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cIQc

Assessors' report for cIQc Run 69: Breast Module (ER, PR and HER2)

Assessors: J Garratt and J Won (recorder)

Assessment performed on Monday, May 29, 2017, at Lions Gate Hospital, North Vancouver, Canada

Overview

The TMA used in Run 69 was previously used for cIQc Run 59, and consists of 40 breast carcinomas enriched for HER2 3+ cases. As with the previous breast biomarker challenge, results remain excellent. All laboratories were considered to have either optimal or adequate staining. Congratulations to all participants! Slides from Labs 120, 146, and 199 were not returned in time for the assessment meeting.

ER

Cores 15 and 40 were noted to have sampling variability, with staining in only a few tumour cells. As previously established and shown in the Garrattogram for ER after cIQc assessment below, the weaker staining-nature of Cores 13, 21 and 30 (i.e. Allred 3-5) provided a good measure to distinguish optimal from adequate staining by participants. A lab was considered to have optimal staining if results were completely concordant with the reference or at most one of the weakly staining tumour cores was negative. If two or three of the weakly staining cores were negative, staining was considered adequate. All labs exhibited either optimal or adequate staining. A slight background blush was noted for Lab 189. Congratulations on the excellent staining!

Lab/ Core	101	102	103	106	107	109	111	112	114	115	120	123	124	125	126	127	128	129	132	133	134	138	141	144	145	146	147	148	149	150	151	155	157	159	160	161	168	175	178	183	186	187	189	190	192	194	196	198	199	202	209	217	221	230	R1
1	N	U	U	N	U	U	U	U	U	U	U	U	N	U	N	U	U	U	N	U	N	U	U	U	U	N	U	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
5	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N
6	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
7	U	U	U	U	U	U	P	P	P	U	P	U	P	P	P	P	P	P	U	U	U	P	P	U	P	U	U	P	P	P	P	P	U	P	U	P	P	P	P	P	U	U	U	U	U	U	U	U	U	U	U	U	U	U	P
8	P	P	P	P	P	P	P	P	P	P	N	P	P	P	P	P	P	P	P	P	P	N	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
9	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
10	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
11	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
12	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
13	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
14	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U
15	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N	U	N	U	N	N	P	N	U	N	N	N	P	N	N	N	N	N	N	N	N	P	N	U	N
16	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
17	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
18	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	U	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
19	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
20	P	P	P	P	P	P	P	P	P	P	N	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
21	P	P	P	P	P	P	P	U	N	N	N	P	P	P	P	U	P	U	P	P	P	P	U	P	P	P	P	N	N	N	N	P	P	P	P	N	P	P	N	P	P	P	P	N	P	P	P	N	N	N	N	P	N	P	P
22	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
23	P	P	P	P	P	P	P	P	N	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
24	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	U	U	U	U	U	U	U	U	U	U	U	U	U	U	P	U	U	U	U	U	U	U	U	U	U	U	U	P
25	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
26	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
27	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N	N	N	N	N	N	N	N	N
28	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	N	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
29	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
30	P	P	P	P	N	P	P	P	P	N	N	P	P	P	P	P	P	P	P	P	N	N	N	P	P	P	N	N	N	N	N	N	P	N	N	N	P	P	N	P	N	P	N	N	N	P	P	N	N	N	N	P	N	P	P
31	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	N	U	N	N	N	N	N	N	N	N	N	N	N	U	U	U	U	U	U	N	U	U	U	U	U	U	N
32	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
33	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	U	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
34	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
35	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
36	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
37	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
38	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N	P	N	N	N	N	N	P	N	N	N	N	N	P	N	N	N	N	N	N	U
39	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	U	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
40	N	N	N	P	N	N	N	N	P	N	N	N	P	P	N	N	N	N	N	P	N	N	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N

PR

Overall results were very good for PR, which tends to have the greatest variability across labs during breast biomarker quality assurance challenges. All labs exhibited either optimal or adequate staining. As there is no accepted "gold standard" for comparison, the consensus of results from labs across Canada remains the cIQc approach. Sampling variability was evident in several cores, as shown in the Garrattogram for PR after cIQc assessment below.

Lab/ Core	101	102	103	106	107	109	111	112	114	115	120	123	124	125	126	127	128	129	132	133	134	138	141	145	146	147	149	150	151	155	157	159	160	161	168	175	178	183	186	187	189	190	192	194	196	198	199	202	209	217	221	230	R1
1	N	N	U	N	U	U	U	U	U	U	U	U	N	U	U	U	U	U	N	U	U	N	U	U	N	U	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N	N	N	N	N	N	N	N	N	N	U	N
2	P	N	P	N	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N	N	P	N	N	N	N	N	N	P	P	N	N	N	P	P	N	P	N	P	N	N	N	N	N	N	N	N	N	P	N	N	N
3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
4	P	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N
5	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
6	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
7	U	U	U	U	U	U	N	N	N	N	U	U	U	U	U	N	P	N	U	P	U	U	N	U	U	N	N	N	N	U	U	N	U	N	N	U	N	U	U	N	U	U	U	U	U	U	N	U	U	U	U	U	U
8	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
9	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N	N
10	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
11	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
12	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N	N	N	N	N	N	N	N	N	N	N	N	N
13	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
14	N	N	N	N	N	N	N	U	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U
15	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
16	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N	N	N	N	N	N	N	N	N	N	N	N	N
17	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
18	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	U	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
19	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
20	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
21	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N	N	N	U	N	N	N	U	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N	N	N	N	N	N	N	N	N	N	N	N	N
22	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
23	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
24	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	U	U	U	U	U	U	U	P	U	U	U	U	P	U	U	U	P	U	U	U	U	U	U	U	P	P
25	P	N	P	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N	N	P	N	N	N	N	N	N	P	N	N	N	N	P	N	P	N	N	P	N	P	N	P	N	N	N	P	N	N	N	N	N	N
26	P	N	P	N	N	N	P	U	P	P	P	P	N	N	P	N	P	N	N	N	N	N	P	N	N	N	N	N	N	P	P	N	N	N	P	N	P	N	N	U	N	N	N	N	N	N	N	N	P	N	N	N	N
27	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N	N	N	N	N	N	N	N	N	N
28	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	P	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
29	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
30	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N	P	N	N	N	N	U	N	N	N	N	N	N	N	N	N	N	N	N	N
31	U	U	U	U	U	U	U	U	U	U	U	U	U	U	N	U	U	U	U	U	U	N	U	U	U	N	U	N	N	N	N	N	N	N	N	U	N	U	U	U	U	U	U	N	U	U	N	N	U	N	U	N
32	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
33	U	U	N	U	N	U	N	U	U	U	U	N	N	U	N	N	N	N	U	N	N	U	U	U	U	U	U	U	U	P	N	U	U	U	P	N	N	P	P	U	N	N	U	U	P	P	N	U	U	N	P	U	P
34	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
35	P	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
36	P	P	P	P	P	P	P	U	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
37	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P	N	U	N	N	N	N	N	N	N	N	N	N	N
38	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
39	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	U
40	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Variable intensity staining observed in Core 2 was particularly interesting and not seemingly due to sampling or related to a specific protocol, as shown in Figure 1 below.

