

NQLM

Nordic Committee for External
Quality Assurance Programmes
in Laboratory Medicine

2001-11-23

NORDIC INTERFERENCE STUDY, March 2001

Effects of bilirubin on some common serum analysis

Enclosed please find the results of the bilirubin interference study of March 2001. The report is late, as EQUALIS has reformatted the computer program for this survey, and the input data was individually checked, - also by going back to the individual labs in cases where results were questioned. In this way we have achieved consistent data, although we want to apologise for the time it took until we could return the report.

206 laboratories participated in this joint survey, 24 from Denmark, 42 from Finland, 4 from Island, 33 from Norway, 100 from Sweden and 3 from outside the Nordic countries. The interference studies was initiated by NQLM, Nordic committee for external quality assurance programmes in laboratory medicine, - and run as a collaboration between all the Nordic EQA organisers, according to a protocol worked out by NQLM. The sera were prepared and mailed directly from Sero AS in Oslo. EQUALIS (the Swedish EQA organisation) has done the data processing and the mailing of the results directly to the participating laboratories.

Material

6 sera were sent out, consisting of one sample with normal level bilirubin ("0-sample"), 4 samples to which conjugated bilirubin was added, and one sample to which unconjugated bilirubin was added, as shown in Table 1. All samples had the same concentrations of the 12 analytes to be tested for bilirubin interference. The concentration of the analytes were endogenous concentrations or spiked to concentrations around the upper reference limit, as indicated in table 2.

Table	1. Bilirubin contents (µmol/L)					
	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
Bilirubin						
Conjugated	0	0	250	75	400	140
Unconjugated	140	0	0	0	0	0

Table 2. Concentration of the components in the serum without bilirubin, given as the overall mean value.

Analyte	Concentration levels
ALAT, U/L	67
ALP, U/L	317
GT, U/L	88
Amylase, U/L	229
Cholesterol, mmol/L	4,6
HDL cholesterol, mmol/l	1,3
Triglycerides, mmol/L	0,8
Creatinine, µmol/L	97
Glucose, mmol/L	6,0
Uric acid, µmmol/L	388
Phosphorus, mmol/L	1,1
Iron µmol/L	19

Endogenous bilirubin: ca 8 µmol/L

Production of the material

Sera from voluntary blood donors from Scandinavian blood centers were spiked with various components to give the final concentration levels shown in table 2. The conjugated bilirubin used was a synthetic preparation, while unconjugated bilirubin was a preparation from gallstone, both purchased from Europa Bioproducts in England. There were no other additives than the spiking material.

Mailing and analysis

The sera were mailed as *A-priority mail* directly to the participating laboratories on February 27th, - the following day after production, - packed in polystyrene foam, but with no further temperature control packing. The samples were received by the laboratories after 1-3 days and were analysed on March 1st with a few exceptions.

The analysis were done in triplicates and the mean values transferred to the result form. The labs were asked to omit possible outliers among the triplicates, according to "common sense".

Statistics and result presentation

Grouping. The results are grouped according to the instrument used, except for creatinine, where results from the Jaffe method and the enzymatic methods were studied separately.

Exclusion of outliers. As a principle all results are processed, also those where the lab had commented that the sample would ordinarily not have been analysed, due to high bilirubin. Suspicion of sample mix up were clarified, and remaining outliers that apparently did not belong to the result population were excluded.

Numerical summaries. The tables give mean values, SD and CV % in each sample, for each instrument. For groups of ≤ 3 results SD and CV are not given. For creatinine results are presented per method group instead of per instrument.

Graphs - interferographs. Graphs are given for each analyte for major groups of related instruments as difference plots, in which the value from the sample with 0 g added bilirubin/L from each laboratory as 100 %. Each instrument group has the same style and colours in all graphs. For instruments with only few results curves are not given. If your results belong to such a group, we recommend you to calculate the points for your group from the data given in the tables and plot them on the respective graphs for comparison to the others. Especially for analytes where interference is seen, this may be informative.

Example for the calculation of one of the 75 $\mu\text{mol/L}$ points:

$$\% \text{ on the Y-axis} = \frac{(\text{Xmean } 75 \mu\text{mol/L} - \text{Xmean } 0 \mu\text{mol/L}) \times 100}{\text{Xmean } 0 \mu\text{mol/L}}$$

The scales are the same for all the analytes, ranging from 40 to 140 % of the value without addition. For further explanation to the graphs literature reference (5) is recommended.

Comments

The bilirubin concentrations in these samples (75 – 400 $\mu\text{mol/L}$) ranged from a slightly increased level frequently seen in a clinical laboratory, to extremely high as one would occasionally see in samples from new-born.

The laboratories were asked to analyse the samples regardless of whether they would have done so if the samples were routine patient samples. They were also asked to give the same comments as they would have done when receiving such samples in the routine. These comments are registered but not reported here, since the main purpose of the interference project is to get information about the robustness of present

analysis systems towards various kinds of interference. The laboratories are however recommended to check their routines for comments for the individual analytes with respect to the outcome of this study.

The 12 analytes chosen were analytes that was considered as possibly susceptible to interference. The concentrations of the analytes were close to the upper reference limits. These concentrations were selected because the nature of the optical interference is regarded as a “blanking” problem, giving a constant bias and not a proportional bias.

Half of the 12 analytes tested did not seem to be seriously affected by any of the bilirubin concentrations, - conjugated or unconjugated. The non affected analytes were ALAT, ALP (AFOS), GT, amylase, glucose, and iron. Occasionally 5-10 % interference was seen for these analytes, but this is neither regarded to be of statistical significance, since the method groups are rather small, nor to be of clinical importance. The 20 % positive deviation at the 450 $\mu\text{mol/l}$ bilirubin level found for ALP (AFOS) in the Vitros group, and the 15% negative deviation for amylase in the Integra group are also considered to be of minor clinical importance. (The large span of measurement levels reported for amylase is partly due to the fact that some laboratories have reported measurement of pancreas amylase instead of total amylase. As the interferographs and the relative effect of bilirubin are unaffected, we have decided to report all data in the amylase group.)

Cholesterol

Most instruments gave a negative deviation at the two highest levels of conjugated bilirubin, while this was not particularly apparent for HDL cholesterol. Almost all laboratories now apply the direct method, where the final reaction often is the same as for total cholesterol, - the major difference being the presence of the polyanionic agent in the HDL reagent.

Four analytes seemed to be seriously affected by bilirubin; creatinine, phosphorus, uric acid and triglycerides.

Creatinine

For obvious reasons the creatinine data has been compiled according to measurement method instead of instrument. As expected the majority of the Jaffé methods were seriously affected, while the enzymatic creatinine methods were not. However, some of the Jaffé methods seem to compensate well for the bilirubin interference.

Phosphorus

For phosphorus two instrument groups gave a serious deviation at high bilirubin levels, - the Axon instruments in positive direction and the Kone instruments in the negative direction. The observed interference increased proportionally to the phosphorus concentration.

Uric acid

Three instrument groups (Integra, Synchron, Axon) was seriously disturbed by conjugated bilirubin, - starting already at the lowest bilirubin concentration. The Hitachi and Vitros instruments were not affected.

Triglycerides

Two instrument groups showed a negative interference in all the samples where conjugated bilirubin had been added, (Integra and Aeroset). It is interesting that unconjugated bilirubin gave the opposite effect for Aeroset, and a couple of other instrument groups, - a positive deviation.

The data reported by the participating laboratories regarding measurement methods has – with the exception for creatinine above – not been utilize for this report. The measurement method is often associated with the specific instrument, and the added information therefore of minor value. For specific questions, however, the data can be made available in a form categorized on measurement methods as well.

Many of the newer instruments have diode array optics and apply bi- or polychromatic readings to reduce the blanking problem. Separate serum blanks are usually avoided due to increased costs and slow down of the throughput of discrete analysers. Instruments with bi- or polychromatic reading (like Hitachi, Integra, Synchron, Axon, Aeroset, and only partly Kone instruments etc) should in principle handle optical interference like bilirubin better than those which only have monochromatic reading. Also the Vitros instruments, with its special dry chemistry technology is known to handle the blanking problem well. In this study bi- or polychromatic reading design did apparently not guarantee a solution to the bilirubin interference problem. Although a number of instruments are new in use, it seems that the design of the Hitachi and Vitros analysis systems still seem superior.

Two general patterns concerning optical interference have been apparent through the the study.

- A. When interference occur, it is in principle proportional to the amount of interferent added, and
- B. The interference, when given as % deviation from the "0 sample", as we have done here, is more pronounced at the lower analyte concentrations than at the higher, - as is expected when the interference is due to a blanking problem.

It is hardly relevant to compare our results here with the results of Glick and coworkers, since most of the instruments (US 12 years ago!) are no longer in use, - new models have taken over. But the interference problem is still with us, as we have seen, especially from the hemolysis - and from bilirubin. Next year we will study lower concentrations of these two interferents, in order to pinpoint critical concentrations by these two interferents.

Thank you for your participation!

*On behalf of NQLM,
Adam Uldall (DEKS), Minna Loikkanen (Labquality), Elin Olafsdottir (Island),
Jaak Eintrei and Gunnar Nordin (EQUALIS) and Heidi Steensland (NKK)*

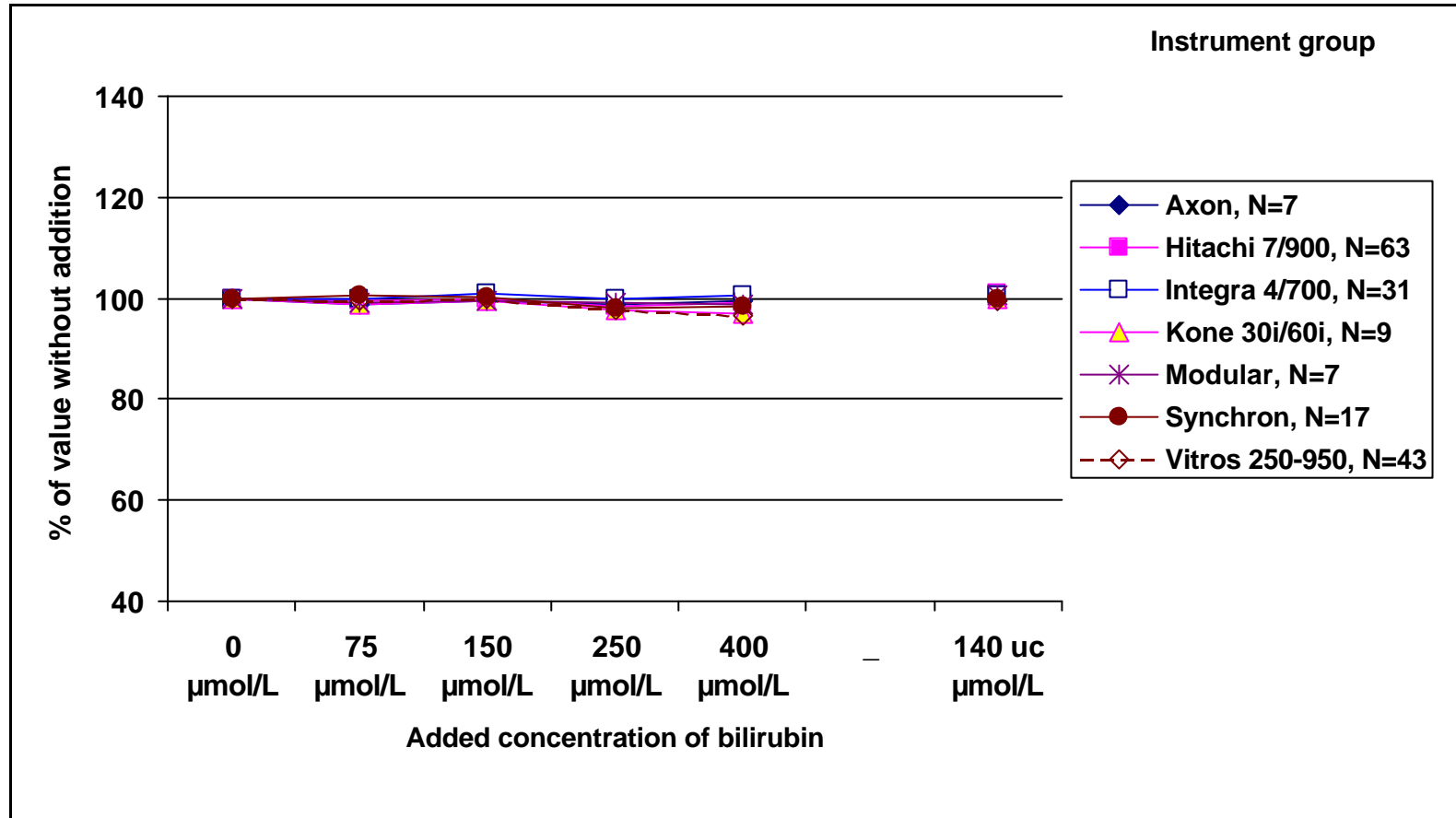
Literature references:

1. Glick MR; Ryder KW. Analytical systems ranked by freedom from interferences. Clin.Chem. 1987;33:1453-8
2. Glick MR; Ryder KW; Jackson S.A Graphical Comparisons of Interferences in Clinical Chemistry Instrumentation. Clin.Chem. 1986;33:470
3. Glick MR; Ryder KW; Glick SJ. Incidence and amount of turbidity, hemolysis and icterus in serum from outpatients. Lab.Med. 1991;22:415-18
4. Glick MR; Ryder KW. Erroneous laboratory results from hemolyzes, icteric and lipemic specimens. Clin.Chem. 1993;39:175-6
5. Glick MR; Ryder KW; Glick SJ. Interferographs, User's guide to interferences in clinical chemistry instruments, 2nd edition, 1991; Science Enterprises, Inc, USA.
ISBN 0-930116-08-9

