INTERNAL & EXTERNAL QUALITY CONTROL

WHY.... and HOW....?

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Why should we control the quality of our analytical data?

Although we use ingenious sophisticated analytical methods they can provide erroneous and therefore misleading data.

Medical action based on false data is more dangerous than medical action without certain data.

NO NUMBER IS SAFER THAN A FALSE NUMBER!!

Validation of Analytical Methods

for every metabolite to be quantified

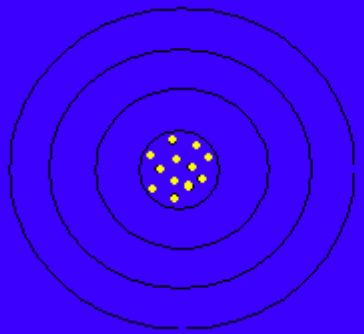
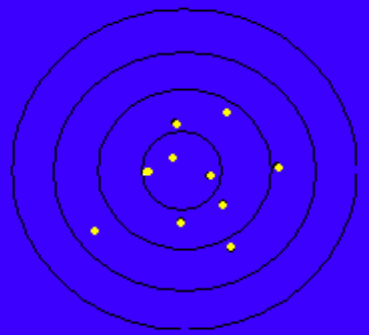
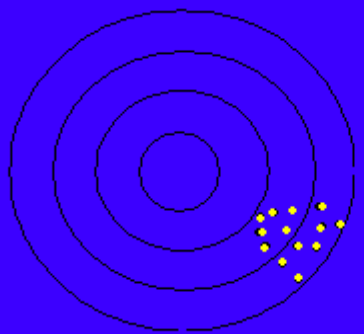
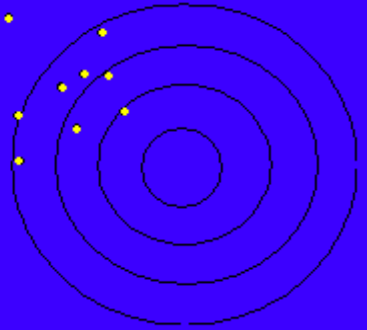
- Specificity
- Selectivity
- Accuracy
- Trueness (Bias)
  - Bias (total systematic error)
- Precision (repeatability and reproducibility)
- Linearity

Validation of Analytical Methods

for every metabolite to be quantified

- Calibration
- Range incl. detection limit
- Matrix variation effect
- Recovery
- Robustness
- Sensitivity

ACCURACY

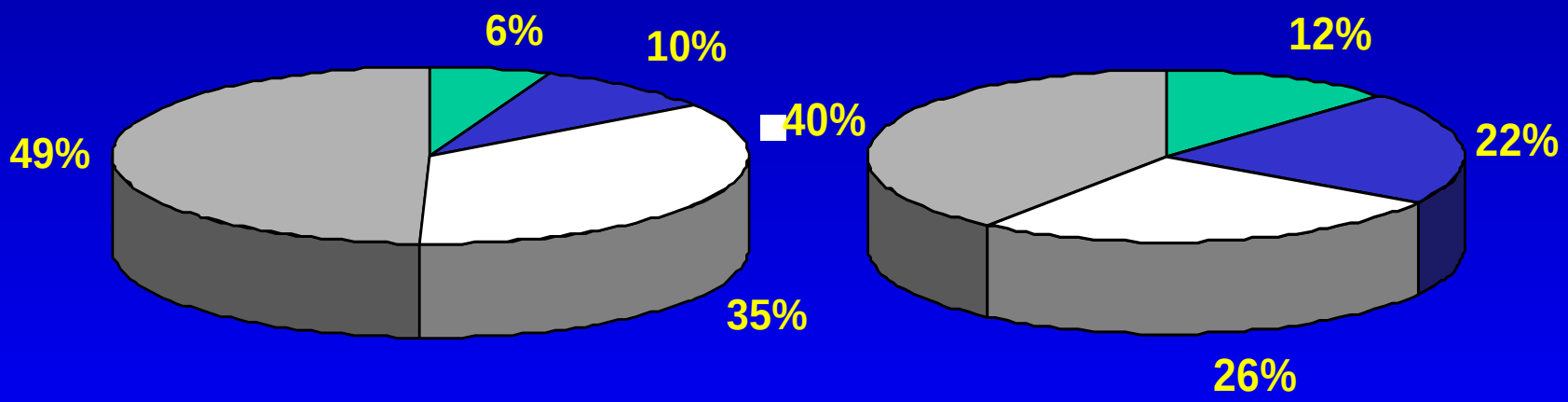
	high precision	low precision
high trueness	 (high accuracy)	 (fair accuracy)
low trueness	 (fair accuracy)	 (poor accuracy)

