WHITE
PAPER

COMPARISON STUDY BETWEEN THE HETTICH EBA200S (HP) BLOOD TUBE PACKAGE – 8 (FORMERLY QUICKSPIN PLUS) AND A SMALL CLINICAL CENTRIFUGE IN BLOOD CHEMISTRY DETERMINATIONS

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Introduction

The Hettich EBA 200S (HP) Blood Tube Pakckage – 8 (formerly QuickSpin Plus) is a small high-speed clinical bench top centrifuge developed for stat sample applications. The fixed angle rotor holds up to 8 tubes and accommodates tube capacities from 2.7mL (with included inserts) to 15mL. The EBA 200S Blood Tube Package - 8 has spin times programmable in increments of one minute and speeds up to 8000 RPM programmable in increments of 100.

Study Objective

This study examined and compared chemistry test results for 17 analytes in samples centrifuged in the EBA 200S Blood Tube Package - 8 and a small clinical (300ml) centrifuge.

Methodology

Two SST tubes (BD, 13x100mm) were taken from 20 individuals and centrifuged in the EBA 200S Blood Tube Package - 8 at 7500 RPM for two minutes and the small clinical centrifuge at 5000 RPM for five minutes. Post centrifugation, the serum was tested for the following: glucose, BUN, creatine, albumin, total protein, calcium, total bilirubin, CPK, CKMB, troponin, alkaline phosphatase, SGPT, SGOT, amylase, Na, Cl, and CO2. The Roche Integra 700 analyzer was used to test the serum.

Results

Table 1 shows the statistical analysis. Table 2 displays the percentage difference between each sample processed in the EBA 200S Blood Tube Package - 8 and each sample processed in the small clinical centrifuge (SCC). Table 3 shows original data for chemistry results. The group of scatter plot charts collectively labeled “Chart 1” shows plot points for each sample defined by the analyte result for the EBA 200S Blood Tube Package - 8 on the x-axis and the result for the small clinical centrifuge on the y-axis.

Data Analysis

Linear regression was used to analyze the results from each centrifuge. Correlation coefficients range from 0.88 to 1.00. Slopes range from 0.88 to 1.03, and y-intercepts range from -4.10 to 3.46.

The average percentage differences for the analytes with number of samples >10 range from 0.52% (Cl) to 7.01% (total bilirubin). Analytes with more than ten samples account for 16 of the 17 analytes tested.

Interpretation

SST tubes centrifuged in the EBA 200S Blood Tube Package - 8 for just two minutes achieved separation of serum and cells and produced samples suitable for blood chemistry testing.

Additionally, the general 45 degree linear trend demonstrated in Chart 1 indicates a near one-to-one relationship between the values for the analyte test results for the EBA 200S Blood Tube Package - 8 and the small clinical centrifuge.

than eight percent. Troponin only has ten values accounted for, and the numerical values are generally small numbers with a small range for normality (0-0.03). For the purposes of this study, these numbers were only available to the second decimal place, meaning that very small variances, even well within the normal range, reflect large differences in terms of percentage.

Conclusion

Results indicate that the EBA 200S Blood Tube Package - 8 is capable of preparing samples suitable for blood chemistry tests in only two minutes, and that it provides comparable clinical efficacy to the small clinical centrifuge that was tested in the study. The EBA 200S Blood Tube Package - 8 provides faster turnaround times (2 minutes versus 5 minutes) without sacrificing the quality and accuracy of the test results.

