Analysis Report

Bruker IVDr Quantification in URine B.I.Quant-UR b™

Sample ID: ALZ_Urine_Rack01_RCM_221214_expno400.100000.10r

Measuring Date: 23-Dec-2014 23:19:18
Reporting Date: 11-Dec-2020 22:14:30, 7 page(s), Version 1.1.0
Quantification Method Version: Quant-UR B.1.1.0

Disclaimer

RESEARCH USE ONLY: This is no clinical diagnostic analysis report. Must not be used for clinical (medical or IVD) diagnosis or for patient management! Additional concentration range information (95% range) provided numerically or graphically in this report must not be used for clinical diagnostic interpretation.

Application of B.I.Quant-UR B 1.1.0 requires use of Bruker's B.I.Methods SOP for urine.

Summary

The following metabolites were found with concentrations outside the 95% range of Bruker Quant-UR B.1.1.0 urine metabolite concentration database:

Carboxylic acids: Trigonelline (110 mmol/mol Crea),
Keto acids and derivatives: Acetoacetic acid (37 mmol/mol Crea), Oxaloacetic acid (85 mmol/mol Crea).

Further detailed information is provided on the following pages.

Contents

1 Creatinine

Compound	Conc. mmol/L	LOD mmol/L	r mmol/L	ρ %	Δ mmol/L	95% Range(*) mmol/L
Creatinine	5.4	0.3	5.366	100	0.089	1 - 19

(*) Gray horizontal boxes represent 95% concentration range, black vertical lines represent sample value.

2 Amines and derivatives

Compound	Conc. mmol/L	Conc. $\frac{\text{mmol}}{\text{mol Crea}}$	LOD $\frac{\text{mmol}}{\text{mol Crea}}$	r mmol/L	ρ %	Δ mmol/L	95% Range(*) $\frac{\text{mmol}}{\text{mol Crea}}$
Dimethylamine	0.18	33	31	0.179	100	0.008	$\leq$ 54
Trimethylamine	$<$ 0.01	$<$ 2	2	0.003	94	0.001	$\leq$ 3

(*) Gray horizontal boxes represent 95% concentration range, black vertical lines represent sample value.

3 Amino acids and derivatives

Compound	Conc. mmol/L	Conc. $\frac{\text{mmol}}{\text{mol Crea}}$	LOD $\frac{\text{mmol}}{\text{mol Crea}}$	r mmol/L	ρ %	Δ mmol/L	95% Range(*) $\frac{\text{mmol}}{\text{mol Crea}}$
1-Methylhistidine	$<$ 0.08	$<$ 15	15	0.065	0	0.105	$\leq$ 15
2-Furoylglycine	$<$ 0.21	$<$ 39	39	0.042	68	0.023	$\leq$ 40
4-Aminobutyric acid	$<$ 0.11	$<$ 20	20	0.000	0	0.457	$\leq$ 20
Alanine	0.17	32	10	0.172	100	0.009	11 - 72
Arginine	$<$ 4.0	$<$ 750	750	0.342	0	2.040	$\leq$ 750
Betaine	0.05	9	7	0.047	100	0.009	9 - 78
Creatine	$<$ 0.27	$<$ 50	50	0.023	100	0.089	$\leq$ 280
Glycine	0.67	130	34	0.672	100	0.027	38 - 440
Guanidinoacetic acid	$<$ 0.55	$<$ 100	100	0.203	81	0.105	$\leq$ 140
Methionine	$<$ 0.10	$<$ 18	18	0.000	0	0.251	$\leq$ 18
N,N-Dimethylglycine	0.04	8	5	0.045	87	0.014	$\leq$ 15
Sarcosine	$<$ 0.01	$<$ 2	2	0.007	0	0.013	$\leq$ 7
Taurine	0.88	160	140	0.876	98	0.125	$\leq$ 170
Valine	0.02	4	2	0.024	0	0.056	$\leq$ 7

(*) Gray horizontal boxes represent 95% concentration range, black vertical lines represent sample value.

4 Benzene and substituted derivatives

Compound	Conc. mmol/L	Conc. $\frac{\text{mmol}}{\text{mol Crea}}$	LOD $\frac{\text{mmol}}{\text{mol Crea}}$	r mmol/L	ρ %	Δ mmol/L	95% Range(*) $\frac{\text{mmol}}{\text{mol Crea}}$
Benzoic acid	< 0.05	< 10	10	0.018	85 ●	0.010	≤ 10
D-Mandelic acid	< 0.01	< 2	2	0.000	0 ○	0.050	2 - 17
Hippuric acid	2.2	410	170	2.205	99 ●	0.193	≤ 660

(*) Gray horizontal boxes represent 95% concentration range, black vertical lines represent sample value.

