

GLDH3

GLDH Gen.3

cobas[®]
Enzymes

Order information

REF	CONTENT	Analyzer(s) on which cobas c pack(s) can be used
11929992 216	GLDH Gen.3 (4 × 100 tests)	System-ID 07 6789 1 COBAS INTEGRA 400 plus COBAS INTEGRA 800
10759350 190	Calibrator f.a.s. (12 × 3 mL)	System-ID 07 3718 6
12149435 122	Precinorm U plus (10 × 3 mL)	System-ID 07 7999 7
12149443 122	Precipath U plus (10 × 3 mL)	System-ID 07 8000 6
10171743 122	Precinorm U (20 × 5 mL)	System-ID 07 7997 0
10171735 122	Precinorm U (4 × 5 mL)	System-ID 07 7997 0
10171778 122	Precipath U (20 × 5 mL)	System-ID 07 7998 9
10171760 122	Precipath U (4 × 5 mL)	System-ID 07 7998 9
05117003 190	PreciControl ClinChem Multi 1 (20 × 5 mL)	System-ID 07 7469 3
05947626 190	PreciControl ClinChem Multi 1 (4 × 5 mL)	System-ID 07 7469 3
05117216 190	PreciControl ClinChem Multi 2 (20 × 5 mL)	System-ID 07 7470 7
05947774 190	PreciControl ClinChem Multi 2 (4 × 5 mL)	System-ID 07 7470 7
20756350 322	NaCl Diluent 9 % (6 × 22 mL)	System-ID 07 5635 0
04593138 190	cobas c pack MULTI	
on request	Open/Close tool	

English

System information

Test GLDH3, test ID 0-189

Intended use

In vitro test for the quantitative determination of the catalytic activity of GLDH (EC 1.4.1.3; glutamate dehydrogenase) in human serum and plasma on COBAS INTEGRA systems.

Summary^{1,2,3}

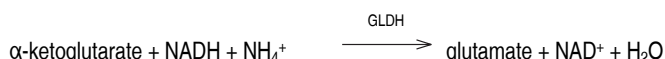
GLDH is a largely liver-specific enzyme found exclusively in the mitochondria and located predominantly within the liver cell acinus. GLDH activity in other organs such as the kidneys, pancreas, heart, brain and intestines is negligible. Determination of GLDH activity is performed to diagnose liver disorders, and in particular to assess the severity of damage to individual cells. Necrotizing liver damage such as acute hepatic dystrophy, necrotizing hepatitis, multiple liver metastases and obstructive jaundice are accompanied by elevated GLDH activities in serum.

In 1972, the German Society for Clinical Chemistry (DGKC) recommended the optimized standard method for determination of GLDH with optimized substrate concentration, NADH excess, and activation of GLDH by addition of ADP. The method described here is derived from the formulation recommended by the German Society of Clinical Chemistry (DGKC) and optimized for performance and stability.

Test principle

UV test according to a standardized method

The GLDH enzyme catalyzes this NADH-dependent reaction; the equilibrium is on the side of glutamate and NAD.



The decrease in NADH is directly proportional to the GLDH activity.

Reagents - working solutions

R1 Triethanolamine buffer: 60 mmol/L, pH 8.0; EDTA: 3.1 mmol/L; ammonium acetate: 124 mmol/L; ADP: ≥ 1.36 mmol/L; NADH (yeast): 0.27 mmol/L; LDH (rabbit muscle): ≥ 45 µkat/L; stabilizers; preservative

SR Triethanolamine buffer: 8.6 mmol/L, pH 7.9; α-ketoglutarate: 48 mmol/L; stabilizers; preservative

Precautions and warnings

Pay attention to all precautions and warnings listed in Section 1 / Introduction of this Method Manual.

Reagent preparation and **cobas c** pack MULTI assembly

Reagent handling

R1: Connect one **bottle 1** to one **bottle 1a** using the enclosed adapter and dissolve the lyophilizate completely in the buffer.

SR: Ready for use.

Labeling the **cobas c** pack MULTI

Turn the barcode labeled side of a new **cobas c** pack MULTI toward you. Affix the supplied GLDH3 barcode label directly over the existing barcode label.



Filling the **cobas c** pack MULTI

1. Turn the **cobas c** pack MULTI toward you as shown above.
2. Position A of the **cobas c** pack is now in the center, position B on the left side, position C on the right side of the **cobas c** pack.
3. Unscrew the screw cap of the bottle in position A in the center of the **cobas c** pack MULTI using the Open/Close tool.
4. Pour the content of bottle 1 (19 mL) into the opened bottle of the **cobas c** pack MULTI (position A).
5. Close the bottle tightly using the Open/Close tool.
6. Unscrew the screw cap of the bottle in position C on the right side of the **cobas c** pack MULTI using the Open/Close tool.
7. Pour the content of bottle 2 (5 mL) into the opened bottle of the **cobas c** pack (position C).
8. Close the bottle tightly using the Open/Close tool.
9. Leave position B empty.

