# Clinical Chemistry KMPCLA_CBC_003

## Purpose

Clinical chemistry determines biochemical parameters in plasma including enzymatic activity, specific substrates and electrolytes.

Ontological description: MP:0001545 – blood physiology abnormalities.

## Experimental Design

- **Minimum number of animals :** 7M + 7F
- **Age at test:** Week 60
- **Sex:** We would expect the results of this test to show sexual dimorphism

## Equipment

1. Clinical chemistry analyser
2. Vortex
3. Refrigerated centrifuge
4. Eppendorf tubes
5. Pipettes (200-1000 ul)

## Procedure

Set up the clinical chemistry analyser and perform QC analyses of the control reagents in accordance with the equipment guidelines.

**Sample collection and preparation:**

a. Collect the appropriate volume of blood required (160-200l of plasma), for the clinical chemistry analyser being used for assessment, preferably using a tube with an anticoagulant with the relevant blood collection procedure (see IMPC protocol Blood collection by retro-orbital puncture). Time of day for collection is in the morning, starting no earlier than 07:30.
b. Keep whole blood samples on ice until centrifugation. Centrifuge for 10 minutes at 5000 x g in a refrigerated centrifuge set at 8°C. If plasma samples cannot be analysed immediately, keep them in the fridge until analysis.
c. Analysis of samples is optimally done on the day of collection. When not possible the plasma samples can be stored at 2-8°C. If samples require storage for > 48 hours,

freeze plasma at -20 °C in single aliquots. All samples are allowed to come to room temperature prior to analysis.

d. Use plasma samples undiluted or diluted to a ratio of 1:2 with deionised water if the volume is insufficient.
e. Plasma samples that were frozen or stored in the fridge should be vortexed briefly and centrifuged again at ~5000 x g for 2-3 minutes immediately prior to analysis. If necessary, remove fibrin clots using a wooden applicator.

**Analysis:**

Samples that produce results that lie outside the linear range for a specific assay have to be re-tested. In some cases it may be necessary to dilute samples with water to bring test results into range.

# Notes

Blood collection for Clinical Chemistry and Hematology is usually performed as a non-fasting, terminal procedure but can be performed as a non-terminal procedure under certain circumstances. Mice from the terminal procedure may be used for subsequent gross pathology and other procedures included in terminal assessments. Whole blood (for Hematology) and plasma (for Clinical Chemistry) require different collection tubes so two independent samples are required from each mouse.

The information about the date of the experiment, that is the date when the measurement is performed, is an important parameter which is to be submitted in the Experiment xml file (dateOfExperiment="2013-02-28").

**Dilution**. Dilution of blood is highly discouraged, but is allowed when the total necessary amount is not obtained. If dilution is necessary then the assays should be done in one run.

**Hemolysis.** Two fields currently exist to capture metadata information about the hemolysis status in the clinical chemistry plasma samples.The first is the LIH Hemolysis severity score which can only be performed by clinics who run one of the Beckman Coulter AU-series of analysers. Such clinics are encouraged to capture and submit the hemolysis score of the LIH test in this field. Clinics who do not have an AU analyser are encouraged to use the second /alternative field which is simply titled Hemolysis.  Simply enter "slight", “moderate”, or “ marked" based on whether the sample is visibly haemolysed or not. Provision of this information is not compulsory and it is suggested that any clinic completes at least one field or the other (not both).

## Data QC

1. Plasma samples must be free of Fibrin clots in order to be analysed.
2. Badly haemolysed samples should be discarded.
3. Each morning, all parameters are tested with control sera (see ESLIM_015_001_Annex_3: Controls for biochemistry on AU400). Some parameters are tested with control serum level 1 (Beckman Coulter System Reagent, ODC0003)

and control serum level 2 (Beckman Coulter System Reagent, ODC0004), which consists of lyophilised human plasma with a normal and a pathological concentration. Other parameters are tested with specific controls from other suppliers.

