Date of Shipment: Xxxxx xx, 20xx 6403a00-240219-241219

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 6403-a

No. +++

Steroid Hormones in Human Serum

This certified reference material (CRM) is produced in accordance with the NMIJ's management system and is in compliance with ISO 17034 and ISO/IEC 17025. This CRM is intended primarily for use in calibration of analytical instruments and evaluating the accuracy and validation of analytical procedures for the determination of aldosterone, cortisol and testosterone in human serum by instrumental analysis.

Certified Values

The certified values for mass concentrations of aldosterone, cortisol and testosterone at 25 °C are given in the table below. The uncertainty of the certified value is the expanded uncertainty obtained by multiplying the combined standard uncertainty by a coverage factor (k) of 2, and it is the half-width of an interval estimated to have a level of confidence of approximately 95 %.

Substance	CAS No.	Certified value Mass concentration	Expanded uncertainty Mass concentration
Aldosterone	52-39-1	31.2 pg/mL	6.0 pg/mL
Cortisol	50-23-7	94 ng/mL	11 ng/mL
Testosterone	58-22-0	4.65 ng/mL	0.52 ng/mL

Analysis

The certified values were based on the results of isotope dilution liquid chromatography tandem mass spectrometry (ID-LC-MS/MS). The mass concentrations were calculated from the obtained mass fractions of aldosterone, cortisol and testosterone by using the density of the materials.

Metrological Traceability

The certified values were determined by isotope dilution mass spectrometry (IDMS) and density of the materials. The calibrants for IDMS used were the aldosterone standard, purity of which was assessed by NMIJ using mass balance approach, NMIJ CRM 6007-a Hydrocortisone and NMIJ CRM 6002-a Testosterone. The density was determined by a vibration type density meter calibrated by JCSS Accredited Density Standard Liquid. The certified values, therefore, are traceable to the International System of Units (SI).

Indicative Values

The indicative values for mass fractions of aldosterone, cortisol and testosterone are given in the table below. The uncertainty of the indicative value is the expanded uncertainty obtained by multiplying the combined standard uncertainty by a coverage factor (k) of 2, and it is the half-width of an interval estimated to have a level of confidence of approximately 95 %.

Substance	Indicative value Mass fraction	Expanded uncertainty Mass fraction
Aldosterone	30.5 pg/g	5.9 pg/g
Cortisol	92 ng/g	11 ng/g
Testosterone	4.54 ng/g	0.51 ng/g

Mutual Recognition Arrangement under Metre Convention

The certified value of cortisol in this CRM is recognized for international equivalence based on the Mutual Recognition Arrangement under the Metre Convention (CIPM MRA). The calibration measurement capability (CMC) of NMIJ related to this CRM is registered in the Key Comparison Database (KCDB) (see https://www.bipm.org/kcdb/) of the International Bureau of Weights and Measures (BIPM).

Expiration of Certification

This certificate is valid for one year from the date of shipment, provided that this CRM remains unopened and is stored in accordance with the instructions given in this certificate.

Description of the Material

This CRM is pooled human serum. The state of this CRM is yellow liquid at room temperature. Approximately 0.5 mL of material was bottled in the plastic vial, which was kept in an aluminum-laminated bag.

Instructions for Storage

This CRM should be kept under –80 °C in a clean area and protected from light.

Instructions for Use

From the viewpoint of homogeneity, the minimum sample volume should be the whole volume (aldosterone) or more than 200 µL (cortisol and testosterone). Approximately 1 hour before use, place at approximately 25 °C to thaw naturally (do not heat). Make sure that the screw on the cap is sufficiently tightened, then mix thoroughly by inversion to ensure complete homogeneity before use. Use up immediately after thawing. Once thawed, samples should not be refrozen for use.

Precautions for Handling

THIS CRM IS INTENDED FOR IN-VITRO LABORATORY USE ONLY AND NOT FOR IN-VIVO USE. THIS IS A HUMAN SOURCE MATERIAL. HANDLE PRODUCT AS A BIOHAZARDOUS MATERIAL CAPABLE OF TRANSMITTING INFECTIOUS DISEASE. The supplier of this material has reported that serum material used in the preparation of this product has been tested and found non-reactive/negative for hepatitis B surface antigen, hepatitis C virus, and human immunodeficiency virus antigen. However, no known test method can offer complete assurance that hepatitis B virus, hepatitis C virus, HIV, or other infectious agents are absent from this material. Accordingly, this human blood-based product should be handled at higher as recommended for any POTENTIALLY INFECTIOUS HUMAN SERUM. Refer to the safety data sheet (SDS) on this CRM before use.

Preparation

This CRM was prepared by Reference Material Institute for Clinical Chemistry Standards (Kanagawa, Japan). The serum material used was rapid freeze processed according to Clinical Laboratory Standards Institute (CLSI) Publication C37-A [1].

[1]"Preparation and Validation of Commutable Frozen Human Serum Pools as Secondary Reference Materials for Cholesterol Measurement Procedures; Approved Guideline", NCCLS Publication C37-A, Clinical Laboratory Standard Institute.

Technical Information

The density of this CRM at 25 °C was 1.0234 g/cm^3.

NMIJ Analysts

The technical manager for this CRM is KATO M., the production manager is KAWAGUCHI M. and the analysts are KAWAGUCHI M. and EYAMA S.

Information

If substantive technical changes occur that affect the certification before the expiration of this certificate, NMIJ will notify the

registered customers. Customer registration on the NMIJ Website (given below) will facilitate notification. Technical reports regarding this CRM can be obtained from the contact details given below.

Reproduction of Certificate

In reproducing this certificate, it should be clearly indicated that the document is a copy.

February 19, 2024

ISHIMURA Kazuhiko
President
National Institute of Advanced Industrial Science and Technology

If you have any questions about this CRM, please contact:
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Revision history
December 19, 2024: The expanded uncertainties of aldosterone and cortisol in “Certified Value” and “Indicative Values” were changed.