ALAT

Mean value without additon: 67 U/L

Graphical presentation of mean values for the major instrument groups



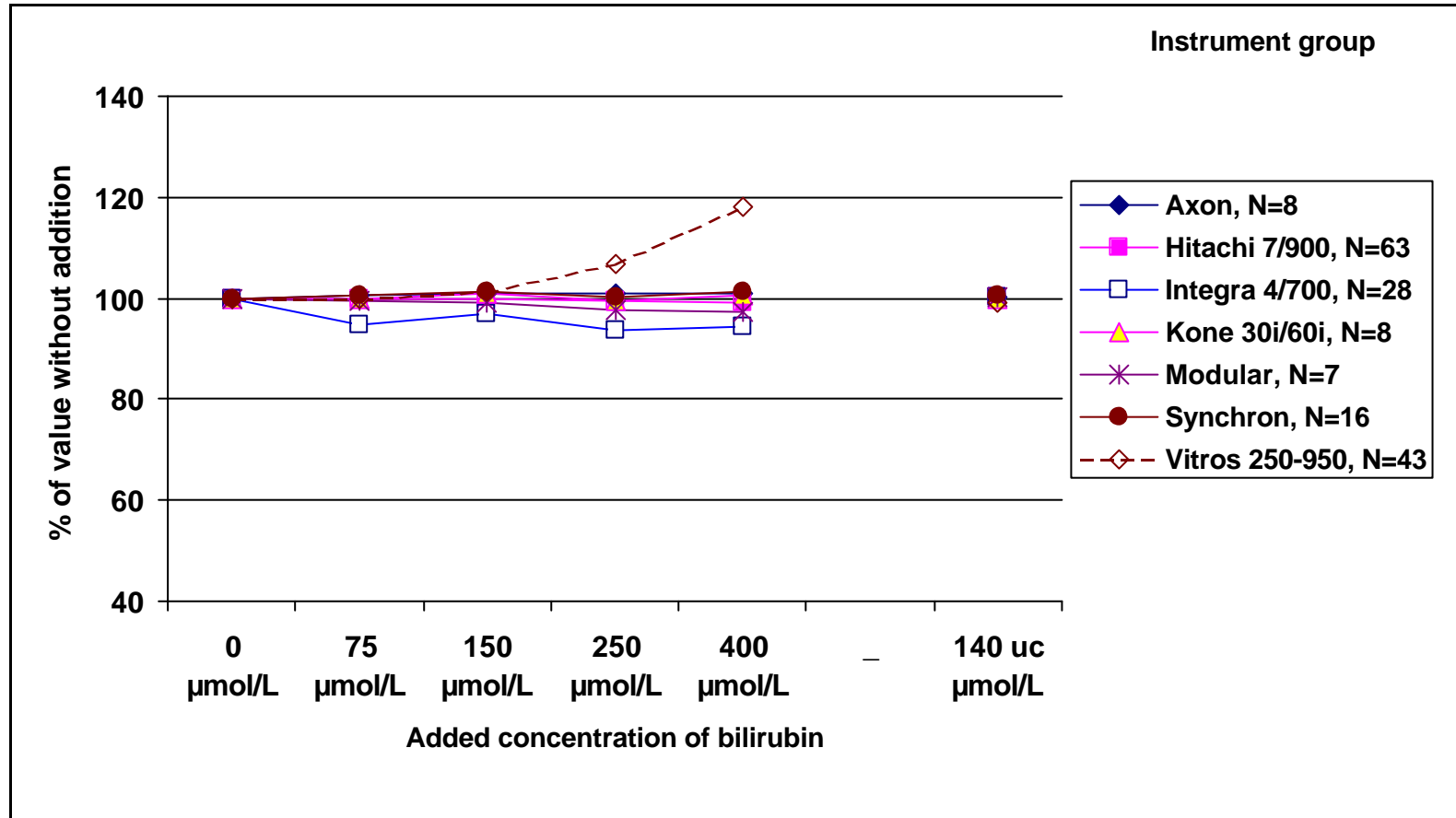
ALAT: summary of all data categorized by instrument

Instrument	Unit	N	No addition			+ 75 µmol/			+ 150 mmol/L			+ 250 µmol/			+ 400 µmol/L			+ 140 µmol/L (uc)		
			Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Aeroset	U/L	3	64.2			63.9			64.3			63.3			64.8			63.1		
Vision	U/L	4	60.8	2.6	4.2%	62.6	4.3	6.9%	56.3	13.8	24.5%							60.0	1.1	1.8%
Mira Plus	U/L	2	63.5			64.5			66.0			63.5			63.5			63.5		
Mira S	U/L	1	71.0			70.0			71.0			68.0			70.0			69.0		
ADVIA 1650	U/L	2	69.4			68.0			68.3			68.5			68.0			68.6		
DAX	U/L	1	65.4			63.6			64.8			61.8			61.2			62.4		
Axon	U/L	7	67.0	4.7	7.0%	66.1	4.7	7.1%	66.5	4.3	6.5%	66.1	4.1	6.2%	66.6	4.2	6.3%	66.6	4.5	6.8%
Opera	U/L	1	67.0			68.0			68.0			66.0			68.0			67.0		
Synchron CX5	U/L	8	65.6	2.0	3.0%	65.9	2.8	4.2%	66.3	2.8	4.2%	64.7	2.7	4.2%	64.6	2.3	3.6%	66.2	2.9	4.4%
Synchron CX7	U/L	2	66.7			65.8			65.6			65.0			65.4			65.8		
Synchron CX9	U/L	3	65.9			65.9			67.1			65.0			66.3			65.4		
Synchron LX20	U/L	4	64.7	4.1	6.4%	66.5	4.3	6.4%	63.6	4.0	6.4%	63.2			63.8			64.2	5.6	8.7%
Dimension RxL	U/L	4	65.6	4.2	6.3%	64.0	3.7	5.7%	63.9	4.4	6.9%	61.4	3.3	5.3%	59.6	3.4	5.8%	64.9	4.3	6.6%
Kone 30i	U/L	4	64.2	5.6	8.7%	62.9	4.8	7.7%	64.4	5.0	7.8%	62.4	5.5	8.8%	61.4	4.0	6.5%	63.8	5.1	8.0%
Kone 60i	U/L	5	66.0	3.0	4.5%	65.8	3.3	5.0%	65.4	2.7	4.1%	64.6	3.0	4.7%	64.4	3.2	5.0%	66.2	3.5	5.3%
Optima	U/L	1	63.0			60.0			63.0			64.0			62.0			61.0		
MEGA	U/L	1	58.2			58.2			58.2			54.0			57.6			58.2		
AU 600	U/L	2	63.9			63.9			63.7			63.4			63.1			64.8		
Vitros 250	U/L	26	71.4	3.6	5.0%	71.1	4.1	5.7%	71.7	4.2	5.8%	69.8	3.5	5.1%	69.1	3.9	5.6%	71.2	2.9	4.0%
Vitros 700	U/L	2	65.5			64.0			65.5			64.5			62.5			65.5		
Vitros 950	U/L	15	67.9	3.8	5.6%	67.5	4.5	6.7%	67.2	4.6	6.8%	65.8	4.3	6.6%	65.5	4.7	7.1%	67.0	4.5	6.7%
Vitros DT 60	U/L	1	70.2			69.0			74.4			71.4			64.2			74.4		
Integra 400/700	U/L	31	67.4	2.3	3.3%	67.4	2.3	3.4%	68.1	2.4	3.5%	67.4	2.2	3.3%	67.7	2.4	3.5%	67.7	2.3	3.5%
Hitachi 717	U/L	7	66.6	4.8	7.2%	66.5	4.7	7.1%	66.7	4.0	6.0%	66.2	4.7	7.1%	66.1	4.7	7.1%	67.3	4.8	7.1%
Hitachi 902	U/L	5	69.2	1.7	2.5%	68.3	2.1	3.1%	68.6	2.3	3.4%	67.4	2.3	3.5%	67.8	2.6	3.9%	69.1	1.6	2.3%
Hitachi 911	U/L	26	66.4	2.9	4.4%	66.0	3.2	4.9%	66.4	2.9	4.4%	65.6	3.0	4.6%	65.8	2.9	4.4%	66.9	3.0	4.5%
Hitachi 912	U/L	6	67.2	2.6	3.9%	67.3	2.2	3.2%	67.2	2.2	3.3%	66.5	1.9	2.8%	66.7	2.5	3.7%	67.5	2.0	3.0%
Hitachi 917	U/L	19	66.5	2.6	3.8%	66.1	2.5	3.8%	66.5	2.3	3.4%	65.2	2.2	3.3%	65.7	2.5	3.8%	67.3	2.4	3.6%
Modular P/D	U/L	7	65.6	3.0	4.6%	65.0	2.7	4.2%	65.2	2.9	4.4%	64.9	3.0	4.6%	64.7	2.2	3.3%	65.9	2.4	3.6%

ALP

Mean value without additon: 317 U/L

Graphical presentation of mean values for the major instrument groups



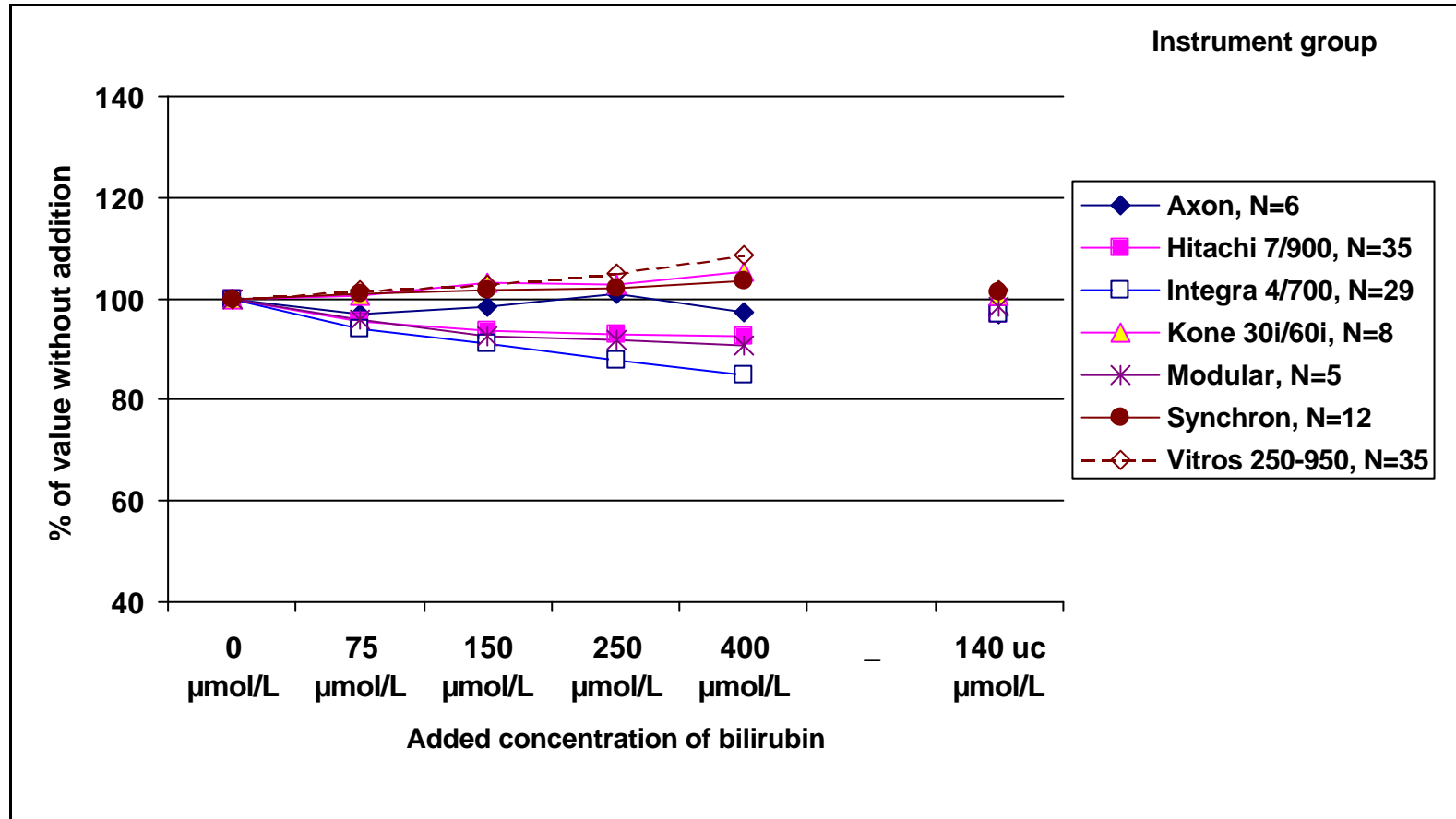
ALP: summary of all data categorized by instrument

Instrument	Unit	N	No addition			+ 75 µmol/			+ 150 mmol/L			+ 250 µmol/			+ 400 µmol/L			+ 140 µmol/L (uc)		
			Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Aeroset	U/L	3	345.9			344.9			350.1			353.9			360.8			348.5		
Vision	U/L	3	303.4			315.2			313.8			306.0						304.6		
Mira Plus	U/L	1	276.0			275.0			279.0			275.0			280.0			278.0		
Mira S	U/L	2	335.5			334.0			333.5			335.5			330.5			328.0		
ADVIA 1650	U/L	2	312.2			312.8			313.9			314.4			317.0			311.4		
DAX	U/L	1	288.0			291.0			294.0			222.0			300.0			288.0		
Axon	U/L	8	292.6	18.6	6.4%	294.1	19.4	6.6%	295.4	17.8	6.0%	295.8	18.8	6.3%	294.9	19.2	6.5%	293.6	19.4	6.6%
Opera	U/L	1	326.0			328.0			330.0			327.0			325.0			328.0		
Synchron CX5	U/L	7	313.2	19.6	6.3%	317.5	18.4	5.8%	318.7	20.1	6.3%	317.9	21.2	6.7%	320.7	22.4	7.0%	314.0	17.3	5.5%
Synchron CX7	U/L	2	319.2			322.2			321.2			320.4			324.4			321.5		
Synchron CX9	U/L	3	337.7			345.1			346.1			341.3			348.3			339.1		
Synchron LX20	U/L	4	339.5	13.3	3.9%	331.4	16.0	4.8%	337.4	17.4	5.2%	331.7	11.8	3.6%	329.9	18.1	5.5%	342.3	15.4	4.5%
Dimension RxL	U/L	4	358.2	18.3	5.1%	355.5	4.8	1.3%	361.0	12.3	3.4%	360.5	9.3	2.6%	361.4	11.6	3.2%	357.8	21.0	5.9%
Kone 30i	U/L	4	297.1	11.6	3.9%	297.8	11.3	3.8%	300.8	11.6	3.9%	296.6	7.1	2.4%	298.1	11.7	3.9%	295.7	10.2	3.5%
Kone 60i	U/L	4	328.0	19.3	5.9%	326.5	18.5	5.7%	330.3	18.2	5.5%	325.0	17.6	5.4%	329.5	17.3	5.2%	329.8	20.1	6.1%
Optima	U/L	1	346.0			356.0			351.0			330.0			340.0			350.0		
MEGA	U/L	1	300.6			298.8			295.8			300.0			295.8			302.4		
AU 600	U/L	2	299.0			300.0			299.0			300.5			300.0			303.5		
Vitros 250	U/L	26	319.9	21.0	6.6%	318.3	21.8	6.8%	323.1	21.7	6.7%	339.1	23.4	6.9%	380.3	45.9	12.1%	315.5	23.5	7.4%
Vitros 700	U/L	2	289.0			293.5			295.5			312.5			345.0			290.0		
Vitros 950	U/L	15	308.9	22.3	7.2%	309.5	22.8	7.4%	315.5	27.3	8.7%	333.0	25.2	7.6%	361.6	27.0	7.5%	307.8	23.2	7.5%
Integra 400/700	U/L	28	331.7	23.4	7.1%	306.6	68.6	22.4%	315.6	41.1	13.0%	309.2	28.1	9.1%	316.8	30.9	9.7%	325.4	43.2	13.3%
Hitachi 717	U/L	7	310.0	14.7	4.7%	311.2	12.8	4.1%	309.3	10.9	3.5%	308.9	11.5	3.7%	309.6	12.5	4.0%	311.3	16.0	5.1%
Hitachi 902	U/L	5	319.4	6.5	2.0%	316.7	8.9	2.8%	316.3	8.9	2.8%	316.9	7.9	2.5%	315.8	7.9	2.5%	320.8	5.2	1.6%
Hitachi 911	U/L	26	311.7	11.0	3.5%	310.1	10.7	3.4%	310.5	10.9	3.5%	310.1	11.0	3.6%	309.1	10.9	3.5%	312.0	10.8	3.5%
Hitachi 912	U/L	6	312.1	12.6	4.0%	311.4	10.7	3.4%	311.1	8.9	2.9%	307.9	11.8	3.8%	308.9	10.2	3.3%	311.9	10.5	3.4%
Hitachi 917	U/L	19	304.6	18.4	6.0%	304.0	18.6	6.1%	304.1	18.1	6.0%	303.5	18.2	6.0%	302.4	18.2	6.0%	305.7	19.2	6.3%
Modular P/D	U/L	7	331.9	24.9	7.5%	330.3	24.4	7.4%	328.3	23.7	7.2%	324.6	23.6	7.3%	322.8	18.2	5.6%	332.4	26.1	7.8%