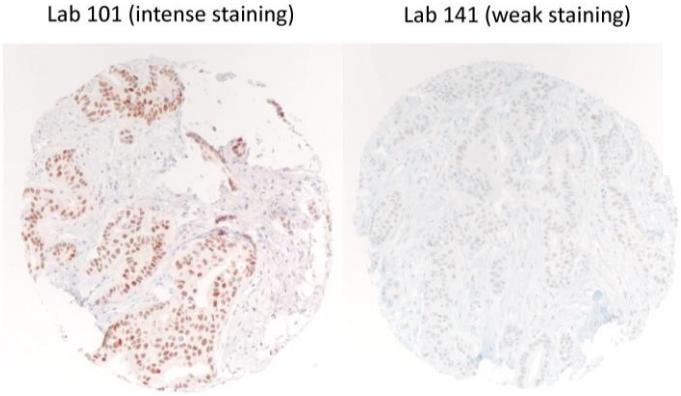

Figure 1. Representative staining of the variable staining intensity observed specifically in Core 2.

HER2

HER2 immunostaining also continues to be excellent. No false-positive results were observed. Only a couple of false-negative results were seen in Core 23, which was previously noted to be a case with amplification of HER2 but relatively low-level protein expression. We wish to reiterate that it is impossible to know the significance of HER2 amplification in breast cancers with relatively low level (or absent in some cases) protein expression. We do not believe that it is appropriate to adjust protocols in an attempt to achieve 2 or 3+ staining in cases such as this, where the clinical significance of amplification is not known.

Lab/ Core	101	102	103	106	107	109	111	112	114	115	120	123	124	125	126	127	129	133	138	145	147	149	150	151	155	157	160	161	168	175	181	186	187	189	190	194	198	199	202	217	221	230	FISH
1	3	3	3	U	U	U	3	U	U	U	U	U	U	U	U	U	U	U	U	U	U	3	3	3	3	3	3	3	3	3	3	3	3	3	3	U	3	3	3	3	3	Amplified
2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Amplified
3	N	1	2	1	N	1	1	1	N	2	1	1	N	1	1	1	N	1	2	N	1	2	N	1	1	1	1	2	1	1	1	1	1	1	N	1	N	1	2	1	2	1	Non-amplified
4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Amplified
5	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	Amplified
6	N	U	1	N	N	N	N	N	N	N	N	N	N	N	1	1	N	1	U	N	1	1	N	1	N	1	N	N	N	N	N	N	N	1	N	N	U	1	N	1	N	U	Non-amplified
7	U	U	U	U	U	U	U	N	N	U	U	U	N	U	1	N	N	U	N	U	U	1	U	U	N	U	U	1	N	N	U	U	U	U	U	U	U	U	U	U	U	--
8	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Amplified
9	N	1	2	1	N	1	1	1	1	2	1	1	N	1	2	1	N	2	1	N	1	1	N	1	1	1	1	2	1	1	1	N	1	1	N	1	N	N	2	1	2	1	Non-amplified
10	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N	N	N	N	N	N	N	N	N	N	N	N	Non-amplified
11	2	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	2	3	2	3	3	3	3	3	3	3	3	2	3	3	3	2	3	3	3	3	2	Amplified
12	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Amplified
13	N	1	2	1	N	N	1	N	N	1	1	N	N	1	N	1	N	N	1	N	N	N	N	1	1	1	1	1	1	1	1	N	1	1	N	1	N	N	2	1	2	1	Non-amplified
14	3	3	3	3	2	3	3	3	3	2	2	2	2	3	3	3	3	3	2	3	2	3	3	3	3	3	2	3	3	3	3	2	3	3	2	2	3	3	2	3	2	--
15	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	U	N	Non-amplified
16	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Amplified
17	N	1	2	N	1	1	1	N	N	1	1	1	N	1	1	1	N	1	1	N	N	N	N	1	1	1	N	1	1	1	1	N	1	1	N	N	N	N	2	1	2	1	Non-amplified
18	N	1	N	N	N	N	N	N	N	1	1	N	N	N	N	N	N	N	1	N	N	U	N	1	N	N	N	1	N	N	N	N	N	N	N	N	N	N	1	N	1	N	--
19	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	1	N	N	N	N	N	N	N	Non-amplified
20	N	1	2	1	N	1	1	1	N	1	1	1	N	1	1	1	1	1	1	1	1	1	U	1	1	N	N	N	1	N	N	N	N	U	1	N	N	1	U	1	N	1	--
21	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Non-amplified
22	N	1	N	N	N	N	N	N	N	N	N	N	N	N	1	1	N	N	1	N	N	1	N	1	N	N	N	N	N	N	N	N	N	1	N	N	N	N	1	N	1	N	Non-amplified
23	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	Amplified
24	1	1	1	1	N	1	1	1	2	2	1	1	N	1	2	1	1	1	2	1	U	U	U	U	U	N	U	U	U	U	U	U	U	U	N	N	U	U	N	U	U	Non-amplified
25	1	2	2	1	1	1	2	1	2	2	1	2	N	1	2	2	N	2	1	1	2	2	N	1	1	2	1	1	2	2	2	N	1	2	1	1	1	1	2	1	2	1	--
26	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Amplified
27	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Non-amplified
28	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	--
29	N	2	2	N	N	1	N	1	2	N	N	N	N	N	2	1	1	1	N	1	2	2	N	2	1	1	1	N	1	N	1	N	N	1	1	N	N	1	1	1	1	N	Non-amplified
30	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Amplified
31	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	3	3	3	3	3	3	2	3	3	2	U	U	3	U	U	U	3	U	U	2	U	Amplified
32	1	2	1	1	N	N	N	N	2	1	1	N	N	1	2	1	N	1	1	1	1	2	1	1	N	1	N	N	N	N	1	N	N	1	1	N	N	1	1	N	1	N	Non-amplified
33	U	U	N	U	U	U	N	U	U	U	N	N	N	N	N	N	U	N	U	U	U	N	U	U	N	N	N	N	N	U	U	N	U	N	N	N	U	U	N	N	U	N	--
34	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Non-amplified
35	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	1	N	N	1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	1	N	1	N	Non-amplified
36	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Amplified
37	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Non-amplified
38	1	2	1	1	N	1	1	1	2	1	1	1	N	1	2	1	1	1	N	1	1	2	1	1	1	1	1	N	2	1	1	N	N	1	1	N	N	1	1	N	1	1	Non-amplified
39	N	1	1	1	1	1	1	1	N	1	1	1	N	1	2	1	N	1	1	N	1	1	N	1	1	1	1	1	1	N	1	N	N	1	N	N	N	1	1	1	N	N	--
40	N	1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Non-amplified

