THE EDUCATIONAL ROLE OF EQA: The organizer and laboratories perspectives

Jonna Pelanti

EQALM symposium September 22, 2011

Szeged, Hungary

Aim of this presentation

- Labquality – a small history
- How do we learn
- EQA from the laboratories perspective
- EQA from the organizers perspective
- New ways of challenging the participants
- Discussion

Labquality

Labquality

External quality assessment services since 1971

- Kliinisten laboratoriotutkimusten laaduntarkkailu Oy (1971)
- Labquality Oy (1996)
- Labquality Group (2008)
  - Labquality
  - Bioclin
  - Qualitor

Labquality

Shareholders

Finnish Society of Clinical Chemistry

Association of Finnish Local and Regional Authorities

19 local hospital districts

Association of Medical Service Providers

Finnish Medical Association

Finnish Union of Experts in Science

Finnish Red Cross

Labquality

Labquality is an independent and impartial organization.

Labquality´s owners represent health care widely and all profits from Labquality go back into health care.

Labquality

Activities

Labquality Days

External quality assessment services
EQAS/ proficiency testing, PT

Education
Labquality Days, international congress of laboratory medicine and EQAS
Labquality News, information magazine
Recommendations

Research and development
Coordination and participation in national and international projects and studies.

International associations
IFCC, EQALM, Eurachem, EQANord

Labquality

Quality System

ISO9001 –certification

Labquality´s quality system has been certified since 1996. Present certificate is according to ISO9001:2008 standard.

Accreditation

ISO standard for EQA providers in 2010
ISO17043:2010 (specifies general requirements for the competence of providers of proficiency testing schemes and for the development and operation of proficiency testing schemes)

Labquality´s aim is to get accreditated during 2011

Labquality

External Quality Assessment Services

Wide programme for all medical laboratory expertise

Expertise	2008-2009	2010-2011
Andrology	1	1
Physiology	2	2
Genetics	4	4
Haematology	**55**	**59**
Immunology	16	16
Nuclear medicine	1	1
Clinical chemistry	**275**	**284**
Instruments	12	14
Microbiology	**180**	**188**
Pathology and cytology	8	8
All together	**554**	**577**

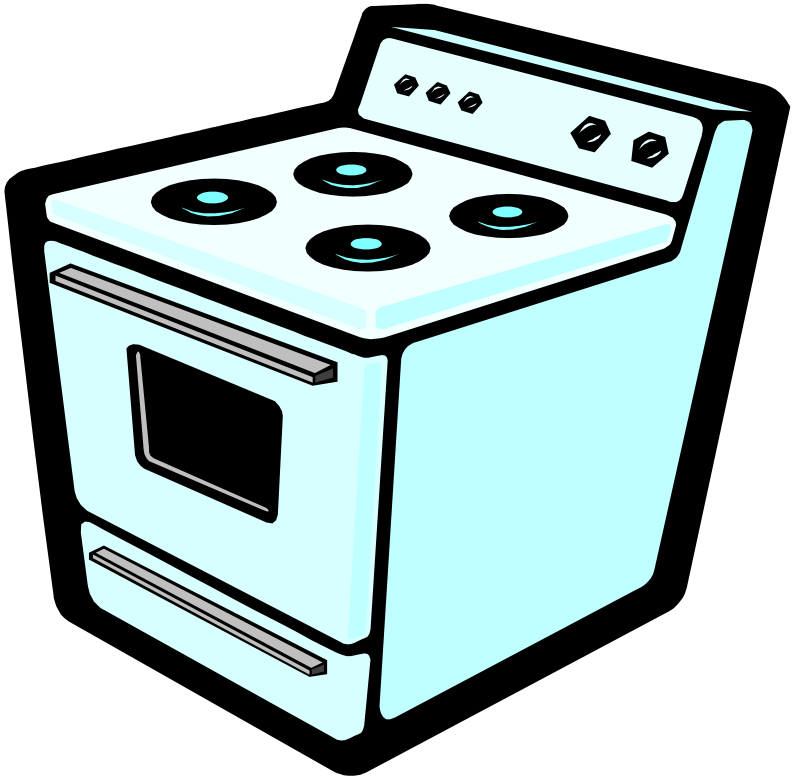
Labquality

Labquality

- Around 30 employees
  - **CEO Mauri Keinänen**
  - **Production manager** Harri Laitinen (Minna Loikkanen's successor)
  - **Client relations manager** Juha Wahlstedt
  - **10 EQA coordinators**
  - **6 EQA assistants**
  - Financial department
  - Client relations
  - Communication
  - IT

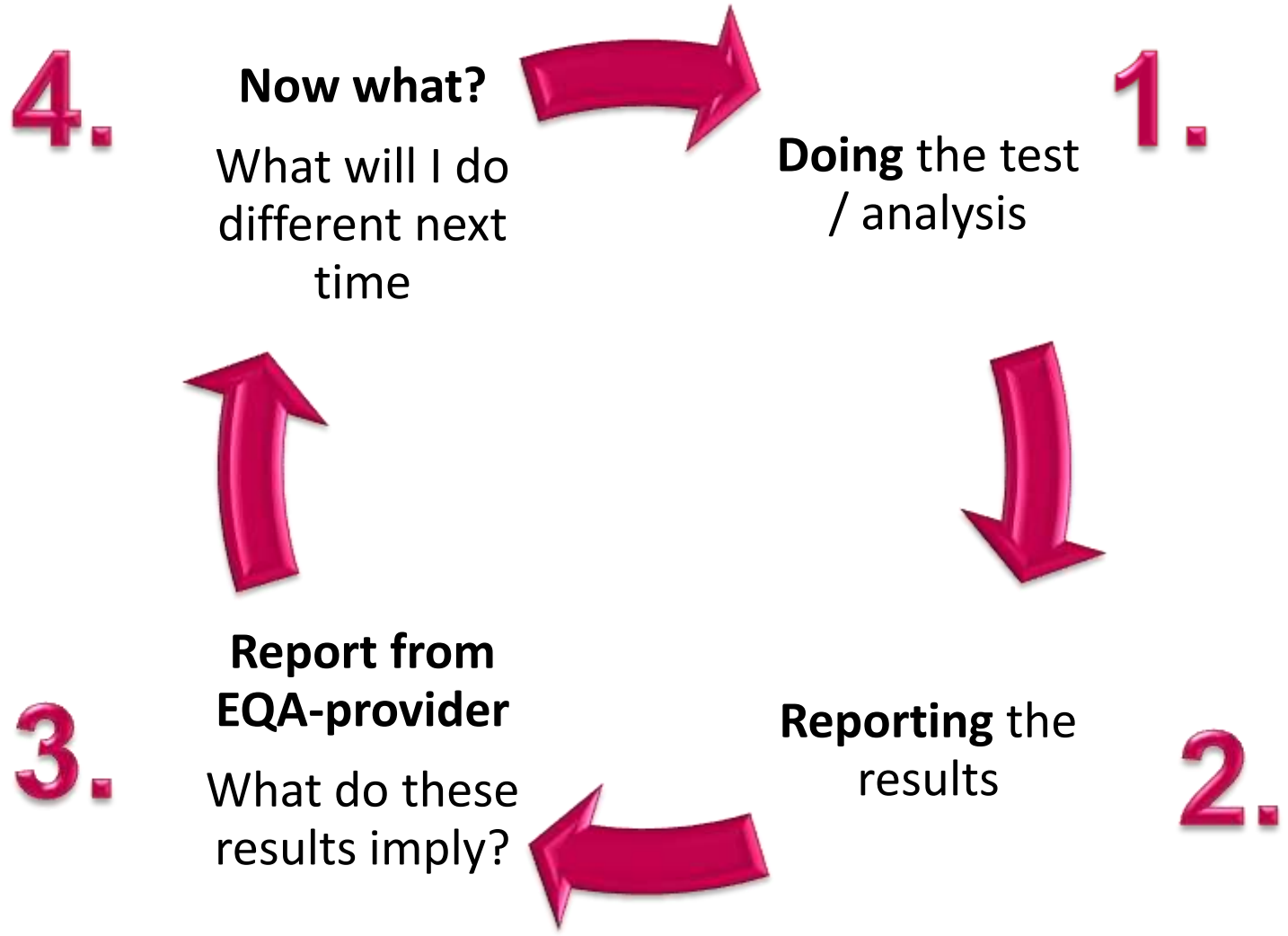
How do we learn?

- **Listening learners**
- **Seeing learners**
- **Touch / experience learners**



Labquality

EQA = Experiential learning?



