Report

Proficiency Test - HCort 24/1
Hair Cortisol

Examination period
13-May - 25-Jun-2024

PROFICIENCY TESTING SUPERVISOR
Dr. Tina M. Binz
University of Zurich
Institute of Forensic Medicine
Center for Forensic Hair Analytics
Kurvenstrasse 17
8006 Zurich
Switzerland

CREATING OF THE REPORT
ARVECON GmbH
Kiefernweg 4
69190 Walldorf
Germany

Participant: 3007
Dirk Moser
Ruhr Universität Bochum, Genetic Psychology
Universitätstr. 150
44801 Bochum
Deutschland

NUMBER PARTICIPANTS

Number of registered laboratories   10
Number of laboratories reporting results   8

HEAD OF THE ORGANIZATION OF THE PROFICIENCY TEST

Tina M. Binz, PD Dr.
University of Zurich
Institute of Forensic Medicine
Center for Forensic Hair Analytics
Kurvenstrasse 17
8006 Zurich
Switzerland

DATA ACQUISITION, EVALUATION, CREATING REPORTS

ARVECON GmbH
Kiefernweg 4
69190 Walldorf
Germany

Contact   Michael Herbold
E-Mail   mherbold@arvecon.de
Website   www.arvecon.com

PREPARATION OF THE SAMPLE MATERIAL

Society of Hair Testing

METHOD OF CALCULATING THE RESULTS

CALCULATING OF THE TARGET VALUE

The target value was determined by the *Algorithm A* procedure. This method represents a robust procedure for calculating estimated values. These are derived by iterative calculation.

REFERENCES: DIN ISO 13528:2020 and DIN ISO 5725-5:2002

CALCULATING OF THE Z-SCORE

The difference between measured value and target value is given by the z-score. It is calculated according to the following formula:

$$z\text{-score} = \frac{\text{result - target value}}{SD_{PT}}$$

SD_{PT} = applied standard deviation of the proficiency test

The accepted range for successful participation is |z-score| ≤ 2. The value of the z-score can be interpreted as follows:

Z-score	$|z| \leq 2$	$2 < |z| < 3$	$|z| \geq 3$
Interpretation	satisfactory	questionable	unsatisfactory

The z-score was calculated by means of the standard deviation according to Horwitz.

REFERENCE: Horwitz, W. (1982): Evaluation of analytical methods used for regulation of foods and drugs. Anal Chem 54 (1): 67A-76A

SUMMARY OF THE RESULTS

The following is a summary of your results in the proficiency test. The detailed results and further data on the test are listed on the following pages.
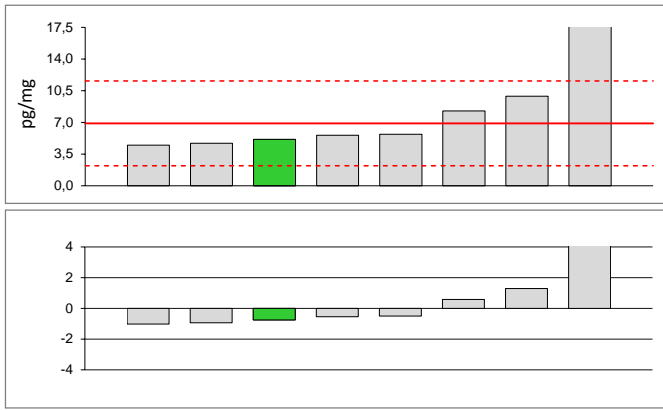
Analyte	Sample	Unit	Target value	Evaluation limits	Your result	Z-score	Passed
Cortisol	A	pg/mg	6,89	2,21 - 11,57	5,124	-0,75	yes
Cortisol	B	pg/mg	7,60	2,52 - 12,68	6,128	-0,57	yes
Cortisol	C	pg/mg	---	≤1,50	0,601	---	yes

Abbreviations

SD = standard deviation   NA = not analysed
VC = variation coefficient   ND = not detected
TV = target value