Supplementary Tables 1 to 3 summarizing staining protocols and Supplementary Tables 4 to 6 summarizing descriptive statistics can also be found at the end of this document. Quality control methodologies of immunohistochemical assessment are evolving, and numeric results should be interpreted with caution. Your regular participation in cIQc is greatly appreciated and we look forward to continuing to work with you and the Canadian Association of Pathologists – Association Canadienne des Pathologistes.

Table S1. Reported ER staining protocols.

Lab ID	Ag Retrieval Method	Time for Ag Retrieval (min)	Ab Clone	Ab Dilution	Ab Supplier/ Vendor	Ab Lot No.	Time for Ab Incubation (min)	Detection System	Amplification (Y/N)	Enhancement (Y/N)	Chromogen
101	CC1	32 min	SP1	1:50	THERMO FISHER	9101S1501E	37, 32	Optiview	N	N	DAB
102	Dako PT - High pH TRS	20	EP1	1:50	DAKO	10114095	30	DAKO FLEX	NO	CUSO4	DAB+
103	CC1	64 mins	SP1	PRE	VENTANAN	790-4325	16 MINS	ULTRA VIEW	N	Y	DAB
106	CC1	64	SP1	predilute	Ventana/Roche	F08061	32	Optiview	no	no	DAB
107	ultra cc1	36	SP1	pre-diluted	Ventana	G03194	16	Ultraview DAB	N	Y	DAB
109	HIER high pH	64 MIN	SP1	RTU	VENTANA	G02331	32 MIN	ULTRAVIEW	N	Y	DAB
111	CC1	36	SP1	PREDILUTE	VENTANA	G06054	32	ULTRA	N	Y	DAB
112	Bond ER2 pH 9.0	20 minutes	SP1	1:200	ThermoFisher	9101S1604H	15 minutes @ RT	BOND POLYMER REFINE	NO	NO	DAB
114	CC1	32	SP1	1/50	Thermo Fisher	9101S1501J	16	Optiview	N	Y	DAB
115	HIER	30 MINS	EP1	RTU	DAKO	10117622	30 MINS	ENVISION FLEX	N	N	DAB
120	Waterbath	20	EP1	RTU	Dako	10110172	20	Envision Flex+	N	N	DAB
123	CC1	36 MIN	SP1	PREDILUTE	VENTANA/ROCHE	G03194	32 MIN	HRP	N	C	DAB
124	CC1	32 min	SP1	1/50	Cell Marque	1617304B	16 min	Optiview	n	n	dab
126	Steam Citrate, ph 6.0	45minutes	SP1	1:200	Thermo Scientific	9101S1604E	30 minutes	Envision Plus	NO	NO	DAB Plus
127	Automated (CC1 on Benchmark Ultra	36	SP1	PREDILUTE	VENTANA	F07779	32	ULTRAVIEW DAB DETECTION KIT	N	N	DAB
128	CC1	64 min	SP1	Pre-dilute	Ventana	G04150	16 min	Ultraview	No	Yes	DAB
129	ER 2- high pH retrieval	20	SP1	1:50	Thermo Scientific	9101S1604E	15	Bond Refine Detection Kit	N	N	DAB
132	Envision Flex high pH	20	EP1	RTU	DAKO	10112555	20	Envision Flex	N	N	DAB
133	HIER	36 minutes	SP1	pre dilute	Roche	F05106	32 minutes	polymer Ultraview	n	n	Dab
134	HIER - CC1	30	SP1	RTU	VENTANA/ROCHE	F09522	8	ULTRAVIEW	N	N	DAB
138	HIER High pH	20	EP1	RTU	Dako	10117194	20	Dako Envision Flex	N	N	DAB
141	HIER - CC1	30	SP1	RTU	VENTANA/ROCHE	F09522	8	ULTRAVIEW	N	N	DAB