Table 1: Statistical Analysis

	EBA 200S Blood Tube Package - 8 Mean ± SD	Small Clinical Centrifuge Mean ± SD	Correlation Coefficient	Slope	Y-Intercept
Glucose	113.50 ± 48.72	114.85 ± 47.99	1.00	0.98	3.46
BUN	19.35 ± 15.63	19.15 ± 15.19	1.00	0.97	0.36
Creatine	1.32 ± 1.35	1.35 ± 1.35	1.00	1.01	0.02
Albumin	3.42 ± 0.78	3.45 ± 0.78	1.00	1.01	0.00
T.Protein	6.26 ± 0.94	6.34 ± 0.86	0.96	0.88	0.85
Calcium	9.01 ± 0.71	9.02 ± 0.84	0.88	1.03	-0.27
T. Bilirubin	1.56 ± 2.22	1.57 ± 2.20	1.00	0.99	0.03
CPK	129.32 ± 166.38	130.95 ±169.70	1.00	1.02	-0.92
CKMB	2.69 ± 2.14	2.66 ± 2.13	1.00	1.00	-0.03
Tropinin	0.28 ± 0.78	0.27 ± 0.78	1.00	1.01	0.00
Alk. Phos.	81.84 ± 53.15	80.58 ± 51.84	0.99	0.97	1.52
SGPT	16.26 ± 6.72	16.26 ± 6.81	0.99	1.01	-0.10
SGOT	19.79 ± 8.99	19.95 ± 8.89	0.99	0.98	0.65
Amylase	55.95 ± 25.61	56.00 ± 25.51	1.00	0.99	0.41
Na	138.95 ± 3.53	138.80 ±3.83	0.94	1.03	-4.10
Cl	108.70 ± 19.84	108.45 ± 19.81	1.00	1.00	0.05
CO2	28.02 ± 4.57	27.85 ± 4.83	0.98	1.03	-1.16

Table 2: Percentage Difference in Result Values by Sample and Analyte

Sample	Glucose	BUN	Creatine	Albumin	T.Protein	Calcium	T. Bilirubin	CPK	CKMB	Troponin	Alk. Phos.	SGPT	SGOT	Amylase	Na	Cl	CO2
1	0.00%	0.00%	14.29%	NA	NA	5.68%	NA	90.98%	1.11%	0.40%	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	7.69%	10.53%	1.89%	5.71%	4.69%	6.74%	0.00%	90.12%	16.67%	200.00%	0.00%	0.00%	3.85%	0.00%	0.71%	0.00%	0.33%
3	3.60%	0.00%	0.00%	2.22%	1.35%	3.23%	8.33%	0.00%	3.70%	66.67%	1.09%	7.14%	0.00%	0.00%	0.74%	0.98%	2.93%
4	0.00%	0.00%	0.00%	0.00%	1.37%	4.71%	0.00%	0.54%	0.00%	50.00%	25.20%	4.76%	11.11%	0.00%	0.00%	0.00%	3.04%
5	0.00%	0.00%	11.11%	2.63%	3.08%	2.06%	0.00%	2.66%	0.00%	200.00%	1.19%	6.25%	0.00%	1.28%	0.71%	0.98%	4.82%
6	4.26%	7.14%	0.00%	0.00%	1.52%	6.82%	0.00%	14.29%	0.00%	0.00%	1.49%	10.00%	0.00%	1.69%	0.71%	0.00%	1.73%
7	0.90%	0.00%	0.00%	0.00%	1.56%	2.08%	0.00%	0.00%	18.18%	300.00%	0.00%	0.00%	16.67%	0.00%	0.74%	0.98%	2.72%
8	1.03%	2.04%	2.70%	0.00%	10.42%	1.01%	0.00%	2.11%	12.50%	100.00%	2.44%	3.85%	0.00%	3.33%	0.72%	0.93%	4.88%
9	7.45%	0.00%	0.00%	0.00%	11.67%	5.15%	40.00%	3.88%	8.00%	0.00%	0.00%	12.50	12.50%	0.00%	0.72%	0.97%	1.43%
10	4.44%	0.00%	0.00%	0.00%	1.75%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.82%	2.26%	1.96%	0.45%
11	0.98%	0.00%	5.26%	0.00%	0.00%	2.13%	1.56%	4.17%	3.57%	NA	2.00%	8.33%	8.00%	0.00%	1.32%	0.87%	12.45%
12	1.11%	0.00%	0.00%	0.00%	0.00%	2.00%	0.00%	0.00%	5.56%	NA	1.82%	0.00%	0.00%	3.57%	0.72%	0.00%	2.95%
13	0.57%	8.33%	25.00%	0.00%	4.23%	1.06%	0.00%	1.47%	NA	NA	3.13%	0.00%	0.00%	1.45%	0.00%	0.00%	1.33%
14	0.94%	4.35%	0.00%	0.00%	4.62%	2.97%	0.00%	19.35%	NA	NA	0.00%	10.53%	7.14%	0.00%	0.70%	0.00%	2.75%
15	8.91%	3.57%	2.70%	3.03%	1.85%	15.28%	33.33%	2.68%	NA	NA	4.00%	0.00%	4.76%	4.41%	0.70%	0.00%	2.19%
16	0.00%	12.50%	0.00%	0.00%	6.06%	1.20%	25.00%	0.74%	NA	NA	5.88%	0.00%	11.11%	1.64%	0.00%	0.00%	4.88%
17	1.37%	0.00%	0.00%	2.63%	1.56%	0.00%	0.00%	1.00%	NA	NA	5.45%	0.00%	3.85%	0.00%	0.73%	0.97%	1.09%
18	2.27%	7.69%	0.00%	2.27%	1.23%	0.00%	25.00%	0.00%	NA	NA	2.47%	6.25%	6.67%	6.02%	0.72%	0.00%	0.37%
19	2.27%	33.33%	0.00%	0.00%	2.22%	2.78%	0.00%	4.21%	NA	NA	2.70%	0.00%	4.35%	1.10%	0.71%	0.00%	4.15%
20	2.73%	3.85%	0.00%	4.55%	3.28%	2.30%	0.00%	NA	NA	NA	1.25%	0.00%	23.53%	1.33%	0.72%	1.83%	0.89%
Mean Diff.	2.53%	4.67%	3.15%	1.21%	3.29%	3.36%	7.01%	3.59%	5.77%	91.71%	3.16%	3.48%	5.68%	1.38%	0.68%	0.52%	2.77%

