Performed with bi-annual PM by service technician. Performed by technical staff if a problem is suspected.
   2. Analyte to be tested: PTT

E. Hematology analyzers (LH750, AcT10) do not require carryover studies because testing is including in calibration.