144	CC1	24 min.	SP1	1:50	ThermoScientific	1604A	16 min.	OptiView	No	Yes, copper	DAB
145	CC1	32	SP1	1/100	CELLMARQUE	1422401B	16	XT OPTIVIEW ihc v4	n	n	DAB
146	Flex TRS High	20	EPI	RTU	Dako	10110172	20	EnVision FLEX	N	N	DAB
147	HIER	20	SP1	1:100	Thermo Scientific	9101S1604D	15	Leica Bond Refine	N	N	DAB
148	CC1	36MIN	SP1	RTU	VEN	G06054	8MIN	U	N	N	DAB
149	PT Link high pH	20 min at 97 C	EP1	RTU	Dako IR084	10116200	20	EnVision Flex	No	No	DAB
150	cc1	30 min	SP1	n/a	Ventana	# G02331	16 min	ultra view	n	y	DAB
151	BUFFER PH 9.0	20 MIN	SP1	1:25	THERMO FISHER	9101S1604H	15MIN	BOND REFINE	N	N	DAB
155	CC1	30	SP1	Predilute	Ventana		40	Ultraview dab	n	y	dab
157	CC1	24 MIN.	SP-1	PRE DILUTED	VENTANA	G04150	24 MIN.	OPTIVIEW BENCHMARK XT	Y	Y	DAB
159	High pH	40	Ep1	pre-diluted	Dako (Agilent Technologies)	10116200	20	Flex	N	N	DAB
160	CC1	36	SP1	Pre-Diluted	Ventana	G00585	8	Ultraview	N	CUSO4	DAB
161	HIER-High EDTA TRIS tampon	20 Minutes	EP1	RTU	DAKO	10117679	20 Minutes	Envision Flex	No	No	DAB
168	Cell Conditioning	60 min.	SP1	RTU	Roche	F07779	12 min.	Ultraview DAB	N	N	DAB
175	HIER	32	rabbit monoclonal	predilute	Roche diagnostics	904150	32 minutes	ultraview	N	Y	DAB
178	HIER	32	SP1	none	Ventana	F08061	16	Ultraview	N	N	DAB
183	ultra CCA	36 min	SP1	predilute	Roche	F10363	32 min	Ultraview	N	N	DAB
186	HIER	20	SP1	1:50	ThermoScientific	9101S1604D	15	POLYMER	N	N	DAB
187	CC1	16.0	SP1	None	Roche	G06054	8	Optiview	N	N	DAB
189	CC1	64	SP1	RTU	Ventana	unknown	16	ultraView DAB	N	N	ultraView DAB
190	CC1	32	SP1	PREDILUTE	VENTANA CONFIRM	1111	32	iVIEW	N	N	DAB
192	Ultra CC1	36 minutes	SP1	Ready to use	Ventana/Roche	G02331	16 minutes	Ventana Ultraview DAB	N	Y (copper)	DAB
194	CC1	30	SP1	PREDILUTE	VENTANA/ROVHE	G03194	12	IVIEW KIT(AVIDIN/BIOTIN)	Y	Y	DAB
196			SP1		VENTANA	G02331	8 MIN	DAB			
198	Envision Flex Tris high pH	30 min	EP1	Prediluted	Dako/Agilent	10117622	17 min	Envision Flex/HRP	N	N	DAB
199	ER-1 (BOND)	20	6F11	RTU	LEICA	46094	15	BOND REFINE	N	N	DAB
202	Leica ER2 citrate Buffer 9.5	20 min	6f11	1/300	vector	6027092	15 min	Refine Detection kit Leica	no	no	DAB
209	HIER	20 mins at 97C and then 20mins cooling down to 85C	EP1	Predilute	Dako	10117622	30mins	Envision plus	N	N	DAB
217	CCI	64	SP1	pre-dilute	Roche Ventana	E10753	20	Optiview	no	no	DAB
221	pH6 Citrate Buffer	20	SP1	1:100	Cell Marque	1603507B	30	Rabbit EnVision	N	N	DAB
230	HIER	60 min	SP1	none	Ventana	G04150	32 min	iView DAB	N	N	DAB

Table S2. Reported PR staining protocols.

