# CHOLINESTERASE

**CHEB**
**CHEB-0250**
**R1 : 2 x 8 mL**
**R2 : 1 x 5 mL**

CE

PIMAC-CHEB-EN-v1 (07/2021)

## INTENDED USE

This *in vitro* diagnostic reagent is intended for the quantitative determination of cholinesterase in human serum and plasma samples on Selectra Mach Series analyzers.

This *in vitro* diagnostic reagent is for professional use only.

## CLINICAL SIGNIFICANCE [1-4]

Cholinesterase (serum cholinesterase or pseudocholinesterase or cholinesterase II) is found in the liver, pancreas, heart, serum and in the white matter of the brain. This enzyme must not be confused with acetylcholinesterase from erythrocytes (EC 3.1.1.7), which is also referred to as cholinesterase I. The biological function of cholinesterase is unknown. Depressed cholinesterase levels are found in cases of intoxication with organophosphorus compounds and in hepatitis, cirrhosis, myocardial infarction, acute infections and atypical phenotypes of the enzyme.
In clinical practice, serum cholinesterase serves as an indicator of possible organophosphate insecticide poisoning or follow-up of personal working with these products. In pre-operative screening, cholinesterase is used to detect patients with atypical forms of the enzyme and hence avoid prolonged apnea caused by slow elimination of muscle relaxants. Cholinesterase may also be measured as an index of liver function.

## LIMITATION OF USE

The quantitative assay of cholinesterase alone cannot be used to diagnose a disease or a specific pathology.
The results must be interpreted in conjunction with other diagnostic test results, clinical findings and the patient's medical history.

## METHOD & PRINCIPLE [5]

DGKC Method - Kinetic.

$$\text{butyrylthiocholine} + H_2O \xrightarrow{\text{cholinesterase}} \text{thiocholine} + \text{butyrate}$$

$$\text{thiocholine} + \text{hexacyanoferrate(III)} \longrightarrow \text{dithiobis(choline)} + \text{hexacyanoferrate(II)}$$

Cholinesterase hydrolyses butyrylthiocholine to thiocholine and butyrate. Thiocholine instantaneously reduces yellow hexacyanoferrate(III) to colorless hexacyanoferrate(II). The decrease in absorbance is measured photometrically at 405 nm.

## COMPOSITION

| | | |
|---|---|---|
| **Reagent : R1** | | |
| Pyrophosphate buffer, pH 7.65 (20°C) | 95 | mmol/L |
| Potassium hexacyanoferrate | 2.54 | mmol/L |
| **Reagent: R2** | | |
| Butyrylthiocholine | 38 | mmol/L |

## MATERIALS REQUIRED BUT NOT PROVIDED

- CALI-0550 ELICAL 2
- CONT-0060 ELITROL I
- CONT-0160 ELITROL II
- Normal saline solution (NaCl 9 g/L)
- General Laboratory equipment (e.g. pipette).
- Selectra Mach analyzer and accessories.
- Do not use materials that are not required as indicated above.

## PRECAUTIONS OF USE AND WARNINGS

- The reagent R1 is classified as hazardous :

- Consult Safety Data Sheet (SDS) for a proper handling.
- Take normal precautions and adhere to good laboratory practice.
- Use clean or single use laboratory equipment only to avoid contamination.
- Do not interchange reagent vials from different kits.

## STABILITY

**Store at 2-8 °C and protect from light. Do not freeze.**
Do not use after expiration date indicated on the vial labels.
On board stability : 8 weeks.

## PREPARATION

The device is ready to use.

## PRODUCT DETERIORATION

- The product should be clear. Cloudiness would indicate product deterioration.
- Do not use the product if there is visible evidence of contamination or damage (e.g. particle matter).
- Damage to the reagent container may impact on product performance. Do not use the product if there is physical evidence of deterioration (e.g. leakages or punctured container).

## SAMPLES

**Specimens required [6]**
- Serum
- Plasma (lithium heparin)
- Using any other specimen type should be validated by the laboratory.

**Warnings and precautions**
Samples should be collected in accordance with Good Laboratory Practice and appropriate guidelines that may be in place.

**Storage and stability [4,6]**
- 6 hours at room temperature
- 1 week at 2-8°C
- 1 year at -20°C

## REFERENCE VALUES [3]

| *Serum/plasma* | U/L | µkat/L |
|---|---|---|
| Children, males, and females over 40 years | 5320-12920 | 88.7 - 215.3 |
| Females 16-39 years, not pregnant, not taking hormonal contraceptives | 4260-11250 | 71.0 - 187.5 |
| Females 18-41 years, pregnant or taking hormonal contraceptives | 3650-9120 | 60.8 - 152.0 |

Note : *The quoted range should serve as a guide only. It is recommended that each laboratory verifies this range or establishes a reference interval for the intended population.*

## INSTALLATION AND USE

Consult Selectra Mach operator manual.
**Special Programming instructions:** Programming special instructions is mandatory when some combinations of tests are performed together on the analyzer. Refer to Instructions For Use for WASH SOLUTION A & WASH SOLUTION B for adequate programming (See PIMAC-WASH).

## PROCEDURE

The application is included in the 2D barcode on this insert.

## CALCULATION

Calculations and/or unit conversions are performed by the analyzer.

## CALIBRATION

ELICAL 2 is traceable to the reference method published by the German Society for Clinical Chemistry (DGKC).

Calibration frequency : 8 weeks.
Recalibrate when reagent lots change, when quality control results fall outside the established range and after a maintenance operation.

## QUALITY CONTROL

It is recommended that quality control sera such as ELITROL I and ELITROL II be used to monitor the performance of the assay.
Controls have to be performed :
- prior to assaying patient samples,
- at least once per day,
- after every calibration,
- and/or in accordance with laboratory and regulatory requirements.

