

So my performance is satisfactory?

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UK NEQAS Haematology reports

UK NEQAS Haematology and Transfusion	Full Blood Count	Laboratory: 20028
	Distribution: 1706FB Date: 05 Jun 2017	Page 1 of 3
	Overall Performance	20028A-A1287

Survey Contents: Specimen 1: 1706FB1 Partially fixed human whole blood Specimen 2: 1706FB2 Partially fixed human whole blood	Non Participation Penalty: 0
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UK NEQAS Haematology and Transfusion	Automated Differential Leucocyte Count	Laboratory: 20028
	Distribution: 1703DL Date: 05 Jun 2017	Page 1 of 3
	Overall Performance	20028A-A1287

Survey Contents: Specimen 1: 1703DL1 Matrix J for 5 Population Instruments Specimen 2: 1703DL2 Matrix J for 5 Population Instruments	Non Participation Penalty: 0
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White Blood Count Your analytical performance score is 23.2	Red Blood Count Your analytical performance score is 15.7
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UK NEQAS Haematology and Transfusion	Erythrocyte Sedimentation Rate	Laboratory: 20028
	Distribution: 1702ES Date: 05 Jun 2017	Page 1 of 2
	Overall Performance	20028A

Survey Contents: Specimen 1: 1702ES1 Commercially prepared whole blood product Specimen 2: 1702ES2 Commercially prepared whole blood product	Non Participation Penalty: 0
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Neutrophils Your analytical performance score is 14.5

UK NEQAS Haematology and Transfusion	Abnormal Haemoglobins Scheme	Laboratory: 20028
	Distribution: 1703AH Date: 05 Jun 2017	Page 1 of 11
	Sickle Cell Screening	

Survey Contents: Specimen 1703SS1 was from a sickle cell positive donation Specimen 1703SS2 was from a sickle cell negative donation Specimen 1703SS3 was from a sickle cell positive donation	Non Participation Penalty: 0
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Specimen Quality 1703SS1 1703SS2 1703SS3 Satisfactory 420 420 418 Unsatisfactory 1 1 3 You reported: Satisfactory Satisfactory Satisfactory	Return Rate Specimens were distributed to 433 participants. 421 participants returned results. This represents a 97% return rate.
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UK NEQAS Haematology and Transfusion	Blood Films for Morphology	Laboratory: 20028
	Distribution: 1704BF Date: 05 Jun 2017	Page 2 of 9
	Specimen: 1704BF1 Data Analysis	

Data Analysis Top ten reported comments (see graph for all reported comments)	Your Results Your reported comments with the number who reported that comment
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Your suggested diagnosis

Data Analysis Top ten reported comments (see graph for all reported comments)

Code Comment Rank Number 622 Nucleated RBCs 1 473 212 Blast cells 2 437 625 Tear drop poikilocytes 3 436 215 Myelocytes 4 252 605 Polychromatic cells 5 209 302 Thrombocytopenia 6 175 206 Band form neutrophils/Left shift 7 98 303 Macrocytic platelets 8 70 213 Plasmacytoid cells 9 44 621 Punctate Basophils 10 38

