DXC (VANC) VANCOMYCIN

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PRINCIPLE

VANC reagent, when used in conjunction with UniCel® DxC 600/800 System(s) and SYNCHRON® Systems Vancomycin Calibrator set, is intended for quantitative determination of Vancomycin concentration in human serum or plasma.

BACKGROUND

Clinical Significance

Vancomycin is a glycopeptide antibiotic. It is primarily used in the treatment of infections due to ß-lactam or methronidazole-resistant gram positive cocci and bacilli. It may also be used prophylactically in some patients who are at risk for endocarditis or when methicillin-resistant *Staphylococcus aureus* or *Staphylococcus epidermidis* is a risk. Since individual patients exhibit a high degree of variability in absorption and metabolism of vancomycin, therapeutic monitoring is recommended in certain patients. The major toxic reactions include "red-man syndrome", nephrotoxicity, and ototoxicity when very high levels of drug are present in the circulation.

Methodology

VANC reagent is used to measure analyte concentration by a particle enhanced turbidimetric inhibition immunoassay method. Particle-bound drug (PBD) binds to the analyte specific antibody (Ab) resulting in the formation of insoluble aggregates causing light scatter. Non-particle-bound analyte in the patient sample competes with the PBD for the antibody binding sites, inhibiting the formation of insoluble aggregates. The rate and amount of particle aggregation is inversely proportional to the concentration of analyte in the sample.The SYNCHRON® System(s) automatically proportions the appropriate sample and reagent volumes into a cuvette. The ratio used is one part sample to 104 parts reagent. The System monitors the aggregate formation by measuring the change in absorbance at 340 nanometers. This change in absorbance is inversely proportional to the concentration of VANC in the sample and is used by the System to calculate and express the VANC concentration based upon a multi-point calibration curve.

RELATED DOCUMENTS

R-PO-CH-0810	Quality Control Program General Laboratory
R-PO-CH-0809	Quality Control Westgard Rules Statistics
R-PR-AD-0540	Specimen Rejection/Cancellation Protocol
J-F-CH-0820	DXC 800 Controls
J-F-CH-0826	DXC 800 Calibrators
J-F-CH-1940	DXC Analytical Measurement Range

M-F-CH-0820 DXC 600 Controls
M-F-CH-0826 DXC 600 Calibrators
M-F-CH-1940 DXC 600 Analytical Measurement Range

SPECIMEN

Type of Specimen

Biological fluid samples should be collected in the same manner routinely used for any laboratory test. Freshly drawn serum or plasma are the preferred specimen. Acceptable anticoagulants are listed in the PROCEDURAL NOTES section of this chemistry information sheet. Whole blood or urine are not recommended for use as a sample.

Serial samples should be collected using the same sample type (i.e., serum or plasma).

Specimen Storage and Stability

1. Tubes of blood are to be kept closed at all times and in a vertical position. It is recommended that the serum or plasma be physically separated from contact with cells within two hours from the time of collection.[5]

2. Separated serum or plasma should not remain at room temperature longer than 8 hours. If assays are not completed within 8 hours, serum or plasma should be stored at +2°C to +8°C. If assays are not completed within 48 hours, or the separated sample is to be stored beyond 48 hours, samples should be frozen at -15°C to -20°C. Frozen samples should be thawed only once. Analyte deterioration may occur in samples that are repeatedly frozen and thawed.

Sample Type	Volume	Sample Stability

Plasma	0.5mL	• Freshly drawn Lithium Heparin mixed gently by inversion ~~and placed on ice~~[HJ(H1]
		• Centrifuge immediately
		• Stability:
		  ○ serum / plasma 8 hours at +18-26° C
		  ○ serum / plasma 48 hours at +2-8° C
		  ○ serum / plasma after 48 hours freeze at -15 to -20° C

Criteria for Unacceptable Specimens

See Specimen Rejection/Cancellation Protocol

Sample Volume

A filled 0.5 mL sample cup is the optimum volume. For optimum primary sample tube volumes in primary tube samples and minimum volumes, refer to the Primary Tube Sample Template for your system.

