NordiQC Workshop in Diagnostic Immunohistochemistry

Culture & Congress Centre

2nd – 4th October 2019

AALBORG UNIVERSITY HOSPITAL

Welcome to Aalborg

Why External Quality Assessment (EQA)?

- Staining patterns and quality varies between different laboratories - depending on the expertise and individual selection of reagents and methods

- Different antibodies, visualization systems, chromogenes, and platforms often give different results – who can decide what is right or wrong?

- Internal quality control will often **not** identify a poorly calibrated IHC system or varying quality of products giving insufficient or aberrant staining results

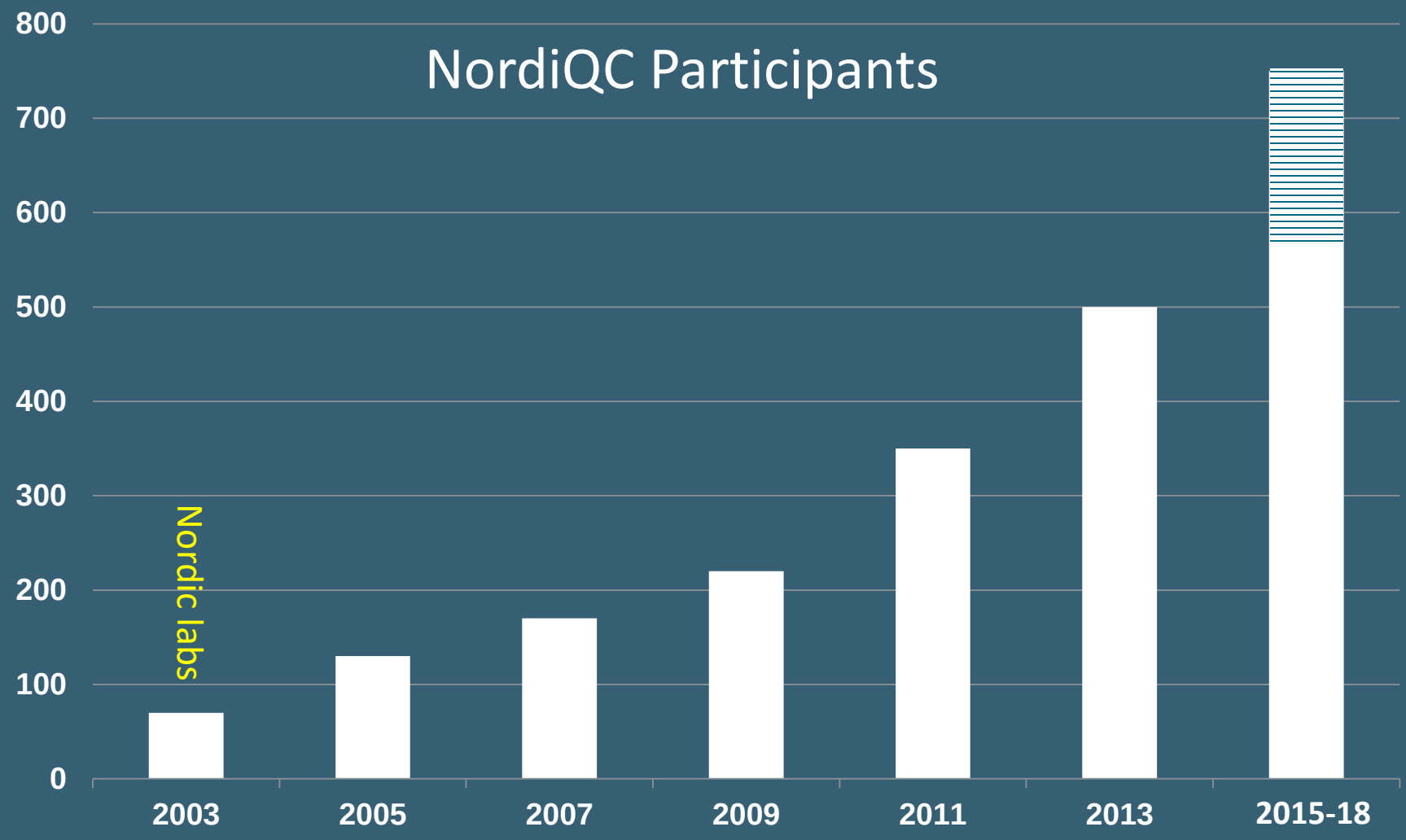
- External Quality Assessment objectively compares a large number of stains, reagents and protocols to identify optimal and suboptimal results and products

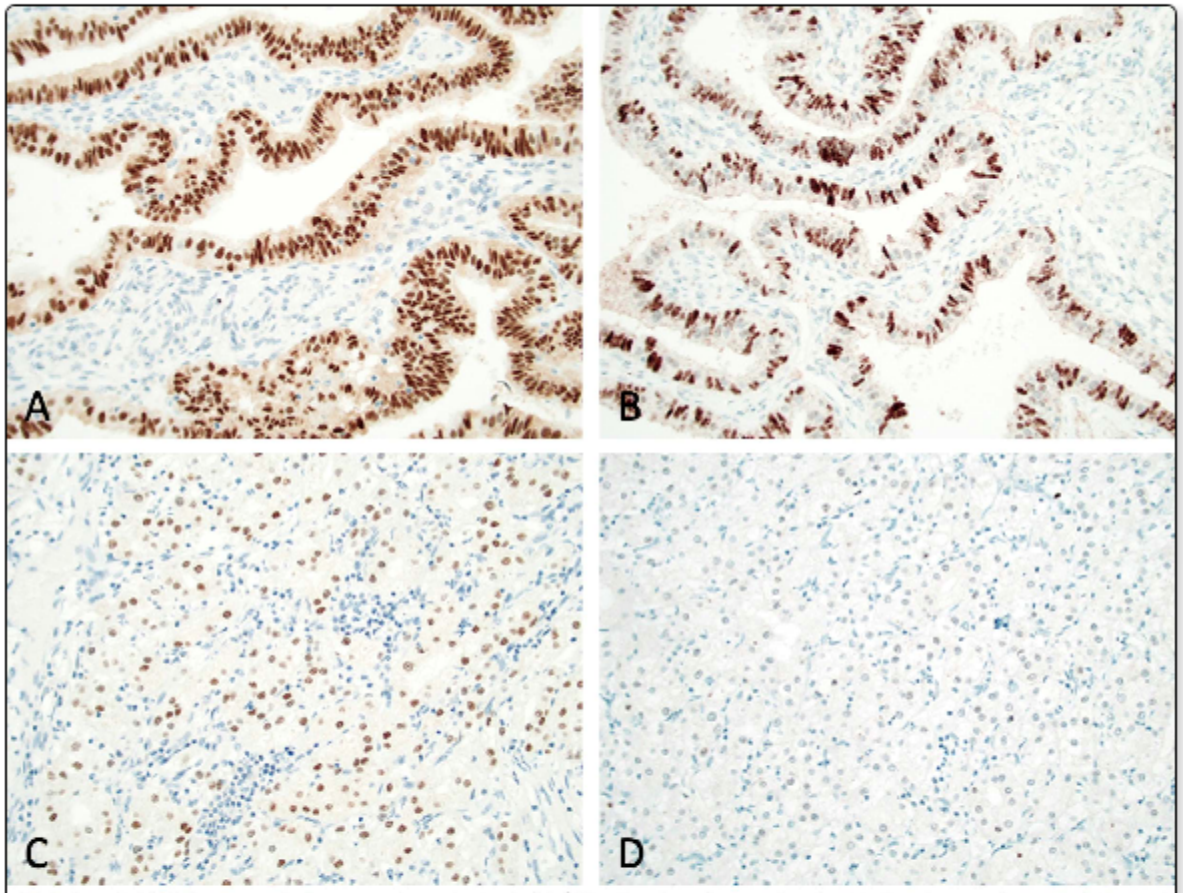
Nordic Immunohistochemical Quality Control

- International organization for quality assurance of IHC
- Founded 2003 by Nordic pathologists
- Independent, scientific, not-for-profit organisation
- Institute of Pathology, Aalborg University Hospital, DK

- General module: 3 runs/year
  - 15-18 different marker challenges
- Breast cancer IHC module: 2 runs/y
  - HER-2, ER/PR, Ki67/E-Cad ...
- HER-2 ISH module: 2 runs/year
  - BRISH, FISH
- Companion module 2017-
  - PD-L1 ....

Nordic immunohistochemical Quality Control





IHC for PAX8 in two laboratories: Lab 1 (A/C): Optimal results in Fallopian tube and Renal clear cell carcinoma. Lab 2 (B/D): Insufficient result in same tissues, especially characterized by false negative reaction in the neoplastic cells of the Renal clear cell carcinoma.

Results - Run 56, C5

9-Jul-2019

The results for the runs 56 and C5 are now available on the website. Individual results can be seen after logging in.

All news

Events

NordiQC Workshop in Diagnostic Immunohistochemistry
2–4 Oct 2019: Aalborg, DK

6th Academy of Diagnostic Immunohistochemistry
9–11 Oct 2019: Krakow, Poland

4th NordiQC Conference on Applied Immunohistochemistry
2–5 Jun 2020: Aalborg, Denmark

Important dates

Run 57, B28, H16, C6
Protocol submission opens
1 Aug 2019
Protocol submission deadline
4 Sep 2019
Slide circulation
10 Sep 2019
Slide return deadline
11 Oct 2019
Publication of results
6 Dec 2019

Questions

Check out our FAQ (Frequently asked questions) or contact us

Modify protocol ID 635, CDX2, run 48

Staining platform

Staining platform	Ventana Benchmark Ultra

Primary antibody

Primary antibody clone	Cell Marque (235-Rxx) - EPR2764Y
Lot number	1523802K
Dilution factor : 1:400	400
Diluent buffer	Dako - Antibody Diluent (K8006)
Incubation time (minutes)	32
Incubation temperature (Celcius)	36

Epitope Retrieval, HIER

Epitope retrieval, HIER	(•) YES ( ) NO
Device	On Board / On Machine
HIER buffer	Ventana - Ultra CC1 (950-224)
Efficient Heating Time (minutes)	48
Max. heating temperature (Celcius)	99

Epitope Retrieval, proteolysis

Epitope retrieval, proteolysis	( ) YES (•) NO

Visualization system

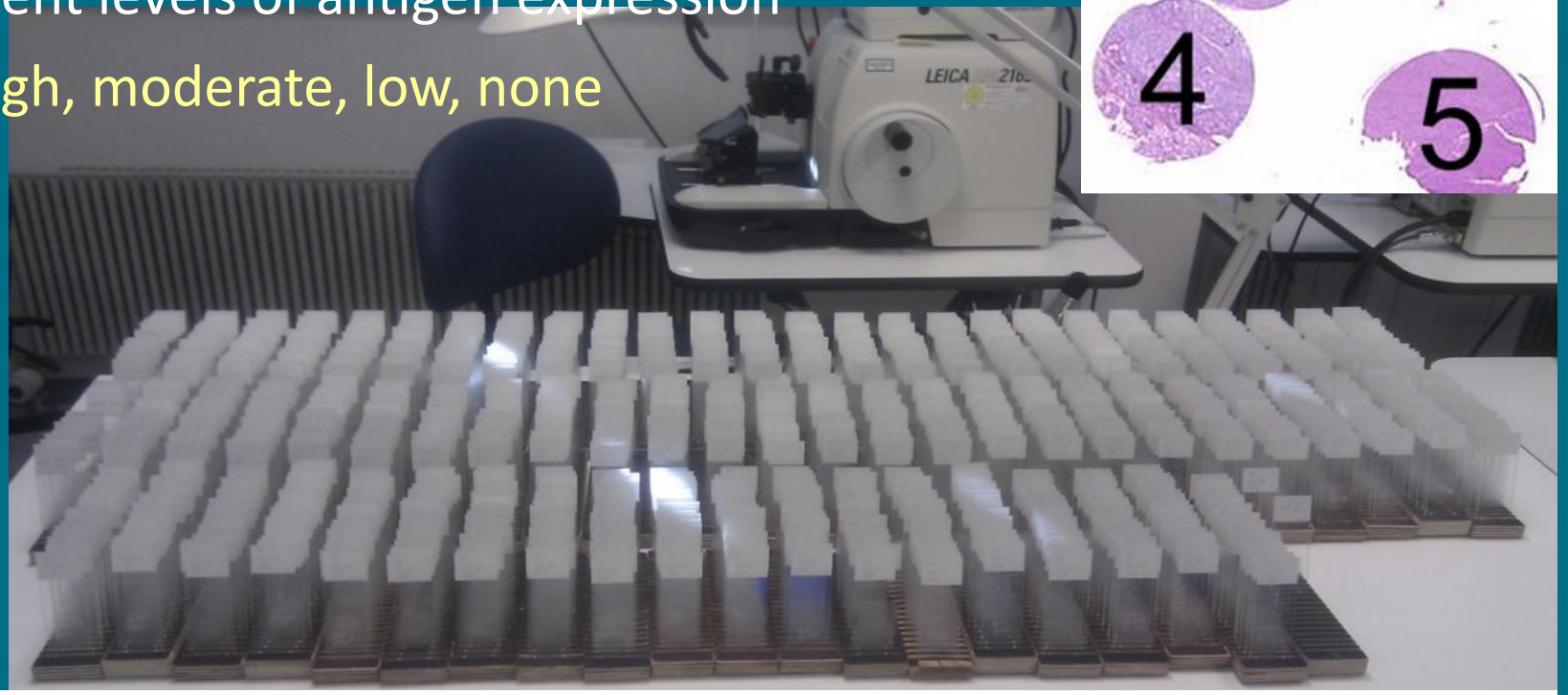
Visualization system	OptiView DAB IHC Detection Kit - 760-700
Amplification	None
Incubation time linker (minutes)	8
Incubation time polymer (minutes)	8
Incubation temperature (Celcius)	36