Amylase

Mean value without additon: 229 U/L

Grafical presentation of mean values for the major instrument groups

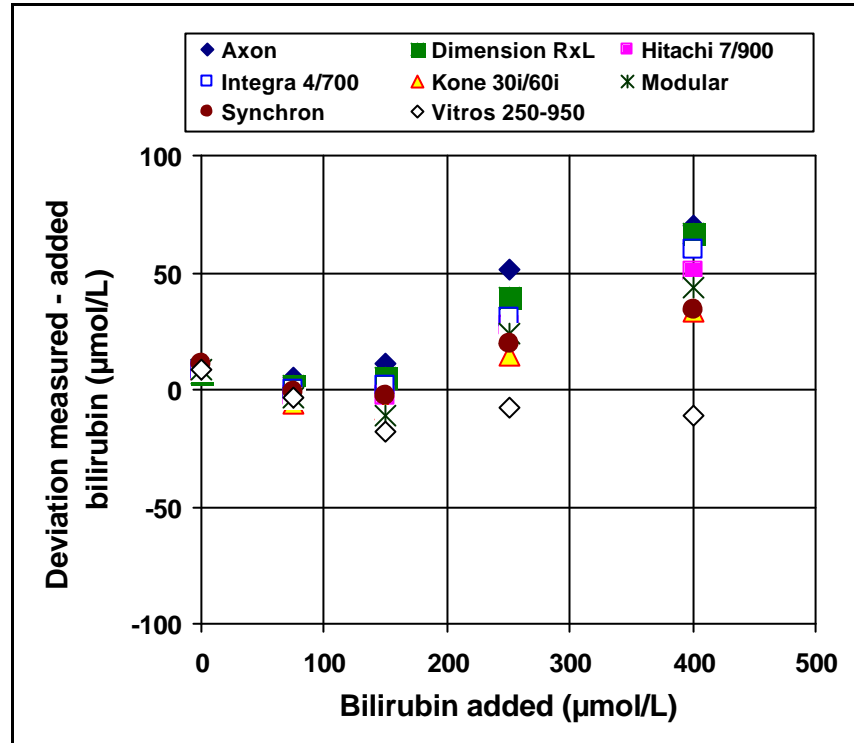
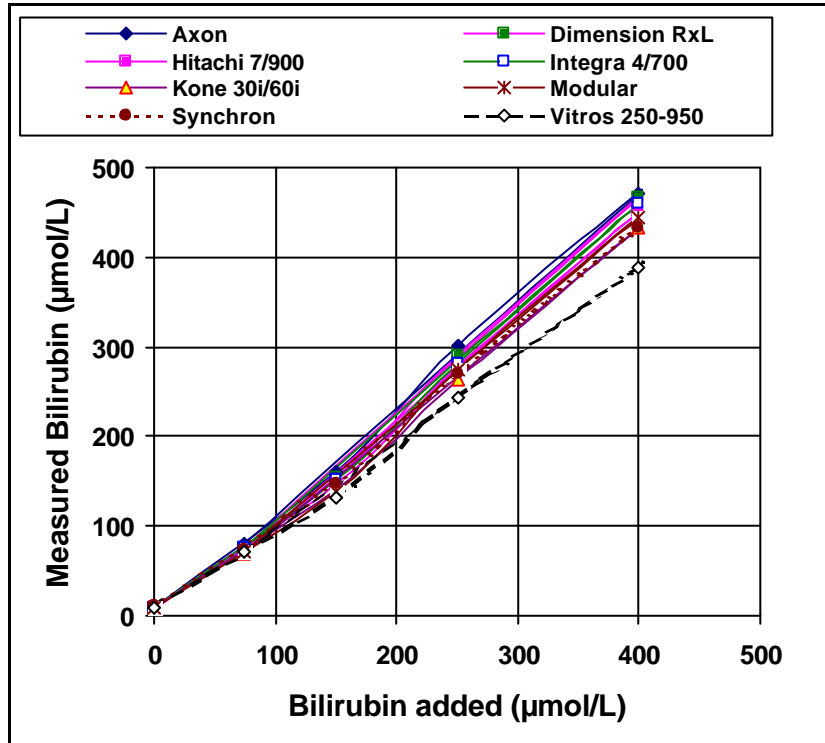


Amylase: summary of all data categorized by instrument

Instrument	Unit	N	No addition			+ 75 µmol/			+ 150 mmol/L			+ 250 µmol/			+ 400 µmol/L			+ 140 µmol/L (uc)		
			Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Aeroset	U/L	2	370			385			393			407			421			370		
Mira Plus	U/L	2	240			232			231			221			234			239		
ADVIA 1650	U/L	2	121			119			118			116			115			121		
Axon	U/L	6	120	145	120%	119	146	122%	122	149	123%	141	162	115%	124	156	126%	117	139	119%
Opera	U/L	1	28			28			30			28			28			31		
Synchron CX5	U/L	5	99	148	149%	99	149	150%	100	151	151%	100	153	152%	102	154	151%	100	149	150%
Synchron CX7	U/L	1	404			403			404			402			407			409		
Synchron CX9	U/L	3	162			170			171			169			174			161		
Synchron LX20	U/L	3	30			31			32			32			32			31		
Dimension RxL	U/L	4	389	19	5%	380	17	5%	382	20	5%	379	18	5%	380	20	5%	386	16	4%
Kone 30i	U/L	4	140	168	120%	144	178	123%	145	169	116%	145	176	121%	149	176	118%	143	169	119%
Kone 60i	U/L	4	443	30	7%	443	28	6%	447	30	7%	449	31	7%	452	36	8%	439	35	8%
Optima	U/L	1	431			426			443			435			435			434		
MEGA	U/L	1	32			32			33			32			29			32		
AU 600	U/L	2	255			257			260			259			261			255		
Vitros 250	U/L	18	182	116	64%	187	122	65%	187	120	64%	193	125	65%	199	128	64%	186	120	65%
Vitros 700	U/L	2	274			282			288			283			302			278		
Vitros 950	U/L	15	301	90	30%	303	90	30%	307	90	30%	315	93	30%	324	97	30%	304	90	29%
Integra 400/700	U/L	29	298	153	52%	282	146	52%	272	142	52%	265	139	53%	258	136	53%	289	148	51%
Hitachi 717	U/L	5	105	165	157%	100	155	155%	94	150	159%	93	148	159%	92	146	159%	103	161	157%
Hitachi 911	U/L	10	258	155	60%	258	156	60%	255	153	60%	255	154	60%	258	156	61%	257	154	60%
Hitachi 912	U/L	5	261	145	56%	258	143	55%	258	143	55%	255	140	55%	257	142	55%	262	147	56%
Hitachi 917	U/L	15	156	152	97%	134	147	110%	133	146	110%	133	147	110%	132	147	111%	135	147	109%
Modular P/D	U/L	5	183	151	82%	179	150	84%	175	149	85%	174	148	85%	172	147	85%	181	150	83%

Bilirubin

Graphical presentation of mean values for the major instrument groups



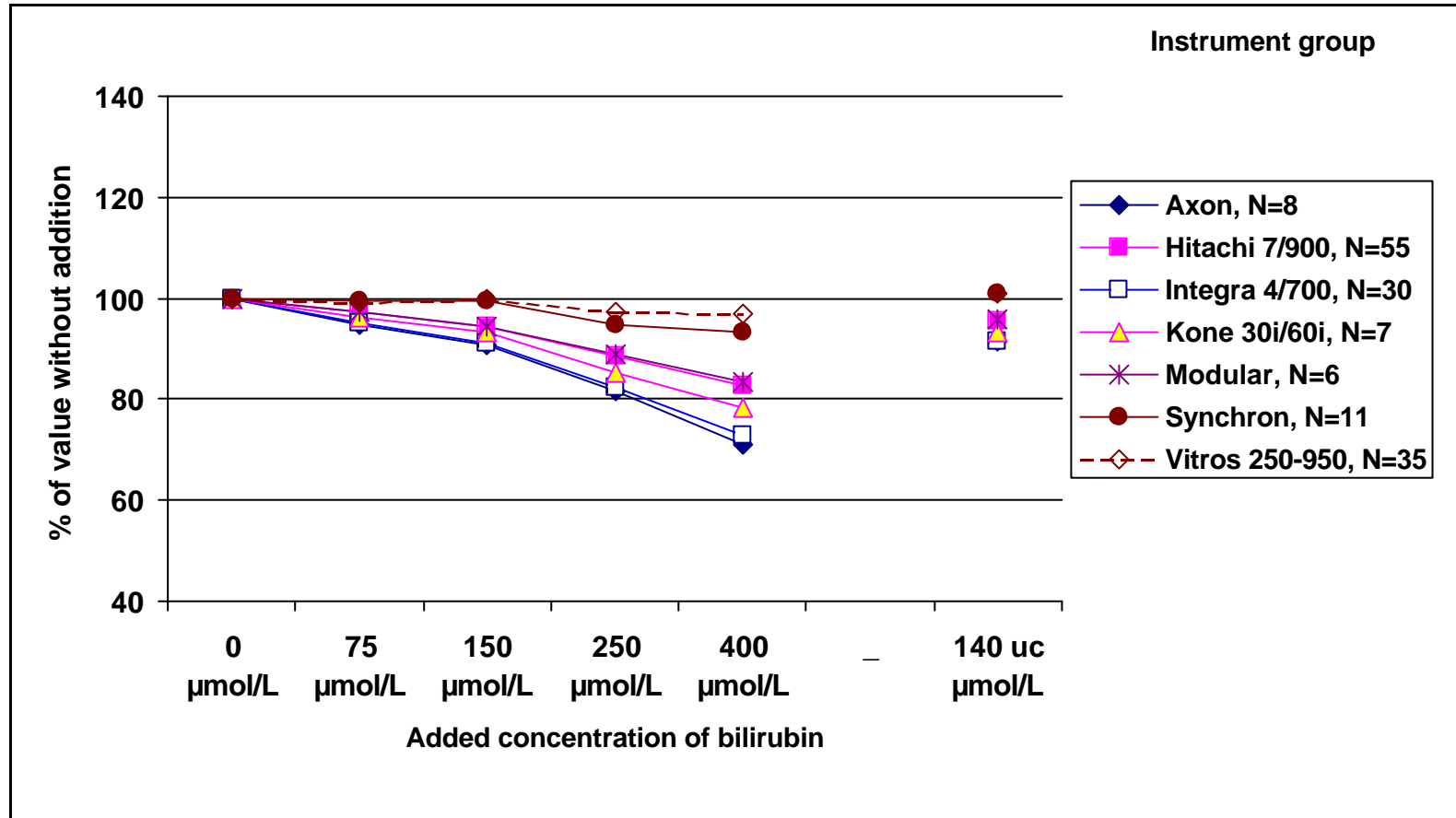
Bilirubin: summary of all data categorized by instrument