REAGENTS

Contents

Each kit contains the following items:

Two VANC Reagent Cartridges (2 x 100 tests)

Volume per Test	
Sample Volume	3uL
ORDAC Sample Volume	2uL
Total Reagent Volume	312uL
Cartridge Volumes	A 230uL B 50uL C 32uL

Reactive Ingredients	
Vancomycin Particle	8mL
Monoclonal anti-Vancomycin Antibody(mouse)	5mL
Vancomycin Reaction Buffer	55mL

Also non-reactive chemicals necessary for optimal system performance.

Reagent Preparation

Note: Failure to mix the reagent will result in erroneous values.

1. Gently invert the cartridge three times prior to loading onto the SYNCHRON System.

2. Check for bubbles or foam in compartments; break any bubbles.

Acceptable Reagent Performance

The acceptability of a reagent is determined by successful calibration and by ensuring that quality control results are within your facility`s acceptance criteria.

Reagent Storage and Stability

VANC Reagent when stored unopened at +2°C to +8°C, will remain stable until the expiration date printed on the cartridge label. Once opened, the reagent is stable for 42 days at +2°C to +8°C unless the expiration date is exceeded. DO NOT FREEZE. Do not expose reagent to temperatures above +35°C or to direct sunlight.

CALIBRATION

Calibrator Required

SYNCHRON® Systems Vancomycin Calibrator set

Calibrator Preparation

No preparation is required.

Calibrator Storage and Stability

SYNCHRON® Systems Vancomycin Calibrator set is stable until the expiration date printed on the calibrator bottle if stored capped in the original container at +2°C to +8°C.

Calibration Information

1. The system must have a valid calibration curve in memory before control or patient samples can be run.

2. Under typical operating conditions the VANC reagent cartridge must be calibrated every 14 days and also with certain parts replacements or maintenance procedures, as defined in the UniCel DxC 600/800 System *Instructions For Use* (IFU) manual. This assay has within-lot calibration available. Refer to the UniCel DxC 600/800 System *Instructions For Use* (IFU) manual for information on this feature.

3. For detailed calibration instructions, refer to the UniCel DxC 600/800 System *Instructions For Use* (IFU) manual.

4. The system will automatically perform checks on the calibration and produce data at the end of calibration. In the event of a failed calibration, the data will be printed with error codes and the system will alert the operator of the failure. For information on error codes, refer to the UniCel DxC 600/800 System *Instructions For Use* (IFU) manual.

Traceability

For Traceability information refer to the Calibrator instructions for use.

QUALITY CONTROL

See Related Documents

PROCEDURE STEPS

1. If necessary, load the reagent onto the system.

2. After reagent load is completed, calibration may be required.

3. Program controls for analysis.

4. After loading samples and controls onto the system, follow the protocols for system operation. To load samples manually refer to the FHS DXC Series Manual Sample Programming procedure. .For detailed testing procedures, refer to the UniCel DxC 600/800 System Instructions For Use (IFU) manual.

CALCULATIONS

SYNCHRON® System(s) perform all calculations internally to produce the final reported result. The system will calculate the final result for sample dilutions made by the operator when the dilution factor is entered into the system during sample programming.

ANTICOAGULANT TEST RESULTS

The following anticoagulants were assessed by Deming regression analysis with a minimum of 50 paired serum and plasma samples. Values of serum (X) ranging from 4.2 to 49.0 µg/mL were compared with the values from plasma (Y) yielding the following results:

Anticoagulant	Level of Anticoagulant Tested
Lithium Heparin	14 Units/mL
Sodium Heparin	14 Units/mL

PERFORMANCE CHARACTERISTICS

Reference Range

	Therapeutic	Toxic (Critical Value)
TROUGH	5.0 – 15.0 ug/mL	>25.0 ug/mL
PEAK	20.0– 80.0ug/mL	>80.0 ug/mL
RANDOM	No ranges	

Analytic Range

The SYNCHRON LX Systems method for the determination of vancomycin provides the following analytical range. It is recommended that the Auto ORDAC feature be enabled.