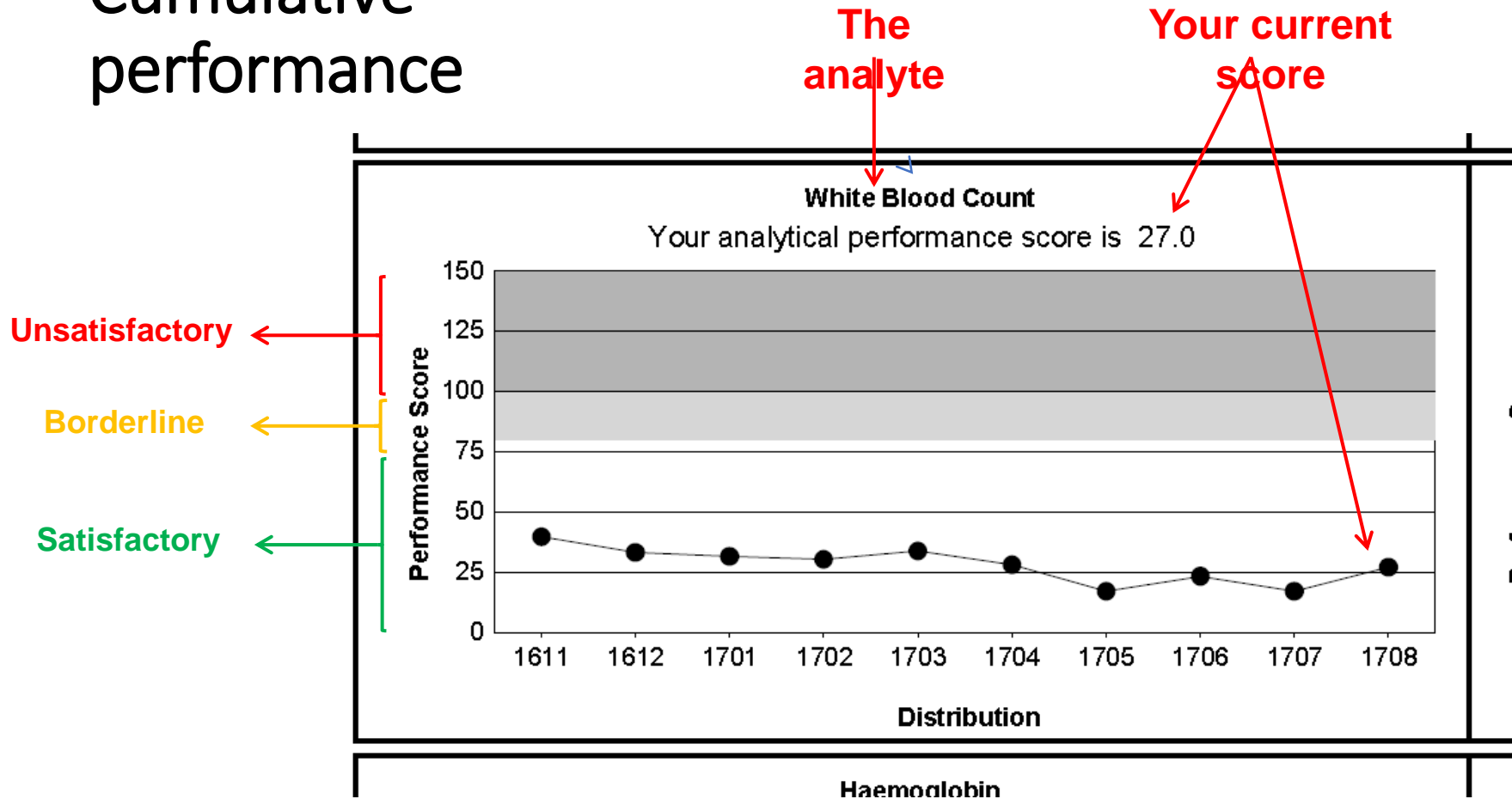
Two types of scores

- UK NEQAS Haematology provides two scores for most programmes:
 - A participation score
 - An analytical performance score
- Analytical performance may be scored for:
 - Quantitative tests, e.g. FBC parameters
 - Qualitative tests, e.g. sickle cell screening
- Some reports are returned for information and education. Results are still reviewed and assessed even if no score is provided

Definitions

- Satisfactory performance
- Unsatisfactory performance
- Poor performance
- Persistent unsatisfactory / poor performance
- Out of consensus performance
- Hazardous performance