Please put your hand up if you perform internal quality control by using a pooled urine/plasma:

- **at amino acid analysis**
- **at GC-MS analysis of organic acids**

PERFORMANCE OF INTERNAL QUALITY CONTROL

questionnaire 1995



QC Organic acids (n = 76)

QC Amino acids (n = 121)

- Yes (pooled urine/plasma)
- Yes (but without details)
- ? (no information)
- No

INTERNAL QUALITY CONTROL

AIM: to limit the analytical variation by controlling the day to day performance of the analyses in your laboratory;

- **Precision (repeatability and reproducibility)**
- **Trueness (Bias)**
- **Linearity**

INTERNAL QUALITY CONTROL

<u>Material to be used</u> (matrix must be similar to samples for the daily analyses):

- **pooled plasmas and/or urines possibly spiked with metabolites; * home made**

*** commercial available**

INTERNAL QUALITY CONTROL

Frequency of internal quality controls guidelines:

- Batch processing: analyze a pool sample each run

- Continuous processing: analyze a pool sample each 24 hours

- Analyze a pool sample after:
  - change of chromatographic parameters
  - refreshment of buffers
  - refreshment of derivatization agent (e.g. ninhydrin)

EXTERNAL QUALITY CONTROL

AIM:

1. To optimize inter-laboratory comparability

2. To approach the accuracy of analytical data (data from many laboratories needed)

3. To check your internal quality controls

4. To improve diagnostic skill by Proficiency testing

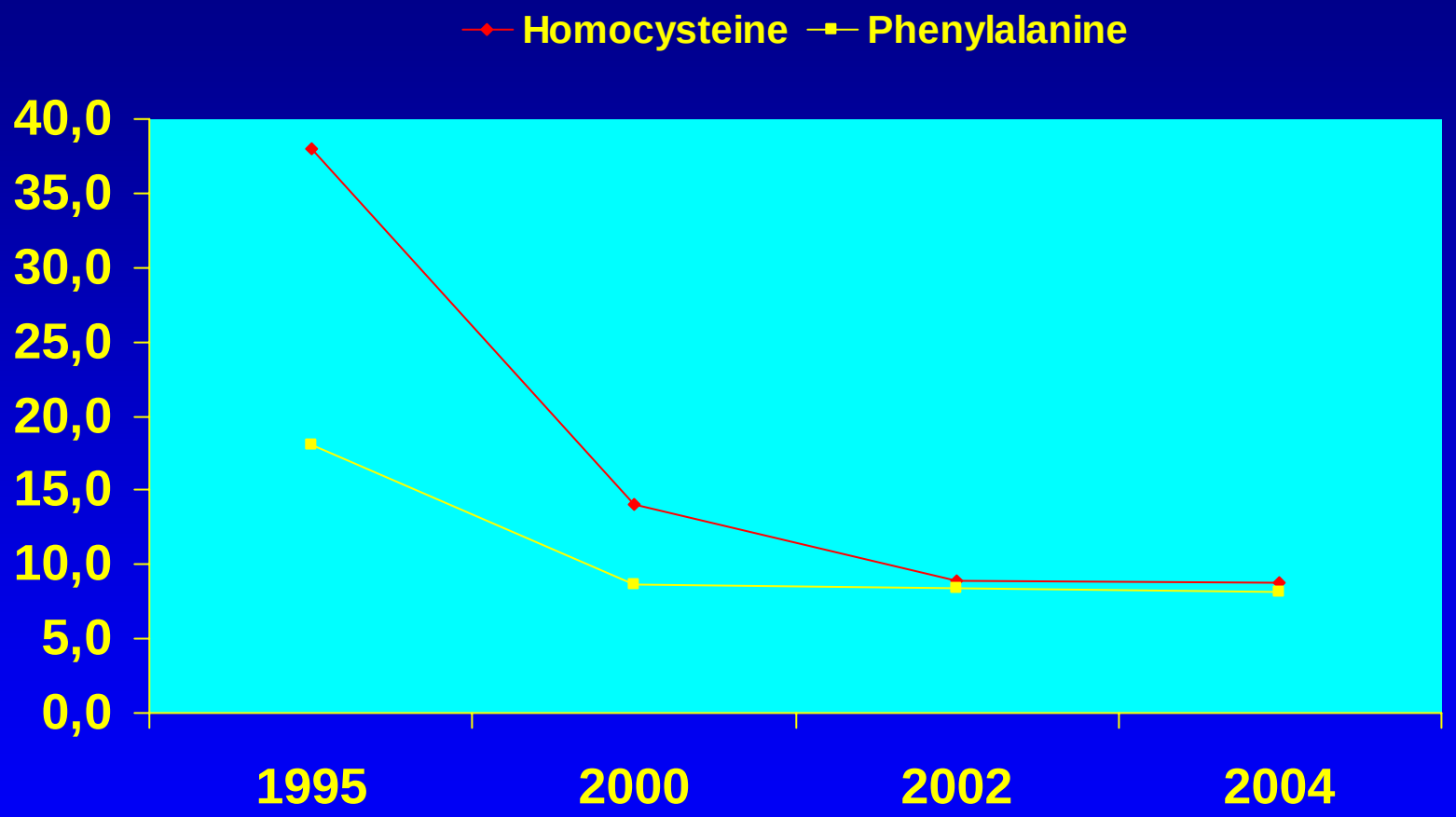
INTERNAL & EXTERNAL QC

GUIDELINE:

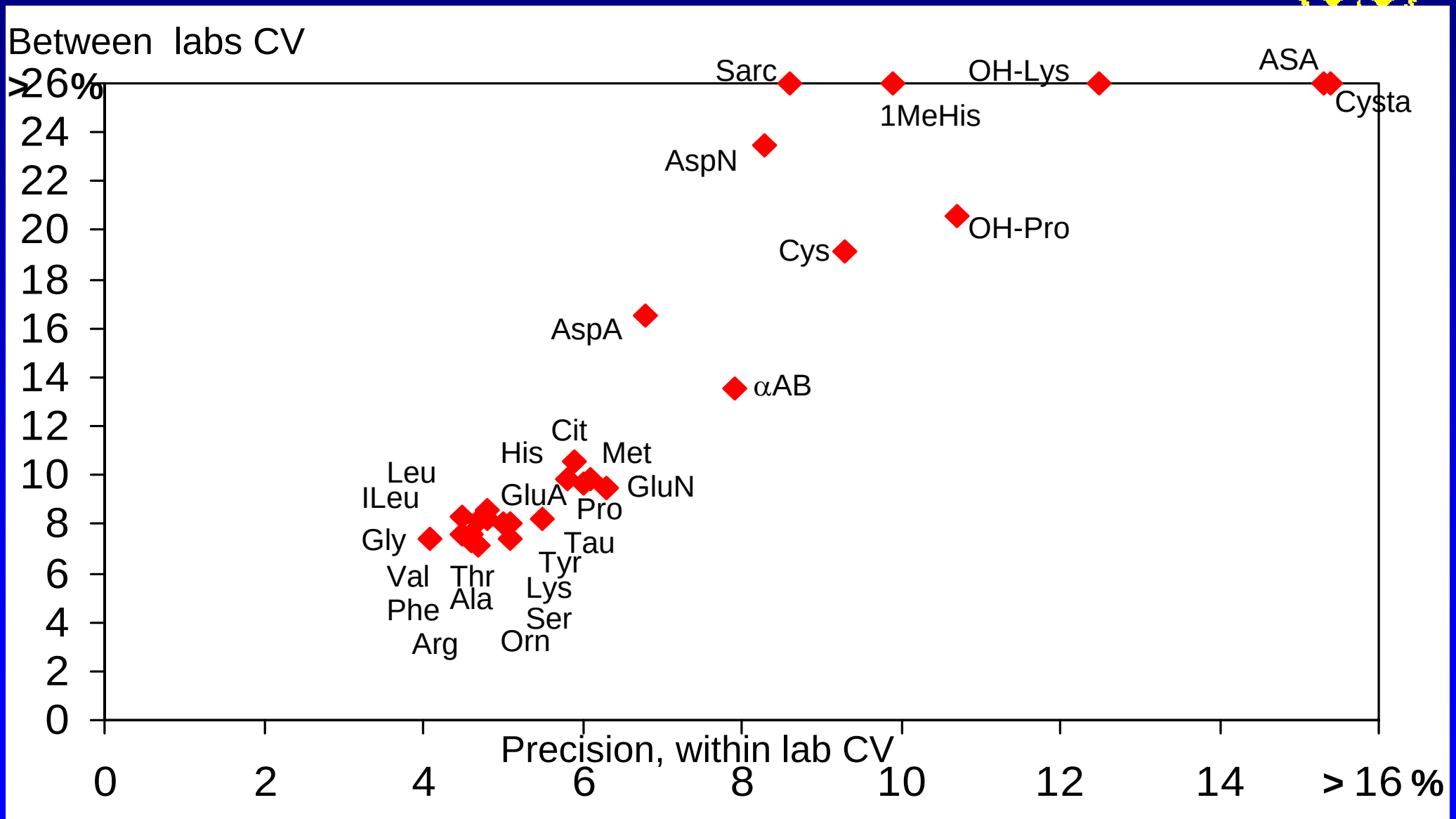
- **Firstly, control the analytical / methodological performance with well defined pooled urine and/or plasma samples.**
- **Secondly, use the data from the ERNDIM QAP to check your internal quality controls.**
- **Don’t use the external control samples for your internal quality control.**