Lab ID	Ag Retrieval Method	Time for Ag Retrieval (min)	Ab Clone	Ab Dilution	Ab Supplier/ Vendor	Ab Lot No.	Time for Ab Incubation (min)	Detection System	Amplification (Y/N)	Enhancement (Y/N)	Chromogen
101	CC1	32 min	16	1:100	Novocastra	6015355	37, 32	Optiview	N	N	DAB
102	DAKO PT - HIGH pH TRS	20	16	1:150	NOVOCASTRA	6044509	30	DAKO FLEX	NO	CUSO4	DAB+
103	CC1	64 mins	100	PRE	VENTANAN	790-4296	16 MINS	ULTRA VIEW	N	Y	DAB
106	CC1	64	PgR1294	1:150	Dako	10109383	32	Optiview	no	no	DAB
107	ultra cc1	64	PqR 1294	1:50	Dako	10117646	32	Ultraview DAB	Y	Y	DAB
109	HIER high pH	36 MIN	1294	1/50	DAKO	10114753	16 MIN	ULTRAVIEW	N	Y	DAB
111	CC1	48	16	1/80	LEICA	6041139	32	OPTIVIEW	N	Y	DAB
112	BOND ER2 pH 9.0	12 minutes	16	RTU	LEICA	46741	15 minutes	BOND POLYMER REFINE	NO	NO	DAB
114	CC1	32	16	1/25	Novocastra	6027462	16	Optiview	N	Y	DAB
115	HIER	30 MINS	PgR 1294	1/50	DAKO	10117646	20 MINS	ENVISION FLEX	N	N	DAB
120	Waterbath	20	Pgr636	RTU	Dako	10109504	20	Envision Flex+	N	N	DAB
123	CC1	64 MIN	16	1/25	LEICA/NOVOCASTRA	6041139	60 MIN	HRP	N	COPPER	DAB
124	CC1	30 min.	100	PrÃ©-diluÃ©	Ventana	G05131	12 min.	Ultra view	n	n	DAB
126	Microwave Pressure Cooker, Citrate Buffer, pH 6.0	35 Minutes	636	1:500	Dako	10110361	30 minutes	Envision Plus	NO	NO	DAB Plus
127	Automated (CC1 on Benchmark Ultra)	36	100	PREDILUTE	VENTANA	F09520	8	ULTRAVIEW DAB DETECTION KIT	N	N	DAB
128	CC1	64 min	100	Pre-dilute	Ventana	G05131	16 min	Ultraview	No	Yes	DAB
129	ER 2- high pH retrieval	20	16	1:400	Novocastra	6027295	15	Bond Refine Detection Kit	N	N	DAB
132	Envision Flex high pH	20	16	1:200	Leica	6041139	30	Envision Flex	N	N	DAB
133	HIER	64 minutes	16	1/25	Leica	6041139	60 minutes	Ultraview polymer	n	n	dab
134	HIER - CC1	30	100	RTU	VENTANA/ROCHE	F00392	12	ULTRAVIEW	N	N	DAB
138	HIER	20	636	RTU	Dako	10117079	20	Dako Envision Flex	N	N	DAB
141	HIER-CC1	30	100	RTU	VENTANA/ROCHE	F00392	12	ULTRAVIEW	N	N	DAB
145	CC1	32	NCL-L-PGR-312	1/100	LEICA	6041139	24	XT OPTIVIEW ihc v4	n	n	DAB
146	Flex TRS High	20	636	RTU	Dako	10101557	20	EnVision	N	N	DAB
147	HIER	20	16	1:800	NCL	6027295	15	Leica Bond Refine	N	N	DAB
149	PT Link high pH	20 min at 97 C	PgR636	RTU	Dako IR068	10114064	20	EnVision Flex	Yes	No	DAB
150	cc1	30 min	100	n/a	Ventana	# F05768	32min	ultra view	n	y	DAB
151	BUFFER PH 6.0	20 MIN	1A6	1:200	NCL	6027295	15 MIN	BOND REFINE	N	N	DAB
155	CC1	30	100	Predilute	Ventana		32	Ultraview dab	n	y	dab
157	CC1	24 MIN.	IE2	PRE DILUTED	VENTANA	G02756	24 MIN.	OPTIVIEW MENCHMARK XT	Y	Y	DAB
159	High pH	40	636	pre-diluted	Dako (Agilent Technologies)	10101557	30	Flex	N	N	DAB
160	CC!	36	100	Pre-Diluted	Ventana	G04962	8	Ultraview	N	CUSO4	DAB
161	HIER-Hier EDTA TRIS tampon	20 Minutes	PgR 636	RTU	DAKO	10117079	20 Minutes	Envision Flex	No	No	DAB
168	HIER	48 min.	PgR 636	RTU	Dako	10117079	20 min.	Envision Flex+	N	Y Link mouse	DAB
175	HIER	64	Rabbit mAb	pre-dilute	Roche diagnostics	905131	32 minutes	ultra-view	N	Y	DAB
178	HIER	32	100	none	Ventana	F09470	16	Ultraview	N	N	DAB
183	ULTRA CC1	36 MIN	100	PREDILUTE	ROCHE	G02756	32 MIN	ULTRAVIEW	N	N	DAB
186	HIER	20	PR88	1:100	BIOGENEX	MU32804	15	POLYMER	N	N	DAB
187	CC1	64.0	IE2	Predilute	Roche	G05131	12	Ultraview	N	N	DAB
189	CC1	64	100	RTU	Ventana	unknown	16	ultraView DAB	N	N	ultraView DAB
190	CC1	32	16	1:50	LEICA NOVOCASTRA	1111	32	iVIEW	N	N	DAB
192	Ultra CC1	36 minutes	100	Ready to use	Ventana/Roche	G02756	16 minutes	Ventana Ultraview DAB	N	Y (copper)	DAB
194	CC1	30	100	PREDILIUTE	VENTANA/ROCHE	G04962	20	IVIEW KIT(AVIDIN/BIOTIN)	N	Y	DAB
196			100		VENTANA	F10358	8 MIN	DAB			
198	Envision Flex Tris high pH	30 min	1294	1/100	Dako/Agilent	10112568	20 min	Envision Flex/ HRP	N	N	DAB
199	ER-2 (BOND)	20	16	1:200	LEICA	31060	15	BOND REFINE	N	N	DAB
202	Leica ER2 citrate Buffer 9.5	30 min	1.6	RTU Leica	Leica	46363	15 min	Refine Detection kit Leica	no	no	DAB
209	HIER	20mins at 97C and then 20mins cooling down to 85C	PgR636	Predilute	Dako	10117079	20mins	Envision plus	Y	N	DAB
217	CC1	64	IE1	pre-dilute	Roche Ventana	E09558	16	Optiview	no	no	DAB
221	pH6 Citrate Buffer	20	1A6	1:200	Leica	6041139	30	Mouse EnVision	N	N	DAB
230	HIER	30 min	100	none	Ventana	G05131	32 min	iView DAB	N	N	DAB

Table S3. Reported HER2 staining protocols.