Instrument	Unit	N	No addition			+ 75 µmol/			+ 150 µmol/L			+ 250 µmol/			+ 400 µmol/L			+ 140 µmol/L (uc)		
			Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Aeroset	µmol/L	3	10.5			64.5			128.4			241.0			385.0			135.1		
Vision	µmol/L	2	7.0			73.5			157.5			270.0						144.0		
Mira Plus	µmol/L	1	8.0			66.0			143.0			274.0			455.0			140.0		
Mira S	µmol/L	1	8.0			67.0			136.0			248.0			395.0			160.0		
ADVIA 1650	µmol/L	2	17.0			77.0			156.0			294.5			476.5			152.5		
DAX	µmol/L	1	9.5			79.5			161.0			296.0			479.0			149.6		
Axon	µmol/L	8	8.3	0.9	10.7%	80.1	6.1	7.6%	161.4	12.5	7.7%	301.1	22.8	7.6%	470.1	52.4	11.1%	151.0	7.6	5.0%
Opera	µmol/L	1	7.0			74.0			150.0			286.0			461.0			140.0		
Synchron CX5	µmol/L	6	11.0	2.6	23.6%	72.9	1.4	1.9%	145.3	2.0	1.4%	266.3	3.7	1.4%	430.4	6.1	1.4%	132.2	2.5	1.9%
Synchron CX7	µmol/L	2	11.8			75.9			150.8			275.2			448.0			135.3		
Synchron CX9	µmol/L	3	13.2			74.1			146.0			265.0			423.4			132.2		
Synchron LX20	µmol/L	4	10.9	0.9	8.0%	76.1	2.8	3.7%	148.5	3.7	2.5%	274.5	8.4	3.1%	440.4	9.8	2.2%	134.5	3.1	2.3%
Dimension RxL	µmol/L	4	6.7	0.5	7.1%	76.3	2.0	2.6%	154.7	3.9	2.5%	289.6	7.4	2.5%	466.7	9.3	2.0%	143.0	2.5	1.8%
Kone 30i	µmol/L	4	7.9	1.2	15.8%	67.9	2.9	4.3%	140.2	6.1	4.4%	264.1	7.9	3.0%	436.5	14.7	3.4%	149.3	3.9	2.6%
Kone 60i	µmol/L	3	9.4			70.1			142.4			264.3			429.9			146.3		
MEGA	µmol/L	1	9.5			65.0			129.0			236.0			370.0			139.0		
AU 600	µmol/L	2	7.5			63.0			130.0			245.5			427.5			123.0		
Vitros 250	µmol/L	22	9.0	1.8	19.6%	71.5	3.3	4.6%	131.6	6.4	4.9%	242.7	13.4	5.5%	391.2	24.0	6.1%	139.3	5.7	4.1%
Vitros 700	µmol/L	2	6.5			74.5			136.5			245.5			382.5			141.0		
Vitros 950	µmol/L	14	8.0	1.9	23.8%	72.4	3.1	4.3%	133.2	4.8	3.6%	242.0	7.4	3.1%	386.8	16.2	4.2%	135.5	3.6	2.6%
Vitros DT 60	µmol/L	1	18.0			92.0			154.0			268.0			434.0			154.0		
Integra 400/700	µmol/L	30	8.8	0.4	4.5%	75.4	3.0	3.9%	151.5	6.6	4.3%	280.4	10.3	3.7%	459.7	15.1	3.3%	144.8	3.8	2.6%
Hitachi 717	µmol/L	7	8.2	0.4	4.5%	75.1	3.9	5.1%	151.1	6.7	4.5%	285.6	12.6	4.4%	458.9	19.5	4.2%	145.4	5.4	3.7%
Hitachi 902	µmol/L	5	7.7	1.3	17.2%	74.0	2.1	2.9%	151.3	4.8	3.2%	284.8	8.4	2.9%	459.9	16.4	3.6%	142.2	9.7	6.8%
Hitachi 911	µmol/L	24	8.2	0.6	7.4%	73.0	3.2	4.3%	148.9	5.7	3.8%	278.6	10.3	3.7%	454.0	24.5	5.4%	141.7	4.9	3.4%
Hitachi 912	µmol/L	6	7.8	1.0	12.6%	71.7	3.2	4.5%	148.0	5.0	3.4%	279.6	9.5	3.4%	458.0	20.4	4.4%	141.2	5.3	3.7%
Hitachi 917	µmol/L	19	7.8	0.6	7.1%	70.3	3.7	5.2%	143.5	7.5	5.2%	271.0	13.3	4.9%	439.2	21.5	4.9%	138.6	6.8	4.9%
Modular P/D	µmol/L	7	8.1	0.4	4.6%	71.4	3.4	4.8%	138.9	19.9	14.3%	273.6	13.7	5.0%	443.5	21.5	4.9%	139.3	7.2	5.2%

Cholesterol

Mean value without additon: 5 mmol/L

Grafical presentation of mean values for the major instrument groups



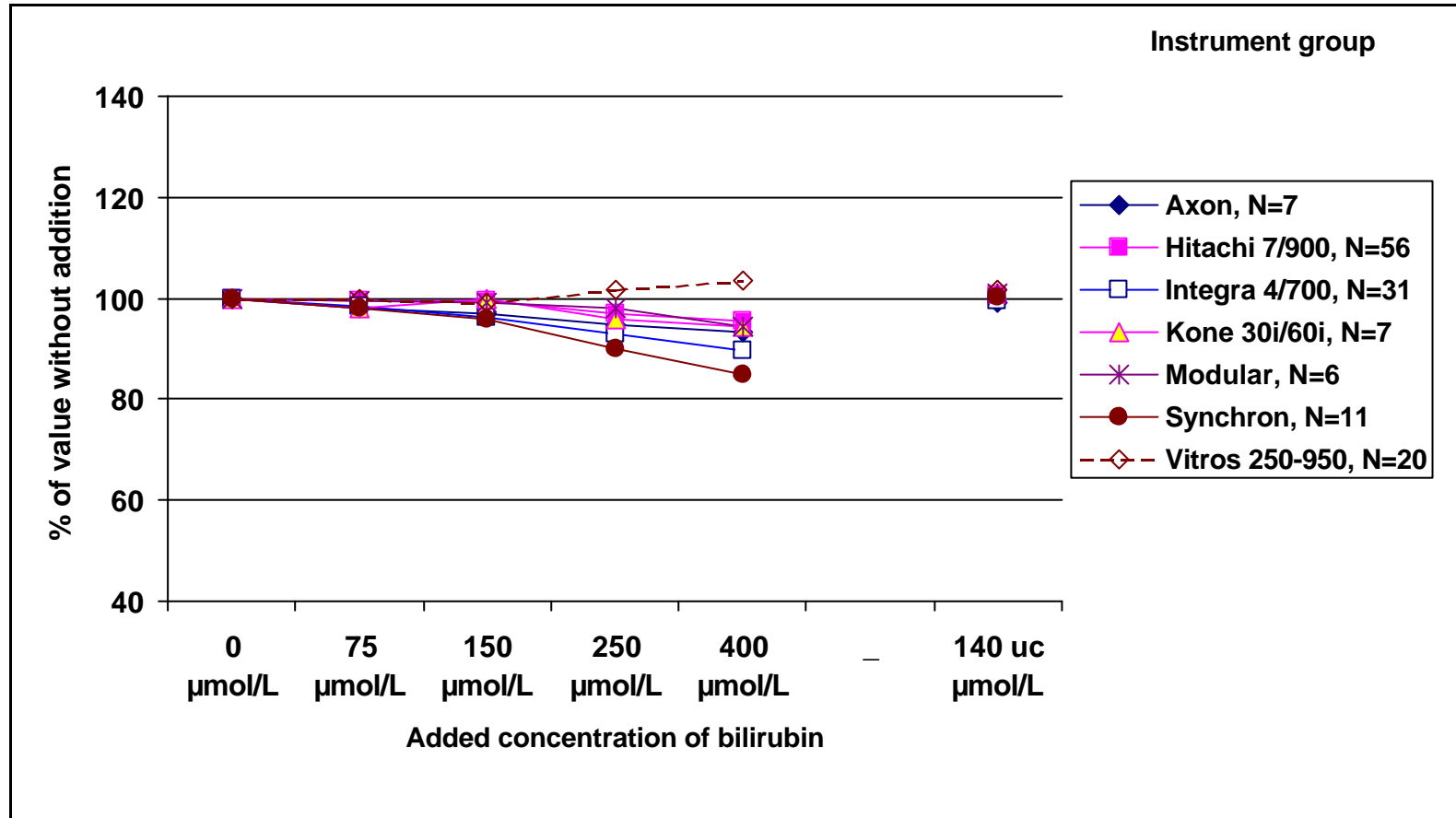
Cholesterol: summary of all data categorized by instrument

Instrument	Unit	N	No addition			+ 75 µmol/			+ 150 mmol/L			+ 250 µmol/			+ 400 µmol/L			+ 140 µmol/L (uc)		
			Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Aeroset	mmol/L	3	4.54			4.31			4.13			3.70			3.27			4.20		
Mira Plus	mmol/L	1	4.30			4.30			4.20			3.85			3.54			4.05		
Mira S	mmol/L	1	4.80			4.50			4.50			4.10			3.70			4.10		
ADVIA 1650	mmol/L	2	4.75			4.55			4.40			4.10			3.80			4.50		
DAX	mmol/L	1	4.60			4.30			4.10			3.70			3.20			4.10		
Axon	mmol/L	8	4.81	0.22	4.5%	4.55	0.19	4.2%	4.36	0.21	4.7%	3.92	0.19	4.9%	3.41	0.24	7.1%	4.41	0.19	4.2%
Opera	mmol/L	1	4.60			4.50			4.40			4.10			3.90			4.60		
Synchron CX5	mmol/L	4	4.52	0.22	4.9%	4.47	0.22	5.0%	4.51	0.27	5.9%	4.29	0.22	5.1%	4.22	0.19	4.5%	4.57	0.22	4.9%
Synchron CX7	mmol/L	2	4.38			4.39			4.37			4.17			4.13			4.46		
Synchron CX9	mmol/L	1	4.50			4.58			4.66			4.26			4.28			4.44		
Synchron LX20	mmol/L	4	4.40	0.15	3.5%	4.36	0.12	2.6%	4.32	0.14	3.1%	4.16	0.14	3.4%	4.06	0.14	3.5%	4.45	0.11	2.4%
Dimension RxL	mmol/L	4	4.59	0.09	2.0%	4.29	0.07	1.6%	3.98	0.10	2.4%	3.44	0.06	1.8%	2.80	0.08	2.9%	4.23	0.10	2.3%
Kone 30i	mmol/L	4	4.66	0.05	1.1%	4.46	0.05	1.1%	4.31	0.10	2.4%	3.90	0.02	0.5%	3.64	0.06	1.6%	4.35	0.05	1.1%
Kone 60i	mmol/L	3	4.43			4.28			4.17			3.85			3.46			4.12		
Optima	mmol/L	2	4.65			4.50			4.30			4.00			3.75			4.35		
MEGA	mmol/L	1	4.61			4.33			4.14			3.77			3.42			4.14		
AU 600	mmol/L	2	4.65			4.49			4.33			3.98			3.64			4.35		
Vitros 250	mmol/L	20	4.65	0.12	2.5%	4.62	0.11	2.4%	4.65	0.10	2.2%	4.53	0.12	2.7%	4.53	0.11	2.4%	4.72	0.15	3.3%
Vitros 700	mmol/L	2	4.65			4.60			4.60			4.55			4.55			4.65		
Vitros 950	mmol/L	13	4.66	0.11	2.3%	4.60	0.13	2.7%	4.63	0.17	3.6%	4.50	0.17	3.8%	4.46	0.24	5.3%	4.65	0.15	3.3%
Integra 400/700	mmol/L	30	4.53	0.11	2.4%	4.31	0.12	2.7%	4.12	0.14	3.3%	3.73	0.11	2.9%	3.29	0.12	3.6%	4.14	0.12	2.9%
Hitachi 717	mmol/L	6	4.63	0.09	2.0%	4.55	0.08	1.7%	4.39	0.08	1.8%	4.11	0.06	1.6%	3.87	0.08	2.1%	4.45	0.09	2.1%
Hitachi 902	mmol/L	2	4.65			4.50			4.35			4.10			3.85			4.45		
Hitachi 911	mmol/L	22	4.57	0.12	2.7%	4.43	0.14	3.1%	4.31	0.12	2.8%	4.03	0.11	2.7%	3.78	0.11	2.9%	4.33	0.11	2.5%
Hitachi 912	mmol/L	6	4.56	0.11	2.4%	4.43	0.10	2.3%	4.33	0.10	2.4%	4.00	0.13	3.2%	3.80	0.08	2.2%	4.36	0.10	2.4%
Hitachi 917	mmol/L	19	4.46	0.10	2.3%	4.34	0.09	2.0%	4.22	0.10	2.3%	3.95	0.09	2.2%	3.68	0.09	2.6%	4.28	0.12	2.8%
Modular P/D	mmol/L	6	4.50	0.10	2.3%	4.38	0.12	2.6%	4.24	0.07	1.7%	4.00	0.08	2.0%	3.76	0.11	2.9%	4.32	0.11	2.6%

Cholesterol, HDL

Mean value without additon: 1 mmol/L

Grafical presentation of mean values for the major instrument groups



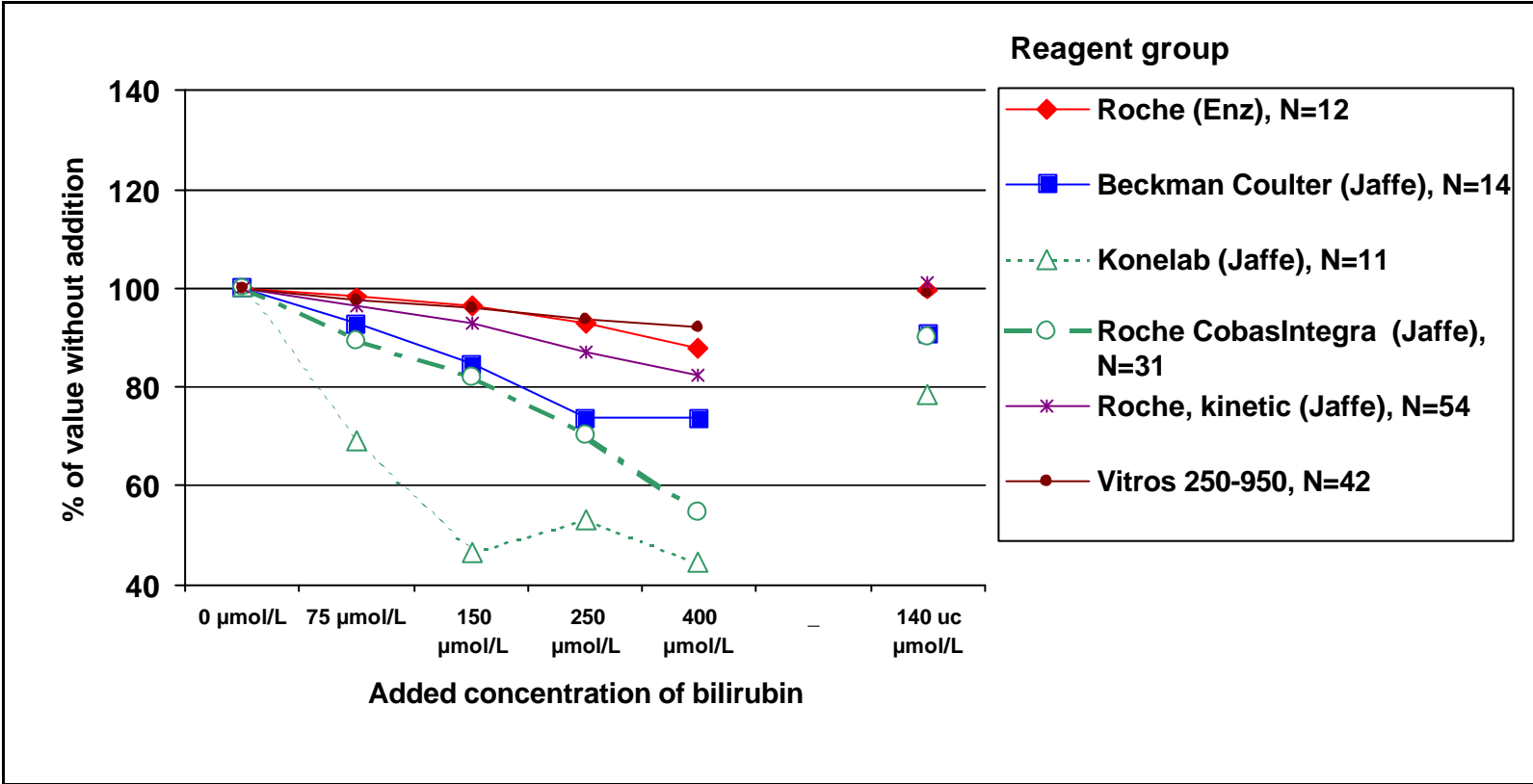
Cholesterol, HDL: summary of all data categorized by instrument