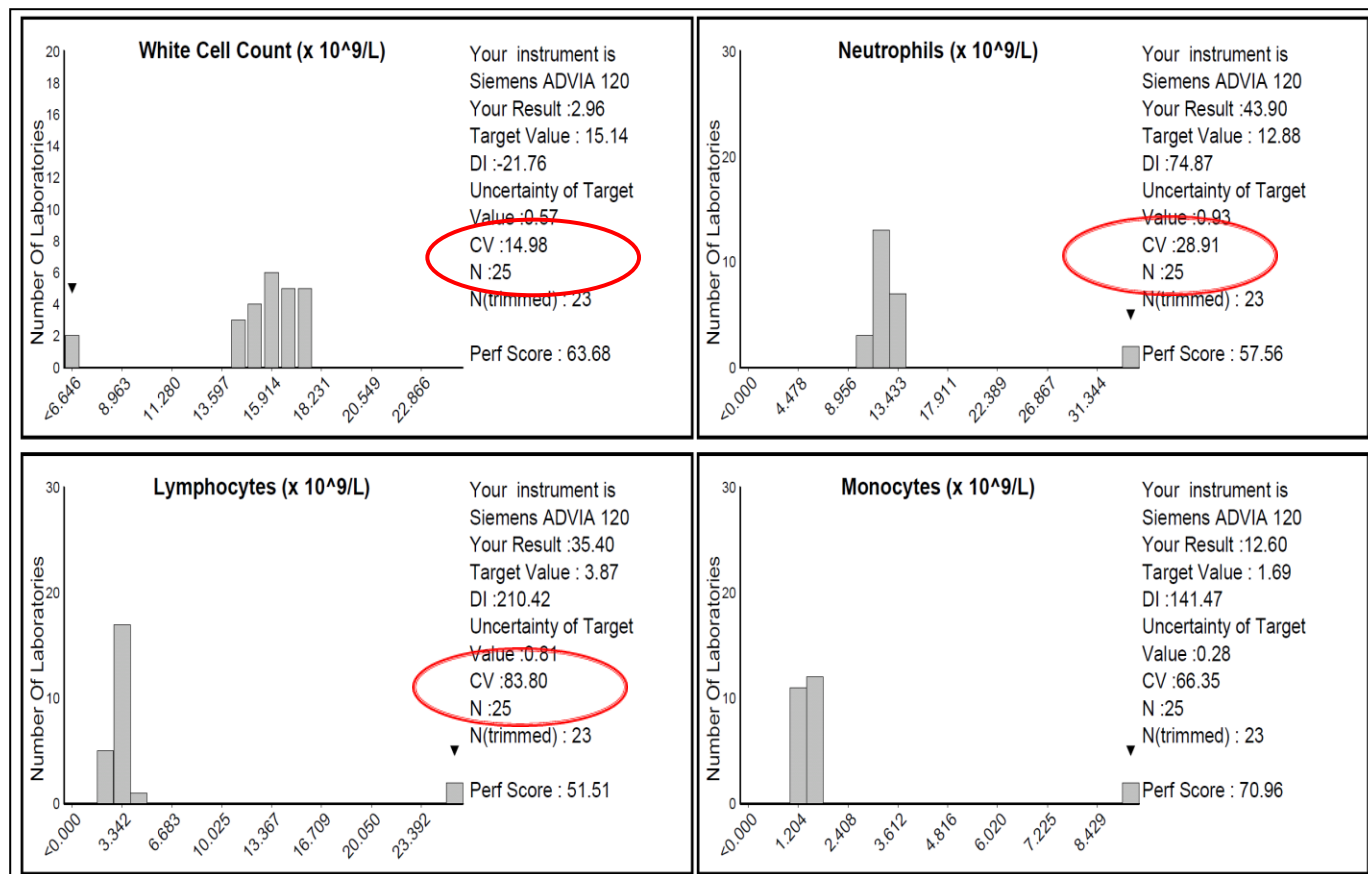
Cumulative performance



Target values

- A separate target value is determined for each analyte (measurand)
- The target value used in most UK NEQAS Haematology programmes are either:
 - The consensus result returned by participants. This is the most commonly used target
 - The expected result, e.g. for a haemoglobinopathy specimen
 - A model answer, defined by our expert advisors
- Data is trimmed to remove outliers
 - 10% symmetrical trimming
- The target value is shown to one decimal place more than the used to report the data but is calculated to many more decimal places than that

10% may not be enough on some occasions



Draft results – not released!!

Calculating the analytical performance score

- The Deviation Index (DI) is calculated. This is analagous to a z-score and shows how far the laboratory's result is from the target
- The DI is calculated on the trimmed data and (in most cases) after log-transformation of the data
- The DI is used to calculate the cumulative analytical performance score, using the results of the last six specimens containing the analyte

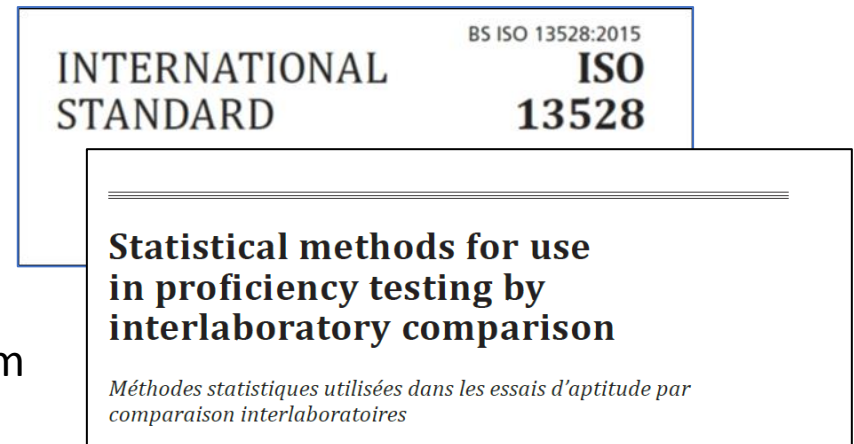
The Deviation Index (DI)