IMPORTANT: evaluation and aftercare

improvement of between Labs CV



Amino acid QC scheme: Precision vs. Interlab variation



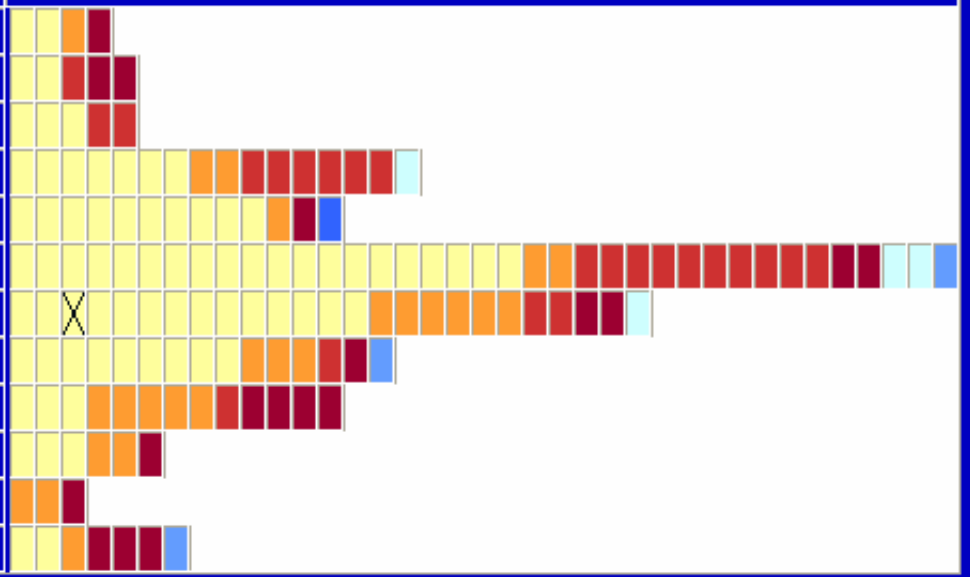
AA 96
Phenylalanine

IEC-ninhydrine-1 Internal Standard

Statistical Results

Parameter	Your Lab	Method
n	1	75
Mean	374	383
Median	374	385
SD		17.8

Scale Standard Deviations	Scale µmol/L
>3SD	> 450
2-3SD	427 - 450
1.5 - 2.0SD	415 - 426
1.0 - 1.5SD	403 - 414
0.5 - 1.0SD	391 - 402
0.0 - 0.5SD	379 - 390
-0.5 - 0.0SD	367 - 378
-1.0 - -0.5SD	355 - 366
-1.5 - -1.0SD	344 - 354
-2 - -1.5SD	332 - 343
-3 - -2SD	308 - 331
<-3SD	< 308