Test material

Multi-tissue FFPE blocks

10% NBF 24-48 h (ASCO/CAP guidelines …)

- Normal and clinically relevant tumour tissues
- Different levels of antigen expression
  - high, moderate, low, none



2 unstained slides for each marker send to the participants

1 stained slide returned for **central assessment**

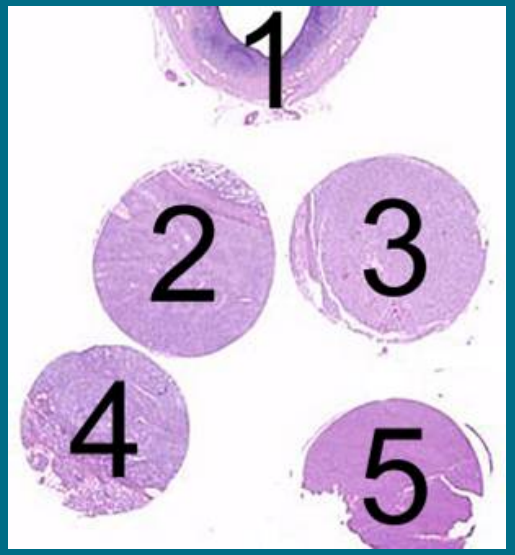
Test material

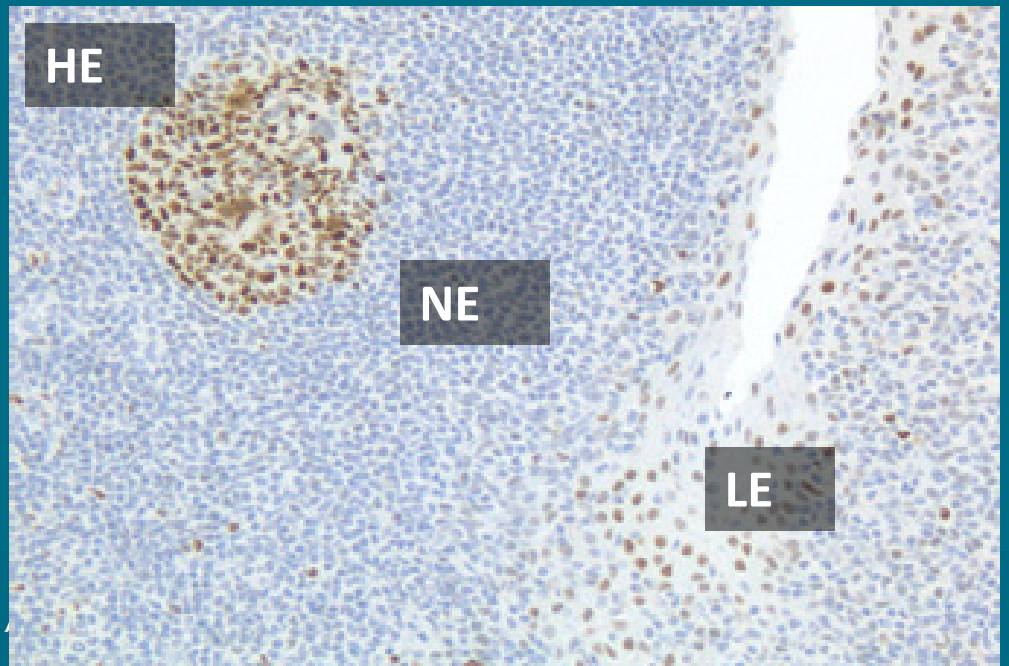
The slide to be stained for **Bcl-6** comprised:
1-2. Tonsils, 24 h/48 h

3. Follicular lymphoma, grade I

4. Follicular lymphoma, grade II

5. Diffuse large B-cell lymphoma



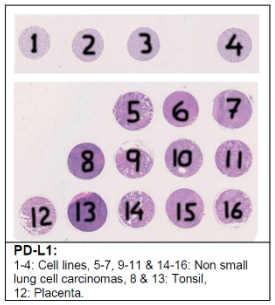


Tissue selection:

- **H**igh **E**xpressor
  - to confirm antibody
- **L**ow **E**xpressor
  - to ensure sensitivity
- **N**o-**E**xpressor
  - to ensure specificity

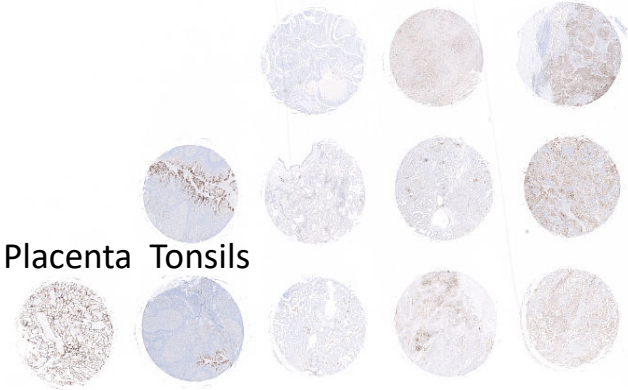
Companion – PD-L1

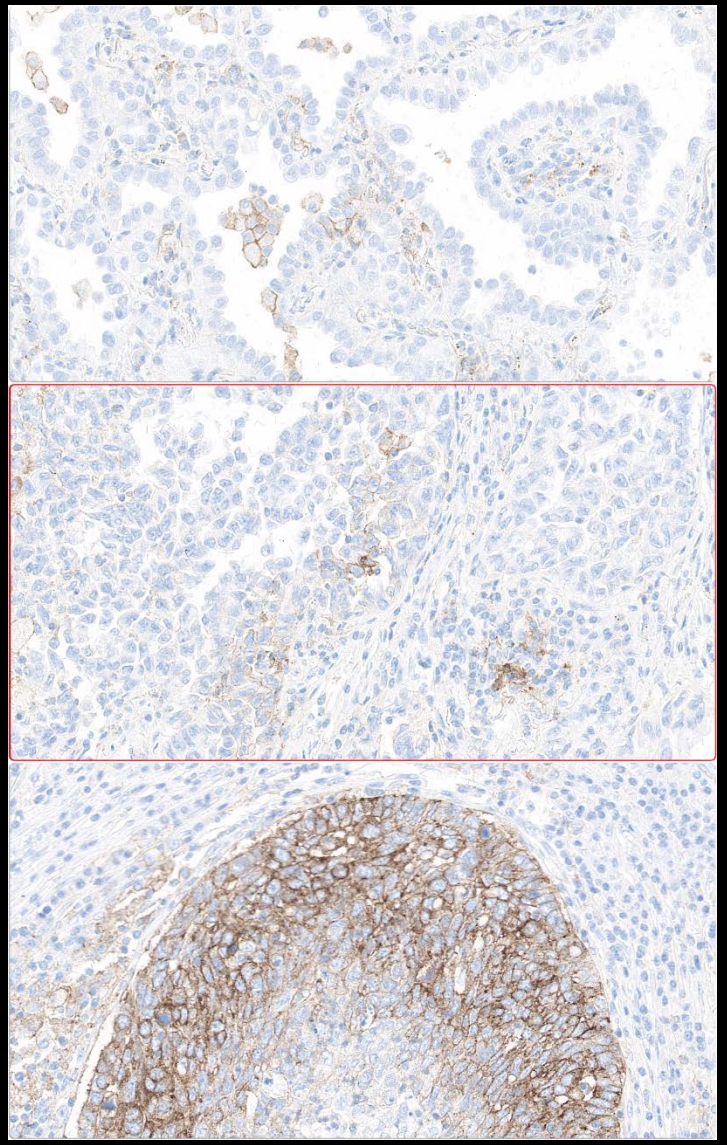
Cell lines



PD-L1:
1-4: Cell lines, 5-7, 9-11 & 14-16: Non small lung cell carcinomas, 8 & 13: Tonsil, 12: Placenta.

Patient lung cancers with clinically relevant PD-L1 levels





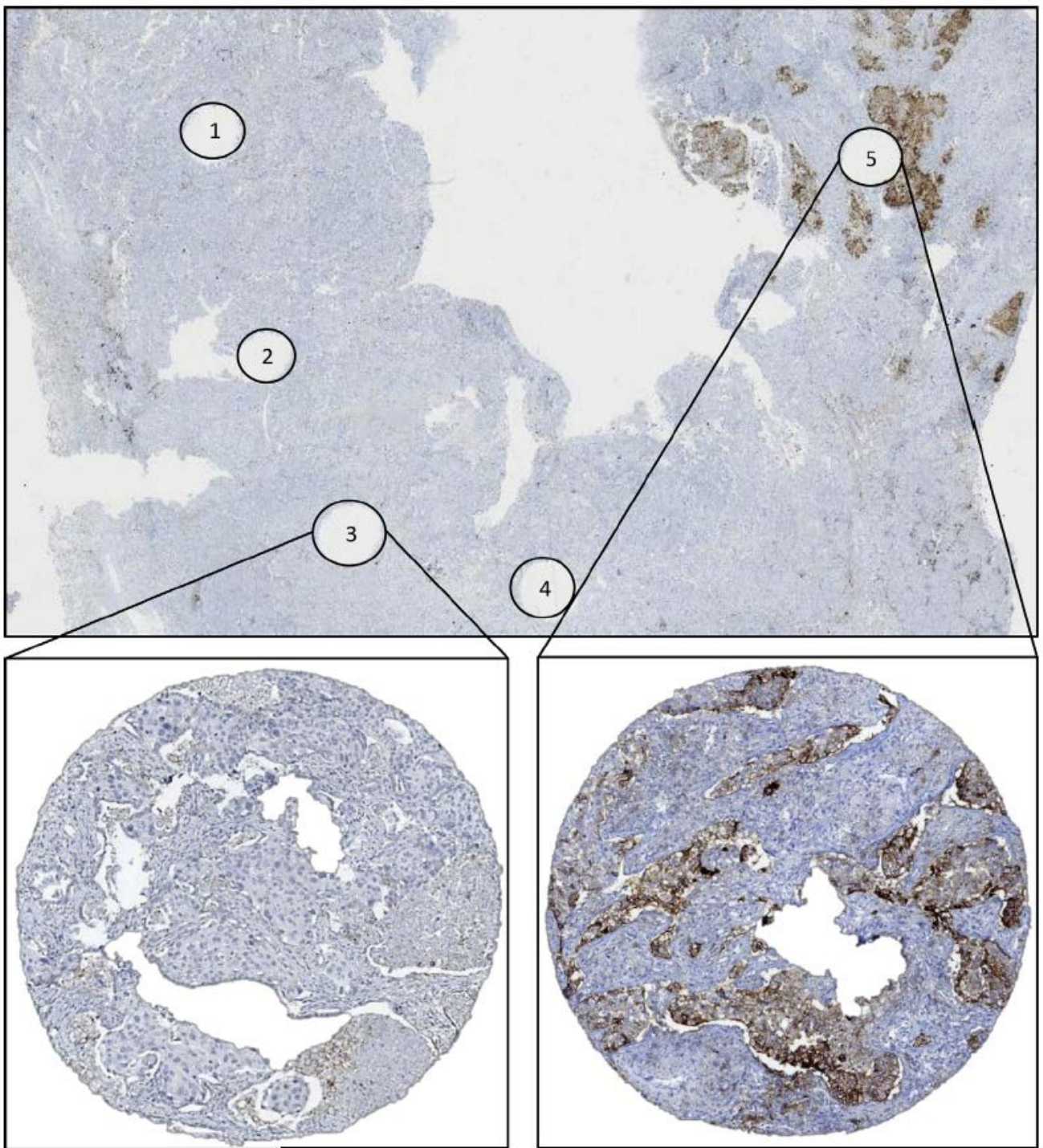
Neg.