4. Controls are thawed and vortexed before utilisation and loaded according to the analyser's display. Control values must lie within the acceptable range indicated by the manufacturer, otherwise the specific tests must be recalibrated and specific measurements repeated. Controls can be stored in 200l aliquots of control sera frozen at -20°C for up to 1 month.

**Metadata and examples**

| **Metadata** | **Example** |
|---|---|
| Equipment ID | ID of the machine used when more than 1 is used having same model and manufacturer. E. g. machine 1, machine 2, machine Minnie, machine Mickey Mouse, etc. |
| Equipment manufacturer | Manufacturer of the equipment. E.g. Olympus Diagnostics. |
| Equipment model | Model of the equipment. E.g. AU400 |
| Blood collection tubes | The tubes used for blood collection. E.g. Sarstedt Li-Heparin gel tubes or Kabe Labortechnik Lithium heparin coated tubes. |
| Anaesthesia used for blood collection | The drug used for anaesthesia during blood collection. E. g. Isofluorane. |
| Method of blood collection | Concise description of the method used for blood collection. E.g. retro-orbital puncture. |
| Anticoagulant | Anticoagulant drug used for blood collection. E. g. Li-Heparin. |
| Samples kept on ice between collection and analysis | Yes/No. |
| | |

| | |
|---|---|
| Storage temperature from blood collection till measurement | E.g. 2°C |
| Sample status | Indicate if the sample were frozen (analysis on the same day of collection not possible) or fresh (analysis on the same day of collection). E.g Fresh/Frozen. |
| Plasma dilution | Dilution is highly discouraged but if necessary indicate here. E.g. “No dilution” or 1:2. Note that results submitted to DCC are assumed to be already corrected for any dilutions made. |
| ID of blood collection SOP | ID of the protocol followed for blood collection. Can be a center specific protocol. E.g. ESLIM_024_001. |
| Date and time of blood collection | Time of day for collection is in the morning, starting no earlier than 07:30. E.g. Year, month, day, time. |
| Date of measurement | The day of blood analysis. Year, month, day. |
| Hemolysis status | If no AU analyser score is provided, indicate here the gauged degree of hemolysis. E.g. slight/moderate/marked. |
| Blood collection experimenter ID | An ID of any format to be used coherently both inside the same procedure and for all procedures indicating the experimenter who collected the blood. E.g. Harw_001, or 1/2/3. |
| Blood analysis experimenter ID | An ID of any format to be used coherently both inside the same procedure and for all procedures indicating the experimenter who analyzed the blood. E.g. Harw_001, or 1/2/3. |
| Date equipment last calibrated | Most recent date in which the equipment (or any part of) used in the procedure was subject to a calibration event. |
| Date and time of sacrifice | The date and time when the mouse is sacrified. |

## Parameters and Metadata

### Glucose KMPCLA_CBC_018_001 | v1.5

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** mg/dl

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### Blood collection tubes KMPCLA_CBC_039_001 | v1.1

procedureMetadata

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** false

**Options:** Kabe Labortechnik Lithium heparin coated tubes,
Kabe Labortechnik 1000ul Lithium Heparin,
TERUMO CAPIJECT Lithium heparin coated tubes,
BD Microtainer Lithium Heparin/PST Gel Blood Tube, Sarstedt Li-Heparin gel tubes,
BD Microtainer Lithium Heparin Tube, Eppendorf 1.7ml,
Greiner MiniCollect Lithium Heparin 1ml,

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### Calcium KMPCLA_CBC_009_001 | v1.5

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** mg/dl

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## Hemolysis status KMPCLA_CBC_048_001 | v1.1

procedureMetadata

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** false

**Options:** None, Moderate, Marked, Slight,

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## Sample dilution KMPCLA_CBC_044_001 | v1.2

procedureMetadata

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** false

**Options:** 1:5, Yes (by Equipment, automatically), Varies, 1:4, Neat plasma, Neat serum, 1:3, 1:2,

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## Chloride KMPCLA_CBC_003_001 | v1.4