Lab ID	Ag Retrieval Method	Time for Ag Retrieval (min)	Ab Clone	Ab Dilution	Ab Supplier/ Vendor	Ab Lot No.	Time for Ab Incubation (min)	Detection System	Amplification (Y/N)	Enhancement (Y/N)	Chromogen
101	CC1	32 min	SP3	1:200	9103S15090	THERMO/LAB VISION	37, 32	Optiview	N	N	DAB
102	DAKO PT - HIGH pH TRS	20	SP1	1:125	9103S1509M	LABVISION	30	DAB+	NO	CUS04	DAB+
103	CC1	36	4B5	PRE	790-2991	VENTANA	16 MINS	ULTRA VIEW	N	Y	DAB
106	CC1	36	4B5	predilute	F08704	Ventana/Roche	16	Ultraview	no	no	DAB
107	ultra cc1	36	4B5	pre-diluted	G04794	Ventana	12	ultraview DAB	N	Y	DAB
109	HIER HIGH pH	36 MIN	4B5	RTU	G05529	VENTANA	16 MIN	ULTRAVIEW	N	Y	DAB
111	CC1	36	4B5	PREDILUTE	G04794	VENTANA	32	ULTRAVIEW	N	Y	DAB
112	BOND ER2 pH 9.0	20 minutes	4B5	1:4 ratio of the RTU	G00135	Ventana/Roche	15 minutes @ RT	BOND POLYMER REFINE	NO	NO	DAB
114	CC1	32	SP3	1/200	9103S1509D	Thermo Fisher	32	Optiview	N	Y	DAB
115	HIER	40 MINS	HERCEPT TEST	RTU	20038535	DAKO	30 MINS	HERCEPT TEST	N	N	DAB
120	Waterbath	40	Herceptest	RTU	20037212	Dako	30	Envision Flex+	N	N	DAB
123	CC1	36 MIN	4B5	PREDILUTE	G04794	VENTANA/ROCHE	24 MIN	HRP	N	COPPER	DAB
124	CC1	8 min.	4B5	PrÃ©-diluÃ©	G04794	Ventana	20 min.	Ultra view	n	n	DAB
126	Steam, 30 minutes Tris, ph 10	55 minutes	SP3	1:100	9103S1606E	Thermo Scientific	30 minutes	Envision Plus	NO	NO	DAB Plus
127	Automated (CC1 on Benchmark Ultra)	36	4B5	PREDILUTE	G05529	VENTANA	24	ULTRAVIEW DAB DETECTION KIT	N	N	DAB
129	ER 2- high pH retrieval	20	SP3	1:100	RA2136461	Thermo Scientific	15	Bond Refine Detection Kit	N	N	DAB
133	HIER	36 minutes	4B5	pre dilute	G04794	Roche	24 minutes	Ultraview polymer	n	n	dab
138	HIER	40	HercepTest Her2	RTU	20037212	Dako	30	Dako HercepTest	N	N	HercepTest DAB
145	CC1	32	SP3	1/1000	1332302A	CELLMARQUE	40	XT OPTIVIEW ihc v4	n	n	DAB
147	HIER	20	SP3	1:75	RH2258121	Thermo Scientific	15	Leica Bond Refine	N	N	DAB
149	PT Link high pH	20 min at 97 C	SP3	1:100	91031509	Thermo RM4103-S	30	EnVision Flex	Yes	No	DAB
150	cc1	30 min	SP3	1/100	#9103S1606B	Neomarkers	32 min	Ultraview	n	y	DAB
151	BUFFER PH 9.0	20 MIN	SP3	1:75	RA2131961	THERMO	15 MIN	BOND REFINE	N	N	DAB
155	CC1	30	4B5	Predilute		Ventana	32	Ultraview dab	n	y	Dab
157	CC1	24 MIN.	4B-5	PRE DILUTED	G05529	VENTANA	24 MIN.	OPTIVIEW BENCHMARK XT	Y	Y	DAB
160	CC1	36	4B5	Pre-Diluted	G05529	Ventana	16	Ultraview	N	CUSO4	DAB
161	Herceptest epitope	40 Minutes	Rabbit anti-human HER protein	RTU	20037212	Dako	30 Minutes	Herceptest visualization reagent	No	No	Herceptest DAB chromogen
168	Cell Conditioning (CC)	30 min.	4B5 pathway	RTU	G06734	Roche	16 min.	Ultraview DAB	N	Y (Ultraview Copper)	DAB
175	HIER	32	Rabbit monoclonal	Pre-dilute	904876	Roche diagnostics	16 minutes	Ultra view	N	Y	DAB
181	on board CC1	30 minutes	4B5	pre-diluted	G04794	Ventana/Roche	16 minutes	Ventana Ultraview DAB	N	Y	DAB
186	HIER	20	POLYCLONAL	1:400	20023582	DAKO	15	POLYMER	N	N	DAB
187	CC1	16	4B5	Predilute	G04794	Roche	24	Optiview	N	N	DAB
189	CC1	32	4B5	RTU	unknown	Ventana	16	ultraView DAB	N	N	ultraView DAB
190	CC1	32	SP3 RABBIT	1:50	1111	THERMOFISHER	40	iVIEW	Y	N	DAB
194	CC1	30	4B5	PREDILUTE	G05529	VENTANA/ROCHE	12	IVIEW KIT(AVIDIN/BIOTIN)	N	Y	DAB
198	CC1	36 min	4B5	Prediluted	G04794	Roche/Ventana	32 min	Ultraview	N	Y	DAB
199	ER-2 (BOND)	20	SP3	1:300	1602506A	CELL MARQUE	15	BOND REFINE	N	N	DAB
202	Herceptest test Epitope Retreival ph 6.0	40 min	Her2	RTU DAKO Herceptest	20038535	DAKO	30 min	Herceptest kit DAKO	no	no	DAB
217	CC1	32	4B5	pre-dilute	790-2991	Roche Ventana	20	Optiview	no	no	DAB
221	Dako Visualization Solution	40	Dako Hercep Test	NEAT	123456	Dako	30	Dako Kit	N	N	DAB
230	HIER	30 min	4B5	none	G06734	Ventana	16 min	iView DAB	N	N	DAB

