Analysis Report

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

Sample ID: ALZ_Urine_Rack01_RCM_221214_expno500.100000.10r

Measuring Date: 24-Dec-2014 01:46:05
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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: Acetic acid (94 mmol/mol Crea),
Keto acids and derivatives: Acetoacetic acid (32 mmol/mol Crea), Oxaloacetic acid (120 mmol/mol Crea), Pyruvic acid (38 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	3.5	0.3	3.468	100 ●	0.087	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	0.13	37	31	0.127	100 ●	0.004	$\leq$ 54
Trimethylamine	$<$ 0.01	$<$ 2	2	0.003	98 ●	0.000	$\leq$ 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	$<$ 0.05	$<$ 15	15	0.000	0 ○	0.100	$\leq$ 15
2-Furoylglycine	$<$ 0.13	$<$ 39	39	0.000	0 ○	0.029	$\leq$ 40
4-Aminobutyric acid	$<$ 0.07	$<$ 20	20	0.000	0 ○	0.402	$\leq$ 20
Alanine	0.10	29	10	0.102	99 ●	0.013	11 - 72
Arginine	$<$ 2.6	$<$ 750	750	0.183	0 ○	1.214	$\leq$ 750
Betaine	0.06	18	7	0.062	100 ●	0.022	9 - 78
Creatine	0.42	120	50	0.416	100 ●	0.087	$\leq$ 280
Glycine	0.31	90	34	0.311	100 ●	0.010	38 - 440
Guanidinoacetic acid	$<$ 0.36	$<$ 100	100	0.230	27 ○	0.168	$\leq$ 140
Methionine	$<$ 0.06	$<$ 18	18	0.000	0 ○	0.212	$\leq$ 18
N,N-Dimethylglycine	0.03	8	5	0.029	85 ●	0.014	$\leq$ 15
Sarcosine	$<$ 0.01	$<$ 2	2	0.000	0 ○	0.002	$\leq$ 7
Taurine	$<$ 0.49	$<$ 140	140	0.134	30 ○	0.173	$\leq$ 170
Valine	0.01	3	2	0.010	71 ○	0.006	$\leq$ 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	< 0.03	< 10	10	0.000	0 ○	0.022	≤ 10
D-Mandelic acid	< 0.01	< 2	2	0.000	0 ○	0.062	2 - 17
Hippuric acid	2.1	610	170	2.103	99 ●	0.223	≤ 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	0.32	94	5	0.325	100 ●	0.026	≤ 51
Citric acid	1.1	330	40	1.143	100 ●	0.084	≤ 700
Formic acid	< 0.03	< 10	10	0.025	99 ●	0.002	≤ 43
Fumaric acid	< 0.01	< 2	2	0.002	99 ●	0.000	≤ 3
Imidazole	< 0.17	< 48	48	0.000	0 ○	0.080	≤ 48
Lactic acid	< 0.17	< 49	49	0.118	98 ●	0.035	≤ 110
Proline betaine	< 0.09	< 25	25	0.047	0 ○	0.108	≤ 280
Succinic acid	0.02	6	5	0.019	94 ●	0.004	≤ 39
Tartaric acid	0.03	9	5	0.031	95 ●	0.009	≤ 110
Trigonelline	0.13	37	35	0.127	100 ●	0.004	≤ 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	< 0.17	< 48	48	0.000	0 ○	0.158	≤ 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	< 0.32	< 92	92	0.087	64 ○	0.090	≤ 92
3-Hydroxybutyric acid	< 0.36	< 100	100	0.000	0 ○	0.623	≤ 100
Acetoacetic acid	0.11	32	14	0.109	89 ●	0.064	≤ 30
Acetone	0.01	3	2	0.009	90 ●	0.004	≤ 7
Oxaloacetic acid	0.42	120	17	0.420	95 ●	0.127	≤ 66
Pyruvic acid	0.13	38	9	0.131	100 ●	0.002	≤ 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	< 0.02	< 5	5	0.000	0 ○	0.083	≤ 5
1-Methylnicotinamide	< 0.11	< 32	32	0.048	96 ●	0.009	≤ 32
Adenosine	< 1.3	< 390	390	0.000	0 ○	0.734	≤ 390
Allantoin	< 0.06	< 17	17	0.055	99 ●	0.005	≤ 47
Allopurinol	< 0.03	< 10	10	0.026	68 ○	0.040	≤ 11
Caffeine	< 0.16	< 45	45	0.086	93 ●	0.075	≤ 61
Inosine	< 0.07	< 19	19	0.014	92 ●	0.032	≤ 19

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

9 Sugars and derivatives

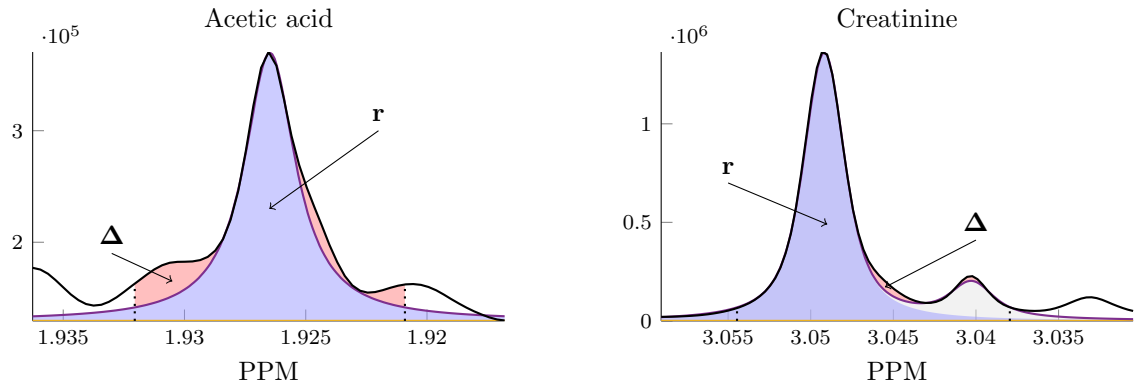
Compound	Conc. mmol/L	Conc. $\frac{\text{mmol}}{\text{mol Crea}}$	LOD $\frac{\text{mmol}}{\text{mol Crea}}$	r mmol/L	ρ %	Δ mmol/L	95% Range(*) $\frac{\text{mmol}}{\text{mol Crea}}$
D-Galactose	< 0.15	< 43	43	0.000	0 ○	0.037	≤ 44
D-Glucose	< 0.12	< 34	34	0.065	96 ●	0.013	≤ 140
D-Lactose	< 0.33	< 96	96	0.046	85 ●	0.062	≤ 96
D-Mannitol	< 0.63	< 180	180	0.000	0 ○	2.272	≤ 180
D-Mannose	< 0.02	< 6	6	0.000	0 ○	0.044	≤ 8
Myo-Inositol	< 15	< 4400	4400	0.000	0 ○	3.549	≤ 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.

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