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** mmol/l

## Equipment manufacturer KMPCLA_CBC_034_001 | v1.0

procedureMetadata

**Req. Analysis:** true **Req. Upload:** true **Is Annotated:** false

**Options:** Cobas, JEOL (Siemens), Hitachi, Beckman Coulter, Olympus Diagnostics, Roche,

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## Aspartate aminotransferase KMPCLA_CBC_012_001 | v1.2

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** U/l

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## LDL-cholesterol KMPCLA_CBC_025_001 | v1.3

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** mg/dl

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## Anticoagulant KMPCLA_CBC_038_001 | v1.1

procedureMetadata

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** false

**Options:** Sodium Heparin, Heparine, No, Lithium Heparin,

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## UIBC (unsaturated iron binding capacity) KMPCLA_CBC_024_001 | v1.0

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** umol/l

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## Free fatty acids KMPCLA_CBC_026_001 | v1.4

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** mmol/l

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## Ferritin KMPCLA_CBC_030_001 | v1.3

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** ng/ml

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## Samples kept on ice between collection and analysis KMPCLA_CBC_042_001 | v1.1

procedureMetadata

**Req. Analysis:** true **Req. Upload:** true **Is Annotated:** false

**Options:** No, Yes,

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## Uric acid KMPCLA_CBC_029_001 | v1.2

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** umol/l

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## Date and time of blood collection KMPCLA_CBC_046_001 | v1.2

procedureMetadata

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** false

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## Fasting KMPCLA_CBC_057_001 | v1.0

procedureMetadata

**Req. Analysis:** true **Req. Upload:** true **Is Annotated:** false

**Options:** Four hours before bleeding, Sixteen hours before bleeding, No,

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## Albumin KMPCLA_CBC_007_001 | v1.2

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** g/l

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## Thyroxine KMPCLA_CBC_053_001 | v1.2

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** ug/dl

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## Total protein KMPCLA_CBC_006_001 | v1.2

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** g/l

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## Transferrin KMPCLA_CBC_031_001 | v1.2

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** mg/dl

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## Date equipment last calibrated KMPCLA_CBC_050_001 | v1.2

procedureMetadata

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** false

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## Total cholesterol KMPCLA_CBC_015_001 | v1.4

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** mg/dl

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## Triglycerides KMPCLA_CBC_017_001 | v1.4

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** mg/dl

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## ID of blood collection SOP KMPCLA_CBC_045_001 | v1.1

procedureMetadata

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** false

**Options:** ESLIM_024_001, sop.inv.019, RIKENMPP_004a_003, PHENO_CBC, sop.inv.063,

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## Magnesium KMPCLA_CBC_054_001 | v1.5

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** mg/dl

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## C-reactive protein KMPCLA_CBC_032_001 | v1.0

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** mg/l

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## Storage temperature from blood collection till measurement KMPCLA_CBC_041_001 | v1.3

procedureMetadata

**Req. Analysis:** true **Req. Upload:** true **Is Annotated:** false

**Unit Measured:** C

**Options:** 4, 18-22, -80, 2,

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## Lactate dehydrogenase KMPCLA_CBC_022_001 | v1.2

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** U/l

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## Sample status KMPCLA_CBC_043_001 | v1.1

procedureMetadata

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** false

**Options:** Fresh, Frozen, Fresh and frozen,

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## Potassium KMPCLA_CBC_002_001 | v1.3

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** mmol/l

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## Equipment ID KMPCLA_CBC_033_001 | v1.0

procedureMetadata

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** false

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## Glycerol KMPCLA_CBC_027_001 | v1.4

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** mmol/l

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## Sample type KMPCLA_CBC_056_001 | v1.0

procedureMetadata

**Req. Analysis:** true **Req. Upload:** true **Is Annotated:** false

**Options:** Plasma, Serum,

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## Urea (Blood Urea Nitrogen - BUN) KMPCLA_CBC_004_001 | v1.5

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** mg/dl

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## Difficult bleed KMPCLA_CBC_055_001 | v1.0

procedureMetadata

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** false

**Options:** No, Yes,

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## Blood analysis experimenter ID KMPCLA_CBC_051_001 | v1.0

procedureMetadata

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** false

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## Alanine aminotransferase KMPCLA_CBC_013_001 | v1.2

