

**REF** A11A01634

**REAGENT** 90 mL



**IVD** **CE**

**HORIBA ABX SAS**  
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FRANCE

# ABX Pentra Cholesterol CP

■ **ABX Pentra 400**

**Diagnostic reagent for quantitative *in vitro* determination of Cholesterol in serum or plasma by colorimetry.**

## Application Release

### Serum, plasma:

World wide except the USA: **C\_Chol** 6.xx  
For the USA only: **Chol\_AK** 2.xx

## Intended Use

**ABX Pentra Cholesterol CP** reagent is intended for the quantitative *in vitro* diagnostic determination of cholesterol in human serum and plasma based on an enzymatic photometric test (Trinder's reaction). Cholesterol measurements are used in the diagnosis and treatment of disorders involving excess cholesterol in the blood and lipid and lipoprotein metabolism disorders.

## Clinical Interest (1, 2)

Cholesterol is a component of cell membranes and a precursor for steroid hormones and bile acids synthesized by body cells and absorbed with food (1). Cholesterol is transported in plasma via lipoproteins, namely complexes between lipids and apolipoproteins (1). There are four classes of lipoproteins: high density lipoproteins (HDL), low density lipoproteins (LDL), very low density lipoproteins (VLDL) and chylomicrons. While LDL is involved in the cholesterol transport to the peripheral cells, HDL is responsible for the cholesterol uptake from the cells. The four different lipoprotein classes show distinct relationship to coronary atherosclerosis (1). LDL-cholesterol (LDL-C) contributes to atherosclerotic plaque formation within the arterial intima and is strongly associated with coronary heart disease (CHD) and related mortality. Even with total cholesterol within the normal range an increased concentration of LDL-C indicates high risk. HDL-C has a protective effect impeding plaque

formation and shows an inverse relationship to CHD prevalence. In fact, low HDL-C values constitute an independent risk factor. The determination of the individual total cholesterol (TC) level is used for screening purposes while for a better risk assessment it is necessary to measure additionally HDL-C and LDL-C. In the last few years several controlled clinical trials using diet, life style changes and / or different drugs (especially HMG CoA reductase inhibitors [statins]) have demonstrated that lowering total cholesterol and LDL-C levels reduce drastically CHD risk (2).

## Certification

Traceability to the National Reference System for Cholesterol was established by performing a direct comparison with the cholesterol reference method using human specimens that cover the National Cholesterol Education Program (NCEP) medical decision points. The ability to meet the NCEP's performance criteria for accuracy was demonstrated by using the **ABX Pentra Cholesterol CP** reagent according to the manufacturer's instructions on the ABX Pentra 400 analyzer (calibrated using the value assigned to the **ABX Pentra Multical**, ref.A11A01652).

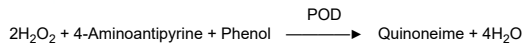
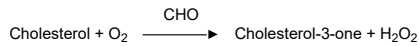
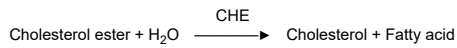
The results of the direct comparison and precision studies are available on [www.horiba-abx.com/documentation](http://www.horiba-abx.com/documentation). The **ABX Pentra Cholesterol CP** reagent is for use in Clinical Laboratories.

## Method (3, 4)

"CHOD-PAP": enzymatic photometric test.  
Determination of cholesterol after enzymatic hydrolysis and oxidation (3, 4). The colorimetric indicator is quinoneimine which is generated from 4-aminoantipyrine

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and phenol by hydrogen peroxide under the catalytic action of peroxidase (Trinder's reaction) (3).



(CHE = Cholesterol Esterase, CHO = Cholesterol Oxidase, POD = Peroxidase)

## Reagents <sup>a</sup>

**ABX Pentra Cholesterol CP** is ready-to-use.

### Reagent:

Good's buffer pH 6.7	50 mmol/L
Phenol	5 mmol/L
4-aminoantipyrine (4-AAP)	0.3 mmol/L
Cholesterol esterase (CHE)	≥ 200 U/L
Cholesterol oxidase (CHO)	≥ 50 U/L
Peroxidase (POD)	≥ 3 kU/L

**ABX Pentra Cholesterol CP** should be used according to this notice. The manufacturer cannot guarantee its performance if used otherwise.

## Handling

1. Remove the cap of the cassette.
2. If present, remove foam by using a plastic pipette.
3. Place the cassette into the refrigerated reagent compartment.

## Calibrator

For calibration, use:

**ABX Pentra Multical** (A11A01652) (not included)  
10 x 3 mL (lyophilisate)

## Control <sup>b</sup>

For internal quality control, use:

- **ABX Pentra N MultiControl** (1300054414) (not included)  
10 x 5 mL (lyophilisate)
- **ABX Pentra P MultiControl** (1300054415) (not included)  
10 x 5 mL (lyophilisate)

Each control should be assayed daily and/or after a calibration.