Instrument	Unit	N	No addition			+ 75 µmol/			+ 150 mmol/L			+ 250 µmol/			+ 400 µmol/L			+ 140 µmol/L (uc)		
			Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Aeroset	mmol/L	3	1,27			1,23			1,23			1,19			1,17			1,27		
Fara	mmol/L	1	1,22			1,07			1,03			0,91			0,66			1,17		
Mira	mmol/L	1	1,40			1,40			1,41			1,39			1,40			1,43		
ADVIA 1650	mmol/L	2	1,34			1,33			1,32			1,27			1,22			1,35		
DAX	mmol/L	1	1,38			1,42			1,40			1,35			1,32			1,39		
Axon	mmol/L	7	1,43	0.05	3.4%	1,40	0.02	1.7%	1,39	0.04	3.0%	1,36	0.05	4.0%	1,34	0.05	3.6%	1,42	0.03	2.1%
RA-XT	mmol/L	1	1,37			1,35			1,31			1,30			1,23			1,37		
Synchron CX5	mmol/L	4	1,34	0.11	8.1%	1,33	0.10	7.6%	1,30	0.07	5.5%	1,21	0.08	6.9%	1,16	0.07	6.0%	1,34	0.11	8.4%
Synchron CX7	mmol/L	2	1,45			1,41			1,34			1,32			1,19			1,47		
Synchron CX9	mmol/L	1	1,39			1,39			1,41			1,27			1,23			1,36		
Synchron LX20	mmol/L	4	1,39	0.04	2.8%	1,33	0.04	2.7%	1,31	0.03	2.2%	1,23	0.04	2.9%	1,15	0.04	3.4%	1,39	0.03	2.0%
Dimension RxL	mmol/L	4	1,36	0.06	4.5%	1,36	0.05	3.7%	1,33	0.06	4.2%	1,30	0.06	5.0%	1,27	0.05	3.8%	1,35	0.05	3.9%
Kone 30i	mmol/L	4	1,36	0.05	3.6%	1,34	0.06	4.7%	1,35	0.04	3.3%	1,30	0.03	2.6%	1,28	0.05	4.2%	1,36	0.05	3.8%
Kone 60i	mmol/L	3	1,32			1,28			1,33			1,28			1,25			1,35		
Optima	mmol/L	2	1,35			1,26			1,16			1,03			0,89			1,22		
MEGA	mmol/L	1	1,25			1,22			1,22			1,21			1,20			1,24		
AU 600	mmol/L	2	1,22			1,20			1,18			1,14			1,10			1,23		
Vitros 250	mmol/L	17	1,22	0.12	9.8%	1,22	0.12	10.1%	1,22	0.12	10.1%	1,23	0.14	11.2%	1,27	0.16	12.6%	1,24	0.12	9.6%
Vitros 700	mmol/L	1	1,20			1,30			1,20			1,40			1,20			1,20		
Vitros 950	mmol/L	2	1,15			1,16			1,04			1,22			1,21			1,22		
Integra 400/700	mmol/L	31	1,35	0.09	6.7%	1,32	0.08	6.0%	1,30	0.07	5.7%	1,25	0.08	6.2%	1,21	0.08	6.8%	1,34	0.06	4.5%
Hitachi 717	mmol/L	5	1,35	0.10	7.4%	1,36	0.11	8.3%	1,35	0.11	8.0%	1,33	0.10	7.2%	1,32	0.11	8.4%	1,36	0.11	8.3%
Hitachi 902	mmol/L	2	1,30			1,30			1,30			1,30			1,25			1,35		
Hitachi 911	mmol/L	24	1,30	0.06	4.7%	1,29	0.05	4.0%	1,29	0.06	4.7%	1,26	0.07	5.3%	1,24	0.05	4.4%	1,30	0.06	4.8%
Hitachi 912	mmol/L	8	1,28	0.04	3.0%	1,27	0.03	2.7%	1,26	0.04	2.9%	1,23	0.03	2.7%	1,22	0.04	2.9%	1,29	0.02	1.7%
Hitachi 917	mmol/L	17	1,30	0.05	3.9%	1,29	0.05	3.9%	1,29	0.06	4.5%	1,26	0.05	4.0%	1,23	0.05	4.0%	1,31	0.05	3.7%
Modular P/D	mmol/L	6	1,32	0.05	3.5%	1,31	0.05	3.7%	1,31	0.05	3.7%	1,29	0.05	3.6%	1,24	0.05	4.1%	1,33	0.04	3.3%

Creatinine

Mean value without additon 97 µmol/L

Mean deviation from the result of the unspiked sample are shown for the major reagent groups.



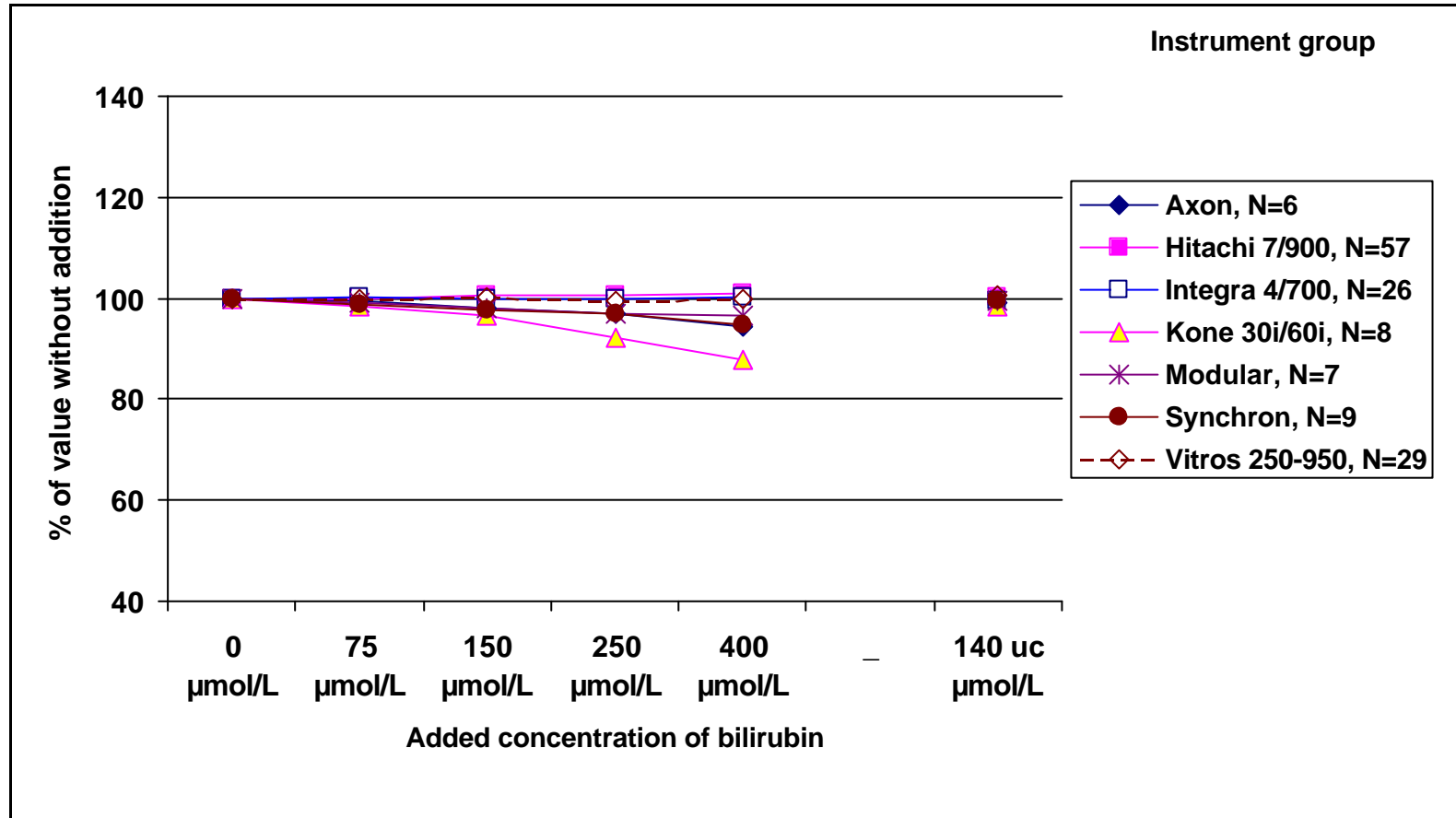
Creatinine: summary of all data categorized by measurement method

Reagent/method	N	No addition			+ 75 µmol/L			+ 150 mmol/L			+ 250 µmol/L			+ 400 µmol/L			+ 140 µmol/L (uc)		
		Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Roche (Enz)	12	86.7	4.9	5.7%	85.1	3.2	3.8%	83.2	2.6	3.1%	80.2	2.7	3.3%	75.8	2.3	3.0%	86.3	4.9	5.6%
Roche CobasIntegra (Enz)	2	75.9			76.2			74.4			71.1			66.5			75.0		
Abbott Aeroset (Jaffe)	3	96.7			84.5			72.8			53.3			33.0			78.0		
Abbott Vision (Jaffe)	3	85.7			89.0			81.3			69.0						62.3		
Bayer Technicon (Jaffe)	4	96.6	4.3	4.4%	85.3	7.1	8.3%	63.3	11.8	18.6%	27.1	20.7	76.4%	18.0			80.3	4.3	5.3%
Beckman Coulter (Jaffe)	14	94.0	4.1	4.4%	87.0	5.2	6.0%	78.3	16.6	21.2%	66.1	30.1	45.6%	65.3	32.7	50.2%	85.4	5.2	6.1%
Biocon Fluitest (Jaffe)	1	104.0			99.0			105.0			113.0			112.0			101.0		
DadeBehring Dimension (Jaffe)	4	95.6	3.4	3.6%	91.6	5.5	6.1%	87.0	5.4	6.2%	76.1	5.5	7.3%	82.1	3.5	4.2%	86.0	3.6	4.2%
Konelab (Jaffe)	11	93.0	6.3	6.7%	65.2	25.4	38.9%	44.8	35.4	79.0%	51.0	34.6	67.9%	42.6	29.1	68.2%	73.6	20.4	27.8%
Merck (Jaffe)	1	93.0			84.0			72.0			44.0			32.0			83.0		
Olympus (Jaffe)	2	96.6			85.5			70.0			52.9			35.2			87.5		
Roche CobasIntegra (Jaffe)	31	93.7	4.7	5.1%	83.6	5.1	6.0%	76.8	6.8	8.8%	65.9	8.7	13.3%	51.2	12.6	24.6%	84.2	7.5	9.0%
Roche, endpoint (Jaffe)	4	100.9	3.0	3.0%	98.6	0.7	0.8%	94.3	1.4	1.4%	89.5	2.4	2.7%	84.8	4.3	5.1%	102.7	0.5	0.5%
Roche, kinetic (Jaffe)	54	101.8	6.3	6.2%	98.1	6.3	6.4%	94.2	6.3	6.7%	88.6	8.5	9.6%	83.5	7.6	9.1%	102.9	8.2	7.9%
Self-made (Jaffe)	2	98.5			77.0			51.5			73.0			61.0			80.0		
Synermed (Jaffe)	4	89.5	7.6	8.5%	88.5	4.7	5.3%	88.0	3.3	3.7%	89.5	7.2	8.1%	87.8	15.6	17.8%	94.0	7.5	8.0%
Not spec	9	95.6	9.3	9.8%	88.3	10.5	11.9%	80.1	19.0	23.7%	74.0	23.0	31.1%	65.4	34.2	52.2%	87.0	14.8	17.0%
Vitros 250-950	42	100.5	3.7	3.7%	97.7	3.9	4.0%	96.3	4.1	4.2%	94.0	3.9	4.1%	92.5	3.6	3.9%	99.4	3.7	3.7%
Vitros DT60	1	123.0			117.0			105.0			112.0			110.0			121.0		

Glucose

Mean value without additon: 6 mmol/L

Gractical presentation of mean values for the major instrument groups



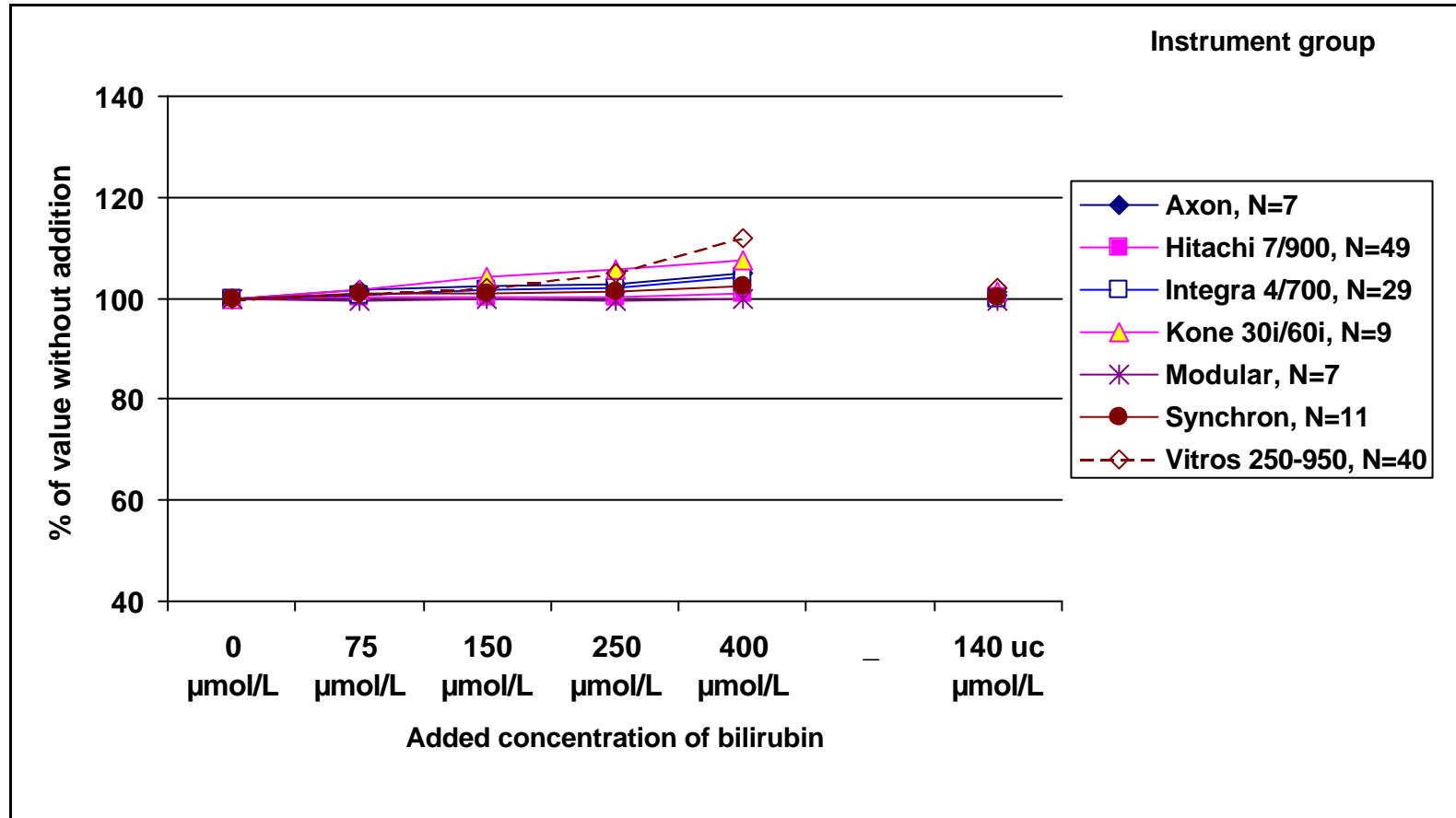
Glucose: summary of all data categorized by instrument