- Calculating the DI:

$$DI = \frac{x_i - x_{pt}}{SD_{pt}}$$

Where x_i is the laboratory result
 x_{pt} is the consensus trimmed mean value or median value
 SD_{pt} is either the HSD or the estimated SD

- Interpreting the DI:
 - Less than 1 is good
 - Between 1 and 2 is satisfactory
 - Between 2 and 3 is borderline
 - Greater than 3 *may* indicate a problem



Investigating a high DI value

Example:

- Participant Platelet count = $15 \times 10^9/\text{L}$
- “Target” Platelet count = $18.3 \times 10^9/\text{L}$
- Deviation Index > 3.0!

Consider:

- Normal statistical distribution of results
- The analyte concentration
- Are both samples affected?
- Has there been a trend in recent results?
- Is the cumulative score satisfactory?
- Are IQC and other performance indicators okay?

The analytical performance score: an example

- DI values are obtained for the most recent six specimens:

Survey	Specimen FB1	Specimen FB2
1	-0.64	+1.85
2	0.00	+1.13
3	-1.89	+0.64

- The score is calculated by ignoring the arithmetical sign, summing the DI values and applying a multiplication factor (in FBC this is 6)
- $\text{Score} = (0.64 + 1.85 + 0.0 + 2.89 + 1.13 + 1.89 + 0.64) \times 6 = 37$
This is **satisfactory** performance, i.e. the score is less than 100
- A score of between 80 – 100 may be borderline
- A score of greater than 100 is unsatisfactory performance

Avoiding unfair penalties

- A result may attract a very high DI because of a ‘blunder’, e.g. result transposition, therefore:
- All DI values are truncated to a maximum of 3.5 before calculating the performance score to avoid unfair penalties
- The multiplication factor varies according to the programme and the analyte, to make scores comparable

UK NEQAS FB Material: Clinically relevant ranges

UK NEQAS FB: Range of values distributed annually

	WBC (10 ⁹ /L)	RBC (10 ¹² /L)	Hb (g/L)	PCV (L/L)	MCV (fL)	PLT (10 ⁹ /L)
Minimum	1.1	2.52	75	0.237	88.6	13
Maximum	27.5	6.2	185	0.598	97.8	795

