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IMEP-17

**Trace and Minor Constituents
in Human Serum**

Report to Participants
Part 3: Overview of national results

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The Mission of IRMM is to promote a common European measurement system in support of EU policies, especially internal market, environment, health and consumer protection standards

IMEP[®]

*provides certified values with demonstrated traceability
and demonstrated uncertainty, independent of the
participants' results*

*enables result-oriented
rather than procedure oriented
evaluation of performance*

*demonstrates a degree of equivalence
in measurement results
on an international scene*

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1. Introduction

Part 1 of the ‘Report to participants’ [1] described the background and objectives of the interlaboratory comparison IMEP-17, organised by the IRMM in collaboration with the C-AQ IFCC* and members of EQALM.† Part 1 summarised also information about the production and characterisation of the two serum materials that were used [2]. The participants’ results from all laboratories from measurements of nineteen components in Material 1 and lithium in Material 2 were displayed.

Part 2 [3] presented the participants’ results for ten components in Material 2 (modified serum). Laboratory performance was displayed with Youden graphs. Special attention was paid to the performance of individual measurement procedures and analytical quality specifications, i.e. performance goals for routine analytical work was discussed and compared with the results in IMEP-17. The properties of the test materials were discussed from the point of view of commutability.

The combined report (Part 1 + Part 2) is available on the Internet [4].

This report (Part 3) displays the results of all laboratories per country for all nineteen components in Material 1 and for lithium in Material 2. The purpose of the report is to provide each regional coordinator with a more detailed picture of the participants’ results than that given in the combined report mentioned above.

2. IMEP-17 participation

Report forms from 1 037 participants from 35 countries on all continents have been collected (Table 1).

2.1. Processing of the data

The regional coordinators [1] collected and forwarded the report forms to IRMM. Each report form was checked for inconsistencies, e.g. changes in structure and/or vital missing information (e.g. units) that would interfere with the processing and evaluation. The information was then extracted and compiled into four sheets in a single Microsoft® Excel file. The information was then imported into a Microsoft® Access database from which the graphical display was prepared. At this stage, additional checks had resulted in a list with about 300 suspicious results for Material 1 and some 150 for Material 2. Most of these were clearly caused by participants selecting the wrong unit in the drop-down menus. With the consent of the regional co-ordinators the correct unit was inserted.‡ Note that the numerical

* Committee for analytical quality of the international federation for clinical chemistry and laboratory medicine

† European committee for external quality assurance programmes in laboratory medicine.

‡ This type of mistakes is mainly caused by the added difficulty that the report form itself constitute. If included, the graphical display would not illustrate correctly the participants’ measurement capability.

values remained as originally reported. Although the measurands were clearly specified in the instructions, some report forms contained results for other measurands. Such results were removed if the information from the participants in the report form, or the coordinator confirmed this. Still there might be some results for, e.g. free thyroxine and pancreas amylase that have slipped through.

Table 1. Number of participants per country

Country	Number of participants	Country	Number of participants	Country	Number of participants
Albania	5	Estonia	5	Romania	8
Argentina	23	Finland	12	Slovakia	41
Australia	39	Germany	20	Slovenia	5
Austria	49	Hungary	4	South Africa	6
Belgium	49	Iceland	1	Spain	26
Bulgaria	23	Israel	36	Sweden	83
Canada	29	Italy	56	The Netherlands	27
China	27	Mexico	33	Turkey	14
Croatia	28	New Zealand	17	United kingdom	31
Cyprus	14	Norway	51	USA	53
Czech Republic	30	Poland	64	Yugoslavia	37
Denmark	53	Portugal	38		
				Total:	1 037

3. Graphical display of results

3.1. The IMEP graph: explanatory remarks

In Figure 1 an example of how results are displayed in IMEP is shown. For each set of data, the participants' results are plotted in ascending order against the certified value. The scale of the graph, around the certified value, is chosen for convenience. No results are excluded but those that are off-scale are presented in textboxes on the graphs.

The main objective of IMEP is to show how results obtained under routine conditions agree on an international level. For this report (Part 3), each participant's data point is therefore the result of a single measurement (replicate 1-1). The participants' self-declared uncertainty statements are included in the graphs but the reader should be aware that they are expressed differently and may cover different steps of the measurement procedure. The participants could specify in the report form if and how the uncertainty was reported. Of the 490

participants that actually provided an uncertainty statement with their results, 88% reported it as a total variation between days.