Instrument	Unit	N	No addition			+ 75 µmol/			+ 150 mmol/L			+ 250 µmol/			+ 400 µmol/L			+ 140 µmol/L (uc)		
			Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Aeroset	mmol/L	3	6.14			6.17			6.11			6.16			6.18			6.18		
Mira	mmol/L	5	6.02	0.48	7.9%	5.90	0.43	7.3%	6.02	0.47	7.7%	5.86	0.42	7.1%	5.92	0.41	7.0%	6.02	0.38	6.4%
Mira Plus	mmol/L	3	5.78			5.81			5.78			5.56			5.73			5.82		
Mira S	mmol/L	2	6.20			6.10			6.20			6.20			6.15			6.15		
ADVIA 1650	mmol/L	2	6.25			6.00			5.80			5.35			4.80			5.90		
DAX	mmol/L	1	6.15			5.90			5.60			5.10			4.60			5.93		
Axon	mmol/L	6	5.93	0.12	2.0%	5.90	0.09	1.5%	5.82	0.12	2.0%	5.75	0.19	3.3%	5.60	0.40	7.1%	5.88	0.08	1.3%
Glucose Analys	mmol/L	1	5.80			5.70			5.80			5.80			5.80			5.80		
Synchron CX5	mmol/L	3	5.90			5.77			5.60			5.60			5.33			5.83		
Synchron CX7	mmol/L	2	6.00			5.95			6.02			5.87			5.87			5.95		
Synchron CX9	mmol/L	2	5.95			6.01			6.00			5.96			6.02			6.00		
Synchron LX20	mmol/L	2	5.85			5.75			5.64			5.60			5.42			5.85		
Dimension RxL	mmol/L	3	6.07			6.00			5.95			5.66			5.45			5.98		
EBIO 6666	mmol/L	3	6.17			6.13			6.20			6.20			6.17			6.20		
EBIO Plus	mmol/L	3	5.97			5.98			5.92			5.97			6.04			5.93		
Kone 30i	mmol/L	5	5.90	0.17	2.9%	5.84	0.11	2.0%	5.72	0.13	2.3%	5.46	0.32	5.9%	5.24	0.40	7.6%	5.84	0.15	2.6%
Kone 60i	mmol/L	3	6.03			5.90			5.80			5.53			5.17			5.90		
Optima	mmol/L	3	6.04			5.94			5.87			5.67			5.54			6.02		
Kyoto, not spec	mmol/L	1	6.00			6.00			6.00			6.00			6.00			6.10		
MEGA	mmol/L	1	6.23			6.21			6.08			6.21			6.17			6.19		
AU 600	mmol/L	2	6.00			5.95			5.87			5.81			5.70			5.89		
Vitros 250	mmol/L	17	6.00	0.13	2.2%	6.00	0.14	2.3%	6.02	0.13	2.2%	5.97	0.13	2.2%	5.99	0.14	2.3%	6.04	0.15	2.5%
Vitros 700	mmol/L	2	6.00			6.05			6.05			6.00			6.05			6.05		
Vitros 950	mmol/L	10	5.98	0.11	1.9%	5.98	0.13	2.2%	5.97	0.15	2.5%	5.97	0.16	2.6%	5.96	0.15	2.6%	6.01	0.14	2.3%
Vitros DT 60	mmol/L	1	5.90			5.90			6.00			6.00			5.90			5.90		
Integra 400/700	mmol/L	26	6.03	0.38	6.3%	6.05	0.36	5.9%	6.02	0.35	5.9%	6.03	0.35	5.8%	6.05	0.32	5.3%	5.99	0.23	3.8%
Hitachi 704	mmol/L	1	5.96			6.00			5.95			6.03			6.03			5.88		
Hitachi 717	mmol/L	6	6.09	0.25	4.0%	6.10	0.28	4.5%	6.16	0.26	4.2%	6.15	0.31	5.1%	6.20	0.26	4.1%	6.16	0.28	4.6%
Hitachi 902	mmol/L	8	5.98	0.20	3.4%	5.99	0.25	4.2%	5.93	0.24	4.0%	6.01	0.24	4.1%	6.09	0.20	3.2%	6.02	0.27	4.5%
Hitachi 911	mmol/L	18	5.96	0.17	2.8%	5.96	0.23	3.9%	5.99	0.20	3.3%	5.93	0.23	3.9%	5.95	0.24	4.0%	5.96	0.26	4.4%
Hitachi 912	mmol/L	6	6.06	0.19	3.2%	6.07	0.15	2.5%	6.11	0.17	2.7%	6.14	0.18	3.0%	6.19	0.17	2.7%	6.07	0.17	2.9%
Hitachi 917	mmol/L	18	5.92	0.16	2.7%	5.92	0.19	3.2%	5.97	0.17	2.8%	5.99	0.21	3.4%	5.98	0.23	3.8%	5.96	0.19	3.2%
Modular P/D	mmol/L	7	5.99	0.11	1.9%	5.94	0.10	1.7%	5.87	0.15	2.5%	5.81	0.22	3.8%	5.77	0.40	6.9%	5.96	0.15	2.6%
Not specified	mmol/L	1	5.70			5.80			5.90			5.80			5.90			5.80		
UV-1601	mmol/L	1	5.30			5.40			5.50			5.60			5.70			5.60		

GT

Mean value without additon: 88 U/L

Grafical presentation of mean values for the major instrument groups



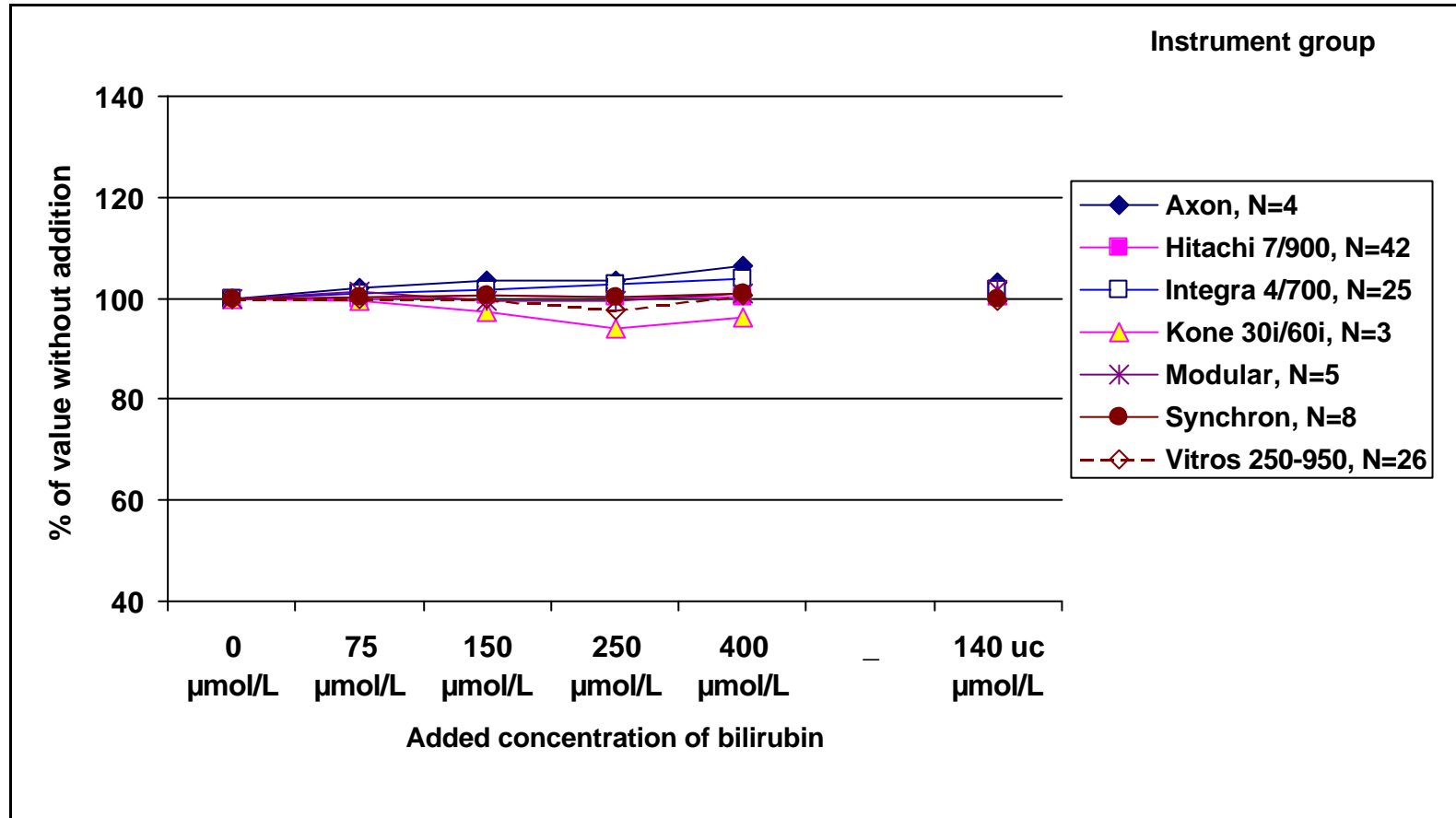
GT: summary of all data categorized by instrument

Instrument	Unit	N	No addition			+ 75 µmol/			+ 150 mmol/L			+ 250 µmol/			+ 400 µmol/L			+ 140 µmol/L (uc)		
			Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Aeroset	U/L	3	83.1			82.9			83.3			83.5			83.5			83.8		
Vision	U/L	1	106.2			105.6			106.8									111.0		
Mira Plus	U/L	2	78.5			79.0			79.0			79.5			80.5			78.5		
Mira S	U/L	1	88.0			88.0			87.0			88.0			89.0			89.0		
ADVIA 1650	U/L	2	84.4			85.9			86.7			87.4			89.2			82.6		
DAX	U/L	1	80.4			81.0			82.2			81.0			78.6			73.8		
Axon	U/L	7	80.7	5.3	6.6%	82.1	5.2	6.4%	82.6	4.8	5.8%	83.0	5.1	6.1%	84.6	4.9	5.8%	81.1	4.5	5.5%
Opera	U/L	1	74.0			74.0			76.0			78.0			77.0			78.0		
Synchron CX5	U/L	3	75.5			76.6			73.9			76.3			77.2			77.3		
Synchron CX7	U/L	3	89.7			88.8			91.2			90.1			91.0			88.0		
Synchron CX9	U/L	1	82.0			86.0			89.0			85.0			88.0			82.0		
Synchron LX20	U/L	4	82.2	1.5	1.9%	83.0	2.1	2.5%	82.4	2.3	2.8%	83.0	1.0	1.2%	83.4	1.3	1.6%	82.2	1.5	1.8%
Dimension RxL	U/L	4	85.8	4.3	5.1%	86.3	3.4	3.9%	86.5	4.7	5.4%	87.3	4.8	5.5%	87.0	4.8	5.6%	86.3	4.7	5.5%
Kone 30i	U/L	4	85.2	3.4	3.9%	86.8	3.4	4.0%	89.3	2.3	2.6%	91.6	3.3	3.6%	94.0	3.2	3.4%	86.5	3.3	3.8%
Kone 60i	U/L	5	85.8	4.4	5.2%	86.9	4.7	5.4%	88.9	3.6	4.1%	89.6	5.2	5.8%	90.1	2.4	2.7%	87.0	4.5	5.2%
Optima	U/L	1	81.0			82.0			84.0			82.0			82.0			83.0		
MEGA	U/L	1	88.8			90.0			90.0			91.2			93.0			88.2		
AU 600	U/L	2	85.0			86.2			87.2			88.4			90.2			84.6		
Vitros 250	U/L	25	97.2	2.0	2.0%	98.3	1.9	2.0%	99.4	2.8	2.8%	102.6	2.3	2.2%	109.5	3.1	2.8%	99.5	2.3	2.3%
Vitros 700	U/L	2	99.5			100.5			100.5			101.5			107.0			100.0		
Vitros 950	U/L	13	97.8	2.7	2.7%	98.0	2.6	2.7%	99.2	2.3	2.4%	101.5	3.2	3.2%	108.5	3.6	3.3%	99.3	2.8	2.8%
Integra 400/700	U/L	29	82.0	6.6	8.0%	82.4	6.6	8.0%	83.4	6.7	8.0%	83.7	6.8	8.1%	85.5	6.7	7.8%	81.8	6.5	8.0%
Hitachi 717	U/L	5	90.1	2.9	3.3%	91.6	1.2	1.3%	90.5	2.6	2.9%	91.0	1.9	2.1%	90.2	2.0	2.2%	90.3	2.6	2.9%
Hitachi 902	U/L	1	96.6			95.4			96.0			97.2			98.4			95.4		
Hitachi 911	U/L	18	90.4	4.4	4.9%	90.6	4.5	4.9%	91.0	4.3	4.8%	90.3	4.0	4.5%	91.2	4.2	4.6%	90.5	4.3	4.7%
Hitachi 912	U/L	6	87.0	6.4	7.3%	86.9	5.9	6.8%	87.3	6.7	7.7%	87.0	6.2	7.1%	87.8	6.0	6.8%	86.7	6.4	7.4%
Hitachi 917	U/L	19	88.2	4.0	4.5%	88.0	4.2	4.8%	88.3	4.4	5.0%	88.2	4.2	4.7%	88.8	4.2	4.7%	88.3	3.8	4.3%
Modular P/D	U/L	7	89.6	3.9	4.3%	89.2	4.0	4.4%	89.5	3.6	4.1%	89.1	4.3	4.8%	89.4	3.7	4.1%	89.2	3.6	4.0%