The chart above shows the percentage difference between the value for the result of the analyte tested in the small clinical centrifuge versus the value for the same analyte tested in the EBA 200S Blood Tube Package - 8. For example, it could be correctly stated that for glucose sample number 11, there is a 0.98% difference between the result achieved in the small clinical centrifuge and the result achieved in the EBA 200S Blood Tube Package - 8. A designation of “NA” indicates that the sample was not tested for that analyte.

Table 3a: Original Data

Sample No.	Glucose		BUN		Creatine		Albumin	
	QSP	SCC	QSP	SCC	QSP	SCC	QSP	SCC
1	112	112	12	12	0.6	0.7	NA	NA
2	84	91	21	19	5.2	5.3	3.3	3.5
3	107	111	7	7	0.4	0.4	4.4	4.5
4	109	109	7	7	0.8	0.8	3.1	3.1
5	87	87	19	19	0.8	0.9	3.7	3.8
6	98	94	15	14	0.7	0.7	3.6	3.6
7	112	111	6	6	0.7	0.7	3.8	3.8
8	98	97	50	49	3.8	3.7	2.8	2.8
9	149	161	24	24	0.9	0.9	3.1	3.1
10	86	90	7	7	0.3	0.3	3.1	3.1
11	101	102	48	48	1.8	1.9	4.8	4.8
12	91	90	18	18	0.9	0.9	3.1	3.1
13	175	174	11	12	0.3	0.4	4.2	4.2
14	107	106	22	23	1.0	1.0	4.1	4.1
15	99	101	58	56	3.6	3.7	3.4	3.3
16	82	82	9	8	0.5	0.5	2.2	2.2
17	297	293	12	12	1.1	1.1	3.7	3.8
18	86	88	12	13	0.6	0.6	4.3	4.4
19	90	88	2	3	0.4	0.4	2.1	2.1
20	107	110	27	26	2.0	2.0	2.1	2.2