Monthly or bi-monthly distributions: all common analytes

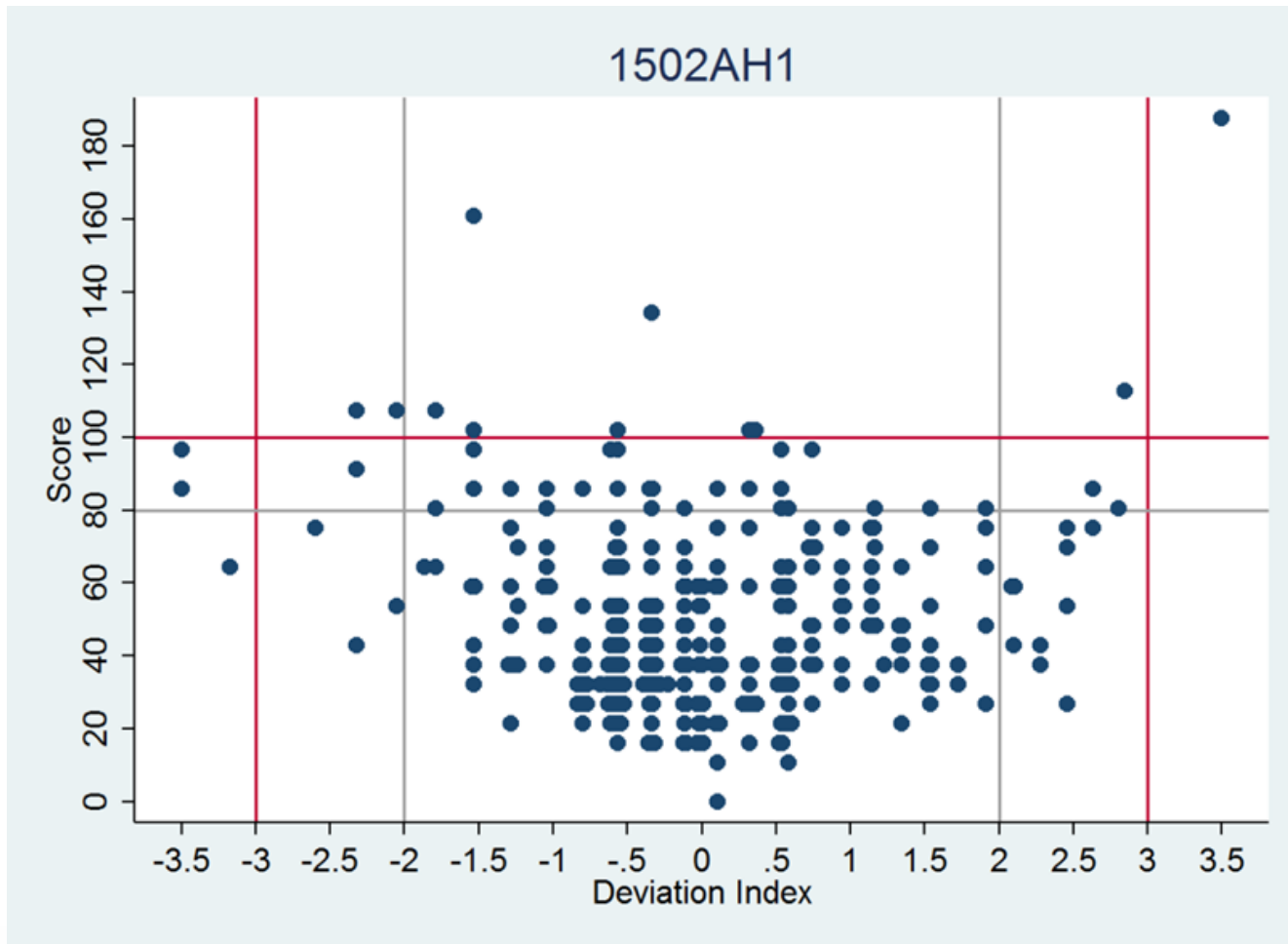
Robust statistics - Platelets

SampleNo	N	Mean	SD	HSD	CV	HCV
	trimmed					
1908FB2	650	162.79	0.06	0.11	6.01	12.03
1908FB1	650	633.49	0.05	0.11	4.80	12.03
1907FB2	644	248.49	0.05	0.11	4.79	12.02
1907FB1	644	200.91	0.08	0.11	8.26	12.02
1906FB2	632	234.49	0.05	0.10	4.96	10.33
1906FB1	632	7.51	0.29	0.10	33.04	10.33
1905FB2	644	24.50	0.11	0.09	11.78	9.77
1905FB1	644	112.58	0.05	0.09	4.80	9.77
1904FB2	614	261.57	0.04	0.10	4.36	10.33
1904FB1	614	238.13	0.04	0.10	3.87	10.33
1903FB2	598	11.16	0.20	0.08	22.66	8.45

Robust statistics – Red cells

SampleNo	N					
	trimmed	Mean	SD	HSD	CV	HCV
1908FB2	651	3.10	0.01	0.01	1.33	1.28
1908FB1	651	3.36	0.01	0.01	1.27	1.28
1907FB2	646	4.83	0.01	0.01	1.18	1.29
1907FB1	646	4.01	0.03	0.01	2.84	1.29
1906FB2	633	6.07	0.01	0.01	1.19	1.34
1906FB1	633	3.71	0.01	0.01	1.21	1.34
1905FB2	646	2.10	0.02	0.01	1.61	1.32
1905FB1	646	3.98	0.01	0.01	1.28	1.32
1904FB2	615	6.14	0.01	0.01	1.25	1.32
1904FB1	615	3.80	0.01	0.01	1.22	1.32
1903FB2	599	3.83	0.01	0.01	1.16	1.33