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** U/l

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## Glycosilated hemoglobin A1c (HbA1c) KMPCLA_CBC_052_001 | v1.3

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** %

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## Cholesterol ratio KMPCLA_CBC_058_001 | v1.0

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Derivation:** div('KMPCLA_CBC_015_001', 'KMPCLA_CBC_016_001')

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## Phosphorus KMPCLA_CBC_010_001 | v1.6

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** mg/dl

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## LIH (Hemolysis Severity - available on AU analysers) KMPCLA_CBC_019_001 | v1.3

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** false

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## Alkaline phosphatase KMPCLA_CBC_014_001 | v1.2

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** U/l

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## Total bilirubin KMPCLA_CBC_008_001 | v1.4

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** mg/dl

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## Creatinine KMPCLA_CBC_005_001 | v1.5

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** mg/dl

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## Blood collection experimenter ID KMPCLA_CBC_049_001 | v1.1

procedureMetadata

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** false

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## Method of blood collection KMPCLA_CBC_037_001 | v1.0

procedureMetadata

**Req. Analysis:** true **Req. Upload:** true **Is Annotated:** false

**Options:** Retro-orbital puncture, Cardiac puncture, Tail vein, Heart puncture, Jugular vein,

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## Anesthesia used for blood collection KMPCLA_CBC_036_001 | v1.0

procedureMetadata

**Req. Analysis:** true **Req. Upload:** true **Is Annotated:** false

**Options:** Injection narcosis with Sodium Pentobarbital (Pentobarb, 0.1ml),
Injection narcosis with Ketamine (110mg/kg)/Xylazine (11mg/kg),
Injection narcosis with Tribromoethanol (Avertin),
Injection narcosis with Ketamine (100mg/kg)/Xylazine (10mg/kg),
Gas anaesthesia with Isofluorane, No,
Injection narcosis with Sodium Pentobarbital (Euthatal),
Injection narcosis with Ketamine (137mg/kg)/Xylazine (6.6mg/kg),
Injection narcosis with Sodium Pentobarbital (Somnopentyl),
Injection narcosis with Ketamine (100mg/kg)/ Xylazine (10mg/kg )/Antipamezole (Antisedan, 1mg/kg),
Injection narcosis with Ketamine (110mg/kg)/Xylazine (11mg/kg)/ Antipamezole (Antisedan, 1mg/kg),

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## Reagent manufacturer KMPCLA_CBC_059_001 | v1.0

procedureMetadata

**Req. Analysis:** true **Req. Upload:** false **Is Annotated:** false

**Options:** Wako and Sekisui, Beckman Coulter, Microgenics,

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## Lipase KMPCLA_CBC_021_001 | v1.1

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** U/l

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## Equipment model KMPCLA_CBC_035_001 | v1.0

procedureMetadata

**Req. Analysis:** true **Req. Upload:** true **Is Annotated:** false

**Options:** AU 480, Integra 400 Plus, AU 680, Hitachi 917, JCA-BM6070, AU 400, UniCel 600 Pro, 7020, JCA-BM2250 (Advia 2400), Cobas,

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## Creatine kinase KMPCLA_CBC_028_001 | v1.2

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** U/l

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## Iron KMPCLA_CBC_011_001 | v1.5

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** mg/dl

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## Alpha-amylase KMPCLA_CBC_023_001 | v1.2

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** U/l

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## HDL-cholesterol KMPCLA_CBC_016_001 | v1.4

simpleParameter

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** true

**Unit Measured:** mg/dl

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## Fructosamine KMPCLA_CBC_020_001 | v1.2

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** umol/l

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## Sodium KMPCLA_CBC_001_001 | v1.3

simpleParameter

**Req. Analysis:** false **Req. Upload:** false **Is Annotated:** true

**Unit Measured:** mmol/l

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## Date and time of sacrifice KMPCLA_CBC_040_001 | v1.1

procedureMetadata

**Req. Analysis:** false **Req. Upload:** true **Is Annotated:** false

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