≥1%.

≥50%.

IHC reference tests:
Ventana PD-L1 (SP263)

PD-L1 IHC 22C3 Dako pharmDx, SK006
PD-L1 IHC 28-8 Dako pharmDx, SK005



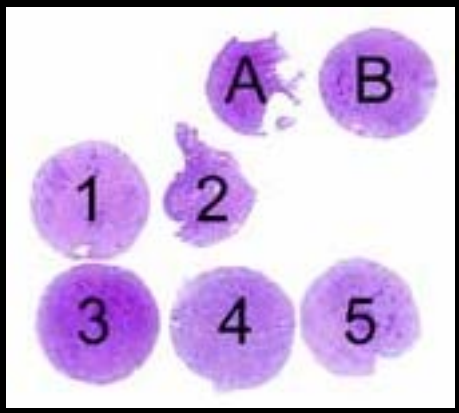
Heterogeneity in PD-L1 expression[1]

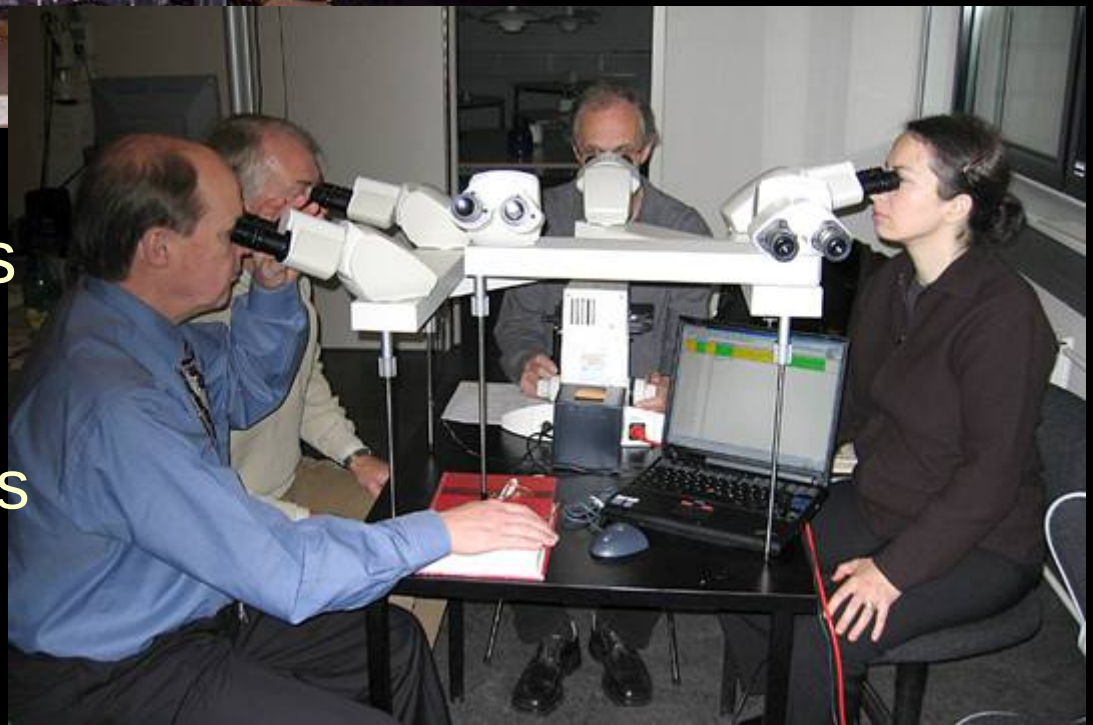
Four ”dimensions”:

- **Two in the slide**
- **One extra for all new slides**
- **One for primary vs. metastatic**

[1]Munari et al. PD-L1 Expression Heterogeneity in Non–Small Cell Lung Cancer: Defining Criteria for Harmonization between Biopsy Specimens and Whole Sections. Journal of Thoracic Oncology Vol. 13 No. 8: 1113-1120

NordiQC assessment



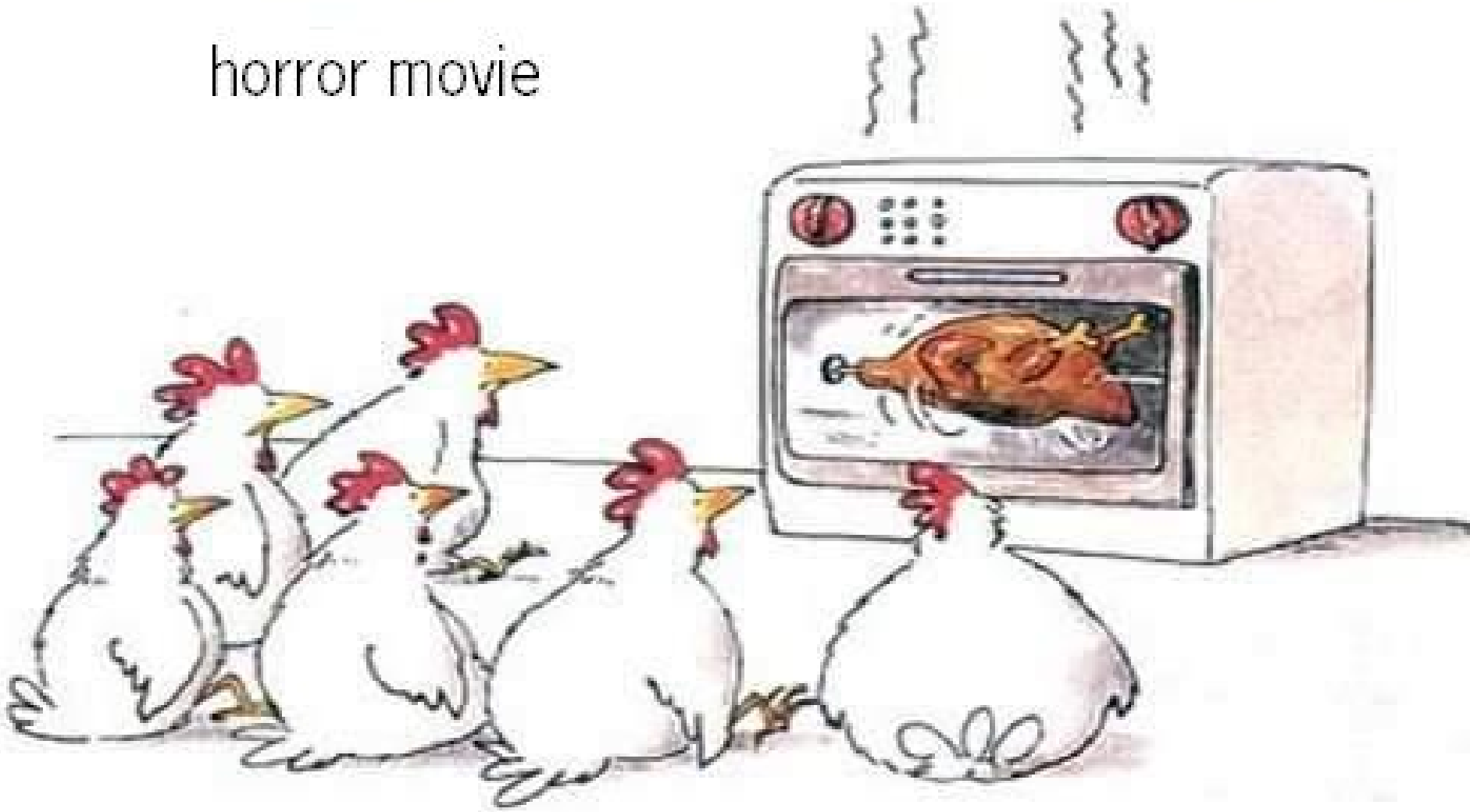


~ 100 Runs ~ 400 tests

~ 100,000 slides =

~ 500,000 tissue sections

~ 5,000,000 data


horror movie

PD-L1 Run C5 2019, LUNG: 176 labs

Lab. mod.: 42/108

LDTs: 68

Table 3. **Assessment marks for IHC assays and antibodies run C5, PD-L1 (lung) IHC**

CE-IVD / FDA approved PD-L1 assays	n (108)	Vendor		Optimal	Good	Borderline	Poor	Suff.[1]	Suff. OPS[2]
rmAb clone SP263, **740-4907**[3]	16	Ventana/Roche		12	2	2	-	88%	93%
rmAb clone SP263, **740-4907**[4]	1	Ventana/Roche	Stainer transfer	-	-	-	1	-	-
rmAb clone SP263, **741-4905**[5]	4	Ventana/Roche		2	2	-	-	-	-
rmAb clone SP263, **790-4905**	48	Ventana/Roche		34	10	4	-	92%	92%
mAb clone 22C3 pharmDX, **SK006**[6]	24	Dako/Agilent		17	5	-	2	92%	92%
mAb clone 22C3 pharmDX, **SK006**[7]	9	Dako/Agilent	Stainer transfer	2	2	1	4	44%	-
mAb clone 22C3 pharmDX, **GE006**[8]	3	Dako/Agilent		3	-	-	-	-	-
rmAb clone 28-8 pharmDX, **SK005**[9]	3	Dako/Agilent		2	1	-	-	-	-
Antibodies[10] for laboratory developed PD-L1 assays, concentrated antibodies	n (68 (incl. "RTU"))	Vendor	Protocol transfer	Optimal	Good	Borderline	Poor	Suff.[1]	Suff. OPS[2]
mAb clone **22C3**	42	Dako/Agilent		11	20	9	2	74%	74%
mAb clone **E1L3N**	5	Cell Signaling		1	4	-	-	100%	100%
rmAb **CAL10**	3 3	Biocare Zytomed Systems		3	1	-	2	67%	100%
rmAb clone **28-8**	4	Abcam		1	2	-	1	-	-
rmAb clone **ZR3**	1 1 1 1	Cell Marque Zeta Corporation Nordic Biosite Gene Tech		1	-	-	3	-	-
rmAb clone **QR1**	1 1	Quartett Diagomics		1	-	-	1	-	-
rmAb **BSR90**	1	Nordic Biosite		1	-	-	-	-	-