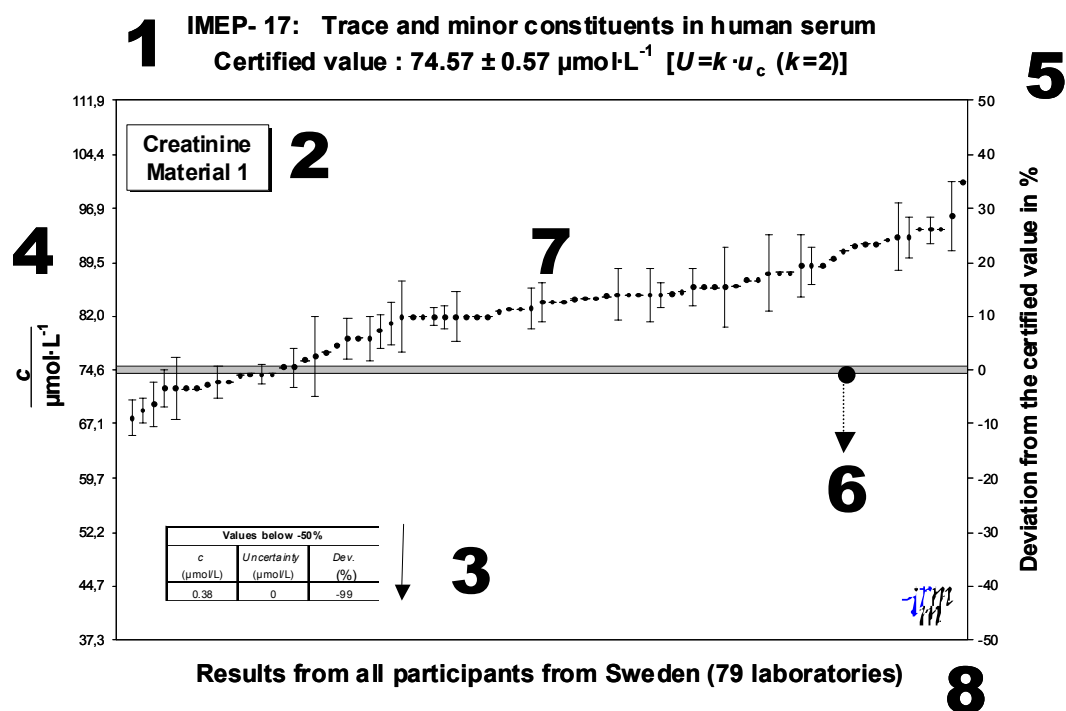


Figure 1. Description of the content displayed in the result graphs:

1. Legend with project name and certified value for the displayed component.
2. Component name and material.
3. Box indicating results falling outside the scale of the graph.
4. Scale with the value of the quantity expressed in absolute numbers.
5. Scale with the value of the quantity expressed in % deviation from the certified value.
6. Range (shaded) encompassing the certified value and its expanded uncertainty.
7. Participant's result (single measurement unless otherwise stated) and self-declared uncertainty.
8. Legend explaining details of the graph.

3.2. How to find a country-specific graph for each of the 20 components

This report is composed of twenty subdocuments each with 18 pages, arranged per component. It contains, for all 20 components, a country-specific graph. As an example, in each subdocument on page 1, the results of the Albanian laboratories can be found and on page 15 as second figure, the Swedish participants can see their results displayed. Please find in Table 3 guidance to the specific country graphs.

3.3. Order of appearance of the subdocuments

In case this document is consulted in printed version, the order of appearance of the subdocuments is alphabetically (Table 2). For the electronic version, the specific subdocuments are enclosed in the folder in alphabetical order.

Table 2. The appearance of the subdocuments is organised in alphabetical order.

Albumin	Iron
Amylase	Lithium
Calcium	Magnesium
Chloride	Potassium
Cholesterol	Selenium
Copper	Sodium
Creatinine	Thyroxine T4
γ -Glutamyl transferase	Urea
Glucose	Uric acid
IgG	Zinc

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Table 3. Overview of the number of laboratories per country for the components under investigation, including the page in the subdocuments where to find it.

