

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan



Reference Material Certificate

NMIJ CRM 6401-b

No. +++



Cortisol in Human Serum (3 Concentration Levels)

This certified reference material (CRM) was produced in accordance with the NMIJ's management system and in compliance with ISO GUIDE 34:2009 and ISO/IEC 17025:2005. This CRM is intended primarily for use in calibration of analytical instrument and evaluating the accuracy and validation of analytical procedures and instruments for the determination of cortisol in human serum by instrumental analysis. In addition, by the immunoassay of the cortisol analysis, when there is commutability, it can be used in controlling the precision of analysis and confirming the validity of analytical methods and instruments.

Certified Values

The certified values for samples of Level 1 to 3, expressed as mass concentrations at 20 °C, are given in the table below. The uncertainty of the certified value is the half-width of the expanded uncertainty interval calculated using a coverage factor (k) of 2, which gives a level of confidence of approximately 95 %.

| | Cortisol (CAS No.: 50-23-7) | |
|---------|--|---|
| | Certified value Mass concentration (µg/L) | Expanded uncertainty Mass concentration (µg/L) |
| Level 1 | 21.0 | 0.8 |
| Level 2 | 48.3 | 1.4 |
| Level 3 | 91.4 | 3.6 |

Analysis

The certified values of this CRM were based on the results of isotope dilution liquid chromatography-tandem mass spectrometry (ID-LC-MS/MS). Mass concentration was calculated from obtained mass fraction of cortisol and density of the material.

Metrological Traceability

The certified values of this CRM were determined by ID-LC-MS/MS as a primary method of measurement. The calibration solution for the measurements was prepared with certified reference material (NMIJ CRM 6007-a hydrocortisone). The certified values are traceable to the International System of Units (SI).

Mutual Recognition Arrangement under Meter Convention

This certificate is consistent with the calibration and measurement capabilities (CMCs) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures (CIPM). Under the MRA, all participating institutes recognize the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in Appendix C (as for Appendix C of MRA, see <http://kcdb.bipm.org/AppendixC/default.asp>).

Expiration of Certification

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

Sample Form

This CRM is in the form of a yellow liquid. This CRM of ca. 0.5 mL in net volume for each level is kept in a vial, and a set of 3 vials is sealed in an aluminum-laminated plastic bag.

Homogeneity

The homogeneity of the CRM was measured by ID-LC-MS/MS, analyzing 10 vials selected from 200 vials. The homogeneity is reflected in the uncertainty of the certified value.

Stability

The stability is confirmed by stability study at $-80\text{ }^{\circ}\text{C}$ and at $-20\text{ }^{\circ}\text{C}$. The uncertainty by stability test is included in the uncertainty of the certified value.

Instructions for Storage

This CRM should be stored below $-20\text{ }^{\circ}\text{C}$ until ready for use.

Instructions for Use

At about one hour prior to use, the CRM to be analyzed should be removed from the freezer and allowed to stand at $20\text{ }^{\circ}\text{C}$ to $25\text{ }^{\circ}\text{C}$ until thawed. After confirming the cap of the vial is tightly closed, the vial is turned upside down gently several times for complete mixing. The thawed material should be used immediately. Storage of thawed material may result in changes in the cortisol concentrations.

NOTICE AND WARNINGS TO USERS

NMIJ CRM 6401 IS INTENDED FOR IN-VITRO LABORATORY USE ONLY. 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 processed according to Clinical Laboratory Standards Institute (CLSI) Publication C37-A [1]. Serum samples of suitable concentrations of cortisol were prepared by mixing the serum from which cortisol was removed by charcoal treatment with the untreated serum.

[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 mass fractions of the certified values for samples of Level 1 to 3 are given in the table below. The uncertainty of the indicative value is the half-width of the expanded uncertainty interval calculated using a coverage factor (k) of 2, which gives a level of confidence of approximately 95 %.

| | Cortisol | |
|---------|--|---|
| | Value Mass fraction ($\mu\text{g}/\text{kg}$) | Expanded uncertainty Mass fraction ($\mu\text{g}/\text{kg}$) |
| Level 1 | 20.5 | 0.8 |
| Level 2 | 47.0 | 1.4 |
| Level 3 | 89.1 | 3.5 |

NMIJ Analysts

The technical manager for this CRM is A. Takatsu, the production manager is M. Kawaguchi. The analysts are M. Kawaguchi and S. Eyama.

Information

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

April 1, 2015

Ryoji Chubachi
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

April 1, 2015: "Metrology Management Center" was renamed to "Center for Quality Management of Metrology."

April 1, 2018: Uncertainty of "Certified value" and "Information" of level 4 were changed.

July 4, 2018: "Certified value" and "Information" of level 4 out of the four concentrations initially set up were eliminated based on stability monitoring. The name of this CRM was partially changed. The expanded uncertainty of "Certified value" and "Information" of level 1 to 3 were changed.