Labquality

EQA from the laboratories perspective

Labquality

Ways to learn

- EQA schemes with survey reports
- Seminars
- Publications
- Webinars
- Web based training programs
- Electronic schemes having good quality pictures or even videos that can be further processed on the participant's computer

Labquality

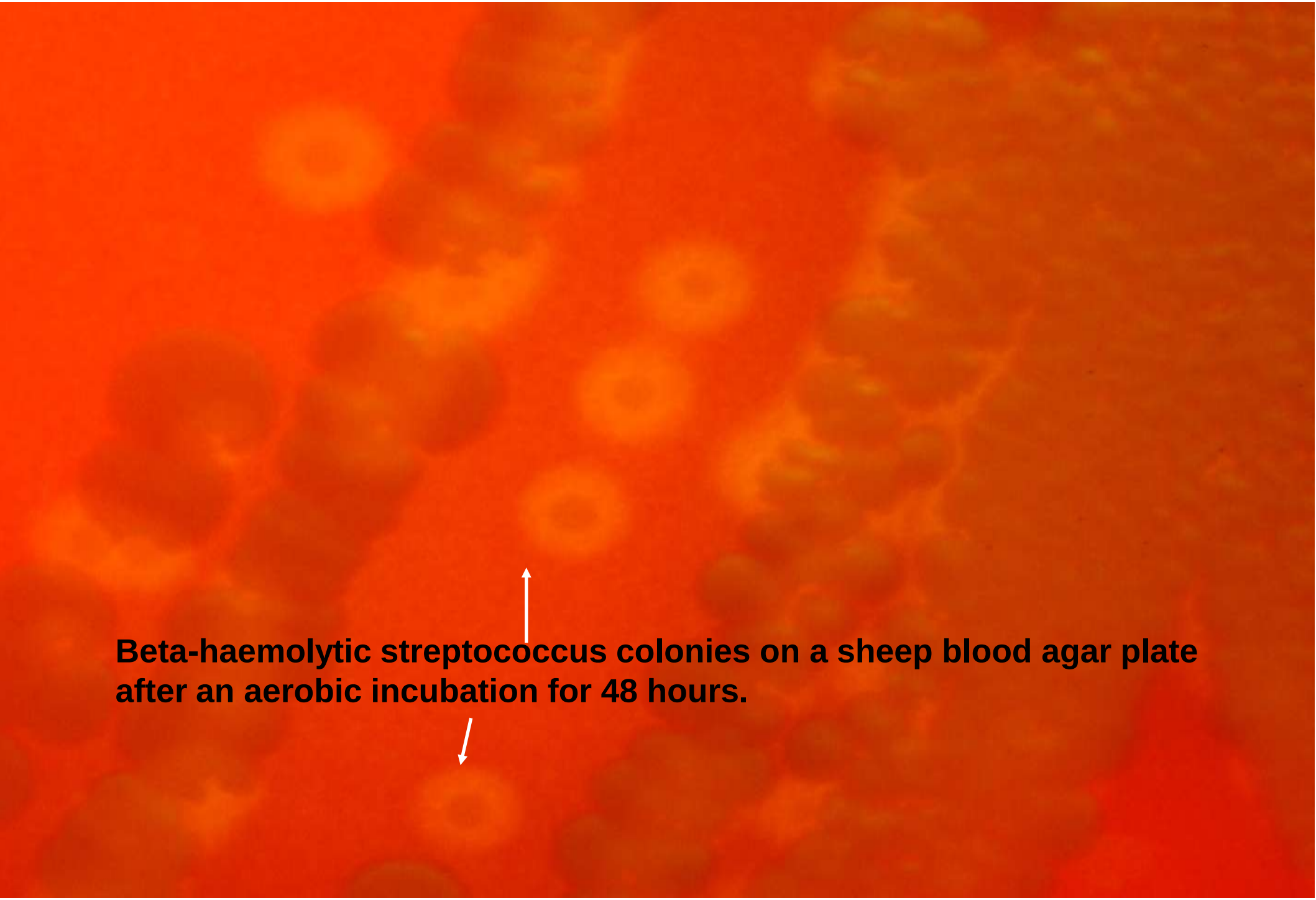
Examples

5080-5081 General bacteriology 1/2

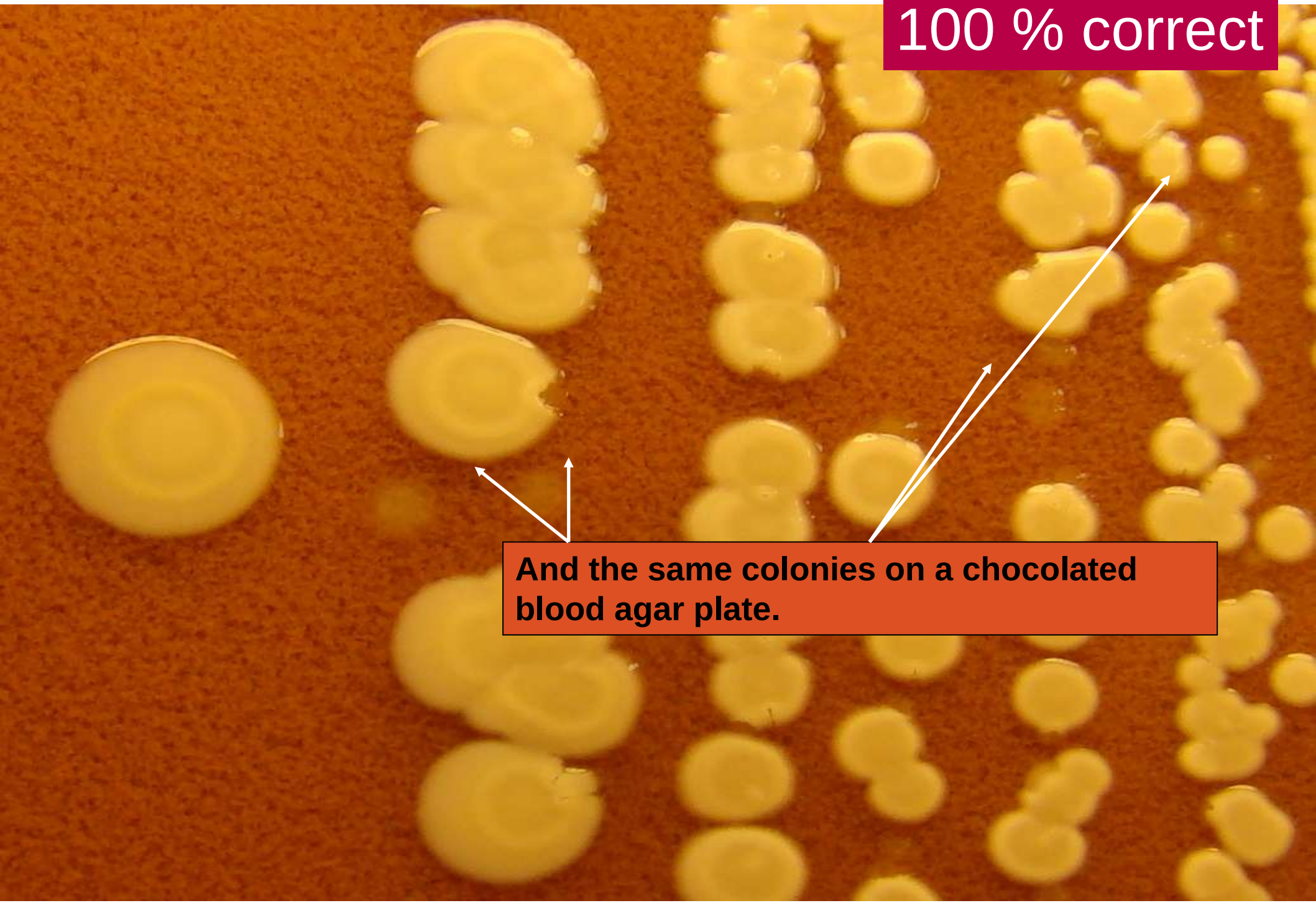
- 4 surveys per year
- 2-4 lyophilized mixtures of bacteria
  - Pathogens
  - Normal flora
  - Samples intended for susceptibility testing may include both international quality control stains and clinical stains (VRE, MRSA etc.)
- Brief case histories
- Isolation of pathogens and antimicrobial susceptibility testing
- Results / findings presented in pictures on www.labquality.fi
- Final results in a summary table, a histogram and in a numerical summary
- Expert Markku Koskela, M.D., Ph.D., Oulu University Hospital

Findings presented in pictures
Sample 14/2008

- Swab sample taken from an infected skin lesion of a 4 year old boy
- **Finding:**
  Streptococcus pyogenes ie. Group A betahaemolytic streptococcus (GAS)
- **Lab exercises:**
  Isolation and identification of the GAS from among a heavy mass of coagulase negative staphylococcus representing the normal bacterial flora of the skin.