5 Carboxylic acids

Compound	Conc. mmol/L	Conc. $\frac{\text{mmol}}{\text{mol Crea}}$	LOD $\frac{\text{mmol}}{\text{mol Crea}}$	r mmol/L	ρ %	Δ mmol/L	95% Range(*) $\frac{\text{mmol}}{\text{mol Crea}}$
Acetic acid	0.07	13	5	0.072	87 ●	0.028	≤ 51
Citric acid	2.2	400	40	2.156	100 ●	0.222	≤ 700
Formic acid	0.12	21	10	0.115	100 ●	0.004	≤ 43
Fumaric acid	< 0.01	< 2	2	0.003	98 ●	0.001	≤ 3
Imidazole	< 0.26	< 48	48	0.066	88 ●	0.048	≤ 48
Lactic acid	< 0.26	< 49	49	0.126	98 ●	0.020	≤ 110
Proline betaine	0.30	55	25	0.297	100 ●	0.023	≤ 280
Succinic acid	0.07	12	5	0.065	93 ●	0.015	≤ 39
Tartaric acid	< 0.03	< 5	5	0.020	83 ○	0.017	≤ 110
Trigonelline	0.61	110	35	0.613	100 ●	0.015	≤ 67

(*) Gray horizontal boxes represent 95% concentration range, black vertical lines represent sample value.

6 Fatty acids and derivatives

Compound	Conc. mmol/L	Conc. $\frac{\text{mmol}}{\text{mol Crea}}$	LOD $\frac{\text{mmol}}{\text{mol Crea}}$	r mmol/L	ρ %	Δ mmol/L	95% Range(*) $\frac{\text{mmol}}{\text{mol Crea}}$
2-Methylsuccinic acid	< 0.26	< 48	48	0.049	17 ○	0.067	≤ 48

(*) Gray horizontal boxes represent 95% concentration range, black vertical lines represent sample value.

7 Keto acids and derivatives

Compound	Conc. mmol/L	Conc. $\frac{\text{mmol}}{\text{mol Crea}}$	LOD $\frac{\text{mmol}}{\text{mol Crea}}$	r mmol/L	ρ %	Δ mmol/L	95% Range(*) $\frac{\text{mmol}}{\text{mol Crea}}$
2-Oxoglutaric acid	< 0.50	< 92	92	0.087	27 ○	0.129	≤ 92
3-Hydroxybutyric acid	< 0.55	< 100	100	0.000	0 ○	0.721	≤ 100
Acetoacetic acid	0.20	37	14	0.196	89 ●	0.080	≤ 30
Acetone	< 0.01	< 2	2	0.009	75 ○	0.005	≤ 7
Oxaloacetic acid	0.45	85	17	0.454	97 ●	0.121	≤ 66
Pyruvic acid	< 0.05	< 9	9	0.039	96 ●	0.007	≤ 13

(*) Gray horizontal boxes represent 95% concentration range, black vertical lines represent sample value.

8 Purine, Pyridine and Pyrimidine derivatives

Compound	Conc. mmol/L	Conc. $\frac{\text{mmol}}{\text{mol Crea}}$	LOD $\frac{\text{mmol}}{\text{mol Crea}}$	r mmol/L	ρ %	Δ mmol/L	95% Range(*) $\frac{\text{mmol}}{\text{mol Crea}}$
1-Methyladenosine	< 0.03	< 5	5	0.000	0 ○	0.113	≤ 5
1-Methylnicotinamide	< 0.17	< 32	32	0.027	80 ○	0.016	≤ 32
Adenosine	< 2.1	< 390	390	0.000	0 ○	1.143	≤ 390
Allantoin	0.11	21	17	0.115	99 ●	0.010	≤ 47
Allopurinol	< 0.05	< 10	10	0.015	53 ○	0.036	≤ 11
Caffeine	< 0.24	< 45	45	0.141	75 ○	0.130	≤ 61
Inosine	< 0.10	< 19	19	0.018	54 ○	0.035	≤ 19

(*) Gray horizontal boxes represent 95% concentration range, black vertical lines represent sample value.