PD-L1 Run C5 2019, LUNG: 176 labs

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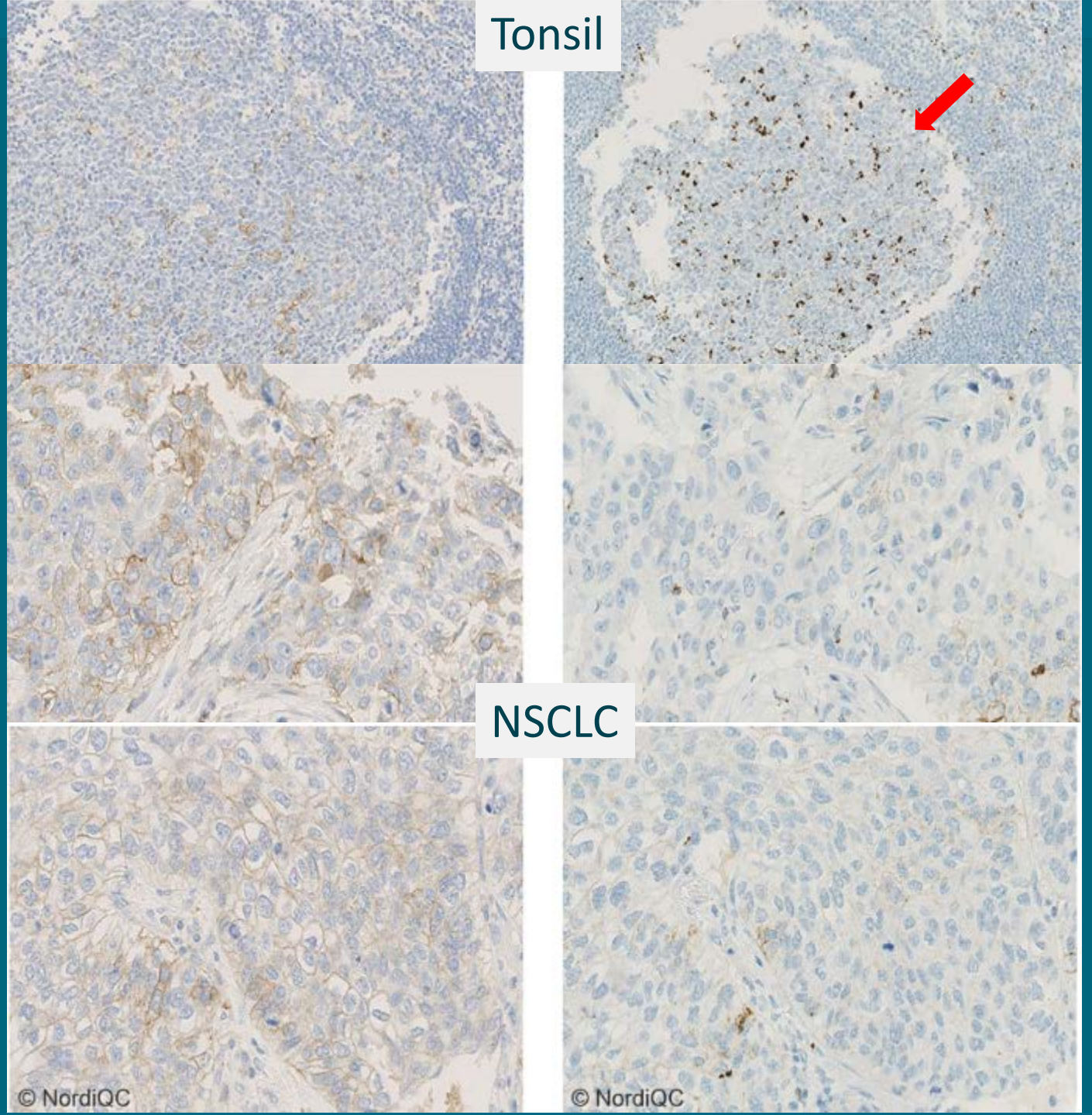
rmAb clone SP263, **740-4907**[3]	16	Ventana/Roche		12	2	2	-	88%	93%
rmAb clone SP263, **740-4907**[4]	1	Ventana/Roche	**Stainer transfer**	-	-	-	1	-	-
rmAb clone SP263, **741-4905**[5]	4	Ventana/Roche		2	2	-	-	-	-
rmAb clone SP263, **790-4905**	48	Ventana/Roche		34	10	4	-	92%	92%

Laboratory developed, modified or tranferred protocols 110 = 63%

Antibodies[10] for laboratory developed PD-L1 assays, concentrated antibodies	n (68 (incl. "RTU"))	Vendor	**Protocol transfer**	Optimal	Good	Borderline	Poor	Suff.[1]	Suff. OPS[2]
mAb clone **22C3**	42	Dako/Agilent		11	20	9	2	74%	74%
mAb clone **E1L3N**	5	Cell Signaling		1	4	-	-	100%	100%
rmAb **CAL10**	3 3	Biocare Zytomed Systems		3	1	-	2	67%	100%
rmAb clone **28-8**	4	Abcam		1	2	-	1	-	-
rmAb clone **ZR3**	1 1 1 1	Cell Marque Zeta Corporation Nordic Biosite Gene Tech		1	-	-	3	-	-
rmAb clone **QR1**	1 1	Quartett Diagomics		1	-	-	1	-	-
rmAb **BSR90**	1	Nordic Biosite		1	-	-	-	-	-


Tonsil
SK006
22C3
Approved
assay
CAL10
Lab
developed
test
1-49%
<1%
NSCLC
> 50%
1-49%
© NordiQC
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Nordic Immunohistochemical Quality Control

Assessing the immunohistochemical assay quality

- Based on “standard” processed circulated tissues

- Identifying optimal and insufficient results
  - Correlated to antibodies, protocols and stainer platforms
- Publishing general results
  - Website: www.nordiqc.org (assessments and protocols)
  - Scientific journals
- Giving directions for improvement
  - Individually tailored recommendations

Search: PD-L1

Epitope	Staining Platform	Clone name	Clone format	Version date	View
PD-L1	Dako Autostainer Link 48 +	22C3	RTU	08 Feb 2017	PDF
PD-L1	Dako Autostainer Link 48 +	28-8	RTU	02 Jan 2017	PDF
PD-L1	Dako Autostainer Link 48 +	E1L3N	CONC *	01 Dec 2017	PDF
PD-L1	Dako Autostainer Link 48 +	28-8	RTU	04 Dec 2017	PDF
PD-L1	Dako Autostainer Link 48 +	22C3	RTU	27 Dec 2017	PDF
PD-L1	Dako Omnis	22C3	CONC *	12 Dec 2017	PDF
PD-L1	Dako Omnis	22C3	CONC *	02 Sep 2018	PDF
PD-L1	Leica BOND III	E1L3N	CONC *	27 Aug 2018	PDF
PD-L1	Ventana Benchmark Ultra	SP263	RTU	18 Jan 2017	PDF
PD-L1	Ventana Benchmark Ultra	SP263	RTU	20 Dec 2017	PDF
PD-L1	Ventana Benchmark Ultra	22C3	CONC *	13 Feb 2018	PDF
PD-L1	Ventana Benchmark Ultra	22C3	CONC *	22 Aug 2018	PDF
PD-L1	Ventana Benchmark XT	SP263	RTU	25 Aug 2017	PDF

Protocols giving optimal results for each clone and platform may be downloaded for free

All protocols

* LDTs

Accurate PD-L1 Protocols for Non–Small Cell Lung Cancer can be Developed for Automated Staining Platforms With Clone 22C3

Rasmus Røge, MD,† Mogens Vyberg, MD,*† and Søren Nielsen, HT**

(*Appl Immunohistochem Mol Morphol* 2017;25:381–385)

TABLE 1. Protocol Parameters for the PD-L1 IHC 22C3 pharmDx Kit and the Optimized Protocols

Platform	AS48 Dako Link, 22C3 pharmDx, SK006 Dako	Dako Omnis, 22C3 Concentrate, M3653 Dako	BenchMark Ultra, Ventana, 22C3 Concentrate, M3653 Dako	BOND III, Leica, 22C3 Concentrate, M3653 Dako
HIER conditions	20 min at 97°C in target retrieval solution low pH 6.1—off board in PT-Link	40 min at 97°C in target retrieval solution low pH 6.1 GV805, Dako	48 min at 99°C in cell conditioning 1, pH 8.5 950-224, Ventana	30 min at 100°C in epitope retrieval solution 2 pH 9.0 AR9640, Leica
Primary antibody conditions	SK006, ready-to-use Incubation for 30 min at room temperature	M3653, 1:20* Incubation for 40 min at 22°C	M3653, 1:40* Incubation for 64 min at 36°C	M3653, 1:20* Incubation for 60 min at room temperature
Detection system conditions	SK006, ready-to-use Incubation for 30 min in linker and 30 min in polymer at room temperature	GV800/821, Dako Incubation for 30 min in linker and 30 min in polymer at 22°C	760-700, Ventana Incubation for 8 min in linker and 8 min in multimer at 36°C	DS9800, Leica Incubation for 20 min in postblock and 20 min in polymer at room temperature
Chromogen conditions	SK006, ready-to-use Incubation for 2 × 5 min at room temperature	GV825, Dako Incubation for 2 × 5 min at 22°C	760-700, Ventana Incubation for 8 min at 36°C	DS9800, Leica Incubation for 8 min at room temperature

*Diluted in antibody diluent K8006, Dako.
HIER indicates heat-induced epitope retrieval; IHC, immunohistochemistry; PD-L1, programmed death-ligand 1.

Modern Pathology
https://doi.org/10.1038/s41379-019-0327-4

Published online: 05 August 2019

REVIEW ARTICLE

Consensus opinion among authors, not approved

"Interchangeability" of PD-L1 immunohistochemistry assays: a meta-analysis of diagnostic accuracy

Emina Torlakovic[1,2] · Hyun J. Lim[2] · Julien Adam[3] · Penny Barnes[4] · Gilbert Bigras[5] · Anthony W. H. Chan[6] · Carol C. Cheung[7,8] · Jin-Haeng Chung[9] · Christian Couture[10] · Pierre O. Fiset[11] · Daichi Fujimoto[12] · Gang Han[13] · Fred R. Hirsch[14] · Marius Ilie[15] · Diana Ionescu[16] · Chao Li[17] · Enrico Munari[18] · Katsuhiro Okuda[19] · Marianne J. Ratcliffe[20] · David L. Rimm[21] · Catherine Ross[22] · Rasmus Røge[23] · Andreas H. Scheel[24] · Ross A. Soo[25] · Paul E. Swanson[26,27] · Maria Tretiakova[26] · Ka F. To[7] · Gilad W. Vainer[28] · Hangjun Wang[29] · Zhaolin Xu[5] · Dirk Zielinski[30] · Ming-Sound Tsao[7,8]

. . . when the testing laboratory is not able to use an Food and Drug Administration [FDA] approved companion diagnostic(s) for PD-L1 assessment for its specific clinical purpose(s), it is **better to develop a properly validated laboratory developed test** for the same purpose(s) as the original PD-L1 FDA-approved immunohistochemistry [IHC] companion diagnostic, than to replace the original PD-L1 FDA-approved IHC companion diagnostic with a another PD-L1 FDA-approved companion diagnostic that was developed for a different purpose.

Open website

NordiQC

Assessment Run 42 2014

Bcl-6 protein (Bcl-6)

Recommended Bcl-6 protocols Recommended Bcl-6 control tissue

Material
The slide to be stained for Bcl-6 comprised:

1. Tonsil, 24h fixation, 2. Tonsil, 48h fixation*, 3. Follicular lymphoma grade I, 4. Follicular lymphoma grade II, 5. Diffuse large B-cell lymphoma, non-Germinal Centre B-cell type (DLBCL non-GCB), 6. DLBCL, GCB.

All tissues were fixed in 10% neutral buffered formalin.

Criteria for assessing a Bcl-6 staining as optimal included:

- A moderate to strong distinct nuclear staining reaction of virtually all normal germinal centre B-cells in the tonsil fixed 24h.
- An at least weak to moderate distinct nuclear staining reaction of the majority of the squamous epithelial cells in the tonsil fixed 24h.
- A moderate to strong distinct nuclear staining reaction of the neoplastic cells in the two follicular lymphomas.
- An at least weak to moderate nuclear staining reaction of the majority of the neoplastic cells in th DLBCL, GCB subtype, tissue core no. 6.
- No or only a nuclear staining reaction in dispersed neoplastic cells of the DLBCL, non-GCB subtyp tissue core no. 5

* The tonsil fixed for 48h (tissue core no 2) was excluded from the assessment due to an aberrant inconsistent staining reaction in the circulated material.

Participation

Number of laboratories registered for Bcl-6, run 42	244
Number of laboratories returning slides	228 (93%)

Results
228 laboratories participated in this assessment. Of these, 168 (74%) achieved a sufficient mark (optima or good). Table 1 summarizes the antibodies (Abs) used and assessment marks (see page 2).

The most frequent causes of insufficient staining reactions were:
- too low concentration of the primary antibody
- less successful performance of the mAb clone PG-B6p
- use of low sensitivity detection systems

Performance history
This was the third NordiQC assessment of Bcl-6. An increased pass rate was seen compared to the two previous runs 17, 2006 and 28, 2010 (see table 2).