Sample Type	Conventional Units
Serum or Plasma	3.5 – 40 µg/mL
Serum or Plasma (ORDAC)	30 – 60 µg/mL

Samples with concentrations outside of the analytical range should be reported as "<3.5 µg/mL" ("<2.4 µmol/L").If the Auto ORDAC feature is not enabled, samples reported out as ">40 µg/mL" (">27.6 µmol/L") should be reprogrammed using the manual ORDAC function and reanalyzed. Samples reported out as ">60 µg/mL" (">41.4 µmol/L") must be confirmed by diluting the sample X2 with saline and reanalyzing. The appropriate dilution factor should be applied to the reported result.

Very rarely, a patient sample may contain a nonspecific protein which could cause a false low VANC result. It is recommended that the low limit of the reportable range of this assay be set to the default value of 0.1 µg/mL (0.07 µmol/L). All samples with printed results below 0.1 µg/mL (0.07 µmol/L) will need to be confirmed by dilution. Printed results between 0.1 µg/mL (0.07 µmol/L) and 3.4 µg/mL (2.38 µmol/L) do not need to be confirmed by dilution and can be reported as "<3.5 µg/mL" ("<2.4 µmol/L").

Dilution protocol: Confirm a suspected low VANC sample result by adding one measured volume of test sample to an equal volume of Synchron control level 2 . The assayed VANC result of this diluted sample should be approximately half of the value of the Synchron control level 2. If the assayed result of the diluted sample is not close to half of the Synchron control level 2 value, send specimen to Reference Lab for testing. The confirmed result should be reported out as '<3.5ug/mL"

Reporting results outside of analytical range

Lower limit of range: serum / plasma	3.5 µg/mL	Results <0.1, dilute 1:2 with Synchron control level 2. The diluted sample should be approximately half of the value of the Synchron Control level 2. If not, redilute and retest. The confirmed result should be reported as "<3.5".
Upper limit of range: serum / plasma	120.0 µg/mL	Results >60.0 should be diluted using 0.9% saline, reanalyzed and dilution factor applied. The maximum allowable dilution is X2. Results >120.0 are reported as ">120.0"

Sensitivity

Sensitivity is defined as the lowest measurable concentration which can be distinguished from zero with 95% confidence. Sensitivity for VANC determination is 3.5 µg/mL (2.4 µmol/L).

LIMITATIONS

None identified.

Interferences

1. The following substances were tested for interference with this methodology:

Substance	Source	Level Tested	Observed Effect
Hemoglobin	RBC hemolysate	500 mg/dL	No Significant Interference (within ±2.6 µg/mL or 8%)
Bilirubin	Porcine	30 mg/dL	No Significant Interference (within ± 2.6 µg/mL)
Rheumatoid Factor	Human	300 IU/mL	No Significant Interference (within ± 2.6 µg/mL)
Lipemia	Human	4+	No Significant Interference (within ± 2.6 µg/mL)
Paraprotein (IgM)	Human	500 mg/dL	No Significant Interference (within ± 2.6 µg/mL)

2. Interference may occur with serum samples from patients diagnosed as having plasma cell dyscrasias and lymphoreticular malignancies associated with abnormal immunoglobulin synthesis, such as multiple myeloma, Waldenström`s macroglobulinemia, and heavy chain disease.[11] Results for these samples are typically suppressed and may include results printed as "<3 µg/mL" ("<2.4 µmol/L") and "<30 µg/mL" ("<20.7 µmol/L"). If using the dilution protocol for results less than the analytical range, results from patients with these disease states usually do not approximate the known value. These samples should be run by an alternate method.

3. For assays employing mouse antibodies, the possibility exists for interference by human anti-mouse antibodies (HAMA) in the sample. Human anti-mouse antibodies may be present in samples from patients who have received immunotherapy or diagnostic procedures utilizing monoclonal antibodies or in individuals who have been regularly exposed to animals.[12,13] Additionally, other heterophile antibodies, such as human anti-goat antibodies may be present in patient samples. Interpretation of results should be done in the context of the overall clinical presentation of the patient, including symptoms, clinical history, data from additional tests and other appropriate information.

4. Refer to References (14,15,16) for other interferences caused by drugs, disease and preanalytical variables.

ADDITIONAL INFORMATION

For more detailed information on UniCel DxC Systems, refer to the appropriate system manual.

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