Iron (Fe)

Mean value without additon: 19 µmol/L

Graphical presentation of mean values for the major instrument groups



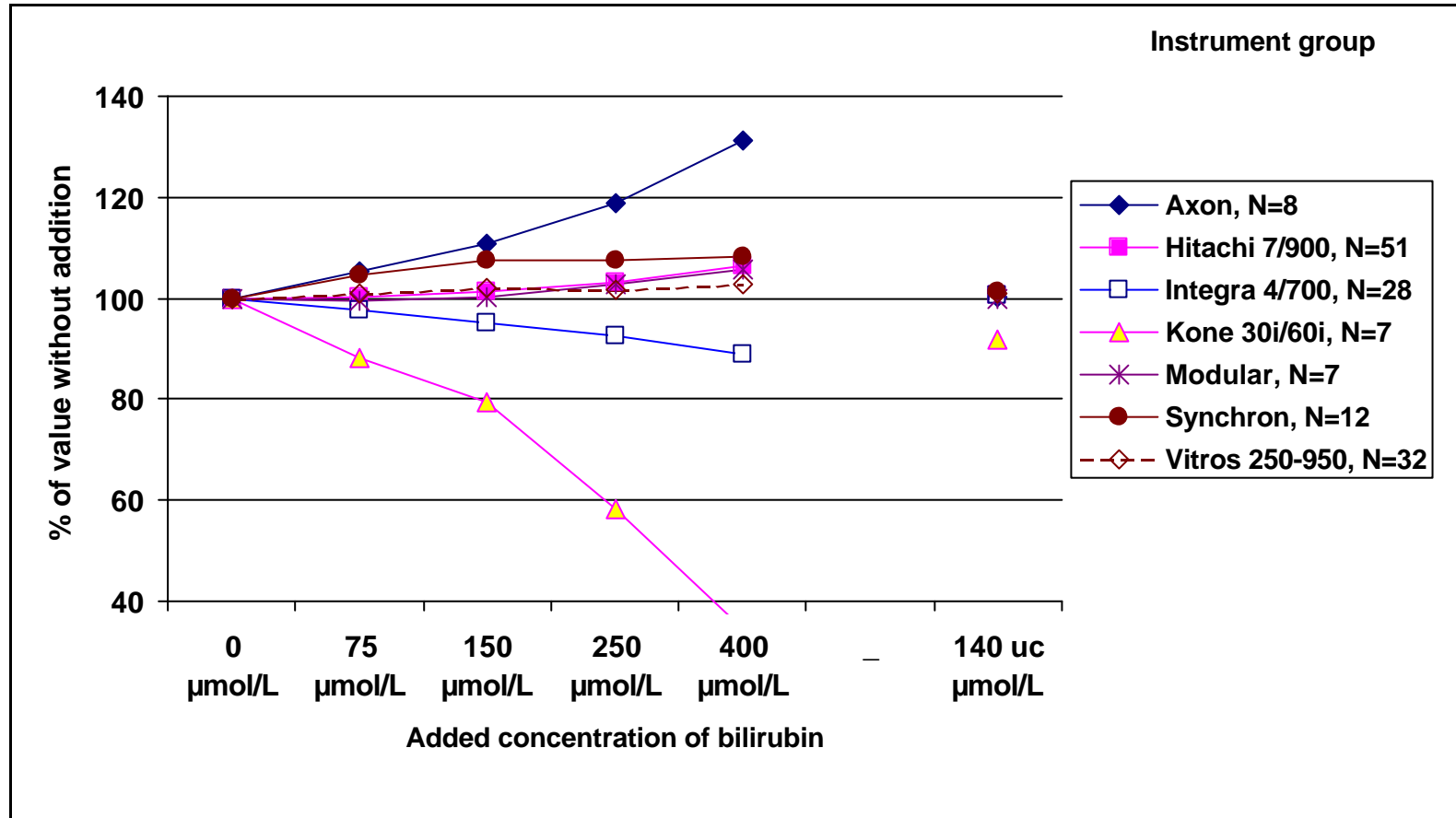
Iron (Fe): summary of all data categorized by instrument

Instrument	Unit	N	No addition			+ 75 µmol/			+ 150 µmol/L			+ 250 µmol/			+ 400 µmol/L			+ 140 µmol/L (uc)		
			Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Aeroset	µmol/L	3	18.7			19.1			18.6			19.0			18.6			19.0		
Fara	µmol/L	1	18.3			18.9			18.5			18.9			19.6			18.8		
Mira	µmol/L	1	22.0			24.0			22.0			22.0			23.0			22.0		
ADVIA 1650	µmol/L	2	20.3			19.3			19.1			20.2			19.3			19.7		
DAX	µmol/L	1	18.0			20.0			20.0			22.0			23.5			17.5		
Axon	µmol/L	4	19.3	1.4	7.5%	19.7	1.5	7.5%	20.0	1.6	7.9%	19.9	1.3	6.7%	20.5	1.3	6.3%	19.9	1.5	7.7%
RA-XT	µmol/L	1	23.0			22.0			22.0			23.0			23.0			23.0		
Synchron CX5	µmol/L	1	18.9			18.7			18.8			18.9			19.1			19.2		
Synchron CX7	µmol/L	3	18.7			18.9			19.1			18.9			19.1			18.8		
Synchron LX20	µmol/L	4	19.4	0.7	3.5%	19.4	0.7	3.7%	19.4	0.7	3.7%	19.4	1.1	5.5%	19.5	1.0	5.2%	19.2	0.5	2.8%
Dimension RxL	µmol/L	2	18.8			18.7			19.4			18.7			18.7			18.9		
Kone 30i	µmol/L	2	17.4			17.6			17.1			16.5			17.1			17.6		
Kone 60i	µmol/L	1	17.6			17.1			16.9			16.3			16.3			17.7		
Optima	µmol/L	2	18.0			17.7			17.5			17.2			16.7			18.3		
MEGA	µmol/L	1	19.0			19.0			19.0			19.0			19.0			19.0		
AU 600	µmol/L	2	19.2			19.3			19.3			19.9			20.2			19.4		
Vitros 250	µmol/L	14	18.4	0.7	3.6%	18.4	0.6	3.5%	18.4	0.7	3.5%	18.2	0.7	4.0%	18.5	0.4	2.4%	18.3	0.6	3.4%
Vitros 700	µmol/L	2	18.1			18.3			18.2			18.0			18.4			18.5		
Vitros 950	µmol/L	10	18.5	0.5	2.8%	18.3	0.5	2.8%	18.5	0.4	2.3%	17.7	2.5	14.3%	18.6	0.5	2.5%	18.3	0.8	4.2%
Integra 400/700	µmol/L	25	20.2	0.7	3.4%	20.4	0.7	3.6%	20.5	0.8	4.0%	20.7	0.8	3.7%	21.0	0.8	3.6%	20.5	0.7	3.5%
Hitachi 717	µmol/L	3	20.0			19.8			20.0			20.0			20.4			20.5		
Hitachi 911	µmol/L	16	19.8	1.3	6.5%	19.8	1.4	6.9%	20.0	1.1	5.3%	19.9	1.4	7.2%	19.9	1.1	5.7%	20.2	1.3	6.5%
Hitachi 912	µmol/L	7	20.4	1.2	5.7%	20.3	1.1	5.3%	20.3	0.8	3.8%	20.5	1.3	6.2%	20.3	0.7	3.6%	20.6	1.2	6.1%
Hitachi 917	µmol/L	16	20.0	0.4	2.0%	19.9	0.6	3.2%	20.1	0.6	2.8%	20.0	0.6	2.9%	20.0	0.4	2.0%	20.4	0.5	2.4%
Modular P/D	µmol/L	5	19.8	0.5	2.3%	20.1	1.2	6.2%	19.7	0.7	3.4%	19.7	0.8	4.1%	20.0	0.6	2.9%	20.2	0.5	2.6%

Phosphorus

Mean value without additon: 1 mmol/L

Grafical presentation of mean values for the major instrument groups



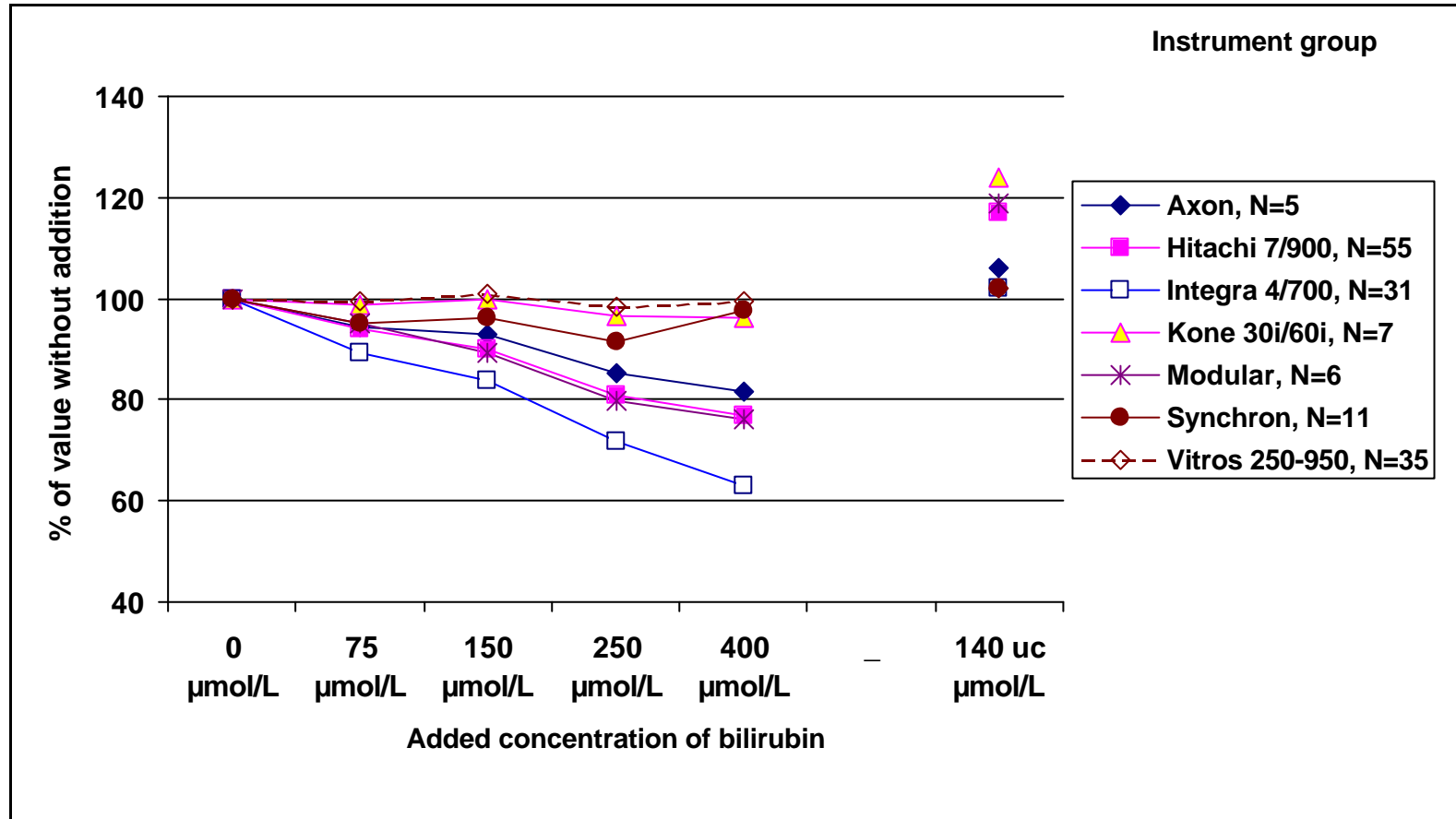
Phosphorus: summary of all data categorized by instrument

Instrument	Unit	N	No addition			+ 75 µmol/			+ 150 mmol/L			+ 250 µmol/			+ 400 µmol/L			+ 140 µmol/L (uc)		
			Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Aeroset	mmol/L	3	1,08			1,06			1,06			1,10			1,15			1,08		
Mira Plus	mmol/L	1	1,25			1,25			1,40			1,55			1,66			1,25		
Mira S	mmol/L	1	1,25			1,36			1,43			1,58			1,76			1,28		
ADVIA 1650	mmol/L	2	1,05			1,11			1,17			1,27			1,40			1,08		
Axon	mmol/L	8	1,11	0.05	4.5%	1,17	0.10	8.4%	1,24	0.15	11.8%	1,33	0.23	17.4%	1,47	0.34	23.5%	1,12	0.05	4.8%
Opera	mmol/L	1	1,06			1,13			1,18			1,27			1,36			1,10		
Synchron CX5	mmol/L	3	1,09			1,04			1,01			0,92			0,79			1,05		
Synchron CX7	mmol/L	2	1,08			1,02			0,99			0,91			0,85			1,08		
Synchron CX9	mmol/L	3	1,11			1,10			1,06			0,94			0,83			1,08		
Synchron LX20	mmol/L	4	1,12	0.01	0.9%	1,35	0.05	3.7%	1,52	0.10	6.5%	1,73	0.07	4.3%	1,96	0.08	3.9%	1,23	0.09	7.1%
Dimension RxL	mmol/L	4	1,09	0.02	2.0%	1,08	0.02	2.1%	1,06	0.01	0.9%	1,04	0.02	2.3%	1,01	0.03	2.6%	1,19	0.02	1.8%
Kone 30i	mmol/L	4	1,08	0.02	2.3%	0,95	0.05	5.2%	0,87	0.04	4.1%	0,63	0.05	7.2%	0,38	0.02	6.1%	0,99	0.01	1.5%
Kone 60i	mmol/L	3	1,09			0,97			0,85			0,64			0,37			1,01		
MEGA	mmol/L	1	1,10			1,13			1,25			1,36			1,58			1,07		
AU 600	mmol/L	2	1,21			1,21			1,20			1,24			1,33			1,22		
Vitros 250	mmol/L	15	1,17	0.04	3.2%	1,19	0.03	2.4%	1,20	0.03	2.5%	1,19	0.03	2.7%	1,21	0.03	2.6%	1,18	0.03	2.5%
Vitros 700	mmol/L	2	1,10			1,11			1,12			1,12			1,13			1,11		
Vitros 950	mmol/L	15	1,15	0.03	2.4%	1,16	0.03	2.7%	1,17	0.03	2.2%	1,17	0.02	2.0%	1,18	0.02	2.0%	1,16	0.03	2.3%
Integra 400/700	mmol/L	28	1,15	0.05	4.2%	1,12	0.08	6.7%	1,10	0.05	4.6%	1,07	0.05	4.5%	1,02	0.05	4.6%	1,16	0.05	4.3%
Hitachi 717	mmol/L	7	1,17	0.04	3.3%	1,17	0.04	3.1%	1,19	0.04	3.1%	1,21	0.02	1.9%	1,25	0.04	2.8%	1,18	0.04	3.0%
Hitachi 902	mmol/L	1	1,13			1,13			1,14			1,17			1,21			1,14		
Hitachi 911	mmol/L	19	1,12	0.04	3.3%	1,13	0.04	3.4%	1,14	0.04	3.3%	1,16	0.03	2.8%	1,19	0.04	3.6%	1,12	0.03	3.1%
Hitachi 912	mmol/L	6	1,13	0.08	7.5%	1,15	0.08	7.0%	1,16	0.09	7.4%	1,18	0.08	6.9%	1,22	0.09	7.2%	1,15	0.08	6.7%
Hitachi 917	mmol/L	18	1,10	0.04	3.4%	1,09	0.04	3.9%	1,10	0.04	3.6%	1,13	0.05	4.2%	1,16	0.06	4.8%	1,10	0.04	3.2%
Modular P/D	mmol/L	7	1,11	0.05	4.3%	1,10	0.05	4.7%	1,11	0.06	5.0%	1,14	0.06	5.1%	1,17	0.06	5.0%	1,11	0.05	4.8%