Beta-haemolytic streptococcus colonies on a sheep blood agar plate after an aerobic incubation for 48 hours.


100 % correct
And the same colonies on a chocolated blood agar plate.

Findings presented in pictures
Sample 8/2009

- Ascites fluid from an elderly patient after colon perforation
- **Finding:**
  E.Coli, Clostridium sporogenes and *Prevotella disiens*
- **Lab exercises:**
  Isolation and identifivation of the pathogens

Labquality

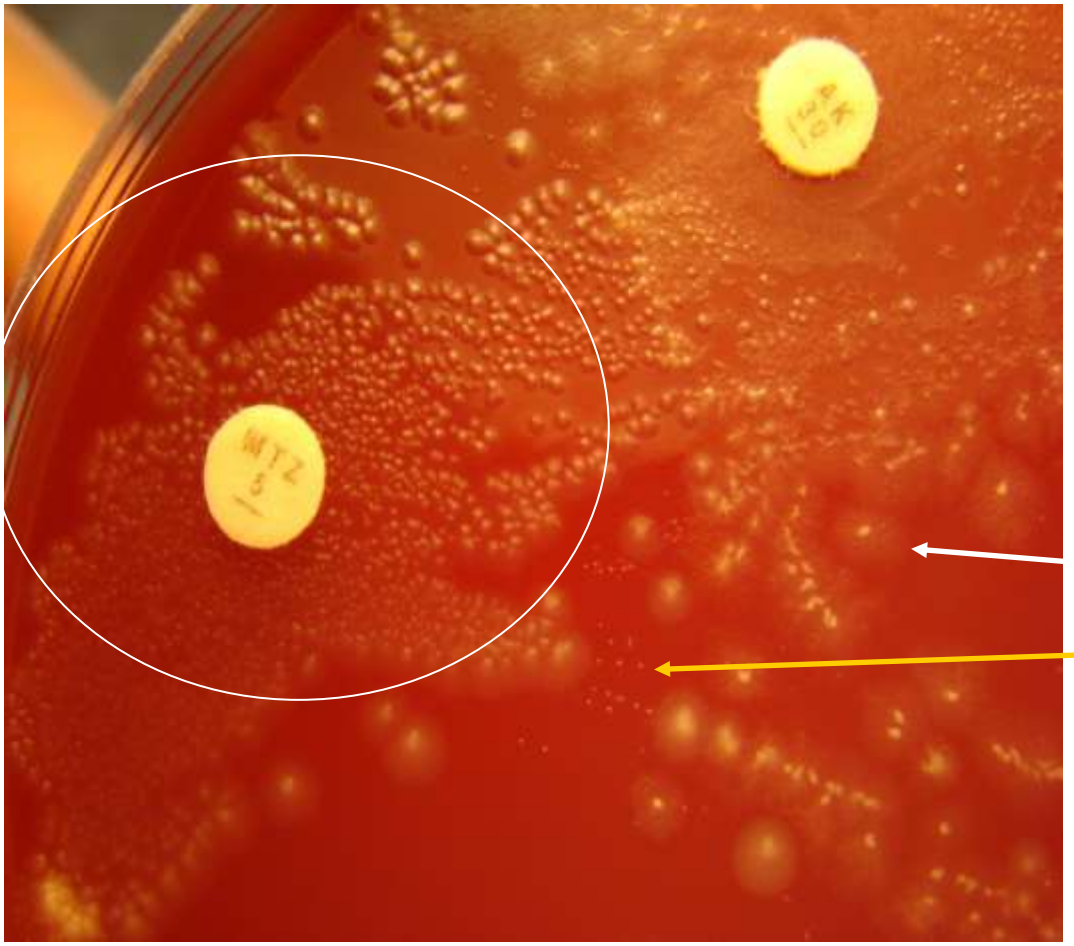
Sample 8/2009. *E.coli*

Aerobic growth on sheep blood agar in 5% CO_2 at +35°C within 48 hours

Only E.coli

Labquality

Sample 8/2009. *E.coli, Clostridium sporogenes* and *Prevotella disiens*



Anaerobic growth on FAA-agar at +35°C after 48 hours.

Anaerobes outside of the growth inhibition zone around a metronidazole disk:

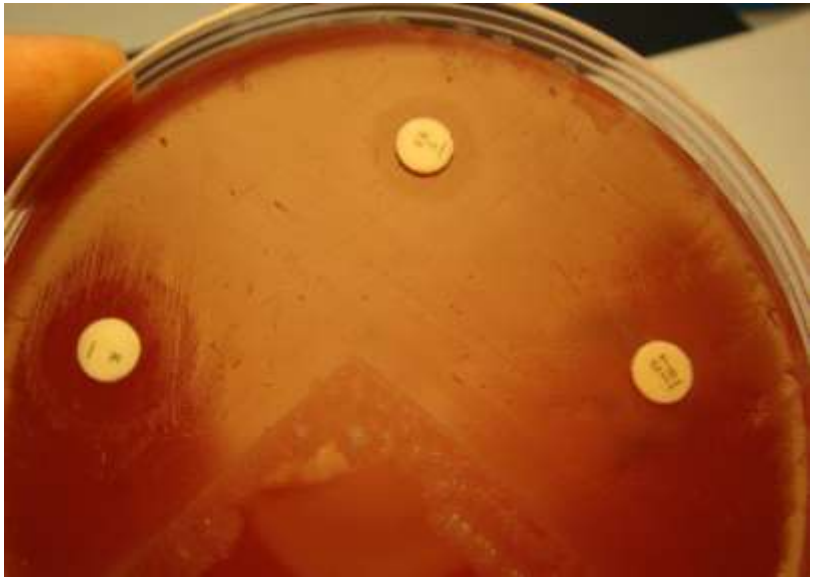
***Clostridium sp*?**

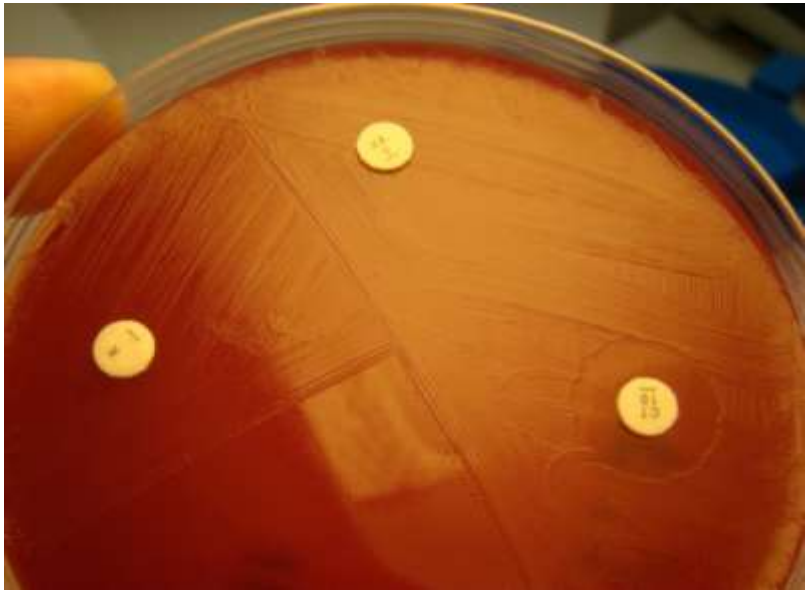
***Another* anaerobe?**

Labquality

Sample 8/2009. *Clostridium sporogenes and Prevotella disiens*

Anaerobic identification (AI): Kanamycin, Vancomycin and colistin (CT) disks





***C.sporogenes*: kanam/S, vankom/S, colistin/R** ***P.disiens*: Kanam/R, vankom/R, colistin/S**

Labquality

Sample 8/2009. *Prevotella disiens* and *Clostridium sporogenes*

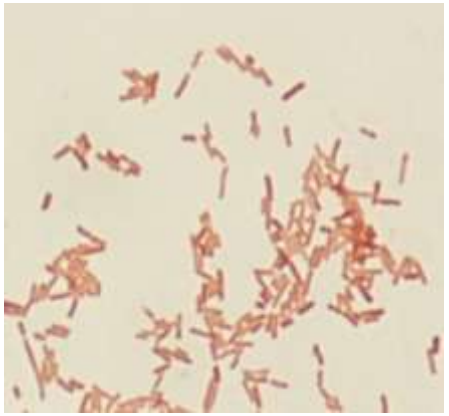
Prevotella disiens found by only 50 % of the participants!

