GAMMA-GLUTAMYLTRANSFERASE (GGT)

OSR6119	**4 x 15 mL**	**R1**
	4 x 15 mL	**R2**
OSR6219	**4 x 50 mL**	**R1**
	4 x 50 mL	**R2**

Intended Use
System reagent for the quantitative determination of Gamma-Glutamyltransferase (EC 2.3.2.2) activity in human serum on Beckman Coulter AU analyzers.

Summary
Gamma-glutamyltransferase measurements are used in the diagnosis and treatment of liver diseases such as alcoholic cirrhosis and primary and secondary liver tumors.

Elevated serum gamma-glutamyltransferase (GGT), sometimes called GGTP, is found in all forms of liver disease. It is more sensitive than alkaline phosphatase, the transaminases, and leucine aminopeptidase (LAP) in detecting obstructive jaundice, cholangitis, and cholecystitis. GGT levels rise earlier in liver disease and to higher values than LAP or 5'-nucleotidase levels.[1] Moderate elevations are seen in infectious hepatitis. However, elevated GGT levels have also been noted in chronic alcoholism, diabetes, and certain neurological disorders. Normal levels of GGT are seen in skeletal diseases; thus GGT in serum can be used to ascertain whether a disease is skeletal or hepatobiliary.

Methodology
This GGT procedure is a modification of the Szasz procedure.[2,3] GGT catalyzes the transfer of the gamma-glutamyl group from the substrate, gamma-glutamyl-3-carboxy-4-nitroanilide, to glycylglycine, yielding 5-amino-2-nitrobenzoate. The change in absorbance at 410/480 nm is due to the formation of 5-amino-2-nitrobenzoate and is directly proportional to the GGT activity in the sample.

L-γ-Glutamyl-3-carboxy-4-nitroanilide + Glyclyglycine $\xrightarrow{\gamma\text{-GT}}$ L-γ-Glutamylglycylglycine + 5-Amino-2-nitrobenzoate

System information
For AU400/400^e/480, AU600/640/640^e/680 and AU2700/5400 Beckman Coulter Analyzers.

Reagents
Final concentration of reactive ingredients:

Tris Buffer, pH 7.95 (37°C)	100	mmol/L
Glycylglycine	100	mmol/L
L-γ-Glutamyl-3-carboxy-4-nitroanilide	4.0	mmol/L

Also contains preservatives

Precautions
1. For *in vitro* diagnostic use.
2. Do not ingest. Harmful if swallowed.
3. Contains sodium azide as a preservative which may react with lead joints in copper plumbing to form explosive compounds. Even though the reagent contains minute quantities of sodium azide, drains should be well flushed with water when discarding the reagent.

Preparation of Reagents
The GGT Reagent is ready for use. No preparation is required.

Storage and Stability
1. The unopened reagents are stable until the expiration date printed on the label when stored at 2 – 8°C.
2. Opened reagents are stable for 30 days when stored in the refrigerated compartment of the analyzer.

Indications of Deterioration
Visible signs of microbial growth, turbidity or precipitate, or any change in reagent color may indicate degradation and warrant discontinuance of use.

Specimen Collection and Preparation
Serum samples, free from hemolysis, are the recommended specimens. If plasma must be used, the recommended anticoagulant is EDTA. Heparinized plasma becomes turbid in the reaction mixture; citrate, oxalate and fluoride depress activity by 10 to 15%.[1]

Sample Storage and Stability
The GGT determination should be performed as soon after specimen collection as possible. GGT in serum is stable for 1 month at 2 – 8°C and 1 year at ≤ -20°C.[4]

Interfering Substances
It has been found that some antiepileptic drugs (phenytoin, barbiturates) may result in falsely elevated GGT values.[5] Heavy alcohol consumption just prior to specimen collection may falsely elevate serum GGT.[6]

Results of studies[7] show that the following substances interfere with this GGT procedure.

The criteria for no significant interference is recovery within 10% of the initial value.