Table 2. **Proportion of sufficient results for Bcl-6 in the three NordiQC runs performed**

	Run 17 2006	Run 28 2010	Run 42 2014
Participants, n=	69	132	228
Sufficient results	42%	48%	74%

Conclusion
The mAbs clones **GI191E/A8**, **LN22** and **PG-B6p** could all be used to produce optimal staining results for Bcl-6. Irrespective of the clone applied, efficient HIER in alkaline buffer, use of a high sensitive detection system and careful calibration of the primary antibody were the most important prerequisites for an

Table 1. **Antibodies and assessment marks for Bcl-6, run 42**

Concentrated antibodies	n	Vendor	Optimal	Good	Borderline	Poor	Suff.[1]	Suff. OPS[2]
mAb clone **GI191E/A8**	13 1 1	Cell Marque Immunologic Zytomed	6	8	0	1	93%	100%
mAb clone **LN22**	38 2 1 1 1	Leica/Novocastra DBS Biocare BioGenex Zeta Corporation	20	16	4	3	84%	100%
mAb clone **PG-B6p**	43 1 1	Dako DBS Thermo/Neomarkers	9	22	11	3	69%	86%
Ready-To-Use antibodies								
mAb clone **GI191E/A8 760-4241**	59	Ventana/Cell Marque	24	25	9	1	83%	84%
mAb clone **GI191E/A8 227M-9x**	1	Cell Marque	0	0	1	0	-	-
mAb clone **LN22 PA0204**	10	Leica/Novocastra	3	7	0	0	100%	100%
mAb clone **LN22 PM410**	1	Biocare	1	0	0	0	-	-
mAb clone **LN22 MAD-00638QD**	1	Master Diagnostica	0	1	0	0	-	-
mAb clone **PG-B6p IR/IS625**	44	Dako	4	17	21	2	48%	75%
mAb clone **PG-B6p GA625**	7	Dako	2	2	3	0	57%	75%
mAb **PG-B6p MAD-004023QD**	2	Master Diagnostica	0	1	1	0	-	-
Total	228		69	99	50	10	-	
Proportion			30%	44%	22%	4%	74%	

1) Proportion of sufficient stains (optimal or good)
2) Proportion of sufficient stains with optimal protocol settings only, see below.

Detailed analysis of Bcl-6, Run 42
The following protocol parameters were central to obtain optimal staining:

Concentrated antibodies
mAb clone **GI191E/A8:** Protocols with optimal results were all based on HIER using Cell Conditi (CC1; Ventana) (6/14)* as retrieval buffer. The mAb was typically diluted in the range of 1:50-1: depending on the total sensitivity of the protocol employed. Using these protocol settings 9 of 9 (laboratories produced a sufficient staining result (optimal or good).
* (number of optimal results/number of laboratories using this HIER buffer)

mAb clone **LN22:** Protocols with optimal results were all based on HIER using Target Retrieval So (TRS) pH 9 (3-in-1) (Dako) (2/2), CC1 (Ventana) (9/18) or Epitope Retrieval Solution 2 (BERS2; (9/11) as retrieval buffer. The mAb was typically diluted in the range of 1:25-1:200 depending on sensitivity of the protocol employed. Using these protocol settings 27 of 27 (100%) laboratories p a sufficient staining result.

PDF file e-mailed to participants with assessment marks and – when needed – explanations and recommendations

Nordic Immunohistochemical Quality Control

Institute of Pathology, Aalborg University Hospital, Ladegaardsgade 3, P.O.Box 561, DK-9100 Aalborg, Denmark

Assessment of ER, B24 - individual results

Aalborg Sygehus (101)

Epitope	ER
Assessment	Optimal

NordiQC has assessed the submitted slides. In general, the assessment is based on staining intensity and distribution in cells expected to be demonstrated, background staining, cross-reactivity, quality of counter-staining and preservation of tissue morphology. Specific criteria for each epitope are described on http://www.nordiqc.org/epitope.php.
Each slide was marked as optimal, good, borderline or poor based on the following criteria:

Optimal: The staining reaction is considered perfect or close to perfect in all of the included tissues.
Good: The staining reaction is considered acceptable in all of the included tissues. However, the protocol settings may be optimized to ensure improved sensitivity or higher signal-to-noise ratio.
Borderline: The staining reaction is considered insufficient because of a generally too weak staining reaction, false negative or false positive staining reaction of one of the included tissues. The protocol should be optimized.
Poor: The staining reaction is considered insufficient because of, e.g., false negative or false positive staining reactions of several of the included tissues. An optimization of the protocol is urgently needed.

Moderate or strong cross reaction (due to the character of the primary antibody) or other false positive staining reaction (e.g. due to endogenous biotin) is not compatible with an optimal result and will usually cause downgrading.
For stains assessed as borderline or poor, comments and recommendations are given to the protocols. Good stains may also be accompanied by comments if specific problems are identified.
Recommended protocols from each staining platform are available at the NordiQC homepage (http://www.nordiqc.org/recommended.php) for comparison. Implementation of NordiQC recommended protocols as well as changes suggested in this letter must be tested carefully in your own laboratory before implementation into diagnostic work. NordiQC do not take any responsibility for consequences of changes in protocols or methods in your laboratory.

Marker	CD23	CR	CyD1	Ki67	Podop	TTF1
Assessment:	Poor	Optimal	Optimal	Good	Good	Borderline
Comments to the protocol:	False negative	-	-	Excessive counterstain	Weak	Weak*
Suggestions for improvement:	Consider change of primary Ab and recalibrate	-	-	-	-	Increase primary Ab conc. and/or prolong HIER

* Please read the epitope description and assessment summary carefully, as the choice of the Ab clone will influence the sensitivity and specificity.

Nordic immunohistochemical Quality Control

Virchows Arch (2016) 468:19–29
DOI 10.1007/s00428-015-1829-1

ANNUAL REVIEW ISSUE

Proficiency testing in immunohistochemistry—experiences from Nordic Immunohistochemical Quality Control (NordiQC)

Mogens Vyberg[1,2] · Søren Nielsen[1]

Free PMC Article

Vyberg et al. BMC Health Services Research (2015) 15:352
DOI 10.1186/s12913-015-1018-6

BMC Health Services Research

RESEARCH ARTICLE Open Access

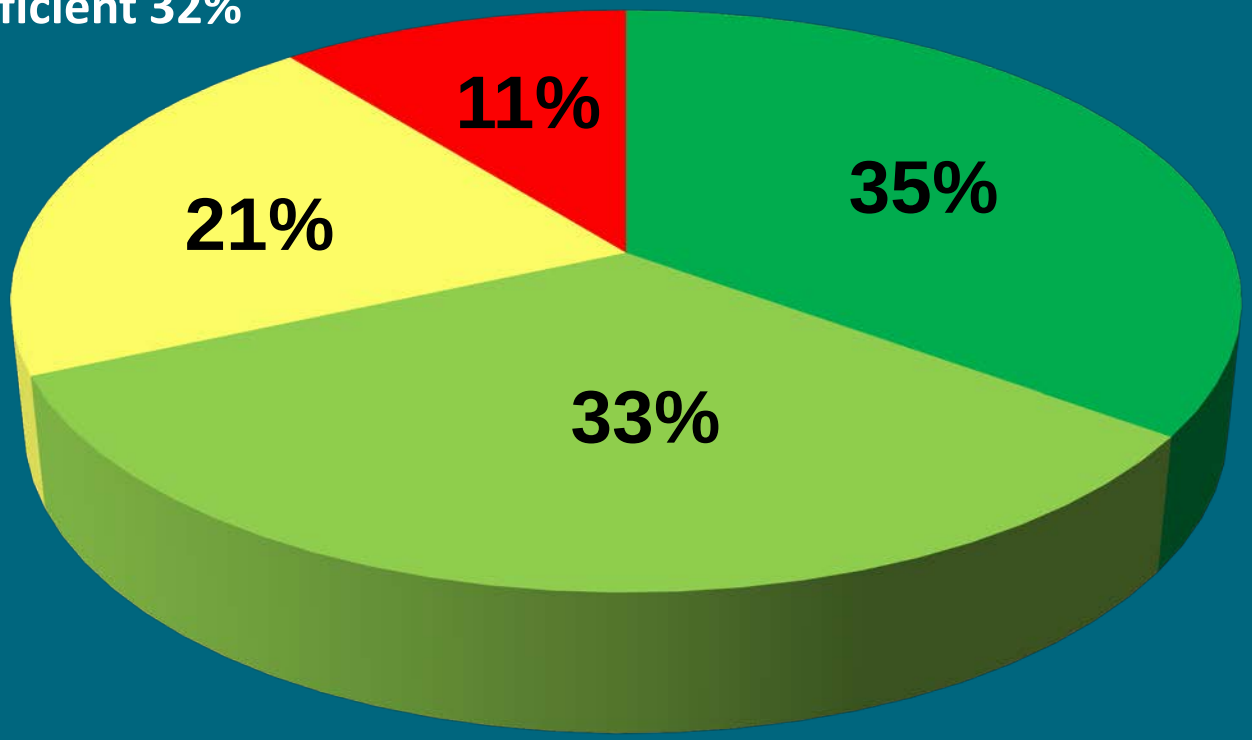
Immunohistochemical expression of HER2 in breast cancer: socioeconomic impact of inaccurate tests

Mogens Vyberg[1*], Søren Nielsen[1], Rasmus Røge[1], Beth Sheppard[2], Jim Ranger-Moore[2], Eric Walk[2], Juliane Gartemann[3], Ulrich-Peter Rohr[3] and Volker Teichgräber[3]

NordiQC assessment results 2003 – 2015

General module ~20,000 slides (~100.000 core sections)

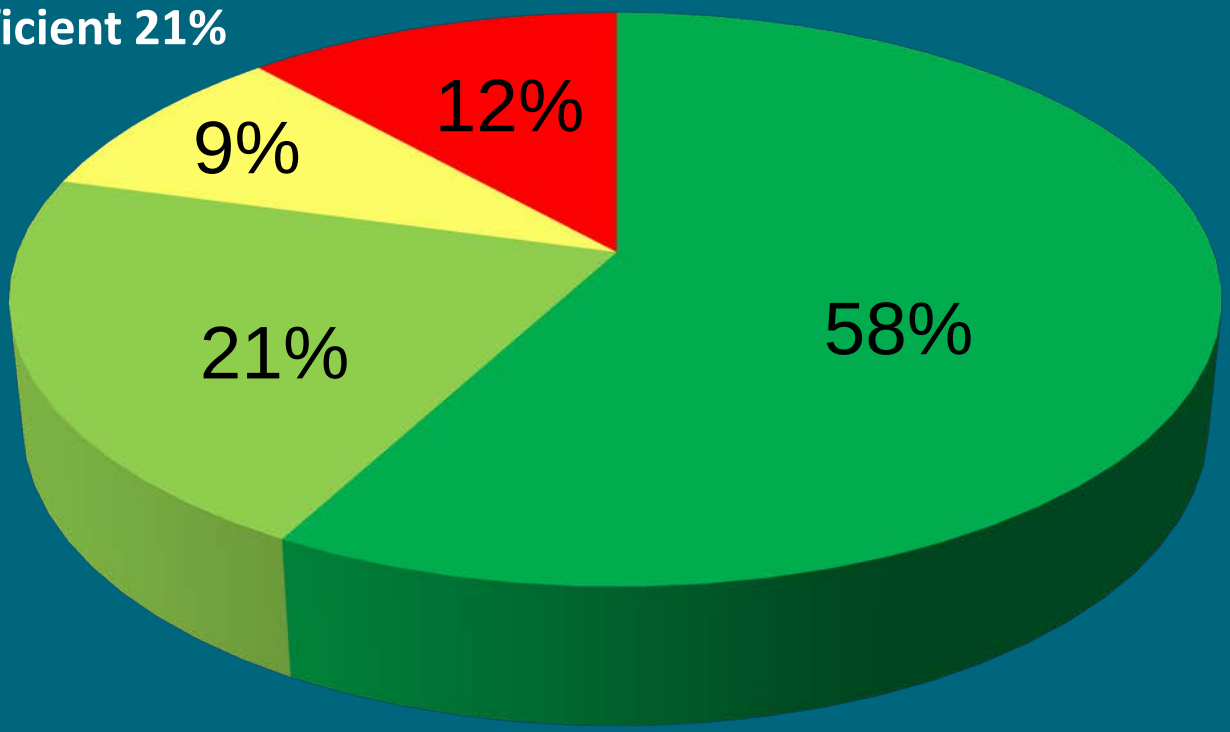
Insufficient 32%



- Optimal
- Good
- Borderline
- Poor

NordiQC assessment results 2003 – 2015

Breast cancer module ~9,000 slides (~35,000 core sections)