Table S4. Descriptive statistics for ER after cIQc assessment.

Lab ID	Total n	% scorable	Pairwise complete observations	Concordance with reference (%)	Sensitivity	Specificity	Cohen's kappa
101	40	92.5	35	35/35 (100%)	1	1	1
102	40	90	34	34/34 (100%)	1	1	1
103	40	90	34	34/34 (100%)	1	1	1
106	40	92.5	35	34/35 (97%)	1	0.89	0.92
107	40	90	34	33/34 (97%)	0.96	1	0.92
109	40	90	34	34/34 (100%)	1	1	1
111	40	92.5	35	35/35 (100%)	1	1	1
112	40	90	34	34/34 (100%)	1	1	1
114	40	92.5	35	33/35 (94%)	0.96	0.88	0.84
115	40	90	34	32/34 (94%)	0.92	1	0.85
120	40	92.5	35	30/35 (86%)	0.81	1	0.67
123	40	90	34	34/34 (100%)	1	1	1
124	40	95	36	35/36 (97%)	1	0.89	0.92
125	40	92.5	35	34/35 (97%)	1	0.88	0.92
126	40	95	36	36/36 (100%)	1	1	1
127	40	90	34	34/34 (100%)	1	1	1
128	40	92.5	35	35/35 (100%)	1	1	1
129	40	90	34	34/34 (100%)	1	1	1
132	40	92.5	35	35/35 (100%)	1	1	1
133	40	90	34	32/34 (94%)	1	0.75	0.82
134	40	92.5	35	34/35 (97%)	0.96	1	0.93
138	40	92.5	35	33/35 (94%)	0.93	1	0.85
141	40	87.5	33	32/33 (97%)	0.96	1	0.91
144	40	90	34	34/34 (100%)	1	1	1
145	40	92.5	35	34/35 (97%)	1	0.88	0.92
146	40	92.5	35	35/35 (100%)	1	1	1
147	40	90	34	33/34 (97%)	0.96	1	0.92
148	40	92.5	35	33/35 (94%)	0.92	1	0.86
149	40	92.5	35	33/35 (94%)	0.92	1	0.87
150	40	92.5	35	33/35 (94%)	0.92	1	0.86
151	40	90	34	32/34 (94%)	0.92	1	0.87
155	40	92.5	35	34/35 (97%)	0.96	1	0.93
157	40	92.5	35	35/35 (100%)	1	1	1
159	40	92.5	35	34/35 (97%)	0.96	1	0.93
160	40	92.5	35	34/35 (97%)	0.96	1	0.93
161	40	95	36	34/36 (94%)	0.92	1	0.87
168	40	97.5	36	35/36 (97%)	1	0.9	0.93
175	40	95	36	36/36 (100%)	1	1	1
178	40	92.5	35	33/35 (94%)	0.92	1	0.86
183	40	95	36	36/36 (100%)	1	1	1
186	40	92.5	35	34/35 (97%)	0.96	1	0.93
187	40	90	34	34/34 (100%)	1	1	1
189	40	92.5	35	33/35 (94%)	0.96	0.89	0.85
190	40	90	34	32/34 (94%)	0.92	1	0.86
192	40	87.5	33	32/33 (97%)	0.96	1	0.92
194	40	90	34	34/34 (100%)	1	1	1
196	40	90	34	34/34 (100%)	1	1	1
198	40	92.5	35	33/35 (94%)	0.92	1	0.87
199	40	90	34	32/34 (94%)	0.92	1	0.86
202	40	90	34	32/34 (94%)	0.92	1	0.86
209	40	92.5	35	33/35 (94%)	0.92	1	0.87
217	40	90	34	32/34 (94%)	1	0.78	0.84
221	40	90	34	32/34 (94%)	0.92	1	0.86
230	40	85	32	32/32 (100%)	1	1	1

Table S5. Descriptive statistics for PR after cIQc assessment.