Cortisol sample: A - hair

	Total		Method: other
Reported results	8		2
Reported values	8		2
Target value	6,89		34,56
Median	5,65		34,56
SD	2,34	(Horwitz)	41,63
VC	0,34		1,20
Evaluation limits	2,21 - 11,57		
Your result	5,12		
Deviation from TV	-1,77		
Z-score	-0,75		

Cortisol sample: B - hair
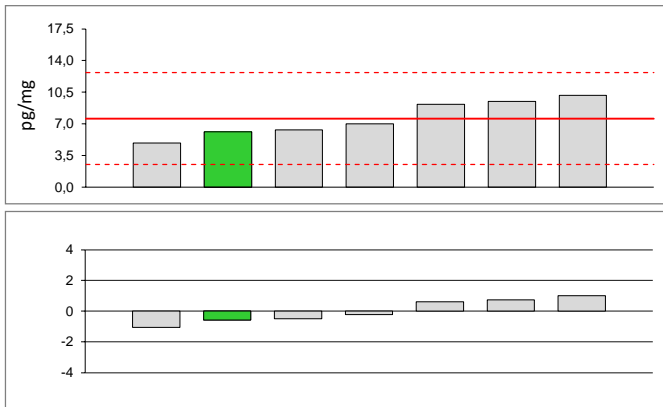
	Total		Method: other
Reported results	8		2
Reported values	7		1
Negative results	1		
Target value	7,60		---
Median	7,00		---
SD	2,54	(Horwitz)	---
VC	0,33		---
Evaluation limits	2,52 - 12,68		
Your result	6,13		
Deviation from TV	-1,47		
Z-score	-0,57		

Cortisol sample: C - hair
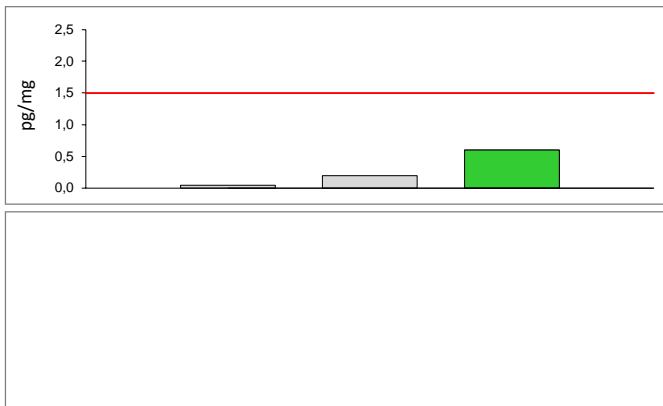
	Total		Method: other
Reported results	8		2
Reported values	3		1
Negative results	5		
Target value	---		
Median	(0,20)		
SD	---		
VC	---		
Evaluation limits	≤1,50		
Your result	0,60		
Deviation from TV	---		
Z-score	---		

Diagrams
— target value
--- lower/upper limit

Participant result
🟩 result satisfactory
🟨 result questionable
🟥 result unsatisfactory

Abbreviations
SD = standard deviation   NA = not analysed
VC = variation coefficient   ND = not detected
TV = target value

SUMMARY OF RESULTS

Analyte	Sample	Participants		Unit	Target value	SD_P	SD_A	SD_{PT}		VC	Accepted range
		number	success			participants	algorithm A	prof. test	source		
Cortisol	A	8	7 (88 %)	pg/mg	6,89	20,50	4,57	2,34	Horwitz	0,34	2,21 - 11,57
Cortisol	B	8	7 (88 %)	pg/mg	7,60	2,00	4,02	2,54	Horwitz	0,33	2,52 - 12,68
Cortisol	C	8	8 (100 %)	pg/mg	--	--	--	--	--	--	≤1,50

APPLIED METHODS

Analyte	LC/MS-MS	GC/MS-MS	other
Cortisol	6	0	2

Abbreviations

SD = standard deviation SD_P = SD of the participants results   N = number of included measured values
VC = variation coefficient SD_A = standard deviation according to algorithm A
TV = target value SD_{PT} = standard deviation of the proficiency test