- Optimal
- Good
- Borderline
- Poor

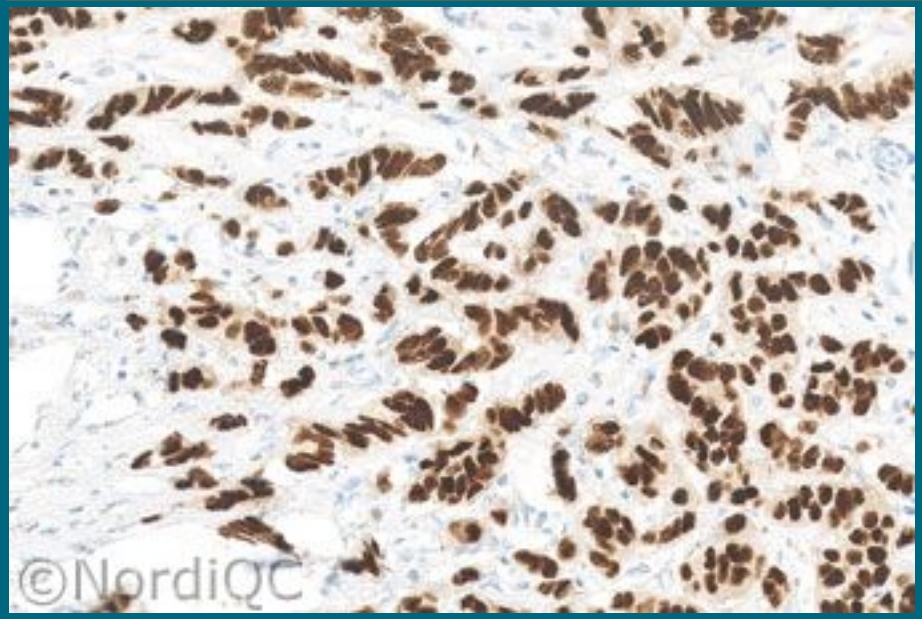
NordiQC general results 2003 – 2015

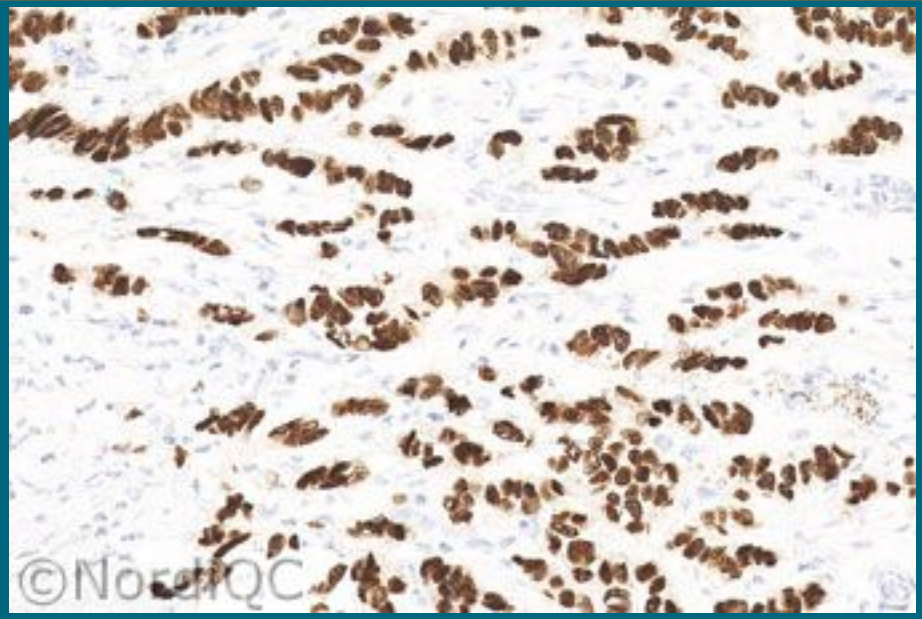
Major causes of insufficient stains in ~ 9,000 slides

Less successful antibodies/RTUs	**17 %**
Inappropriate antibody dilution	**20 %**
Inappropriate epitope retrieval	**27 %**
Inappropriate detection kit	**19 %**
Other inappropriate lab. performance	**17 %**

Endogenous biotin reaction (EBR)
Section drying-out after HIER
Technical platform error
. . . .
Unexplained

