Are commercial assays able to detect all the high-risk HPV genotypes?

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Background

The United Kingdom National External Quality Assessment Service (UK NEQAS) for Microbiology has been providing external quality assessment (EQA) for Molecular detection of Human Papillomavirus (HPV) since 2009. Participants are sent liquid based cytology specimens (PreservCyt) and are scored on the presence or absence of high risk (HR) HPV genotypes with the option to report low risk (LR) genotypes and any non-carcinogenic genotypes.

Graph 1. Genotypes detected by commercial assays

Methods

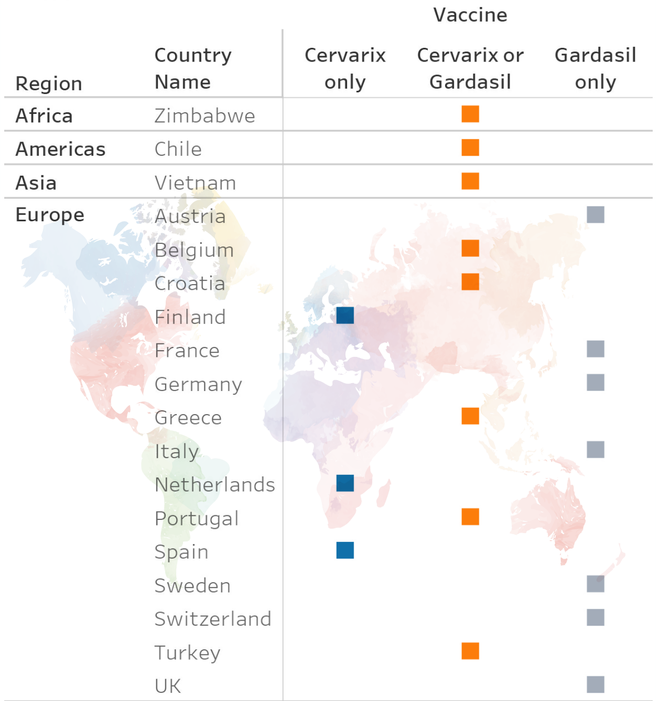
A questionnaire was sent out to 156 participants enrolled to this scheme to query about HPV testing practices. An analysis was carried out to compare whether commercial assays can detect all the high risk genotypes that UK NEQAS for Microbiology has distributed within the last three years. Furthermore, a literature research was conducted to see which vaccines are used in each participant's country and if they screen for the genotypes that the vaccines cover (Cervarix – 16,18; Gardasil 6, 11, 16, 18).

Results

- 105 (67.3%) participants from 18 countries reported which HR genotypes they screen for routinely
- 85 (54.5%) participants reported which LR genotypes they are routinely screening for
- 82 (52.6%) reported which other genotypes they might screen

Graph 1 shows the genotypes that each commercial assay is able to detect based on the questionnaire results.

- All 24 assays were able to detect genotypes 16 and 18
- 22 assays were able to detect 12 other HR genotypes
- International guidelines require screening for types 16 and 18 but many laboratories screen for other 12 HR genotypes too



Graph 2. Vaccine given by region and country

Graph 2 illustrates HPV vaccine given by region and country.

- Cervarix or Gardasil are used by 8 countries
- Gardasil only is used by 7 countries
- Cervarix only is used by 3 countries
- HPV vaccine is administered free of charge in all the countries except Turkey and Zimbabwe

Graph 3 shows all the genotypes that were sent out in the UK NEQAS distributions during the last three years.

- Overall performance is 96.8%
- Only three specimens have had a performance score under 90%

Distribution	Specimen	HR	LR	Performance	High(H)/Low(L) positive
3696	2656	31,39	61,CP6108	96.6	H
	2657	-	42	98.3	-
	2658	-	54	97.5	-
	2659	16,51,58	6,CP6108	98.3	H
3750	2818	-	-	99.2	-
	2819	35,39,59	-	97.7	H
	2820	56	6,42,61,81	93.1	H
	2821	18	-	97.7	L
3807	2998	51	-	95.3	H
	2999	33,59	53	99.2	H
	3000	-	-	98.4	-
	3001	16	-	100.0	H
3920	3236	-	-	100.0	-
	3237	16,39	-	99.3	H
	3238	35,58,68	-	96.3	H
	3239	18,39	-	91.0	H
3975	3404	-	-	97.9	-
	3405	16	66	93.8	H
	3406	51	-	94.5	H
	3407	-	42	96.5	-
4031	3582	18	-	97.2	H
	3583	68	42,62,84	**88.7**	H
	3584	-	42	98.6	-
	3585	-	83	98.6	-
4106	3847	-	-	98.5	-
	3848	-	-	99.3	-
	3849	56,59	42	99.3	H
	3850	33,35,39	54,81	99.3	H
4162	4017	-	-	99.3	-
	4018	-	-	99.3	-
	4019	16,35,45,52	62	**88.1**	H
	4020	16	-	99.3	H
4220	4201	18	-	**84.6**	L
	4202	16,31,45	-	97.1	H
	4203	-	42	99.3	-
	4204	-	-	98.5	-

Graph 3. Genotypes sent out and performance (%)

Conclusion

Cervical cancer is the fourth most common cancer in women. A large majority (around 85%) of the global burden occurs in the less developed regions. Age-standardised rate for world is 14.0, Africa 27.6, Americas 14.9, Asia 12.7, Europe 11.4 and Oceania 10.2 (per 100,000).

The data illustrates that not all commercial assays are able to detect all the high risk HPV genotypes that can cause malignancy. There also seems to be an assay preference in some countries like Roche in the UK and Genomica: CLART HPV 2 in Portugal. Molecular testing for HPV and cervical cytology complement each other in cervical cancer screening, especially in abnormal cases.

The epidemiological analysis shows that most of the countries are screening for more than the two core high risk genotypes which is a good practice. However, the survey results might not be the true representation for the country.

Acknowledgement

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References

References are available on request.