8.2. *P.disiens* (RapIDANAII 020741)

8.3. *C.sporogenes* (RapIDANAII 060033

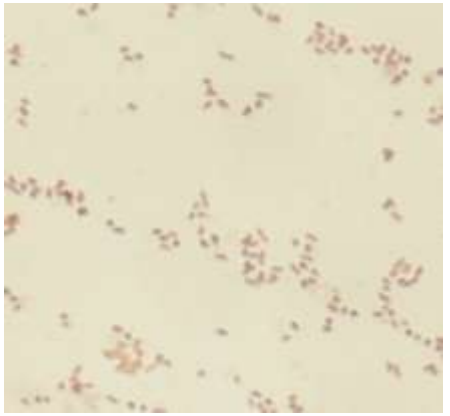
Labquality

Sample 8/2009. Colony morphology by Gram stain



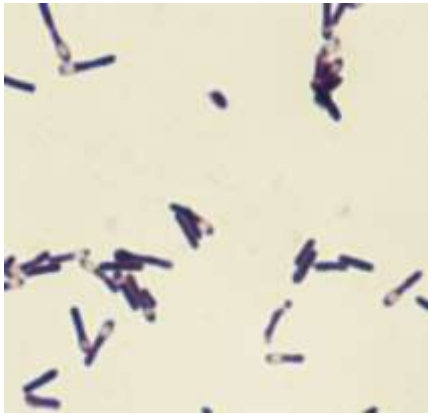
E.coli

Long Gram negative rod



Prevotella disiens

Short, slightly staining Gram negative rod



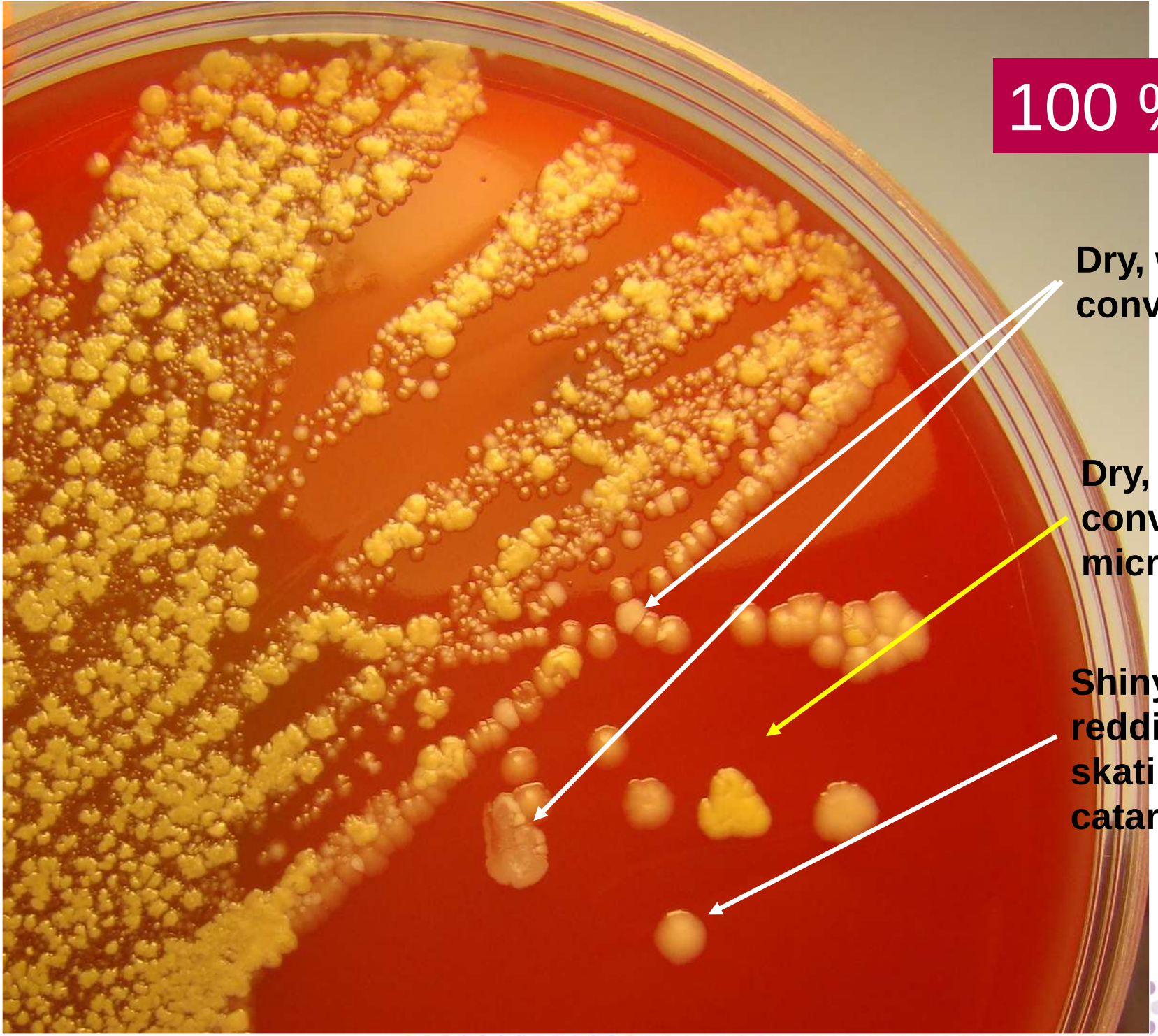
Clostridium sporogenes

Long, Gram positive rod with a terminal spore

Labquality

Sample 6/2008

- Pus sample from the middle ear from a two year old girl with middle ear otitis
- **Finding:**
  Moraxella catarrhalis, diphteroid, micrococcus
- **Lab exercises:**
  To isolate and to identificate the bacteria from the normal flora

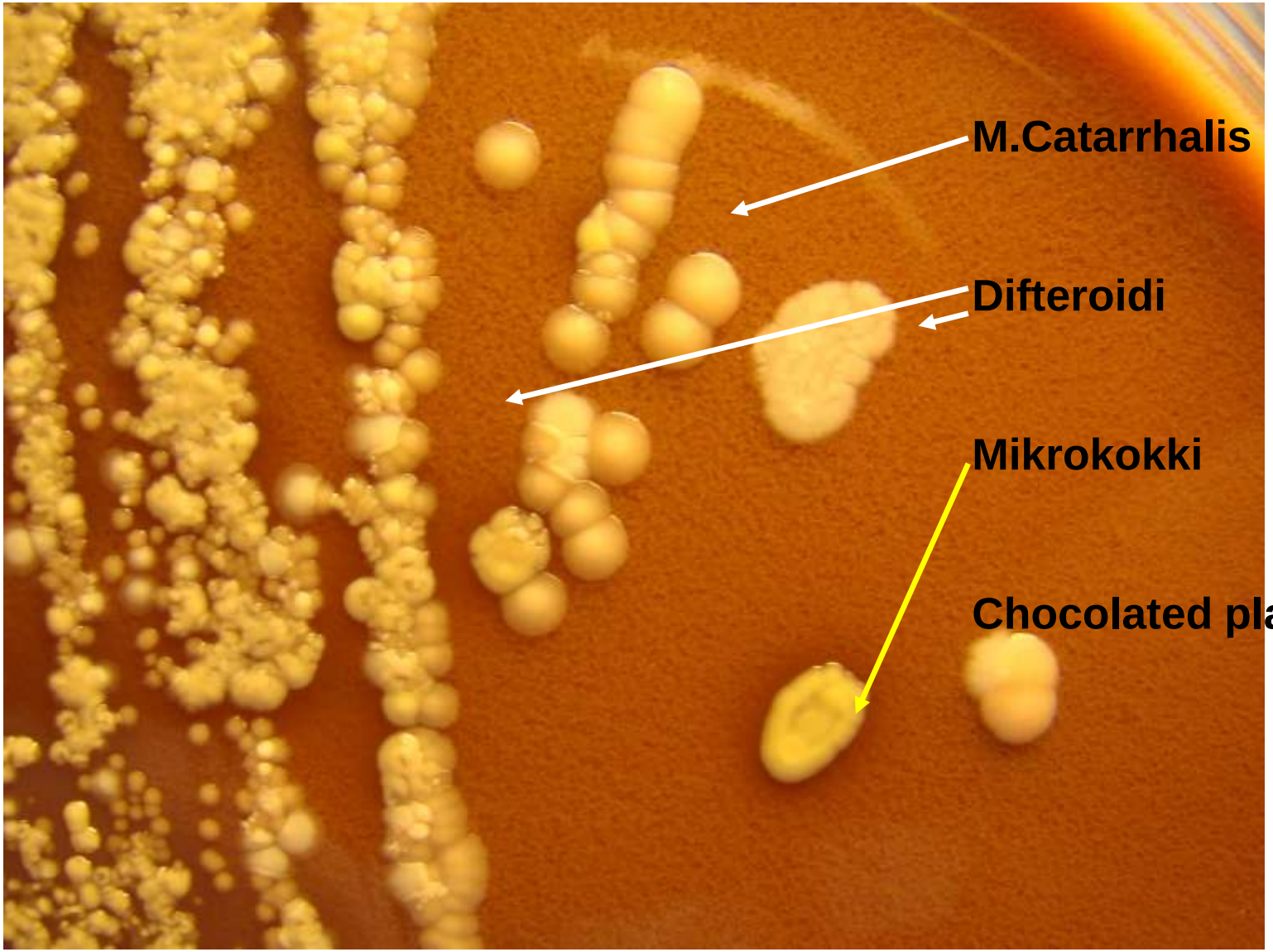


100 % correct

Dry, white and convex diphteroid.