The frequency of controls and the confidence intervals should correspond to laboratory guidelines and country-specific directives. You should follow federal, state and local guidelines for testing quality control materials. The results must be within the range of the defined confidence limits. Each laboratory should establish a procedure to follow if the results exceed these confidence limits.

## Materials Required but not Provided <sup>b</sup>

- Automated clinical chemistry analyzer: ABX Pentra 400
- Calibrator: **ABX Pentra Multical** (A11A01652)
- Controls:
  - **ABX Pentra N MultiControl** (1300054414)
  - **ABX Pentra P MultiControl** (1300054415)
- Standard laboratory equipment.

## Specimen (5, 6, 7) <sup>c</sup>

This device intended testing population is general population.

- Serum.
- Plasma in lithium heparin.

Anticoagulants other than those listed have not been tested by HORIBA Medical and are therefore not recommended for use with this assay.

## Limitations (5, 6, 7):

These specimens should be drawn from the patient after 12 - 14h fast. The patient should sit quietly for about 5 minutes before the sample is drawn.

Biological variability can be reduced by drawing blood under standardized conditions as recommended by NCEP.

<sup>a</sup>Modification: § "Reagents": modification.

<sup>b</sup>Modification: control removed.

<sup>c</sup>Modification: modification of "Specimen".

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NCEP recommends that cholesterol measurements should not be made from plasma derived from fluoride, citrate or oxalate treated specimens.

## Stability (5):

Cholesterol levels in the sample have been reported to be stable for 5 - 7 days at 4°C or room temperature, 3 months at -20°C and many years at -70°C.

## Reference Range (2, 6, 8) <sup>d</sup>

Each laboratory should establish its own reference ranges. The values given here are used as guidelines only.

Cholesterol	Classification
≤ 200 mg/dL (≤ 5.17 mmol/L)	Desirable
200 - 239 mg/dL (5.17 - 6.18 mmol/L)	Borderline high risk
> 240 mg/dL (> 6.21 mmol/L)	High risk

At least two measurements of cholesterol on separate occasions should be made before any medical decision is made since a single point total cholesterol measurement may not represent a patient's usual cholesterol concentration, and cholesterol results around the decision points should be followed with a repeat measurement.

The European Task Force on Coronary Prevention recommends to lower TC concentration to less than 190 mg/dL (5.0 mmol/L) and LDL cholesterol to less than 115 mg/dL (3.0 mmol/L) (2).

Clinical sensitivity and specificity, positive predictive value and negative predictive value are not commonly reported for this analyte. This is largely attributed to the fact that this analyte is not sole indicator for the intended purpose and patient treatment decision making. To arrive at a diagnosis and a course of treatment, results from others routine clinical chemistry tests should be used in conjunction with other diagnostic information and the attending health-care professional's evaluation of the patient's condition.

## Storage and Stability

### Stability before opening:

Stable up to the expiry date on the label if stored at 2-8°C.

### Stability after opening:

Refer to the paragraph "Performance on ABX Pentra 400".

*Note: It has to be mentioned, that the measurement is not influenced by occasionally occurring color changes, as long as the absorbance of the reagent is < 0.3 at 546-nm.*

## Waste Management

- Please refer to local legal requirements.
- This reagent contains less than 0.1% of sodium azide as a preservative. Sodium azide may react with lead and copper to form explosive metal azides.

## General Precautions <sup>e</sup>

- This reagent is for professional *in vitro* diagnostic use only.  
For laboratory use.
- For prescription use only.
- This reagent is classified as non-hazardous in compliance with regulation (EC) N°.1272/2008.
- Do not pipette by mouth.
- Do not replenish the reagents.
- Do not swallow. Avoid contact with skin and mucous membranes.
- Observe the standard laboratory precautions for use.
- The reagent cassettes are disposable and should be disposed of in accordance with the local legal requirements.
- Please refer to the SDS associated with the reagent.
- Do not use the product if there is visible evidence of biological, chemical or physical deterioration.
- Do not use the product if the recommended storage conditions, including temperature, are not followed.
- User must be trained by a HORIBA Medical representative before attempting to operate the device.
- It is the user's responsibility to verify that this document is applicable to the reagent used.
- For technical assistance, you can call +33 (0)4 67 14 15 16.
- Any serious incident that has occurred in relation to the device shall be reported to the manufacturer and the competent authority of the country in which the user and/or the patient is established.

<sup>d</sup>Modification: information added.

<sup>e</sup>Modification: general precautions modification.