Table 3b: Original Data

Sample No.	T.Protein		Calcium		T. Bilirubin		CPK	
	QSP	SCC	QSP	SCC	QSP	SCC	QSP	SCC
1	NA	NA	8.3	8.8	NA	NA	55	61
2	6.7	6.4	8.3	8.9	0.3	0.3	82	83
3	7.3	7.4	9.6	9.3	1.1	1.2	47	47
4	7.2	7.3	8.9	8.5	0.3	0.3	554	557
5	6.7	6.5	9.9	9.7	0.6	0.6	621	638
6	6.5	6.6	9.6	8.8	2.8	2.8	8	7
7	6.5	6.4	9.4	9.6	0.4	0.4	16	16
8	4.3	4.8	9.8	9.9	0.4	0.4	97	45
9	5.3	6.0	9.2	9.7	0.3	0.5	124	129
10	5.6	5.7	9.4	9.4	1.5	1.5	39	39
11	6.2	6.2	9.2	9.4	6.5	6.4	138	144
12	6.5	6.5	9.8	10	0.6	0.6	35	35
13	6.8	7.1	9.3	9.4	6.2	0.2	69	68
14	6.2	6.5	9.8	10.1	6.4	6.4	37	31
15	5.5	5.4	8.8	7.2	0.2	0.3	115	112
16	6.2	6.6	8.2	8.3	0.5	0.4	134	135
17	6.5	6.4	8.0	8.0	0.4	0.4	99	100
18	8.2	8.1	9.4	9.4	0.3	0.4	96	96
19	4.4	4.5	7.4	7.2	0.2	0.2	91	95
20	6.3	6.1	8.5	8.7	0.6	0.6	NA	NA

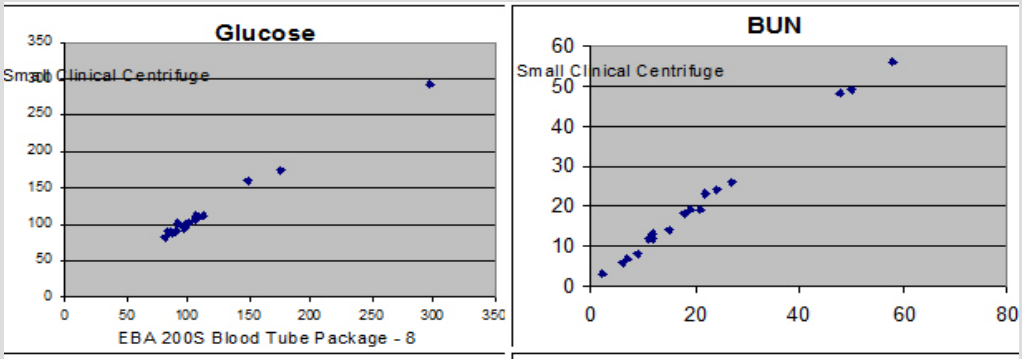
Table 3c: Original Data

Sample No.	Alk. Phos.		SGPT		SGOT		Amylase	
	QSP	SCC	QSP	SCC	QSP	SCC	QSP	SCC
1	NA	NA	NA	NA	NA	NA	119	120
2	105	105	10	10	25	26	33	33
3	273	276	13	14	22	22	30	30
4	154	123	20	21	10	9	24	24
5	85	84	17	16	14	14	79	78
6	66	67	11	10	16	16	58	59
7	79	79	13	13	15	18	42	42
8	42	41	27	26	50	50	31	30
9	40	40	9	8	9	8	25	25
10	68	68	17	17	22	22	56	55
11	49	50	13	12	27	25	33	33
12	54	55	15	15	18	18	54	56
13	66	64	19	19	17	17	68	69
14	54	54	17	19	15	14	33	33
15	52	50	33	33	20	21	65	68
16	80	85	10	10	20	18	60	61
17	52	55	13	13	27	26	55	55
18	83	81	15	16	14	15	88	83
19	72	74	28	28	22	23	92	91
20	81	80	9	9	13	17	74	75