Results should be within the defined ranges. If values fall outside of the defined ranges, each laboratory should take necessary corrective measures.

## WASTE MANAGEMENT

Disposal of all waste material should be in accordance with local, state and federal regulatory requirements (please refer to the Safety Data Sheet (SDS)).

## PERFORMANCES

Performances were obtained on Selectra Mach5, following CLSI technical recommendations, under controlled environmental conditions.

**- Measuring range**

300-20 000 U/L (5.0-333.3 µkat/L)
Samples having greater concentrations will automatically be diluted 1:5 with NaCl 9 g/L solution and re-assayed. Results take the dilution into account. This procedure extends the measuring range up to 100 000 U/L (1 666.7 µkat/L)
Do not report results outside this extended range.

**- Limit of Detection (LoD) and Limit of Quantification (LoQ)**

**LoD :** 257 U/L (4.3 µkat/L)
**LoQ :** 300 U/L (5.0 µkat/L)

**- Precision**

Imprecision data has been obtained on 2 Selectra Mach5 analyzers over 20 days (2 runs per day, tests performed in duplicate).

Representative results are presented below:

| | | Mean | | Within-run | Total |
|---|---|---|---|---|---|
| | n | U/L | µkat/L | CV (%) | |
| **Level 1** | 80 | 2 307 | 38.5 | 1.6 | 2.7 |
| **Level 2** | 80 | 4 203 | 70.1 | 1.1 | 1.6 |
| **Level 3** | 80 | 9 614 | 160.2 | 1.0 | 1.6 |

**- Correlation**

A comparative study has been performed between CHOLINESTERASE reagent on a Selectra Mach5 analyzer and a similar commercially available system on 104 human serum samples.
The sample concentrations ranged from 310 to 20 173 U/L (5.2 - 336.2 µkat/L).
The results are as follows :
Correlation coefficient : (r) = 0.999
Linear regression: y = 0.962x + 112 U/L (1.9 µkat/L)

**- Limitations/Analytical interferences**

- Studies have been performed to determine the level of interference from different compounds.
The following cholinesterase levels were tested: 2 100 U/L and 9 000 U/L
No significant interference is defined by a recovery ≤±10% of the initial value.

Triglycerides: No significant interference up to 3 000 mg/dL (33.90 mmol/L)
Unconjugated bilirubin : No significant interference up to 30.0 mg/dL (513 µmol/L).
Conjugated bilirubin : No significant interference up to 29.5 mg/dL (504 µmol/L).
Hemoglobin : No significant interference up to 500 mg/dL.
Ascorbic acid : No significant interference up to 19.8 mg/dL.
Acetaminophen : No significant interference up to 30 mg/dL.
Acetylsalicylic acid : No significant interference up to 200 mg/dL.

- In very rare cases, monoclonal gammopathies (multiple myeloma), in particular IgM type (Waldenstrom's macroglobulinemia) can cause unreliable results.[7]

- Many other substances and drugs may interfere. Some of them are listed in reviews plublished by Young.[8-9]

## DECLARATION OF SERIOUS INCIDENT

Please notify the manufacturer (through your distributor) and competent authority of the Member state of the European union in which the user and/or the patient is established, of any serious incident that has occurred in relation to the device. For other jurisdictions, the declaration of serious incident should be in accordance with local, state and federal regulatory requirements.
By reporting a serious incident, you provide information that can contribute to the safety of *in vitro* medical devices.

## BIBLIOGRAPHY


1. Jalady, A.M., *Intérêt du dosage des cholinestérases dans le cadre des intoxications aux organophosphorés*, Annales Françaises d'Anesthésie et de Réanimation, (2012), **32**, 856.
2. Burrow, T.A., *Diseases of Genetic Origin*. Clinical Chemistry: Theory, Analysis, Correlation, 5th Ed., Kaplan, L.A, Pesce, A.J., (Mosby Inc. eds), (2010), 1030 and appendix.
3. Pasteur CERBA. Guide des examens spécialisés, 5e Edition, (2007).
4. Wu, A.H.B., Clinical guide to laboratory tests, 4th Ed., (W.B. Saunders eds.), (2006), 250.
5. Schmidt, E., et al., *Proposal of Standard Methods for the Determination of Enzyme Catalytic Concentrations in Serum and Plasma at 37°C. Part II. Cholinesterase*. Eur. J. Clin. Chem. Clin. Biochem., (1992), **30**, 163-170.
6. Guder, W.G., et al., *Use of anticoagulants in diagnostic laboratory investigations and stability of blood, plasma and serum samples*. (2002). WHO/DIL/LAB/99.1 Rev.2.
7. Berth, M. & Delanghe, *J., Protein precipitation as a possible important pitfall in the clinical chemistry analysis of blood samples containing monoclonal immunoglobulins: 2 case reports and a review of literature*, Acta Clin Belg., (2004), **59**, 263.
8. Young, D.S., Effects of preanalytical variables on clinical laboratory tests, 2nd Ed., AACC Press, (1997).
9. Young, D.S., Effects of drugs on clinical laboratory tests, 4th Ed., AACC Press, (1995).


## SYMBOLS

Symbols used are defined in ISO 15223-1 standard, except those presented bellow :

| | |
|---|---|
| CONT | Content |
| R1 | Reagent 1 |
| R2 | Reagent 2 |
| ☞ | Modification from previous version |
| CE | European Conformity |

## TECHNICAL ASSISTANCE:

Contact your local distributor or ELITech Clinical Systems SAS (CCsupport@elitechgroup.com).

CHEB

Place for 2D barcode



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