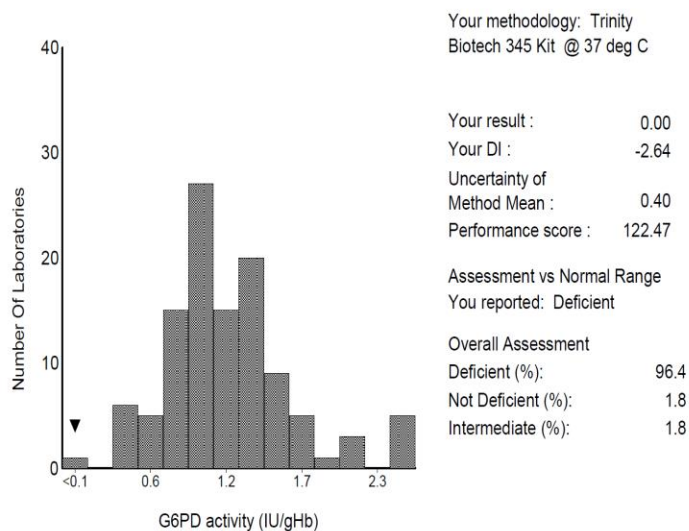
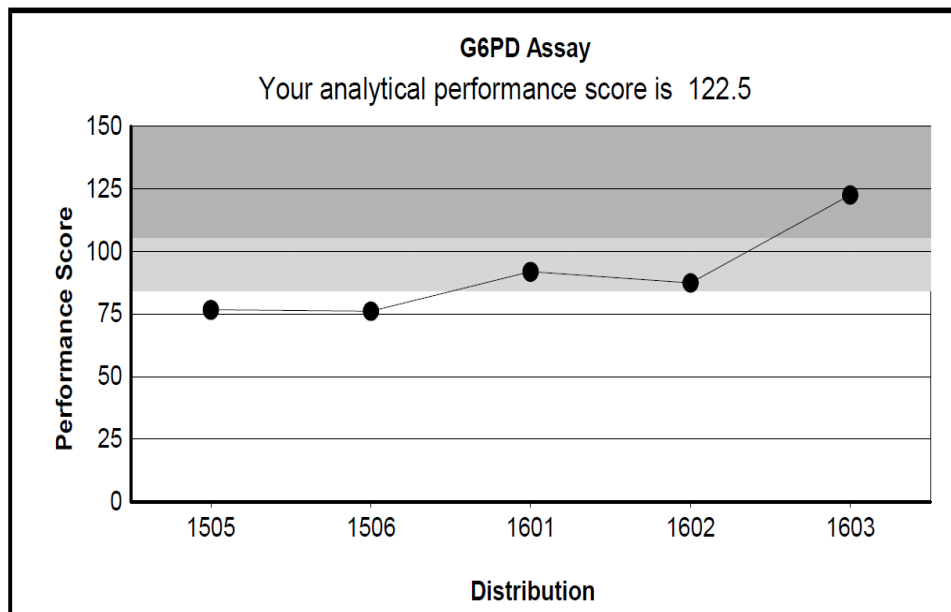
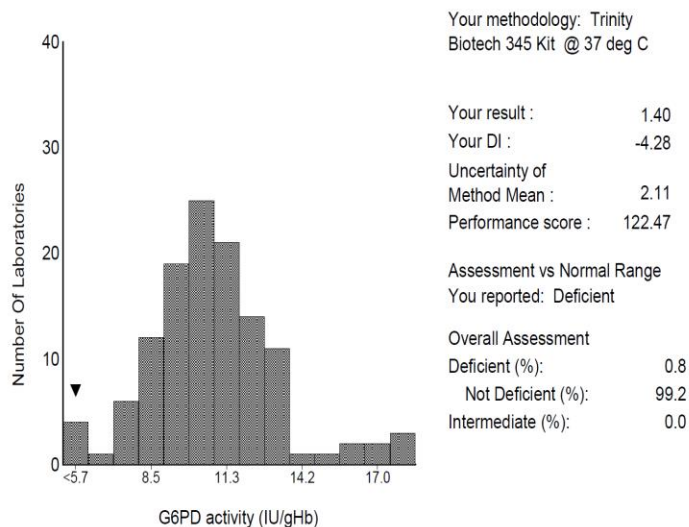
Understanding the Deviation Index and Scores



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International Quality Expertise

Unsatisfactory performance – G6PD



- Error in Hb units -> results 10x too low
- 62 patients affected
- 43 incorrectly diagnosed as G6PD deficient

Thank you for your attention!



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