Table 3d: Original Data

Sample No.	Na		Cl		CO2		CKMB		Troponin	
	QSP	SCC	QSP	QSP	SCC	SCC	QSP	SCC	QSP	SCC
1	135	137	100	102	28.4	28.6	9.1	9.0	2.49	2.50
2	140	141	103	103	30.6	30.5	1.4	1.2	0.03	0.01
3	134	135	101	102	24.6	23.9	2.6	2.7	0.01	0.03
4	140	140	103	103	25.5	26.3	0.9	0.9	0.02	0.04
5	141	140	103	102	32.6	31.1	2.6	2.6	0.03	0.01
6	141	140	106	106	29.4	28.9	2.5	2.5	0.03	0.03
7	136	135	101	102	30.2	29.4	1.3	1.1	0.04	0.01
8	139	138	109	108	25.8	24.6	1.8	1.6	0.02	0.01
9	139	138	104	103	27.5	27.9	2.3	2.5	0.03	0.03
10	136	133	104	102	22.2	22.3	3.2	3.2	0.06	0.06
11	149	151	116	115	28.9	25.7	2.9	2.8	NA	NA
12	138	139	101	101	32.9	33.9	1.7	1.8	NA	NA
13	135	135	101	101	22.3	22.6	NA	NA	NA	NA
14	143	142	97	97	42.5	43.7	NA	NA	NA	NA
15	143	142	191	191	26.8	27.4	NA	NA	NA	NA
16	135	135	106	106	25.8	24.6	NA	NA	NA	NA
17	138	137	104	103	27.1	27.4	NA	NA	NA	NA
18	138	139	104	104	27.0	26.9	NA	NA	NA	NA
19	139	140	109	109	27.7	28.9	NA	NA	NA	NA
20	140	139	111	109	22.6	22.4	NA	NA	NA	NA

Chart 1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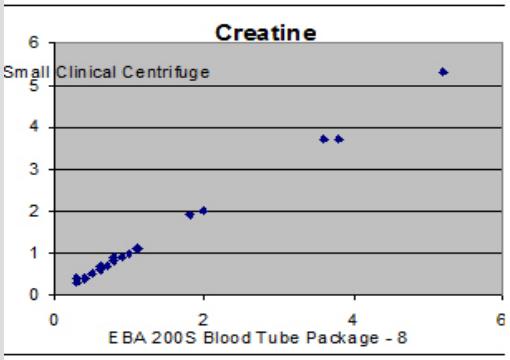
EBA 200S Blood Tube Package - 8