Serial sections stained for Estrogen receptor



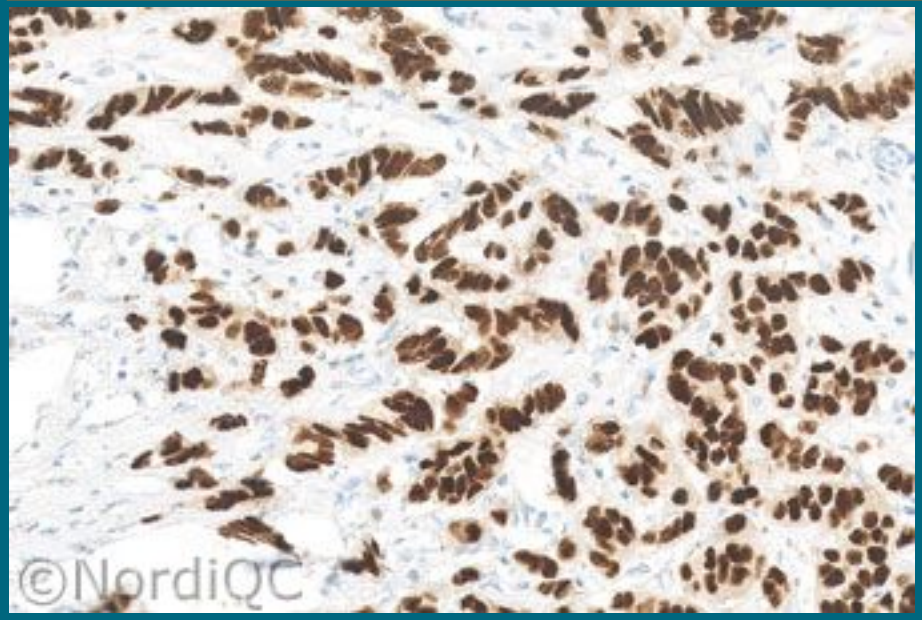


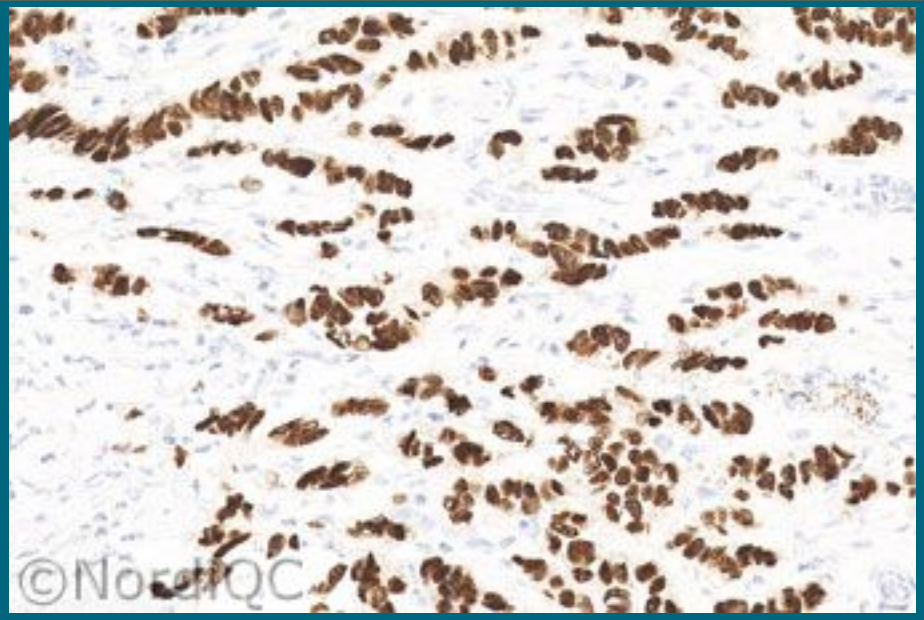
Lab. A

Lab. B

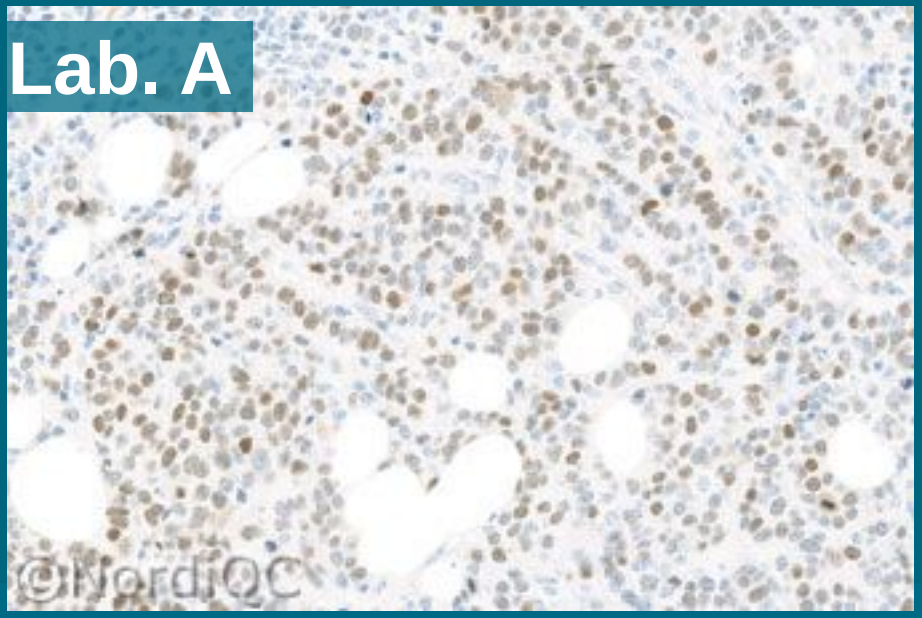
ER in ductal breast carcinoma

Serial sections stained for Estrogen receptor

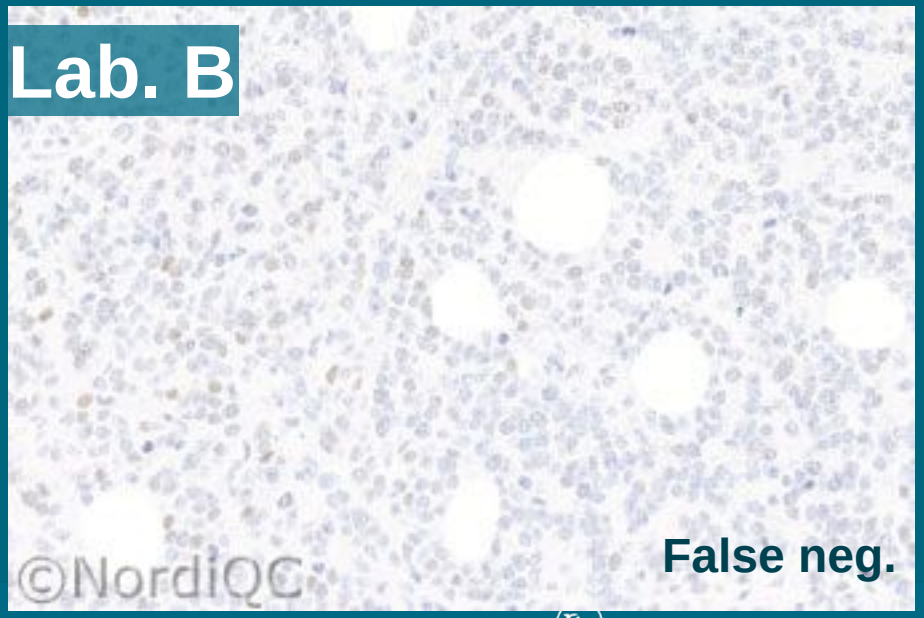




Lab. A

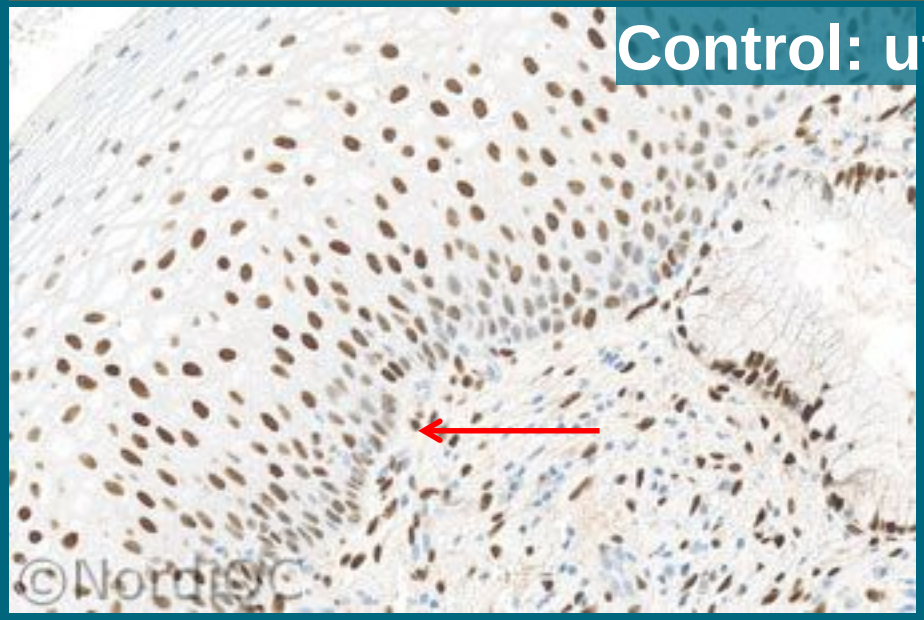


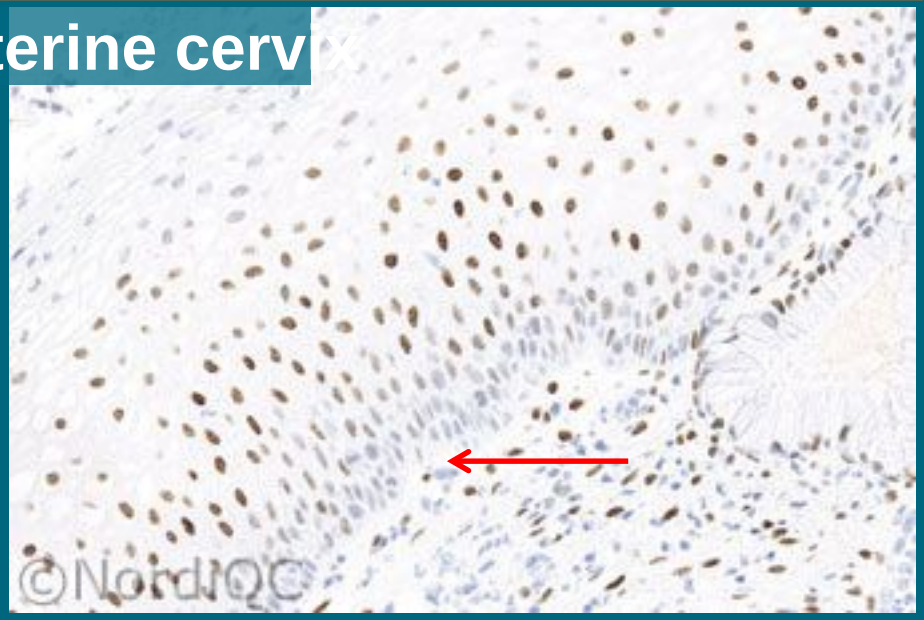
Lab. B

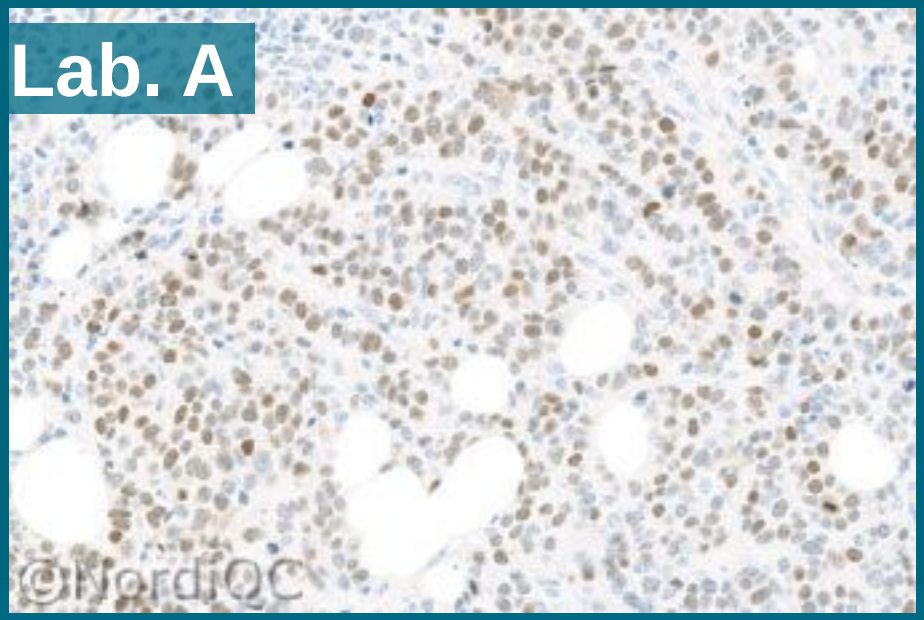


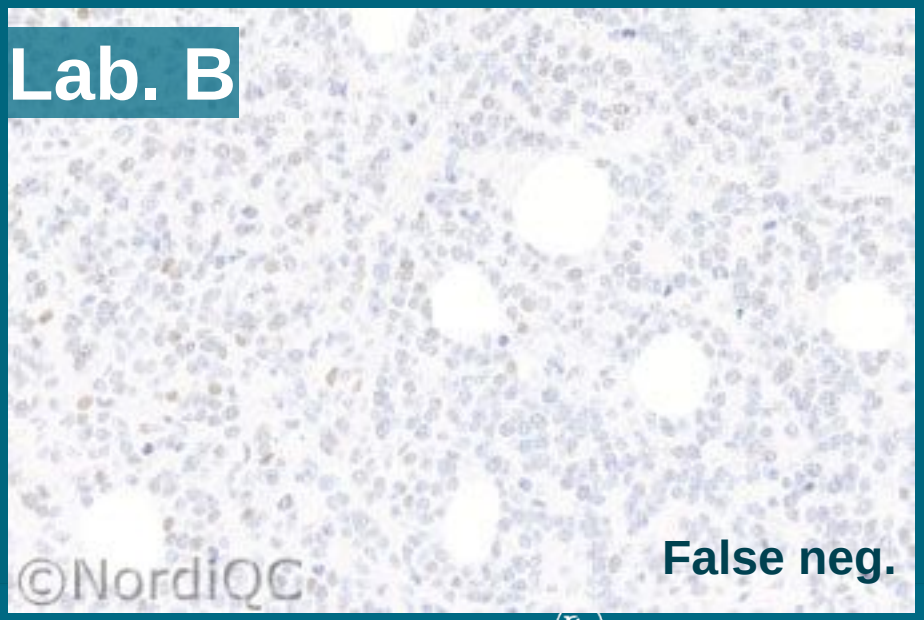
False neg.