Dry, yellow and convex micrococcus

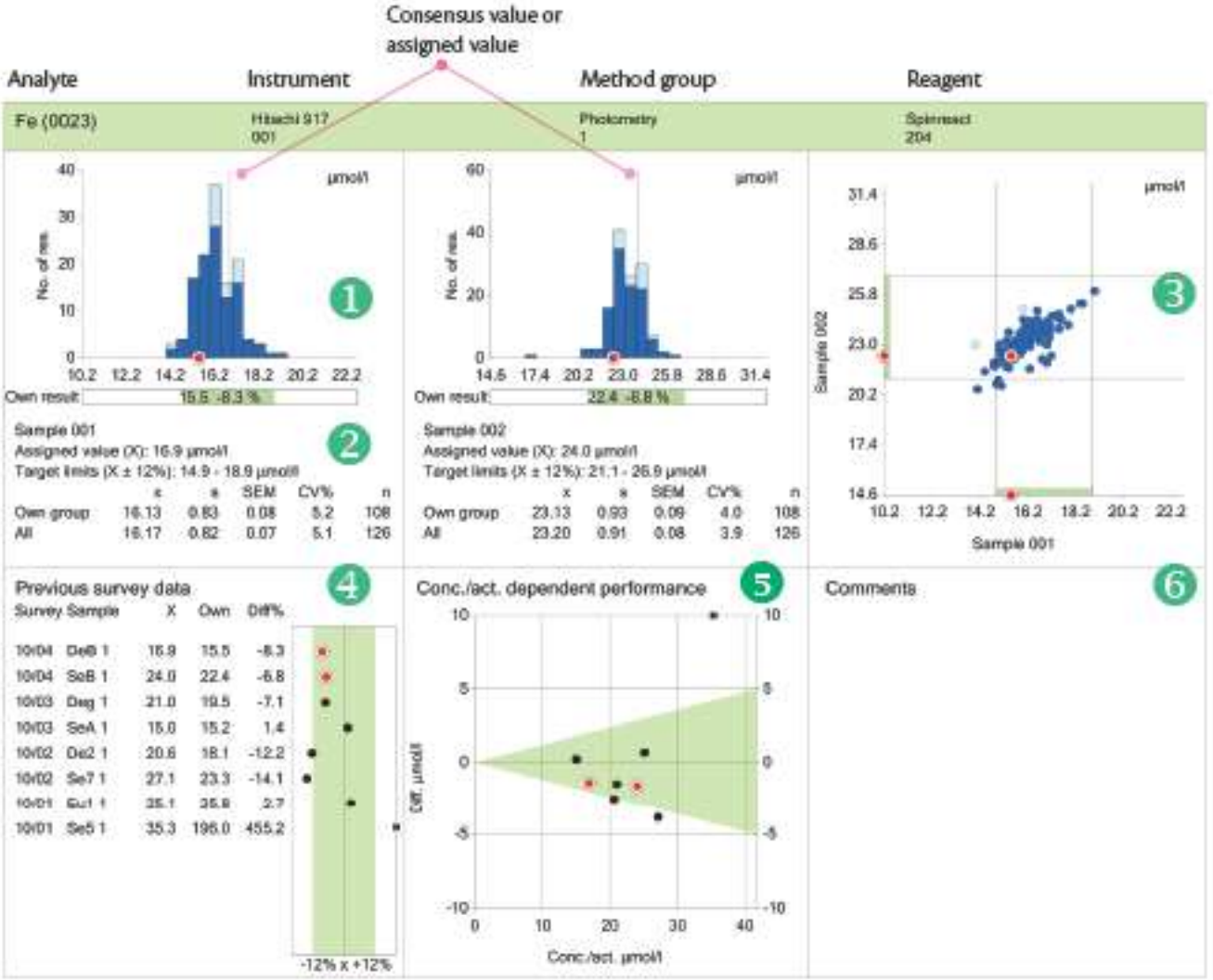
Shiny, convex, light reddish agar-skating M-catarrhalis



2050 Serum B and C general clinical chemistry

- Six surveys per year
- In the 2-level scheme the laboratories are able to monitor the accuracy of two different sample concentrations at the same time
- Specimens are liquid or lyophilized, serum samples selected to cover a wide concentration range for most of the analytes.
- The results are compared to a NFKK Reference Serum X transferred result regarding some of the analytes (transferred values)
- Expert Pål Rustad, Manager, NKK Norway

Laboratory specific histograms



Labquality

Jonna Pelanti

Numerical summary

Labquality

NUMERICAL SUMMARY Serum B and C, general clinical chemistry 2011/02

Analyte	Method group	x	med	s	CV%	SEM	Min	Max	Exclud. Outliers		Number
Sample 001											
A1Glypr, g/l											
	Beckman Coulter nephelometry	0,85	0,9	0,08	9,4	0,06	0,8	0,9	0	0	2
	Siemens nephelometry	0,80	0,8	-	-	-	-	-	1	0	1
	Turbidimetry	0,76	0,8	0,05	6,9	0,01	0,7	1,0	1	1	23
	All	**0,77**	**0,8**	**0,06**	**7,2**	**0,01**	**0,7**	**1,0**	**2**	**2**	**26**
Alb, g/l											
	Bromcresol green	44,1	44	1,4	3,2	0,2	41	47	5	7	46
	Bromcresol purple	41,2	40	1,4	3,4	0,4	40	43	2	1	13
	Immunochemical methods	37,6	38	3,9	10,4	2,3	34	41	0	0	3
	Vitros 250-950 and 5,1	42,7	42	1,7	4,0	0,5	40	45	0	1	14
	All	**43,2**	**43**	**2,0**	**4,7**	**0,2**	**34**	**47**	**7**	**11**	**76**
ALP, U/l											
	IFCC comparable methods (AMP)	56,5	56	3,3	5,8	0,4	43	70	8	8	69
	Reflotron, IFCC-level	54,4	54	-	-	-	-	-	0	0	1
	Vitros 250-950 and 5,1, calculated to IFCC	63,8	64	2,3	3,6	0,6	60	70	0	2	14
	All	**57,7**	**57**	**4,5**	**7,8**	**0,5**	**43**	**70**	**8**	**9**	**84**

Good expert comments

Labquality

External Quality Assessment Scheme

General Clinical Chemistry Serum B and C, survey 2, 2011

Enclosed, please find the processed results from clinical chemistry with two sera at two levels. 106 laboratories participated.

Material

Sample 1 was a liquid, human serum. The code is Deg. This material has been used before in surveys 3-2010, 4-2009, 4-2008, 2-2006 and 2-2005.

Sample 2 was a liquid, commercial human serum. The code is Se4 and this material has been used before in surveys 1-2009 and 2-2008.

The materials were sent without any temperature control packaging.

Methods

Incorrect method information registered on Labquality's web site, particularly if the laboratory is placed in an incorrect method group, corrupts the statistics not only for the laboratory, but also for those who want to get information in general about the methods. If incomplete method information is registered, your results may be placed in the method group "Other". The information from this method group is very limited. Therefore - remember to register method changes on Labquality's web site and check that the method information is correct. And please pay attention to registering your unit correct, when using the internet result form. Also be aware that method changes will be active from the time of registration, so do not update your method data before you have received the report with the results from the former method!

Reports

From the scheme 1-2011 the results are calculated according to the robust procedure described in the standard ISO 13528 (Statistical methods for use in proficiency testing by interlaboratory comparisons, Annex C).

Briefly, the robust mean (*x*) and the robust standard deviation (*s*) of each analyte and method group are obtained by iterative calculation i.e. updating the values of x and *s* several times using the modifications of grossed outliers. The iteration continues until the process converges so that no change in the third significant figure in the robust *x* and in the robust *s* is observed. The final values obtained are the assigned value (*X*) and the standard deviation (*s*) presented in the scheme reports. Be aware, however, that the method means and standard deviations for the methods within the method groups in the method specific report (available at Labqualitys home site as "summary by methods") are calculated with all data that has not been removed manually from the data base – see below.