Bilirubin:	No significant interference up to 40 mg/dL Bilirubin
Hemolysis:	No significant interference up to 350 mg/dL Hemolysate
Lipemia:	No significant interference up to 1000 mg/dL Intralipid*

* Intralipid, manufactured by KabiVitrium Inc., is a 20% IV fat emulsion used to emulate extremely turbid samples.

Gamma-Glutamyltransferase (GGT)

The information presented is based on results from Beckman Coulter studies and is current at the date of publication. Beckman Coulter Inc., makes no representation about the completeness or accuracy of results generated by future studies. For further information on interfering substances, refer to Young[8] for a compilation of reported interferences with this test.

Procedure

A complete list of test parameters and operational procedure can be found in the User's Guide appropriate to the analyzer.

Materials Provided
GGT Reagent

Stability of Final Reaction Mixture
The Beckman Coulter AU analyzer automatically computes every determination at the same time interval.

Calibration
Calibration of this GGT procedure is based upon the measured extinction coefficient for 5-amino-2-nitrobenzoate, which has a molar absorptivity of 7453 at 410/480nm.

Quality Control
During operation of the Beckman Coulter AU analyzer at least two levels of an appropriate quality control material should be tested a minimum of once a day. In addition, controls should be performed with each new lot of reagent, and after specific maintenance or troubleshooting steps described in the appropriate User's Guide. Quality control testing should be performed in accordance with regulatory requirements and each laboratory's standard procedure.

Results
Automatically printed out for each sample in U/L at 37°C.

Dynamic Range

The GGT procedure is linear from 3 to 1200 U/L. Samples exceeding the upper limit of linearity should be diluted and repeated. The sample may be diluted, repeated and multiplied by the dilution factor automatically by utilizing the AUTO REPEAT RUN.

Expected Values

Adults:[4] 9 – 64 U/L
Expected values may vary with age, sex, diet and geographical location. Each laboratory should determine its own expected values as dictated by good laboratory practice.

Specific Performance Characteristics

The following data was obtained using the GGT Reagent on Beckman Coulter AU analyzers according to established procedures. Results obtained in individual laboratories may differ.

Precision[10]
Estimates of precision, based on CLSI recommendations,[9] are consistent with typical performance. The within run precision is less than 5% CV and total precision is less than 10% CV. Assays of control sera were carried out and data reduced following CLSI guidelines above.

N = 60	Within run		Total	
Mean, U/L	SD	CV%	SD	CV%
13	0.1	1.1	0.1	1.1
84	0.4	0.5	0.7	0.9

Method Comparison[10]
Patient samples were used to compare this GGT Reagent. The table below demonstrates representative performance on the AU analyzers.

Y Method	AU640
X Method	AU600
Slope	0.955
Intercept	2.0
Correlation Coeff. (r)	0.9997
No. of Samples (n)	107
Range (U/L)	7 – 1172

Sensitivity
Typical change in absorbance per minute for 1 U/L of Gamma-Glutamyltransferase is 0.23 mAbsorbance.

References

1. Tietz, N.W., Fundamentals of Clinical Chemistry, 3rd Edition, W.B. Saunders, 1986.
2. Szasz, G., Clin Chem, 15: 124, 1969.
3. Szasz, G., Z Klin Biochem, 12: 228, 1974.
4. Beckman Coulter Inc. data on samples collected from 200 blood donors in North Texas.
5. Whitfield, J.B., Moss, D.W., Neale, G., Orme, M. and Breckenridge, A., Brit Med J, 1: 316, 1973.
6. Rosalki, S.B., Rau, D., Clin Chem Acta, 39: 41, 1972.
7. CLSI/NCCLS, Interference Testing in Clinical Chemistry, EP7-P, 1986.
8. Young, D.S., Effects of Drugs on Clinical Laboratory Tests,5th Edition, AACC Press, 2000.
9. CLSI/NCCLS, Evaluation Protocol EP5-T2, 1992.
10. Data is on file for specific AU analyzers.

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