9 Sugars and derivatives

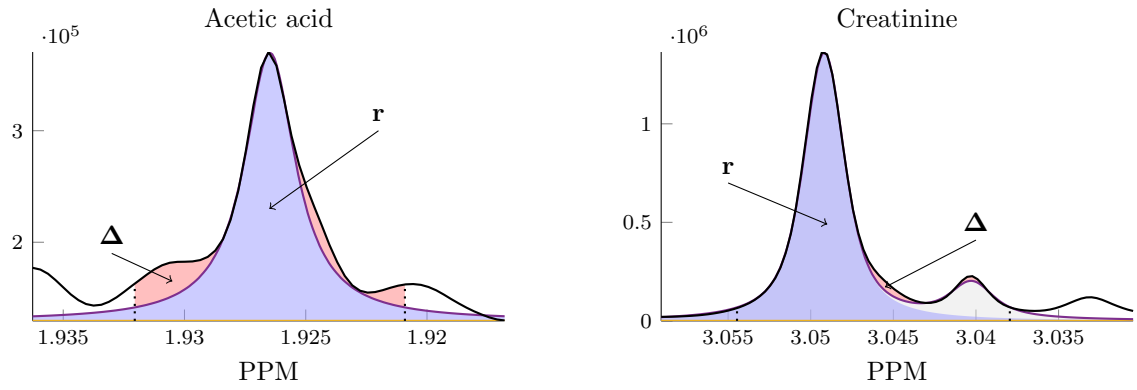
Compound	Conc. mmol/L	Conc. $\frac{\text{mmol}}{\text{mol Crea}}$	LOD $\frac{\text{mmol}}{\text{mol Crea}}$	r mmol/L	ρ %	Δ mmol/L	95% Range(*) $\frac{\text{mmol}}{\text{mol Crea}}$
D-Galactose	< 0.23	< 43	43	0.023	52 ○	0.014	≤ 44
D-Glucose	0.23	43	34	0.230	88 ●	0.064	≤ 140
D-Lactose	< 0.51	< 96	96	0.063	91 ●	0.046	≤ 96
D-Mannitol	< 0.98	< 180	180	0.000	0 ○	2.654	≤ 180
D-Mannose	0.03	6	6	0.034	81 ○	0.015	≤ 8
Myo-Inositol	< 24	< 4400	4400	0.000	0 ○	5.117	≤ 4400

(*) Gray horizontal boxes represent 95% concentration range, black vertical lines represent sample value.

10 Explanations

This section contains the definition of the parameters used above. In the section 10.1 a short manual, how to interpret the results, is presented. The section 10.3 contains the exact definitions of the parameters $\mathbf{r}$, ρ and $\mathbf{\Delta}$.

10.1 How to read the result



(a) Single signal fitting.

(b) Simultaneous fitting of two signals.

Figure 1: Examples of fitting.

In the figure 1(a), the black line, the blue line and the yellow line represent the original spectrum, the calculated signal fit and its baseline, respectively.

The blue area relates to the metabolite concentration to be determined and the red area represents a residue.

In case of the signal overlap a different approach is used: two or more overlapping signals are being fitted simultaneously. The most iconic example of such signals are the ones generated by $\mathrm{CH_3}$ groups of Creatinine and Creatine. In such a case, the blue line and the grey area relate the sum of all fitted signals. The blue area corresponds to the concentration of the metabolite of interest (cf. figure 1(b)).

10.2 Result parameters

a) **Conc.** is the final result concentration of the metabolite,

b) **LOD** is the *limit of detection* of the given metabolite,

c) $\mathbf{r}$ is the *raw concentration* i.e. the concentration equivalent of the resulting signal fit prior to comparing to **LOD** (relates to the blue area, cf. α)),

d) ρ is the correlation of lineshape metabolite signal with calculated fit characterizing the match between metabolite signal and fit (cf. β)). Depending on the value of ρ, the following *flag* is displayed:

- ●, if the correlation is 95%,
- ●, if the correlation is in between 85% and 95%,
- ○, if the correlation is less than 85%,

e) **Δ** is the concentration equivalent of the difference between metabolite signal and calculated fit (residue corresponding to the the red area, cf. γ)).

10.3 Detailed definitions

Let s, f and b denote the functions describing the *raw spectra*, *fitted curve* and *(fitted) baseline* respectively. These functions are chosen such that $s \approx f + b$. Moreover, let I be a relevant PPM interval and P_N be the proton number for given metabolite/signal.

α) $\mathbf{r}$ (*raw concentration*) is defined as

$$\mathbf{r} = \frac{1}{P_N} \int_{\mathbb{R}} f(\xi)\, \mathrm{d}\xi.$$

β) ρ is the *correlation* of the functions s and $f + b$, i.e.

$$\rho = \max\left(0, \operatorname{corr}\left(\overline{s}, \overline{f + b}\right)\right),$$

where $\overline{s}$, $\overline{f + b}$ are numerical representations of the functions s and $f + b$ on sufficiently fine mesh of the interval I.

γ) **Δ** is the the area between the raw signal s and the fitted data $f + b$ on the interval I expressed in the terms of the concentration, i.e.

$$\mathbf{\Delta} = \frac{1}{P_N} \int_I |s(\xi) - f(\xi) - b(\xi)|\, \mathrm{d}\xi.$$