Serial sections stained for Estrogen receptor

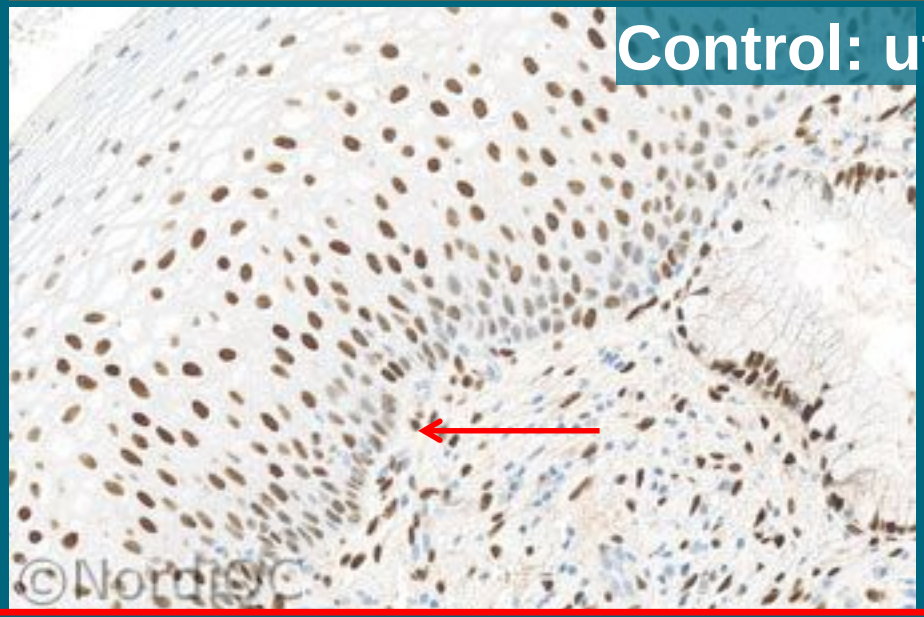


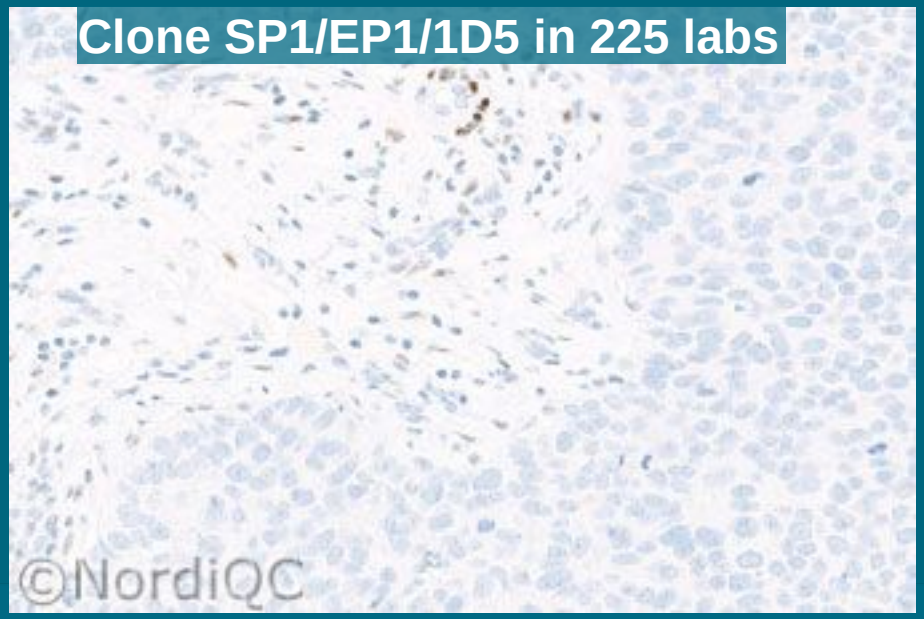


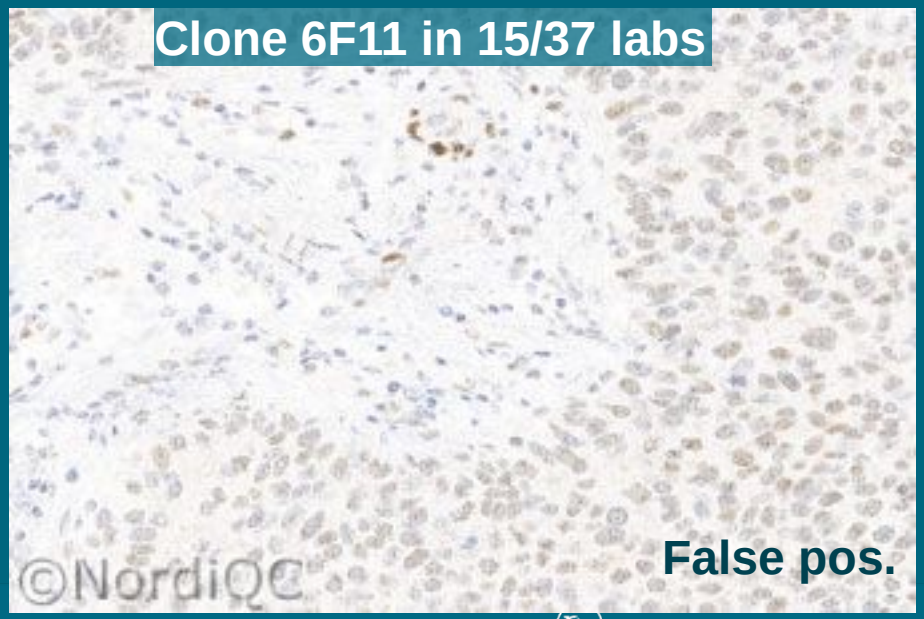




Serial sections stained for Estrogen receptor







Estrogen receptor

Pass rate (optimal + good) by participant status

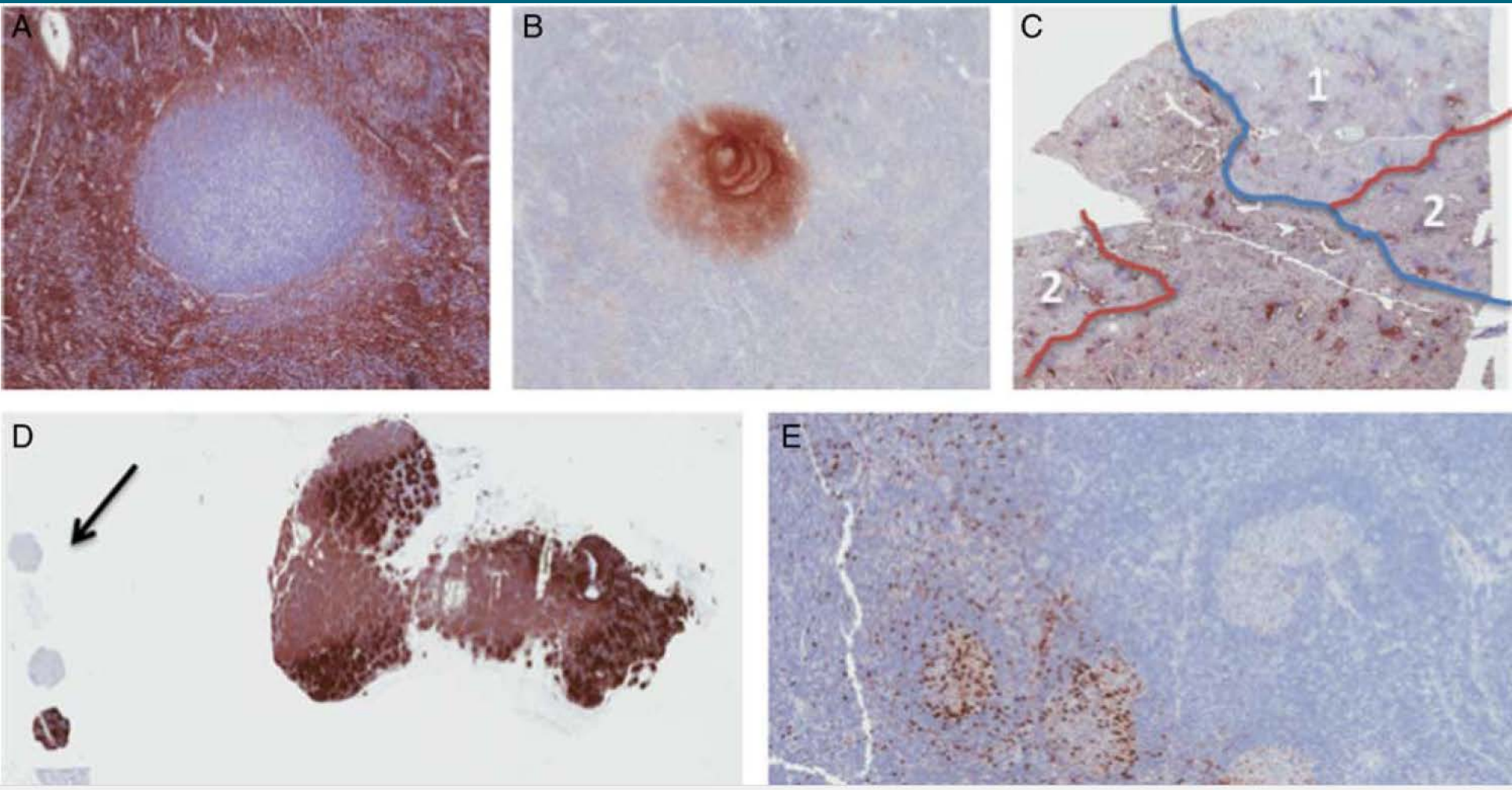
	New participants	'Old' participants
Run 10, 2004	57%	71%
Run B15, 2010	70%	86%
Run B19, 2015	51%	73%
Average	**59%**	**77%**


”Cold spots” – a problem with ~30% of all slides

Uneven Staining in Automated Immunohistochemistry: Cold and Hot Zones and Implications for Immunohistochemical Analysis of Biopsy Specimens

Carol C. Cheung, MD, PhD, JD,† Paul E. Swanson, MD,‡ Søren Nielsen, BMS,§ Mogens Vyberg, MD,§ and Emina E. Torlakovic, MD, PhD‖*

(*Appl Immunohistochem Mol Morphol* 2018;26:299–304)

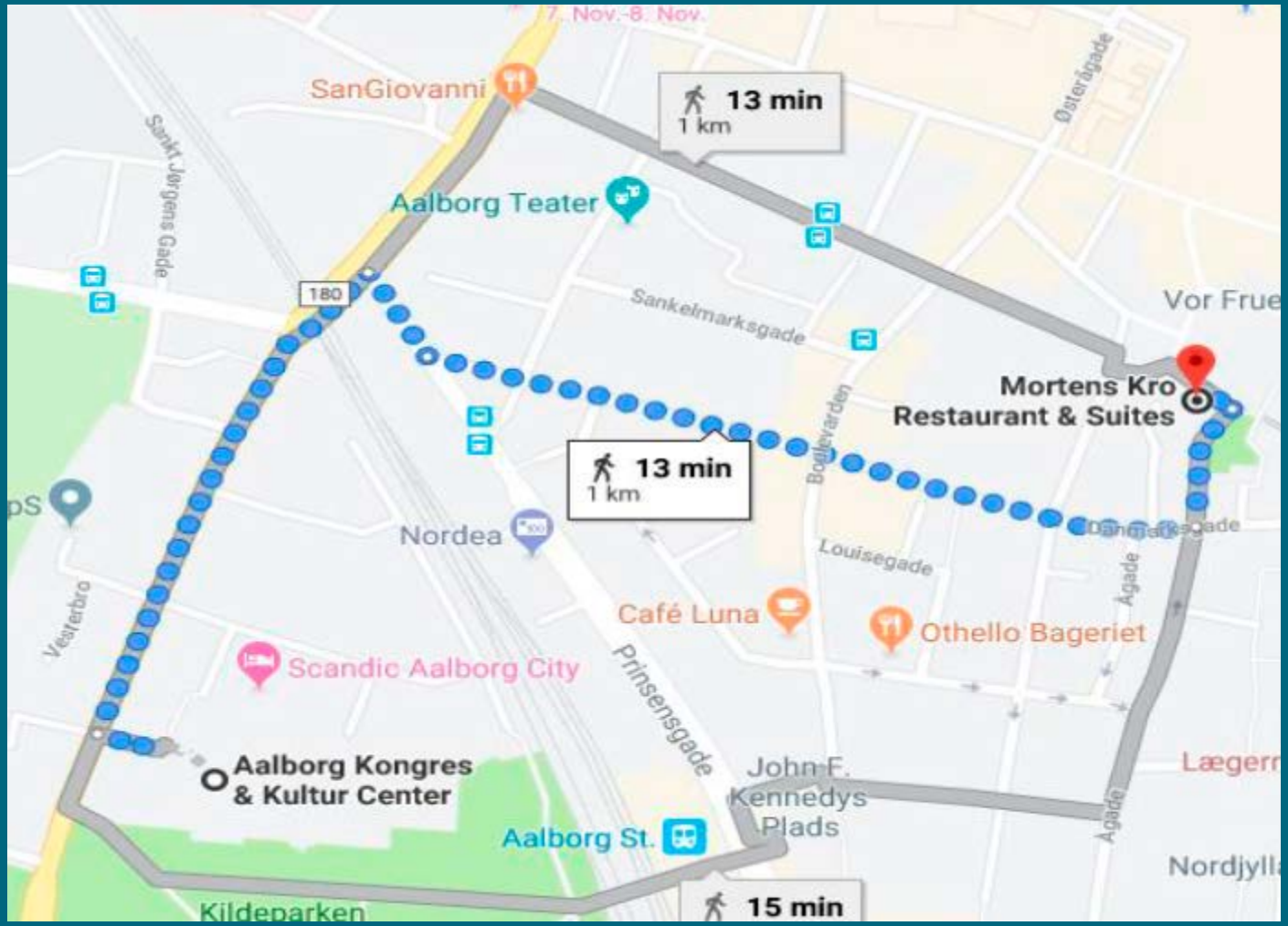


Wednesday, October 2nd

09:15 – 10:00		*Arrival and registration, coffee*	
10:00 – 10:25	**25**	Welcome – Introduction	MV
10:30 – 11:10	**40**	IHC principles: The technical test approach – pre-analytical phase I	ON
11:15 – 11:55	**40**	IHC principles: The technical test approach – pre-analytical phase II	ON
12:00 – 12:50	**50**	*Lunch*	
12.55 – 13:35	**40**	IHC principles: The technical test approach - analytical phase I	MB
13:40 – 14:20	**40**	IHC principles: The technical test approach - analytical phase II	MB
14:20 – 14.40	**20**	*Coffee*	
14.40 – 15:40	**60**	IHC principles: The technical test approach – Tissue tool box for controls	SN
15:45 – 16:00	**15**	Discussion – *'Bring your own questions'*	MV
16.00 – 18.00		*Social arrangement (drinks and snacks will be served)*	

Thursday, October 3rd

08:30 – 09:20	**50**	The unknown primary tumour: IHC for diagnostic use	MV
09:25 – 09:55	**30**	The unknown primary tumour: Antibody selection, protocols and controls	RR
10:00 – 10:20	**20**	*Coffee*	
10:25 – 11:05	**40**	Lung cancer: IHC for diagnostic use	HH
11:10 – 11:40	**30**	Lung cancer: Antibody selection, protocols and controls	ON
11:45 – 12:25	**40**	Breast cancer: IHC for diagnostic use	AVL
12:30 – 13:20	**50**	*Lunch*	
13:25 – 13:55	**30**	Breast cancer: Antibody selection, protocols and controls	RR
14:00 – 14:40	**40**	Haematolymphoid neoplasms IHC for diagnostic use	SH
14:40 – 15:00	**20**	*Coffee*	
15:00 – 15:40	**40**	Haematolymphoid neoplasms: Antibody selection, protocols and controls	MB
15:40 – 16:00	**20**	Discussion – *'Bring your own questions'*	MV
18:30 –		*Workshop dinner (Mortens Kro)*	


SanGiovanni
13 min
1 km
Aalborg Teater
180
Sankelmarksgade
Vor Frue
Mortens Kro
Restaurant & Suites
13 min
1 km
Nordea
Louisegade
Café Luna
Othello Bageriet
Scandic Aalborg City
Prinsensgade
Aalborg Kongres
& Kultur Center
John F.
Kennedys
Plads
Aalborg St.
15 min
Kildeparken

Mølleå 4

Friday, October 4th			
08:30 – 09:15	**45**	IHC double stains – overview, considerations and applications	MB
09:20 – 10:05	**45**	Immunocytochemistry; IHC on frozen sections – overview, considerations and applications	ON
10:10 – 10:30	**20**	*Coffee*	
10:30 – 11:10	**40**	IHC stainers – overview, pros and cons	SN
11:15 – 11:45	**30**	Organizing IHC data	ON
11:45 – 12:00	**15**	Discussion and evaluation	MV
12:00 – 12:50		*Lunch (on-site and to-go), departure*	

AALBORG UNIVERSITY HOSPITAL

NORTH DENMARK REGION

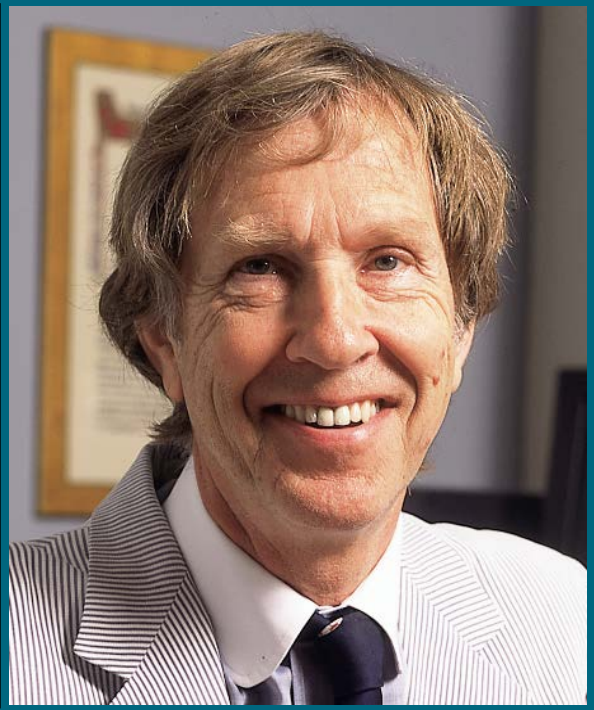
Aalborg Harbour Front

Aalborg House of Music

Budolfi Church

The challenge of immunohistochemistry

"Immunohistochemistry is technically complex, and no aspect of this complexity can be ignored, from the moment of collecting the specimen to issuance of the final report"



Clive Taylor, 2000

Welcome to Aalborg