The GLDH3 **cobas c** pack is now ready for use.

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Note

Use only the **cobas c** pack MULTI. Always use a new **cobas c** pack MULTI when preparing fresh reagent. Never reuse accessories designed for single use, as this may result in reagent contamination and could affect test results. If the **cobas c** pack MULTI bottles are not filled correctly, this may result in faulty reagent pipetting and could cause erroneous results.

Storage and stability

Shelf life at 2-8 °C See expiration date on **cobas c** pack label

COBAS INTEGRA 400 plus system

On-board in use at 10-15 °C 3 weeks

COBAS INTEGRA 800 system

On-board in use at 8 °C 3 weeks

Specimen collection and preparation

For specimen collection and preparation only use suitable tubes or collection containers.

Only the specimens listed below were tested and found acceptable.

Serum: Collect serum using standard sampling tubes.

Plasma: Heparin (Li-, Na-, NH₄⁺-) or EDTA (K₂-, K₃-) plasma.

EDTA plasma values are about 8 % lower than serum values.

The sample types listed were tested with a selection of sample collection tubes that were commercially available at the time of testing, i.e. not all available tubes of all manufacturers were tested. Sample collection systems from various manufacturers may contain differing materials which could affect the test results in some cases. When processing samples in primary tubes (sample collection systems), follow the instructions of the tube manufacturer.

Centrifuge samples containing precipitates before performing the assay.

Stability:⁴ 7 days at 15-25 °C
7 days at 2-4 °C
4 weeks at (-15)-(-25) °C

Materials provided

See "Reagents – working solutions" section for reagents.

Materials required (but not provided)

NaCl Diluent 9 %, Cat. No. 20756350 322, system-ID 07 5635 0 for automatic postdilution. NaCl Diluent 9 % is placed in its predefined rack position and is stable for 4 weeks on-board COBAS INTEGRA 400 plus/800 analyzers.

Assay

For optimum performance of the assay follow the directions given in this document for the analyzer concerned. Refer to the appropriate operator's manual for analyzer-specific assay instructions.

Application for serum and plasma

COBAS INTEGRA 400 plus test definition

Measuring mode	Absorbance
Abs. calculation mode	Kinetic
Reaction mode	R1-S-SR
Reaction direction	Decrease
Wavelength A/B	340/409 nm
Calc. first/last	43/65
Unit	U/L

Pipetting parameters

		Diluent (H ₂ O)
R1	85 µL	
Sample	17.5 µL	5 µL
SR	20 µL	

Total volume 127.5 µL

COBAS INTEGRA 800 test definition

Measuring mode	Absorbance
Abs. calculation mode	Kinetic
Reaction mode	R1-S-SR
Reaction direction	Decrease
Wavelength A/B	340/409 nm
Calc. first/last	60/98
Unit	U/L

Pipetting parameters

		Diluent (H ₂ O)
R1	85 µL	
Sample	17.5 µL	5 µL
SR	20 µL	
Total volume	127.5 µL	

Calibration

Calibrator	Calibrator f.a.s. Use deionized water as zero calibrator.
Calibration mode	Linear regression
Calibration replicate	Duplicate recommended
Calibration interval	Each lot and every 7 days and as required following quality control procedures.

Traceability: This method has been standardized against the Roche reagent using calibrated pipettes together with a manual photometer providing absolute values and the substrate-specific absorptivity, ϵ .

Quality control

Reference range	Precinorm U, Precinorm U plus or PreciControl ClinChem Multi 1
Pathological range	Precipath U, Precipath U plus or PreciControl ClinChem Multi 2
Control interval	24 hours recommended
Control sequence	User defined
Control after calibration	Recommended

For quality control, use control materials as listed in the "Order information" section. In addition, other suitable control material can be used.

The control intervals and limits should be adapted to each laboratory's individual requirements. Values obtained should fall within the defined limits. Each laboratory should establish corrective measures to be taken if values fall outside the defined limits.

Follow the applicable government regulations and local guidelines for quality control.

Calculation

COBAS INTEGRA analyzers automatically calculate the analyte activity of each sample. For more details, please refer to Data Analysis in the Online Help (COBAS INTEGRA 400 plus/800 analyzers).

Conversion factor: U/L \times 0.0167 = μ kat/L

Limitations - interference

Criterion: Recovery within \pm 10 % of initial value.

