Vaccination anti-HPV en Tunisie

Pr Foued BELLAZREG

Hammamet, le 23 mai 2025

HPV

- ❖ virus à ADN

  famille : *Papillomaviridae*

- ➢ IST la plus fréquente dans le monde

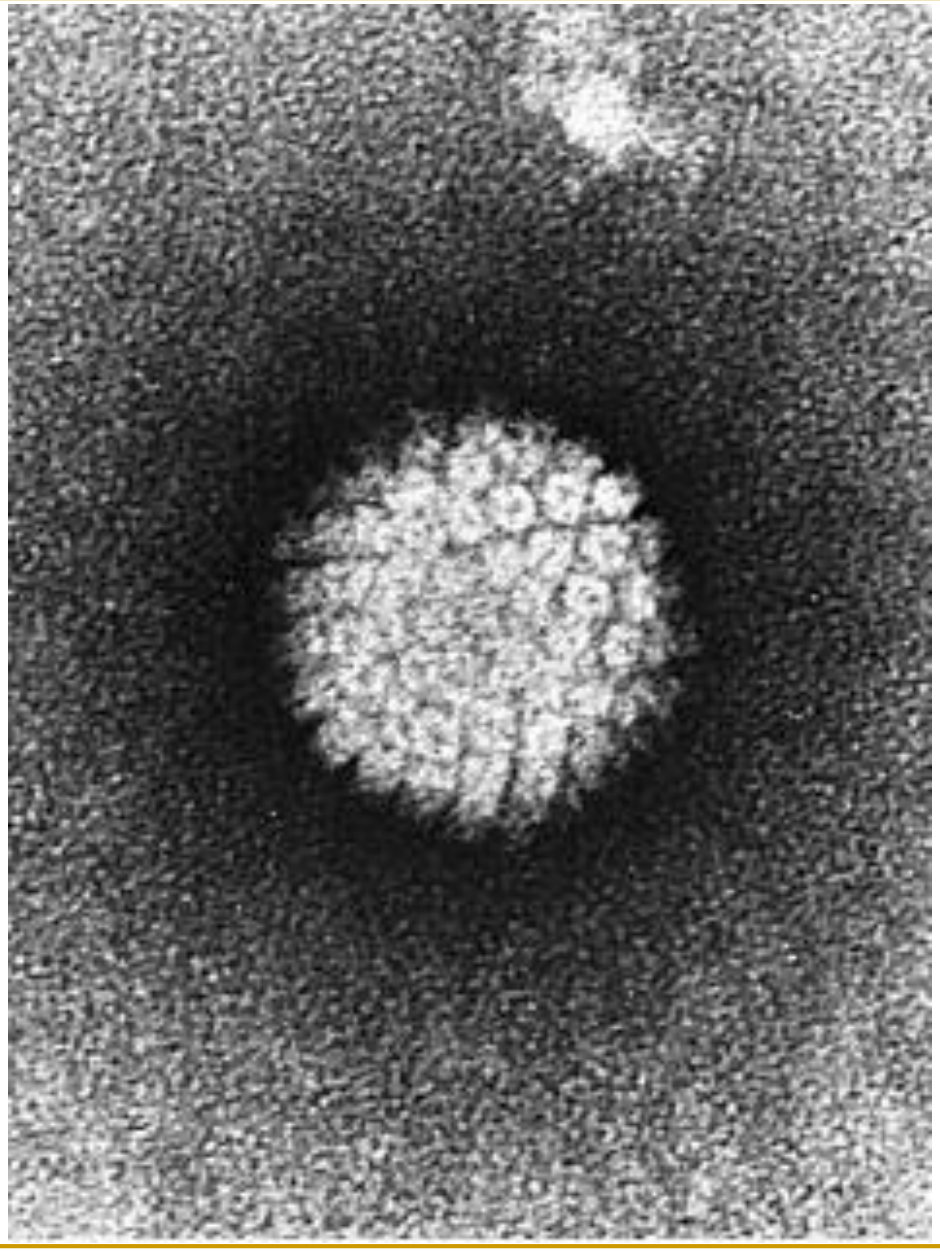
Mavundza EJ et al, Human Vaccin Immunother (2025)

HPV

❖ > 200 sérotypes

- haut risque oncogène (12) : 16, 18, 31, 33, 45, 52, 58 …
- faible risque oncogène : 6, 11 …

Karakusevic A et al. Ther Adv Vaccines Immunother (2024)
Mavundza EJ et al, Human Vaccin Immunother (2025)