	MATERIAL 1																			MATERIAL 2			
Country name	Albumin	Amylase	Calcium	Cholesterol	Chloride	Creatinine	Copper	Iron	Glucose	GGT	IgG	Potassium	Magnesium	Sodium	Selenium	Thyroxine T4	Urea	Uric acid	Zinc	Lithium	Page number	Figure number	
Albania	0	3	1	3	1	3	1	2	3	2	0	4	0	4	0	0	3	3	1	2	1		
Argentina	19	20	21	23	6	23	2	15	23	20	13	21	16	21	1	11	23	23	2	13	1	2	
Australia	39	32	39	39	39	39	5	32	39	39	16	39	39	39	1	3	39	39	5	26	2	1	
Austria	34	36	49	49	44	49	14	49	49	48	37	48	49	48	1	9	49	49	7	20	2	2	
Belgium	40	48	48	48	49	48	6	48	47	48	47	48	48	48	2	7	48	48	8	33	3	1	
Bulgaria	22	21	22	22	16	22	4	22	22	22	10	22	14	22	1	3	22	22	4	2	3	2	
Canada	29	27	29	28	29	29	3	27	29	29	24	29	28	29	1	5	29	29	3	23	4	1	
China	27	23	27	27	27	27	3	18	27	26	13	27	22	27	0	11	27	27	4	0	4	2	
Croatia	13	25	23	26	20	28	9	25	28	27	14	27	18	27	0	3	28	26	5	8	5	1	
Cyprus	13	13	13	14	7	14	0	14	14	14	5	11	10	11	0	1	14	14	0	3	5	2	
Czech Republic	30	27	30	30	30	30	8	30	30	30	24	30	30	30	0	13	30	30	7	19	6	1	
Denmark	53	39	45	45	10	53	1	30	50	37	22	52	29	52	1	13	50	46	6	22	6	2	
Estonia	4	3	4	4	2	4	1	2	4	4	1	4	3	4	0	1	4	4	1	2	7	1	
Finland	12	10	11	12	10	12	1	11	12	12	6	12	10	12	0	1	11	12	1	9	7	2	
Germany	18	19	20	20	20	20	10	19	20	20	14	20	19	20	4	5	20	20	10	15	8	1	
Hungary	4	4	4	4	3	4	1	4	4	4	4	4	4	4	0	1	4	4	0	2	8	2	
Iceland	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	0	1	9	1	
Israel	35	33	36	35	21	36	12	32	36	33	16	36	36	36	0	2	36	36	12	23	9	2	
Italy	46	53	55	55	54	56	17	54	56	54	48	56	53	55	4	7	56	55	12	30	10	1	
Mexico	32	26	30	32	29	33	0	22	33	26	18	31	29	31	0	20	33	32	0	12	10	2	
New Zealand	17	16	15	16	8	17	2	15	17	16	10	17	15	17	0	2	17	17	2	11	11	1	
Norway	50	47	51	50	44	51	3	46	51	51	16	49	41	49	1	4	51	51	6	21	11	2	
Poland	47	60	62	64	58	64	6	62	64	64	23	63	61	63	1	13	64	63	6	9	12	1	
Portugal	33	38	38	38	37	38	6	34	38	38	22	38	37	38	0	28	38	38	3	13	12	2	
Romania	3	7	8	8	5	8	0	8	8	8	3	6	8	6	0	4	8	8	0	0	13	1	
Slovak Republic	40	40	41	41	39	41	6	36	41	40	26	41	37	41	0	1	41	41	5	16	13	2	
Slovenia	5	5	5	1	5	5	1	4	5	5	0	5	2	5	0	0	5	4	1	1	14	1	
South Africa	6	6	6	6	6	6	1	5	6	6	4	6	6	6	0	2	6	6	1	4	14	2	
Spain	26	25	25	25	21	25	2	24	26	26	16	26	13	26	2	8	26	26	2	12	15	1	
Sweden	76	23	76	71	32	79	2	49	70	63	15	78	32	74	0	3	63	66	8	32	15	2	
The Netherlands	26	26	26	26	26	26	1	24	26	26	19	26	26	26	1	1	26	26	1	18	16	1	
Turkey	14	12	13	14	13	13	5	13	14	14	9	13	11	12	0	10	14	14	5	8	16	2	
U.S.A	52	40	51	49	49	52	0	35	52	42	6	49	46	49	0	24	52	49	0	10	17	1	
United Kingdom	30	30	30	30	29	30	5	27	30	29	10	30	30	30	0	3	30	30	7	25	17	2	
Yugoslavia	22	25	28	35	0	36	0	30	36	26	0	30	15	29	0	1	36	34	0	4	18	1	
TOTAL	918	863	983	991	790	1022	138	869	1011	950	512	999	838	992	21	221	1004	993	135	449			

References

1. L. Van Nevel, et al., IMEP-17 Trace and minor constituents in human serum. Report to the participants. Part 1 International comparability, Internal report GE/R/IM/42/02 (EUR 20657 EN), IRMM, Geel
2. U. Örnemark et al., IMEP-17 Trace and minor constituents in human serum. Certification report, Internal report GE/R/IM/36/01 (EUR 20243 EN), IRMM, Geel
3. U. Örnemark et al., IMEP-17 Trace and Minor Constituents in Human Serum. Report to Participants, Part 2: Methodology and quality specifications, Internal report GE/R/IM/04/03 (EUR 20694 EN), IRMM, Geel
4. www.imep.ws

Annex 1 – Graphical presentation