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## Performance on ABX Pentra 400

### Lot to Lot Variability <sup>f</sup>

The recovery of samples (serum and plasma) done during QC release of three consecutive lots of reagent shows that the lot to lot variability is within specification: +/- 8%.

### Serum, plasma

The performance data listed below have been obtained on the ABX Pentra 400 analyzer.

### Number of tests: 344 tests

If the number of tests requested is low and the ABX Pentra 400 user intends to utilise the cassette to the maximum on board stability, it is the recommendation of HORIBA Medical, to utilise the consumable part XEC083 (Kit membrane) to achieve the number of tests stated in this notice.

### On Board Reagent Stability

Once opened, the reagent cassette placed in the refrigerated ABX Pentra 400 compartment is stable for 48 days.

### Sample volume: 3 µL/test

### Detection Limit <sup>g</sup>

The detection limit is determined according to CLSI (NCCLS), EP17-A2 protocol (9) and equals 0.1324 mmol/L (5.1 mg/dL).

### Limit of Quantitation <sup>g</sup>

The limit of quantitation is determined according to CLSI (NCCLS), EP17-A2 protocol (9) and equals 0.20 mmol/L (8 mg/dL).

### Accuracy and Precision

#### Repeatability (within-run precision)

Repeatability according to the recommendations found in the Valtec protocol (10) with samples tested 20 times:

- 2 controls
- 3 specimens (low / medium / high levels)

	Mean value mmol/L	Mean value mg/dL	CV %
Control specimen 1	2.92	113.02	0.82
Control specimen 2	4.81	186.32	0.74
Specimen 1	3.03	117.30	1.21
Specimen 2	4.93	190.73	0.53
Specimen 3	10.04	388.47	0.62

#### Reproducibility (total precision)

Reproducibility according to the recommendations found in the CLSI (NCCLS), EP5-A2 protocol (11) with samples tested in duplicate for 20 days (2 series per day):

- 2 controls
- 2 specimens (low / medium levels)

	Mean value mmol/L	Mean value mg/dL	CV %
Control specimen 1	2.83	109.44	3.0
Control specimen 2	4.74	183.26	2.3
Specimen 1	4.40	170.27	2.8
Specimen 2	6.45	249.53	3.0

#### Measuring Range <sup>h</sup>

The assay confirmed a measuring range from 0.20 mmol/L (8.0 mg/dL) to 15.00 mmol/L (580.5 mg/dL). The reagent linearity has been assessed up to 15.0 mmol/L (580.5 mg/dL) according to the recommendations found in the CLSI (NCCLS), EP06-Ed2 protocol (12).

#### Correlation

Patient samples: Serum

Number of patient samples: 134

Specimens are correlated with a commercial reagent taken as reference according to the recommendations found in the CLSI (NCCLS), EP09c protocol (13).

Values ranged from 0.27 mmol/L (10.32 mg/dL) to 14.92 mmol/L (577.37 mg/dL).

The equation for the allometric line obtained using Passing-Bablok regression procedure (14) is:

$$Y = 0.9501 X + 0.044 \text{ (mmol/L)}$$

<sup>f</sup>Modification: chapter added.

<sup>g</sup>Modification: data added.

<sup>h</sup>Modification: modification of measuring range.

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$Y = 0.9501 X + 1.70$  (mg/dL)  
with a correlation coefficient  $r^2 = 0.993$ .

## Interferences <sup>i</sup>

Haemoglobin:	No significant influence is observed up to 195 $\mu\text{mol/L}$ (336 mg/dL).
Triglycerides:	No significant influence is observed up to a triglyceride concentration of 6.80 mmol/L (595 mg/dL).
Total Bilirubin:	No significant influence is observed up to 350 $\mu\text{mol/L}$ (20.5 mg/dL).
Direct Bilirubin:	No significant influence is observed up to 117 $\mu\text{mol/L}$ (6.8 mg/dL).
N-Acetylcysteine (NAC):	No significant influence is observed up to 275 mg/L (28 mg/dL). Patients treated with N-Acetylcysteine (NAC) for Paracetamol overdose may generate a false low result.
N-acetyl-p-benzoquinone imine (NAPQI):	No significant influence is observed up to 1324 $\mu\text{mol/L}$ (20 mg/dL).

*Other limitations are given by Young as a list of drugs and preanalytical variables known to affect this methodology (15, 16).*

## Calibration Stability

The reagent is calibrated on Day 0. The calibration stability is checked by testing 2 control specimens.

The calibration stability is 8 days.

*Note: A recalibration is recommended when reagent lots change, and when quality control results fall outside the range established.*

## Conversion Factor

$\text{mmol/L} \times 0.387 = \text{g/L}$

$\text{mmol/L} \times 38.7 = \text{mg/dL}$

## Reference

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<sup>i</sup>Modification: modification of interferences.

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