Lab ID	Total n	% scorable	Pairwise complete observations	Concordance with reference (%)	Sensitivity	Specificity	Cohen's kappa
101	40	90	34	29/34 (85%)	1	0.74	0.71
102	40	90	34	34/34 (100%)	1	1	1
103	40	90	34	28/34 (82%)	0.94	0.72	0.65
106	40	90	34	34/34 (100%)	1	1	1
107	40	90	34	33/34 (97%)	0.94	1	0.94
109	40	87.5	33	33/33 (100%)	1	1	1
111	40	92.5	34	32/34 (94%)	0.94	0.94	0.88
112	40	85	31	31/31 (100%)	1	1	1
114	40	87.5	33	32/33 (97%)	1	0.94	0.94
115	40	90	33	32/33 (97%)	1	0.94	0.94
120	40	90	34	32/34 (94%)	0.94	0.94	0.88
123	40	90	34	32/34 (94%)	0.94	0.94	0.88
124	40	90	34	34/34 (100%)	1	1	1
125	40	90	34	33/34 (97%)	0.94	1	0.94
126	40	92.5	35	33/35 (94%)	0.94	0.95	0.88
127	40	90	33	32/33 (97%)	0.94	1	0.94
128	40	92.5	34	29/34 (85%)	0.94	0.78	0.71
129	40	90	33	33/33 (100%)	1	1	1
132	40	92.5	35	34/35 (97%)	0.94	1	0.94
133	40	90	33	32/33 (97%)	0.94	1	0.94
134	40	90	34	33/34 (97%)	0.94	1	0.94
138	40	90	34	34/34 (100%)	1	1	1
141	40	87.5	32	27/32 (84%)	1	0.71	0.69
145	40	87.5	33	33/33 (100%)	1	1	1
146	40	90	34	33/34 (97%)	1	0.95	0.94
147	40	90	33	33/33 (100%)	1	1	1
149	40	92.5	34	34/34 (100%)	1	1	1
150	40	90	33	33/33 (100%)	1	1	1
151	40	92.5	34	34/34 (100%)	1	1	1
155	40	92.5	35	32/35 (91%)	1	0.85	0.83
157	40	92.5	35	30/35 (86%)	0.93	0.8	0.72
159	40	90	33	33/33 (100%)	1	1	1
160	40	90	34	34/34 (100%)	1	1	1
161	40	92.5	34	34/34 (100%)	1	1	1
168	40	100	36	35/36 (97%)	1	0.95	0.94
175	40	92.5	35	29/35 (83%)	0.93	0.75	0.66
178	40	92.5	34	33/34 (97%)	0.93	1	0.94
183	40	90	34	31/34 (91%)	1	0.84	0.82
186	40	92.5	35	35/35 (100%)	1	1	1
187	40	85	31	30/31 (97%)	1	0.94	0.94
189	40	85	32	29/32 (91%)	0.93	0.88	0.81
190	40	90	34	33/34 (97%)	0.93	1	0.94
192	40	82.5	31	30/31 (97%)	1	0.94	0.94
194	40	90	34	34/34 (100%)	1	1	1
196	40	90	34	33/34 (97%)	1	0.95	0.94
198	40	90	34	34/34 (100%)	1	1	1
199	40	95	35	34/35 (97%)	0.93	1	0.94
202	40	87.5	33	32/33 (97%)	1	0.95	0.94
209	40	87.5	33	33/33 (100%)	1	1	1
217	40	92.5	35	30/35 (86%)	0.93	0.8	0.72
221	40	92.5	35	35/35 (100%)	1	1	1
230	40	87.5	33	33/33 (100%)	1	1	1

Table S6. Descriptive statistics for HER2 after cIQc assessment (Core 23 excluded from analyses).

Lab ID	Total n	% scorable	Pairwise complete observations	Concordance with reference (%)	Sensitivity	Specificity	Cohen's kappa
101	39	89.74	35	35/35 (100%)	1	1	1
102	39	87.18	34	34/34 (100%)	1	1	1
103	39	92.31	36	36/36 (100%)	1	1	1
106	39	87.18	34	34/34 (100%)	1	1	1
107	39	87.18	34	34/34 (100%)	1	1	1
109	39	87.18	34	34/34 (100%)	1	1	1
111	39	92.31	36	36/36 (100%)	1	1	1
112	39	89.74	35	35/35 (100%)	1	1	1
114	39	89.74	35	35/35 (100%)	1	1	1
115	39	87.18	34	34/34 (100%)	1	1	1
120	39	89.74	35	35/35 (100%)	1	1	1
123	39	89.74	35	35/35 (100%)	1	1	1
124	39	92.31	36	36/36 (100%)	1	1	1
125	39	89.74	35	35/35 (100%)	1	1	1
126	39	92.31	36	36/36 (100%)	1	1	1
127	39	92.31	36	36/36 (100%)	1	1	1
129	39	89.74	35	35/35 (100%)	1	1	1
133	39	89.74	35	35/35 (100%)	1	1	1
138	39	87.18	34	34/34 (100%)	1	1	1
145	39	87.18	34	34/34 (100%)	1	1	1
147	39	84.62	33	33/33 (100%)	1	1	1
149	39	92.31	36	36/36 (100%)	1	1	1
150	39	87.18	34	34/34 (100%)	1	1	1
151	39	89.74	35	35/35 (100%)	1	1	1
155	39	94.87	37	37/37 (100%)	1	1	1
157	39	94.87	37	37/37 (100%)	1	1	1
160	39	92.31	36	36/36 (100%)	1	1	1
161	39	94.87	37	37/37 (100%)	1	1	1
168	39	94.87	37	37/37 (100%)	1	1	1
175	39	92.31	36	36/36 (100%)	1	1	1
181	39	87.18	34	34/34 (100%)	1	1	1
186	39	89.74	35	35/35 (100%)	1	1	1
187	39	87.18	34	34/34 (100%)	1	1	1
189	39	89.74	35	35/35 (100%)	1	1	1
190	39	89.74	35	35/35 (100%)	1	1	1
194	39	92.31	36	36/36 (100%)	1	1	1
198	39	84.62	33	33/33 (100%)	1	1	1
199	39	89.74	35	35/35 (100%)	1	1	1
202	39	87.18	34	34/34 (100%)	1	1	1
217	39	92.31	36	36/36 (100%)	1	1	1
221	39	87.18	34	34/34 (100%)	1	1	1
230	39	87.18	34	34/34 (100%)	1	1	1