BUN
Small Clinical Centrifuge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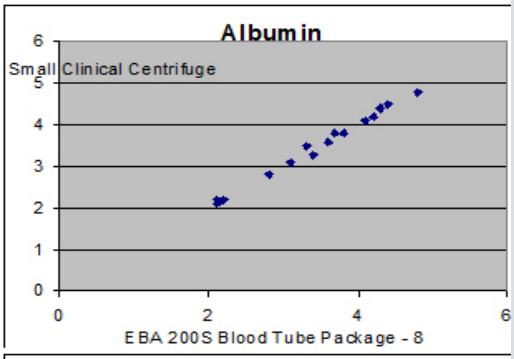
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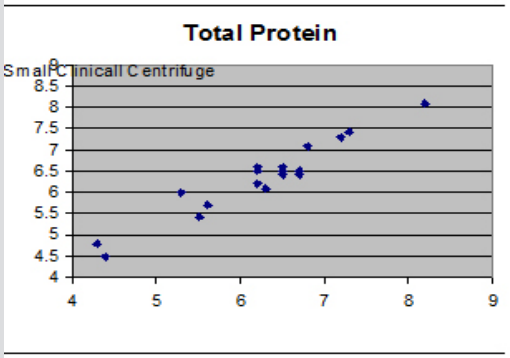
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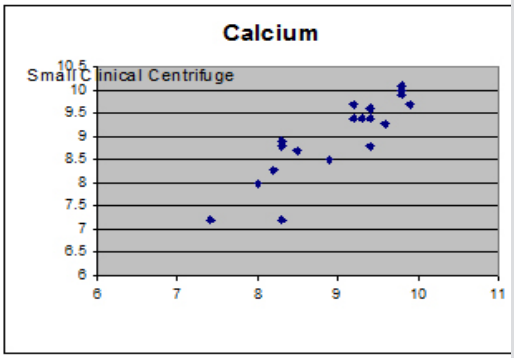
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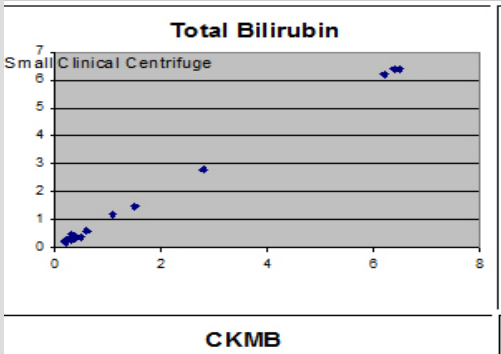
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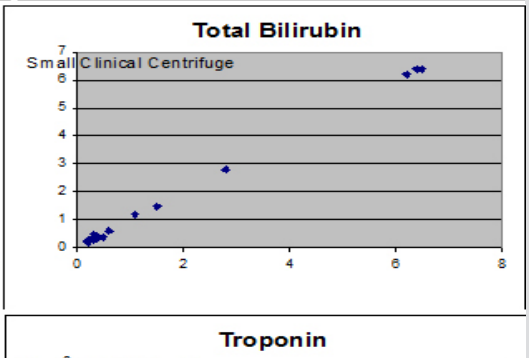
Total Bilirubin
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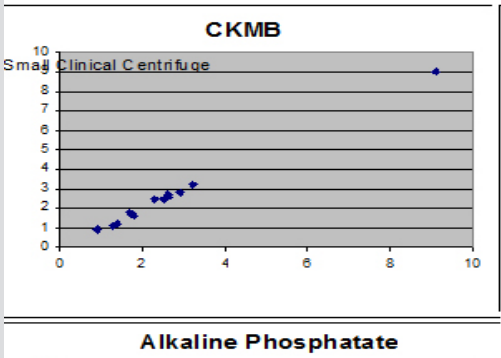
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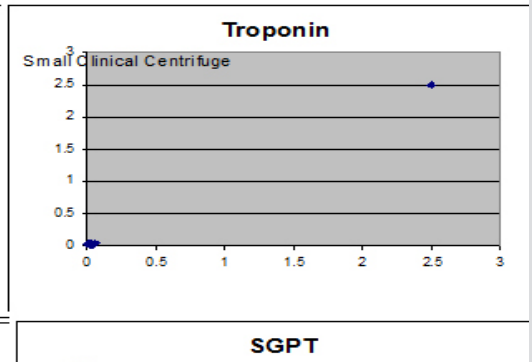
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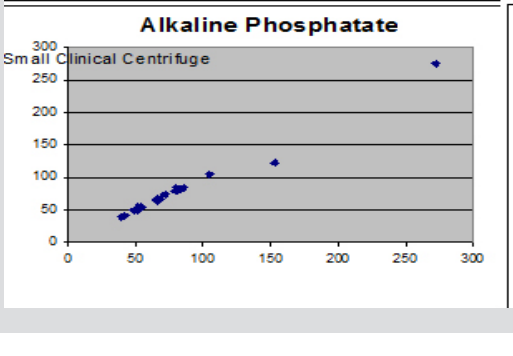
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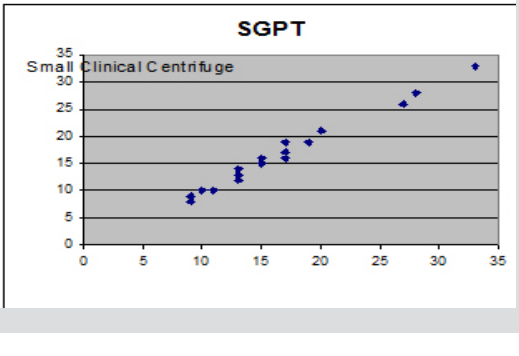
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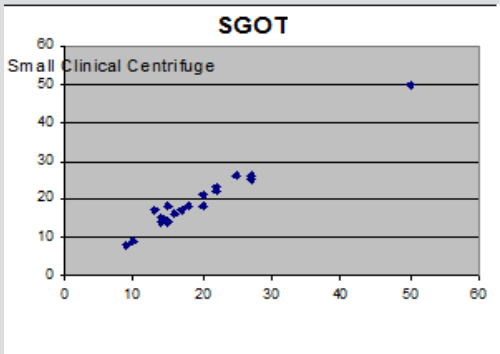
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Small Clinical Centrifuge
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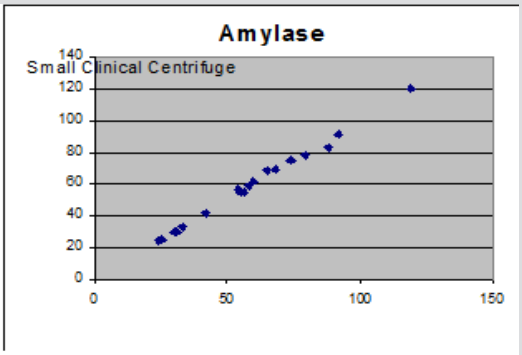
20
10
0
0
10
20
30
40
50
60