Sometimes if there are blunt mistakes in the original data (i.e. wrong units) personal judgment of the scheme coordinator is used and such a data is removed before calculations.

In the calculation of deviation from the assigned value the rounding of all figures are now done at the end of processing. Rounding early in data processing has in previous surveys sometimes resulted in strange results.

2011-03-29

Evaluation Report

Product number: 2050
181/11/DK, 182/11/NO

Samples sent 2011-02-28
Survey closed 2011-03-14
Report released 2011-03-29

The report contains
- Numerical summary
- Individual histograms (if results have been returned)

Inquiries about this survey, including questions of possible errors in result processing, should be at Labquality's office **before 2010-04-29**.

Inquiries
Jonna Pelanti
tel. +358 9 85668211
fax +358 9 85668280
jonna.pelanti@labquality.fi

Scheme expert
Pål Rustad
Norway

Labquality
Ridamsvaarinkatu 11
FI-00520 HELSINKI

Telephone
+358 9 8566 6200
Fax
+358 9 8566 6280
+358 9 8566 6281

info@labquality.fi
www.labquality.fi

Assigned values

The design of this scheme is different from the General Clinical Chemistry serum A scheme, especially in the establishment and use of assigned values (the value used in the calculation of your measurement deviation). In this scheme we use transferred values from NFKK Reference Serum X [1] (below referred to as RSX) as assigned values for 16 components (not for Vitros methods) and hope that these are more reliable than consensus values (robust method group means). For the remainder of the components the assigned values are consensus values.

Transferred values

Four Nordic laboratories using Thermo Fisher Scientific Konelab, Siemens Advia 2400, Abbott Architect c8000 and Roche Cobas Integra methods (below referred to as "transferring laboratories") have transferred values from RSX by measuring in triplicates Sample 1, Sample 2 and RSX, respectively. The transferred values (T) for the two samples are then calculated as: T = (mean of sample) x (Certified value for RSX) / (mean of RSX) for the components shown in the tables for each laboratory. Further calculations are made on these four values after testing for outliers (Q-test) - one for iron and urate for Sample 1 and one for sodium and urate for Sample 2 were found this time.

The mean of the transferred values from the 4 transferring laboratories is used as the "Transferred value" (T in Table 1). The standard uncertainty (u) is calculated as SEM (standard error of mean) of the values (i.e. the uncertainty of the certified value for RSX is ignored). The relative value is shown in Table 1 as u/T.

Table 1
Mean values (M) and coefficient of variation (CV) for the surveys (six for sample 1 and three for Sample 2) these samples have been used (see Materials).

Component	Sample 1		Sample 2	
	M	CV	M	CV
Albumin	42.2	0.5 %	38.1	0.7 %
Calcium	2.34	0.3 %	1.47	1.2 %
Glucose	4.11	1.1 %	2.41	0.9 %
Iron	20.9	0.9 %	18.6	1.8 %
Magnesium	0.82	0.8 %	0.59	0.5 %
Phosphate	1.11	1.1 %	0.72	0.5 %
Potassium	3.84	0.4 %	2.29	0.3 %
Protein	68.6	0.2 %	61.2	0.8 %
Sodium	140.3	0.4 %	117.2	0.5 %
Urate	298	0.4 %	171	0.8 %
Urea	4.9	1.5 %	2.6	1.5 %
Cholesterol	5.09	1.2 %	3.99	0.4 %
Creatinine	76	0.4 %	43	1.5 %
GT	33	2.0 %	41	0.9 %
Triglycerides	1.27	0.8 %	0.67	0.7 %
Transferrin	2.76	1.5 %	2.44	0.8 %

Results

The laboratories were asked to analyze the components in Table 1 in duplicates and report the mean value.

Components with transferred value as assigned value

Table 1 shows the averages and CVs of transferred values for the surveys where these samples have been used. It is natural that the variation is largest for measurements done during a large time span, partly by different laboratories and methods as for Sample 1. The largest variation for this sample is for GT with CV = 2 %, but only 6 components has CVs > 1 %. For Sample 2 the largest variation is for iron with CV = 1.8 %, only four components have CVs above 1 %.

Mean deviations

As commented in previous surveys, there are, for some components, a clear deviation between the mean value for the large method groups and the transferred value. Some components have about the same deviation from survey to survey (small s in Table 2) while others may differ more. This is in itself an interesting phenomenon, some variation may be due to non-proportional deviations to the concentrations, some may be caused by material differences in the samples and some to method changes over time. The statistics for the six last surveys are presented in Table 2 sorted on mean bias.

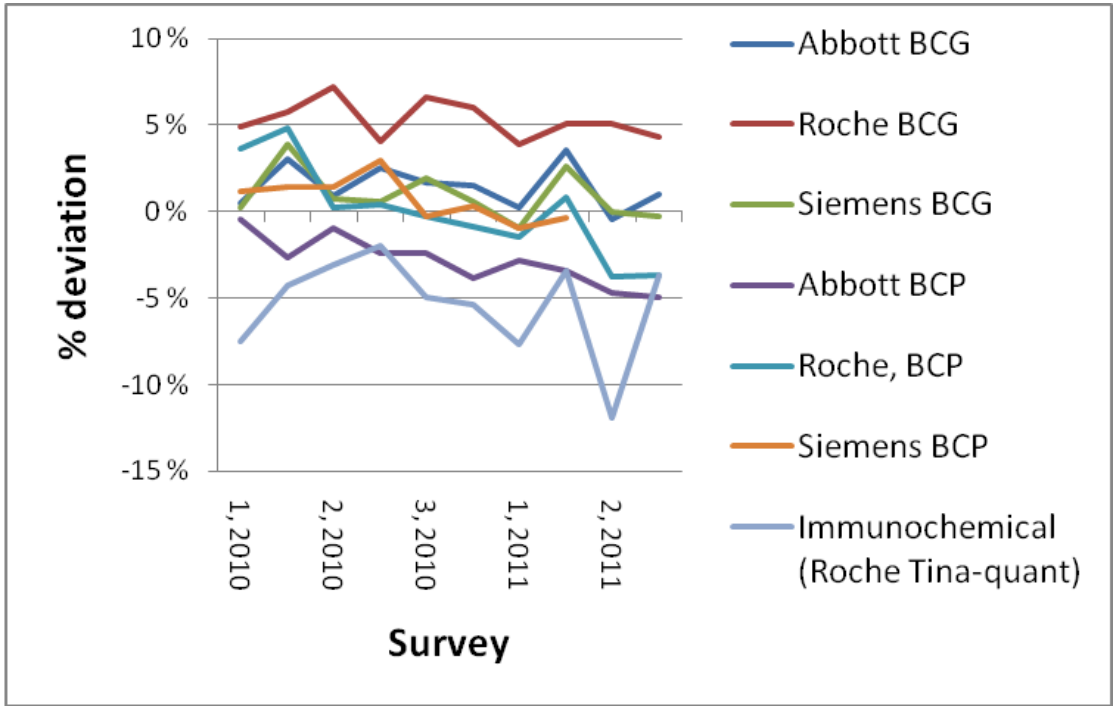
Table 2. Sorted mean relative deviation (D) during 2010 and 2011 (12 samples) and its standard deviation (s). p indicates how significantly (if p<0.05) D is different from zero.

Component, method group	D	s	p
Albumin, Immuno chemistry	-5.0 %	2.9 %	0.000
Iron, Photometry	-4.1 %	2.0 %	0.000
GT, IFCC comparable	-4.0 %	1.5 %	0.000
Urate, Photometry, enzymatic	-2.2 %	1.2 %	0.000
Albumin, BCP	-2.0 %	1.2 %	0.000
Transferrin, Turbidimetry	-1.8 %	1.3 %	0.001
Creatinine, Photometry, enzymatic	-1.8 %	0.9 %	0.000
Phosphate, Photometry	-1.6 %	1.2 %	0.001
Calcium, Photometry	-0.9 %	0.6 %	0.000
Protein, Photometry	-0.5 %	0.7 %	0.029
Sodium, ISE indirect	-0.5 %	0.5 %	0.006
Potassium, ISE indirect	0.0 %	1.1 %	
Potassium, ISE direct	0.3 %	1.1 %	
Sodium, ISE direct	0.6 %	1.1 %	
Magnesium, Photometry	1.1 %	1.6 %	0.037
Creatinine, Photometry, Jaffe	1.4 %	3.6 %	
Cholesterol, Photometry, enzymatic	3.0 %	0.7 %	0.000
Urea, Photometry, enzymatic	3.1 %	1.4 %	0.000
Glucose, Photometry	3.4 %	0.9 %	0.000
Albumin, BCG	4.1 %	0.9 %	0.000
Triglycerides, Photometry, enzymatic	4.3 %	1.9 %	0.000

Good expert comments

Albumin

There are large differences between the method groups and even within groups. The BCG group is dominated by Roche methods which are way too high (+5 % in average since the beginning of 2010) than the assigned transferred value, also clearly higher than the other producers represented in this group – see Figure 1 to the right. The immunochemical Tina-quant method from Roche has on the other hand been far too low since the beginning of 2010. This time this method has only three results with a high CV of 10 % for Sample 1, and the deviation of -12 % have a high uncertainty.