X Your lab

IEC-ninhydrine-1 Internal Standard

IEC-ninhydrine-0 Internal Standard

IEC-ninhydrine-2 Internal Standards

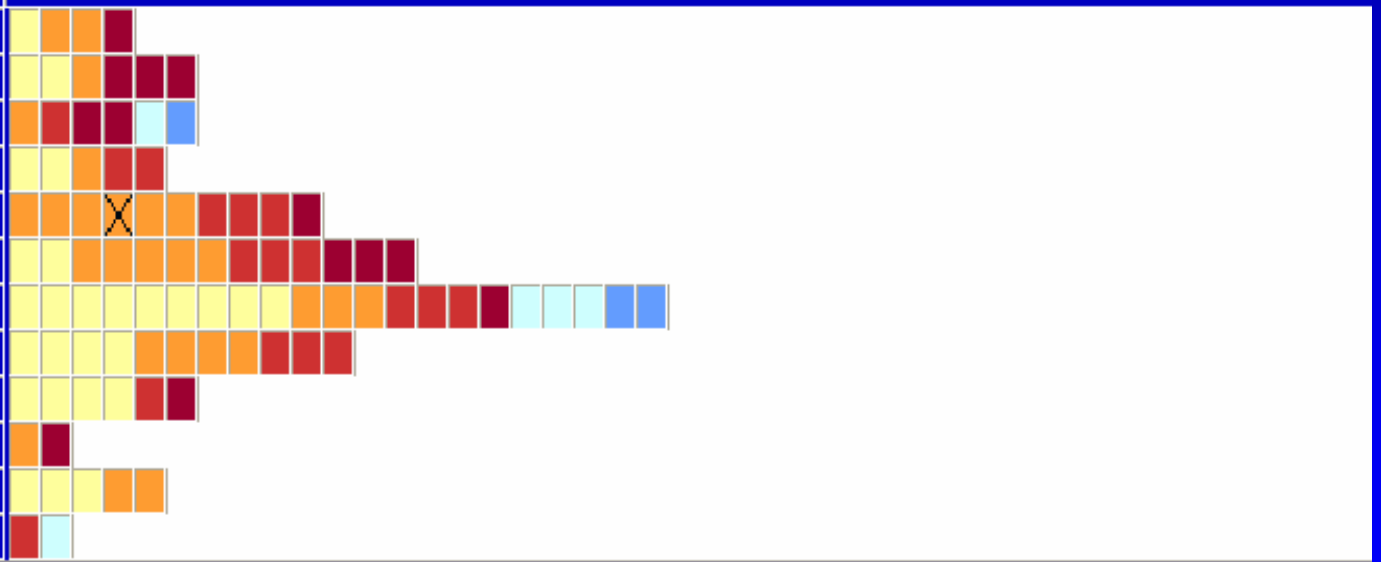
Reverse phase chromatography

IEC-other derivatization

SA-Serum 62
Homocysteine

Method			
Selections for Report			
Hospital Name	Universitäts Kinderspital Beider Basel	**Parameter**	**Your I**
Department	Aminoacid lab	**n**	1
Contact Person	B. Fowler / M. Zaugg / M. Bill	**Mean**	121
Deadline	03-12-2004 23:59	**Median**	121
Unit	µmol/L	**SD**	

Scale Standard Deviations	Scale µmol/L
>3SD	> 148
2-3SD	136 - 148
1.5 - 2.0SD	131 - 135
1.0 - 1.5SD	125 - 130
0.5 - 1.0SD	120 - 124
0.0 - 0.5SD	114 - 119
-0.5 - 0.0SD	109 - 113
-1.0 - -0.5SD	103 - 108
-1.5 - -1.0SD	97 - 102
-2 - -1.5SD	92 - 96
-3 - -2SD	81 - 91
<-3SD	< 81