Amylase
Small Clinical Centrifuge
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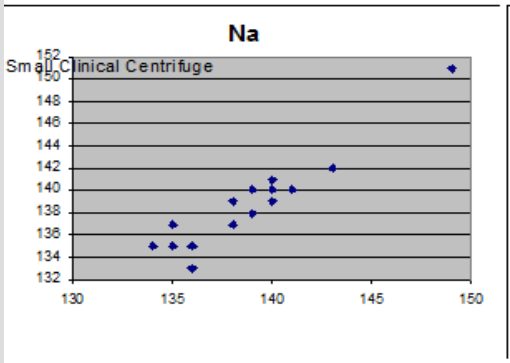
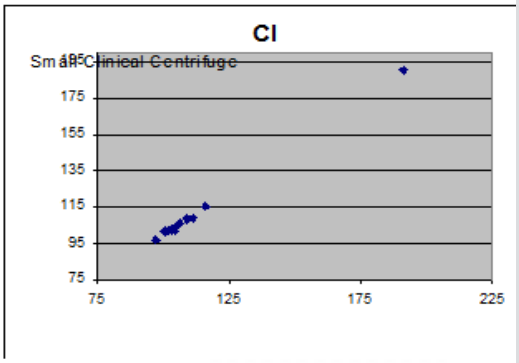
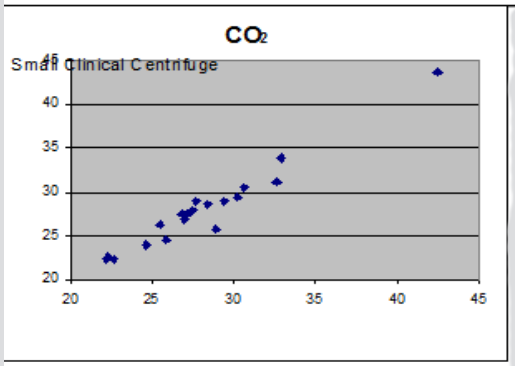
100
80
60
40
20
0
0
50
100
150


Na
Small Clinical Centrifuge
152
150
148
146
144
142
140
138
136
134
132
130
135
140
145
150


Cl
Small Clinical Centrifuge
195
175
155
135
115
95
75
75
125
175
225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