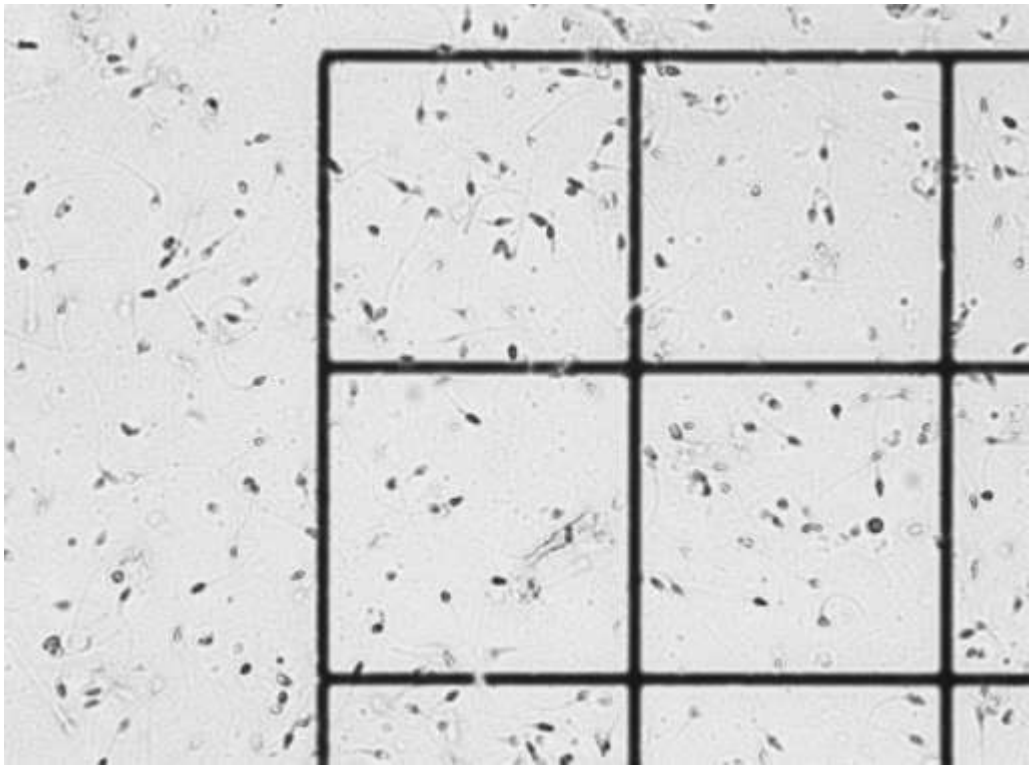
Labquality

Semen analysis

- One survey per year
- Semen sample videos for motility assessment
  - Progressively moving
  - Non-progressively moving
  - Immobile
- Picture set for mophology assessment
  - Normal
  - Head anomaly
  - Neck anomaly
  - Tail anomaly
- Expert Esa Korkeela MD, Ob&Gyn, infertility specialist, Fertia

Labquality

Semen analysis, motility assessment



Sample 001, Video 1

Watch the video and asnwer the results.
The video is shown larger if you save it first to your own computer.

Open video (wmv) Open video (mp4)

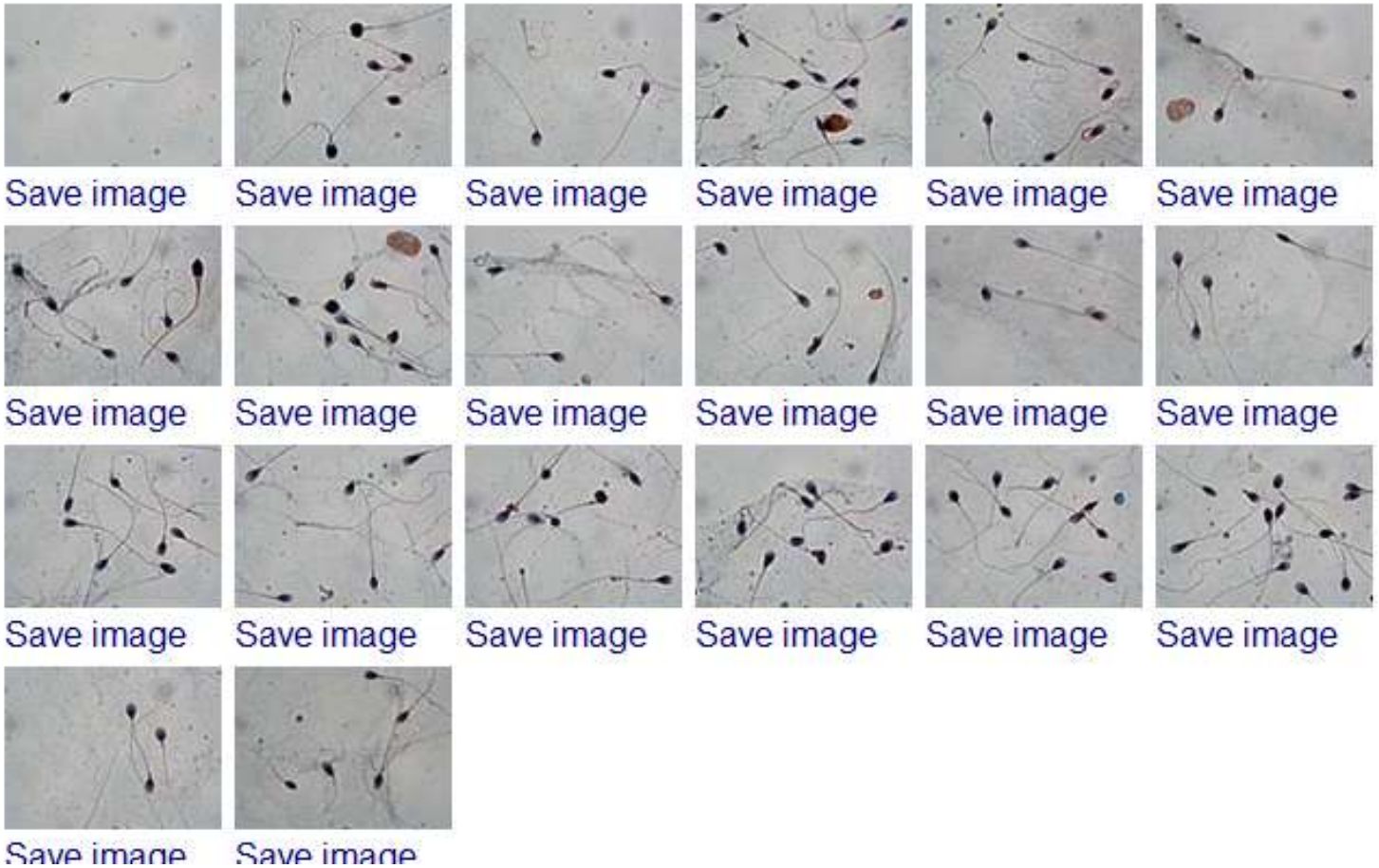
Save

Density (million sperm)		x10E6/ml
Moving forward		%
Moving		%
Non-moving		%

Semen analysis, mophology

Sample 004, Images 1

Show the images and answer the percentage of anomalies in all the images together.