Serum, plasma

Icterus:⁵ No significant interference up to an I index of 22 for conjugated bilirubin and 54 for unconjugated bilirubin (approximate conjugated bilirubin concentration: 376 μ mol/L or 22 mg/dL; approximate unconjugated bilirubin concentration: 923 μ mol/L or 54 mg/dL).

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Hemolysis:⁵ No significant interference up to an H index of 10 (approximate hemoglobin concentration: 6 µmol/L or 10 mg/dL).

Lipemia (Intralipid):⁵ No significant interference up to an L index of 180. There is poor correlation between the L index (corresponds to turbidity) and triglycerides concentration.

Drugs: No interference was found at therapeutic concentrations using common drug panels.^{6,7} Exceptions: Physiological plasma concentrations of Sulfasalazine or Sulfapyridine may lead to false results. Temozolomide at therapeutic concentrations may lead to erroneous results.

Pyruvate: No significant interference up to a pyruvate concentration of 300 µmol/L (26 mg/dL).

In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results.⁸

For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings.

ACTION REQUIRED

Special Wash Programming: The use of special wash steps is mandatory when certain test combinations are run together on COBAS INTEGRA analyzers. Refer to the CLEAN Method Sheet for further instructions and for the latest version of the Extra wash cycle list.

Where required, special wash/carry-over evasion programming must be implemented prior to reporting results with this test.

Limits and ranges

Measuring range

1-80 U/L (0.0167-1.34 µkat/L)

Determine samples having higher activities via the rerun function. Dilution of samples via the rerun function is a 1:5 dilution. Results from samples diluted using the rerun function are automatically multiplied by a factor of 5.

Lower limits of measurement

Lower detection limit of the test:

1 U/L (0.0167 µkat/L)

The lower detection limit represents the lowest measurable analyte level that can be distinguished from zero. It is calculated as the value lying 3 standard deviations above that of a zero sample (zero sample + 3 SD, repeatability, n = 21).

Expected values

Adults^{2,9}

Males up to 6.4 U/L (0.11 µkat/L)*

Females up to 4.8 U/L (0.08 µkat/L)*

*Calculated with a temperature conversion factor of 1.61 (25 → 37 °C).¹⁰

Consensus values for adults¹¹

Males up to 7.0 U/L (0.12 µkat/L)

Females up to 5.0 U/L (0.08 µkat/L)

Reference ranges for children are given in the brochure "Reference Ranges for Adults and Children. Pre-Analytical Considerations", Cat. Nos. 11322524 001 (English), 04347234 001 (German).

Each laboratory should investigate the transferability of the expected values to its own patient population and if necessary determine its own reference ranges.

Specific performance data

Representative performance data on the COBAS INTEGRA analyzers are given below. Results obtained in individual laboratories may differ.

Precision

Precision was determined using human samples and controls in an internal protocol with repeatability (n = 21) and intermediate precision (1 aliquot per run, 1 run per day, 21 days). The following results were obtained:

Serum, plasma

Repeatability	Level 1	Level 2
Mean	22.8 U/L (0.380 µkat/L)	22.3 U/L (0.372 µkat/L)

Repeatability	Level 1	Level 2
CV	0.8 %	0.4 %

Intermediate precision	Level 1	Level 2
Mean	22.7 U/L (0.378 µkat/L)	22.0 U/L (0.367 µkat/L)
CV	1.2 %	1.0 %

Method comparison

GLDH values for human serum and plasma samples obtained on a COBAS INTEGRA 700 analyzer with the application GLDH3 (y) were compared with those determined using the corresponding reagent on a Roche/Hitachi 917 analyzer (x).

Roche/Hitachi 917 analyzer

Sample size (n) = 60

Passing/Bablok¹²

Linear regression

y = 0.98x + 0.25 U/L

y = 0.98x + 0.31 U/L

τ = 0.9711

r = 0.9989

SD (md 95) = 1.08

Sy.x = 0.44

The sample activities were between 0.6 and 65.5 U/L (0.01 and 1.09 µkat/L).

References

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- Thomas L, Müller M, Schumann G, et al. Consensus of DGKL and VDGH for interim reference intervals on enzymes in serum. J Lab Med 2005;29(5):301-308.
- Bablok W, Passing H, Bender R, et al. A general regression procedure for method transformation. Application of linear regression procedures for method comparison studies in clinical chemistry, Part III. J Clin Chem Clin Biochem 1988 Nov;26(11):783-790.

A point (period/stop) is always used in this Method Sheet as the decimal separator to mark the border between the integral and the fractional parts of a decimal numeral. Separators for thousands are not used.

Symbols

Roche Diagnostics uses the following symbols and signs in addition to those listed in the ISO 15223-1 standard.

CONTENT

Contents of kit

0111929992216COINV5.0

GLDH3

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Volume after reconstitution or mixing

GTIN

Global Trade Item Number

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