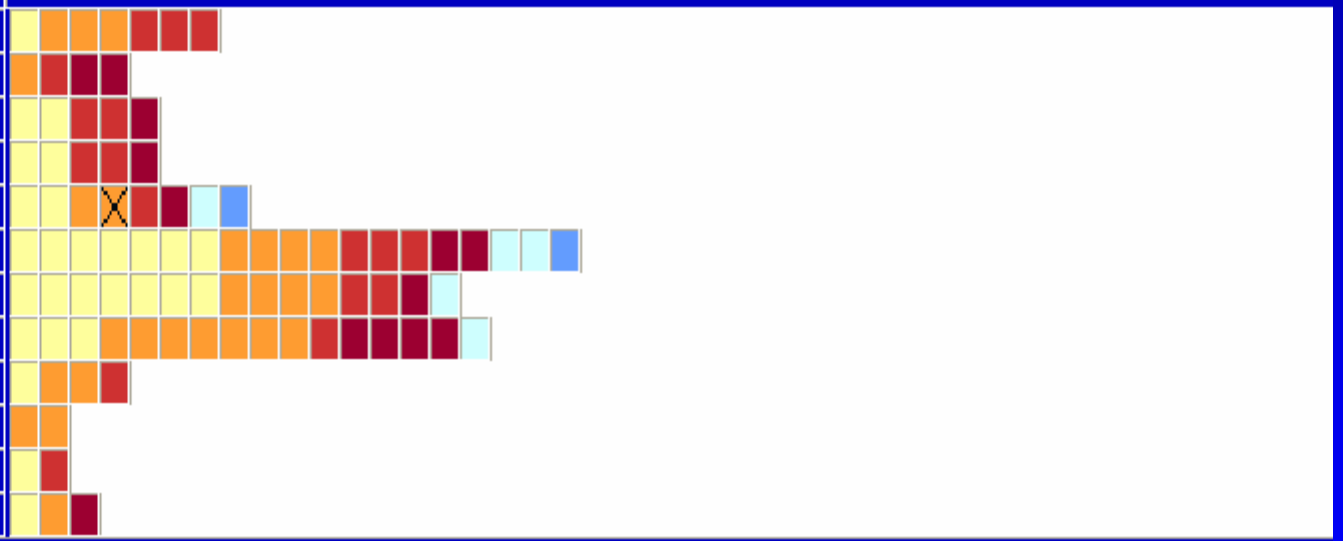
- X Your lab
- Immunoassay
- HPLC-SBDF reagent
- Other
- Ion exchange/reduction DTT/ninhydin
- ELISA
- HPLC-bromobimane reagent

Mean all labs 114 µmol/L

SA-Serum 59
Homocysteine

Method			
Selections for Report			
Hospital Name	Universitäts Kinderspital Beider Basel	**Parameter**	**Your La**
Department	Aminoacid lab	**n**	1
Contact Person	B. Fowler / M. Zaugg / M. Bill	**Mean**	13.5
Deadline	10-09-2004 23:59	**Median**	13.5
Unit	µmol/L	**SD**	

Scale Standard Deviations	Scale µmol/L
>3SD	> 15,8
2-3SD	14,8 - 15,8
1.5 - 2.0SD	14,3 - 14,7
1.0 - 1.5SD	13,8 - 14,2
0.5 - 1.0SD	13,3 - 13,7
0.0 - 0.5SD	12,9 - 13,2
-0.5 - 0.0SD	12,4 - 12,8
-1.0 - -0.5SD	11,9 - 12,3
-1.5 - -1.0SD	11,4 - 11,8
-2 - -1.5SD	10,9 - 11,3
-3 - -2SD	10,0 - 10,8
<-3SD	< 10,0



X Your lab
HPLC-SBDF reagent
Ion exchange/reduction DTT/ninhydin
HPLC-bromobimane reagent
Immunoassay
Other
ELISA

Mean all labs 12.9 µmol/L

THANKS ARE DUE TO:

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