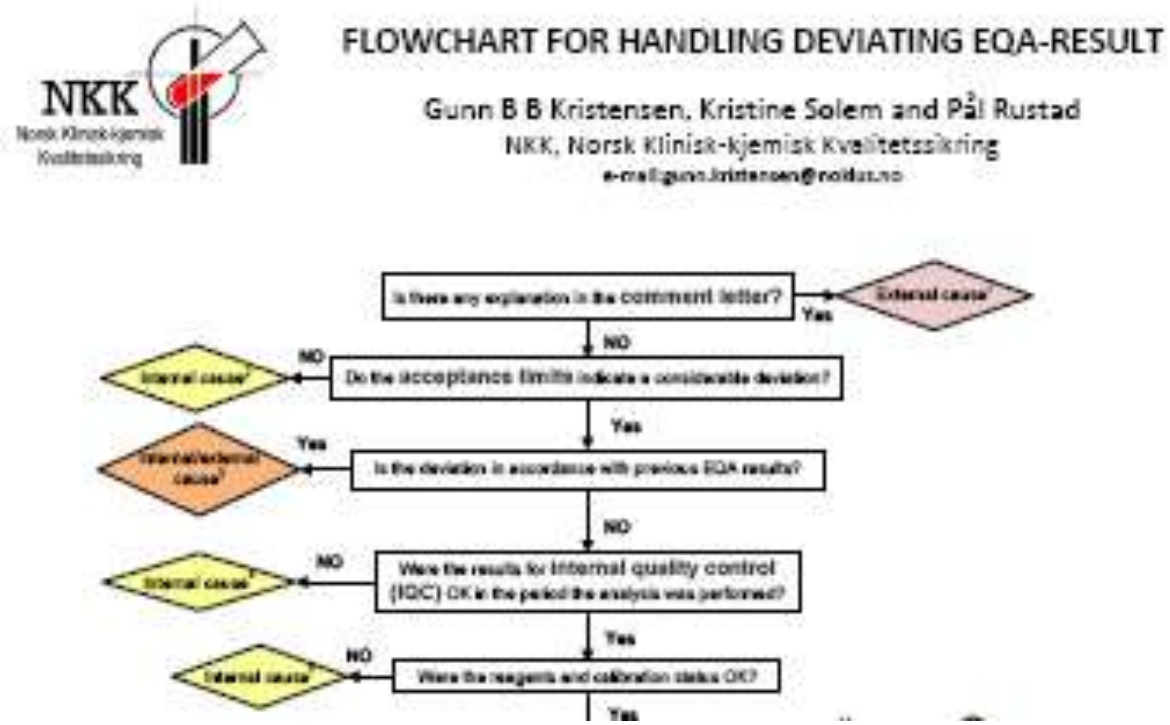
Labquality

EQA from the organizers perspective

Labquality

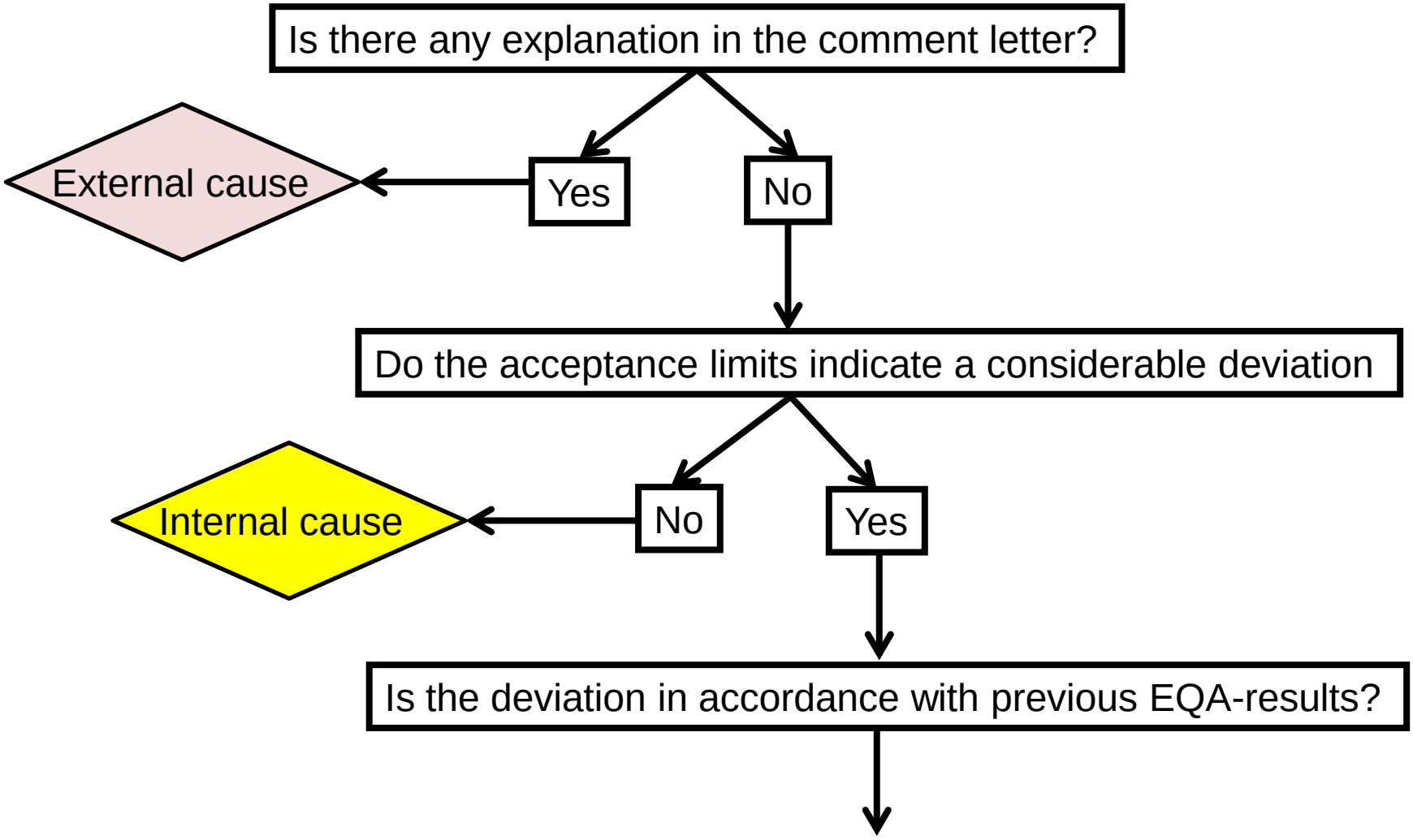
Teaching interactively

- Flowchart for handling deviating EQA-results
  Gunn B B Kristensen, Kristine Solem and Pål Rustad:
- The flowchart consists of several questions indicating possible causes for a deviating result



Labquality

Flowchart for handling deviating EQA-results Kristensen et al.



Labquality

Ways of challenging participants

- Unified results
- Differences in the results
- Material challenges?
  - Reference interval or near the lower or upper limit
  - clearly either positive or negative.
  - range of clinical importance
- The area which at this point is not so well covered is the preanalytic and postanalytic part of the process

Labquality

Hormones B: Steroid and peptide hormones 1, 2011

Closing date: 28.02.2011 Status: Draft

Info
Instructions
Pre-Analytic Data
Sample B1
Sample B2
Post-Analytic Data
Articles
Versions

Back to list

General information about Hormones B

Print Help

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Suspendisse sit amet erat eros, vitae lobortis nunc. Maecenas dolor nulla, scelerisque ut dictum vitae, luctus quis arcu. Suspendisse purus odio, semper ut tempor vitae, pharetra id odio. Quisque vestibulum, turpis vitae sollicitudin ultricies, ligula nulla faucibus dolor, sed interdum neque turpis vitae mi. Sed non risus felis, et euismod felis.

Etiam venenatis pulvinar mi in pulvinar. Duis blandit tortor nibh. Ut molestie, sapien vel vulputate pellentesque, ligula sapien scelerisque diam, nec auctor dui metus eu urna. In euismod convallis purus ac eleifend. Curabitur nec felis eget dolor egestas convallis. In fringilla nulla sit amet tellus viverra adipiscing. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus.

Aenean quis urna vel tellus suscipit laoreet ut a elit. Ut sollicitudin, est dictum malesuada elementum, tortor odio blandit ante, iaculis egestas nisl tellus ac neque. Etiam et nunc quis felis faucibus ultrices. Quisque consectetur luctus eros dapibus tristique. Sed lorem tortor, vehicula sit amet euismod eget, euismod eu nibh. Nulla at lorem et mauris auctor ultrices.

Download the instructions

Product no:	2301
Delivery date:	06.01.2011
Closing date:	28.02.2011
Expected reports:	
Customer ref.:	EB
Status:	Draft

EQA coordinator:
Ulla Tiikkainen
+ 358 9 8566 8238
ulla.tiikkainen@labquality.fi

Comments on the survey:

Send to coordinator

Ways of challenging participants

- EQA scheme in stastistical evaluation
  - webinar?
  - Seminar?
  - Interactive tool for the evaluation of your own results?
- Modern coming techniques
  - Maldi-TOF / Seldi-TOF
  - Automated microbiology –what challenges does that present us with
- Gut metagenome?

Labquality

Conclusions

- We learn by listening, seeing and experiencing
- EQA providers have an impact on what the participants learn
- We should take advantage of the modern IT solutions and the opportunities it gives us
- We should challenge the participants
- Not to educate only in the analysis of samples but to monitor the whole process from before the sample is taken to when the result is reported
- We should stay up-to-date

Labquality

Labquality

Discussion?

Thank you!