Triglycerides

Mean value without additon: 1 mmol/L

Grafical presentation of mean values for the major instrument groups



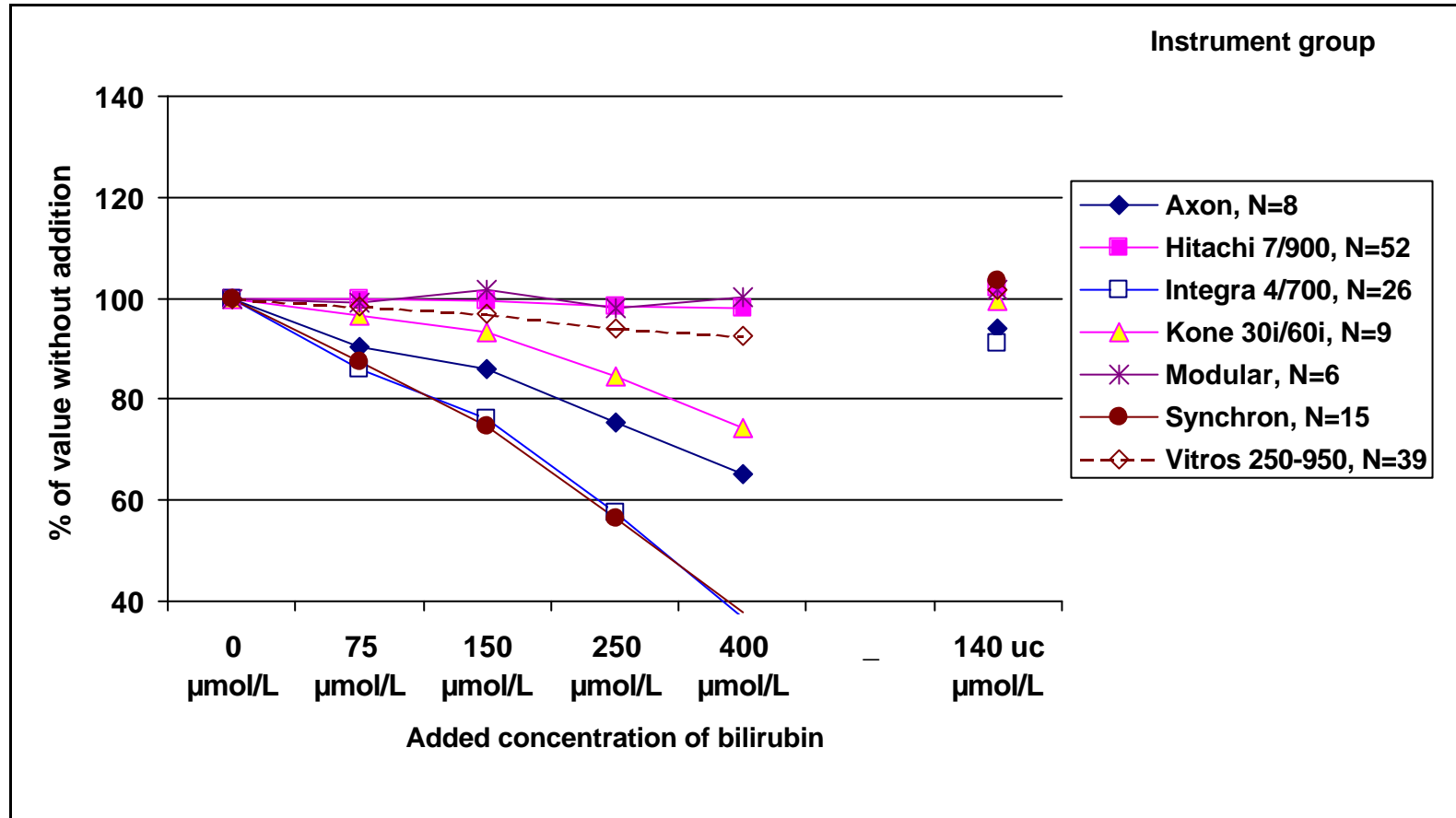
Triglycerides: summary of all data categorized by instrument

Instrument	Unit	N	No addition			+ 75 µmol/			+ 150 mmol/L			+ 250 µmol/			+ 400 µmol/L			+ 140 µmol/L (uc)		
			Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Aeroset	mmol/L	3	0.71			0.57			0.44			0.29			0.29			0.99		
Mira Plus	mmol/L	0																		
Mira S	mmol/L	1	0.80			0.70			0.60			0.40			0.30			0.60		
ADVIA 1650	mmol/L	2	0.79			0.80			0.81			0.77			0.73			0.98		
DAX	mmol/L	1	0.80			0.70			0.70			0.70			0.70			0.80		
Axon	mmol/L	5	0.81	0.07	8.3%	0.77	0.09	11.1%	0.76	0.08	10.9%	0.69	0.09	12.4%	0.66	0.07	11.3%	0.86	0.07	8.6%
Opera	mmol/L	1	0.75			0.78			0.84			0.90			1.00			1.00		
Synchron CX5	mmol/L	4	0.81	0.07	8.7%	0.75	0.06	8.3%	0.81	0.14	17.0%	0.75	0.06	8.3%	0.80	0.07	9.2%	0.84	0.07	8.0%
Synchron CX7	mmol/L	2	0.78			0.77			0.71			0.63			0.59			0.78		
Synchron CX9	mmol/L	1	0.81			0.78			0.77			0.73			0.80			0.78		
Synchron LX20	mmol/L	4	0.76	0.03	4.1%	0.72	0.02	2.4%	0.72	0.02	2.4%	0.73	0.02	2.9%	0.81	0.03	3.9%	0.77	0.02	3.3%
Dimension Rxl	mmol/L	4	0.70	0.03	4.7%	0.73	0.03	4.0%	0.73	0.03	3.6%	0.71	0.03	4.7%	0.72	0.03	4.1%	0.74	0.03	3.5%
Kone 30i	mmol/L	4	0.71	0.02	2.7%	0.70	0.00	0.7%	0.72	0.02	2.7%	0.70	0.01	1.4%	0.69	0.01	2.2%	0.89	0.02	2.1%
Kone 60i	mmol/L	3	0.74			0.73			0.74			0.70			0.70			0.91		
Optima	mmol/L	2	0.75			0.74			0.75			0.70			0.69			0.90		
MEGA	mmol/L	1	0.74			0.72			0.67			0.60			0.53			0.77		
AU 600	mmol/L	2	0.86			0.72			0.69			0.52			0.35			0.80		
Vitros 250	mmol/L	20	0.81	0.02	2.9%	0.81	0.02	2.9%	0.82	0.02	2.9%	0.80	0.02	3.1%	0.81	0.02	3.0%	0.83	0.02	3.0%
Vitros 700	mmol/L	2	0.81			0.80			0.82			0.80			0.81			0.82		
Vitros 950	mmol/L	13	0.80	0.02	1.9%	0.79	0.03	3.5%	0.80	0.03	4.3%	0.78	0.05	5.9%	0.79	0.06	7.8%	0.82	0.04	4.9%
Integra 400/700	mmol/L	31	0.75	0.05	6.2%	0.67	0.06	8.8%	0.63	0.06	8.8%	0.54	0.08	14.3%	0.48	0.11	24.0%	0.77	0.07	9.1%
Hitachi 717	mmol/L	6	0.79	0.02	3.1%	0.74	0.02	2.6%	0.72	0.03	4.6%	0.65	0.06	8.9%	0.62	0.07	11.1%	0.93	0.03	3.6%
Hitachi 902	mmol/L	2	0.80			0.75			0.70			0.60			0.60			0.90		
Hitachi 911	mmol/L	22	0.78	0.03	4.3%	0.73	0.04	4.9%	0.70	0.04	5.7%	0.64	0.06	8.9%	0.60	0.06	10.5%	0.92	0.03	3.8%
Hitachi 912	mmol/L	6	0.79	0.03	3.5%	0.73	0.04	5.8%	0.70	0.03	3.8%	0.62	0.03	4.9%	0.59	0.03	4.4%	0.92	0.05	5.3%
Hitachi 917	mmol/L	19	0.73	0.05	6.4%	0.70	0.04	5.9%	0.66	0.04	5.5%	0.60	0.03	5.4%	0.56	0.04	7.1%	0.85	0.14	16.7%
Modular P/D	mmol/L	6	0.76	0.02	3.1%	0.72	0.04	5.5%	0.68	0.02	2.4%	0.60	0.01	1.7%	0.58	0.02	2.8%	0.90	0.02	1.9%

Uric acid

Mean value without additon: 389 µmol/L

Grafical presentation of mean values for the major instrument groups



Uric acid: summary of all data categorized by instrument

Instrument	Unit	N	No addition			+ 75 µmol/			+ 150 mmol/L			+ 250 µmol/			+ 400 µmol/L			+ 140 µmol/L (uc)		
			Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %	Mean	SD	CV %
Aeroset	µmol/L	2	383.5			354.5			330.0			287.5			244.5			394.0		
Vision	µmol/L	4	397.3	15.1	3.8%	388.2	22.7	5.9%	394.3	40.6	10.3%	388.2	59.5	15.3%	260.1			418.5	9.5	2.3%
Mira Plus	µmol/L	2	375.5			387.5			374.0			356.5			354.5			403.0		
Mira S	µmol/L	1	428.0			357.0			295.0			193.0			91.0			354.0		
ADVIA 1650	µmol/L	2	392.5			366.5			350.0			314.0			265.0			381.0		
Axon	µmol/L	8	397.6	14.0	3.5%	359.3	24.5	6.8%	342.0	38.3	11.2%	298.4	58.8	19.7%	258.0	78.8	30.5%	373.0	23.6	6.3%
Opera	µmol/L	1	371.0			357.0			336.0			318.0			311.0			380.0		
Synchron CX5	µmol/L	5	383.0	6.7	1.7%	335.6	6.7	2.0%	284.6	5.5	2.0%	229.4	53.6	23.4%	166.4	95.0	57.1%	398.0	7.8	2.0%
Synchron CX7	µmol/L	3	371.0			327.7			287.9			223.6			162.4			382.7		
Synchron CX9	µmol/L	3	380.3			334.0			283.3			200.0			118.7			391.0		
Synchron LX20	µmol/L	4	370.5	4.1	1.1%	320.8	0.5	0.2%	270.0	2.4	0.9%	194.8	1.7	0.9%	117.3	4.2	3.6%	383.5	3.9	1.0%
Dimension RxL	µmol/L	4	377.5	5.0	1.3%	372.5	5.0	1.3%	380.0	8.2	2.1%	372.5	5.0	1.3%	372.5	5.0	1.3%	385.0	5.8	1.5%
Kone 30i	µmol/L	4	383.8	3.9	1.0%	370.8	5.7	1.5%	356.8	6.4	1.8%	324.3	5.8	1.8%	285.8	6.8	2.4%	381.8	3.0	0.8%
Kone 60i	µmol/L	5	389.2	6.4	1.6%	375.0	7.1	1.9%	363.4	7.2	2.0%	328.6	7.9	2.4%	288.8	12.4	4.3%	386.4	7.7	2.0%
Optima	µmol/L	1	391.0			367.0			357.0			340.0			300.0			389.0		
MEGA	µmol/L	1	408.0			392.0			378.0			347.0			316.0			416.0		
AU 600	µmol/L	2	407.5			378.0			353.0			315.0			275.0			391.0		
Vitros 250	µmol/L	23	388.0	5.6	1.4%	381.6	8.1	2.1%	377.4	7.5	2.0%	365.8	6.6	1.8%	359.6	7.3	2.0%	393.6	6.5	1.7%
Vitros 700	µmol/L	2	387.0			382.5			376.5			365.5			362.5			393.0		
Vitros 950	µmol/L	14	391.1	11.9	3.0%	384.7	8.9	2.3%	378.7	8.6	2.3%	367.3	7.8	2.1%	360.1	6.8	1.9%	398.5	7.9	2.0%
Integra 400/700	µmol/L	26	392.9	23.9	6.1%	337.8	43.4	12.8%	298.0	12.5	4.2%	224.9	22.1	9.8%	143.1	36.1	25.2%	356.5	12.2	3.4%
Hitachi 704	µmol/L	1	369.0			371.0			387.0			366.0			359.0			381.0		
Hitachi 717	µmol/L	5	396.4	8.3	2.1%	393.8	8.3	2.1%	391.6	5.6	1.4%	390.8	4.3	1.1%	388.4	4.9	1.3%	405.8	7.3	1.8%
Hitachi 902	µmol/L	2	395.0			395.5			396.5			389.5			389.5			403.0		
Hitachi 911	µmol/L	19	387.8	11.4	2.9%	387.3	13.7	3.5%	386.4	14.2	3.7%	380.6	11.1	2.9%	380.4	13.7	3.6%	394.7	11.3	2.9%
Hitachi 912	µmol/L	7	390.6	10.8	2.8%	390.3	10.1	2.6%	389.7	10.4	2.7%	384.4	10.2	2.7%	385.1	11.0	2.9%	400.9	10.4	2.6%
Hitachi 917	µmol/L	18	384.4	8.4	2.2%	383.4	8.3	2.2%	382.4	8.7	2.3%	377.4	8.7	2.3%	375.2	9.1	2.4%	393.5	8.3	2.1%
Modular P/D	µmol/L	6	384.7	10.0	2.6%	381.2	12.4	3.3%	391.1	27.2	7.0%	377.0	10.5	2.8%	385.7	24.8	6.4%	390.8	12.1	3.1%