HPV

❖ infection :

- asymptomatique, transitoire

- persistante

WHO. Weekly epidemiological record (2022)
Mavundza EJ et al, Human Vaccin Immunother (2025)

HPV

❖ infection persistante :

➢ condylomes acuminés (90% HPV 6, 11)

➢ cancers :

- col de l'utérus (71% HPV 16, 18)
- vulve, vagin (70%), anus (90%), verge
- oropharynx

WHO. Weekly epidemiological record (2022)
Mavundza EJ et al, Human Vaccin Immunother (2025)

HPV

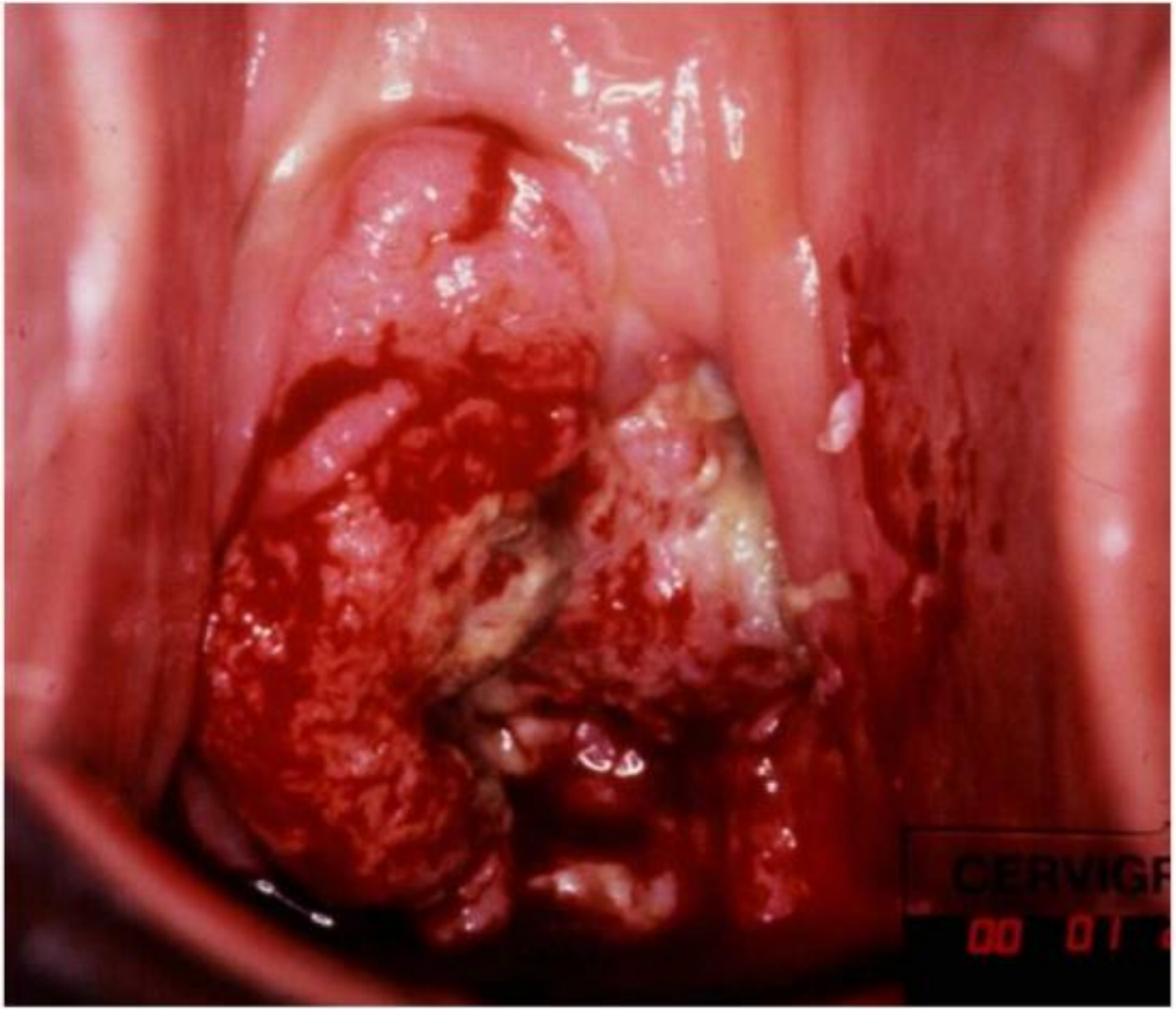
❖ cancer du col de l'utérus (monde) :

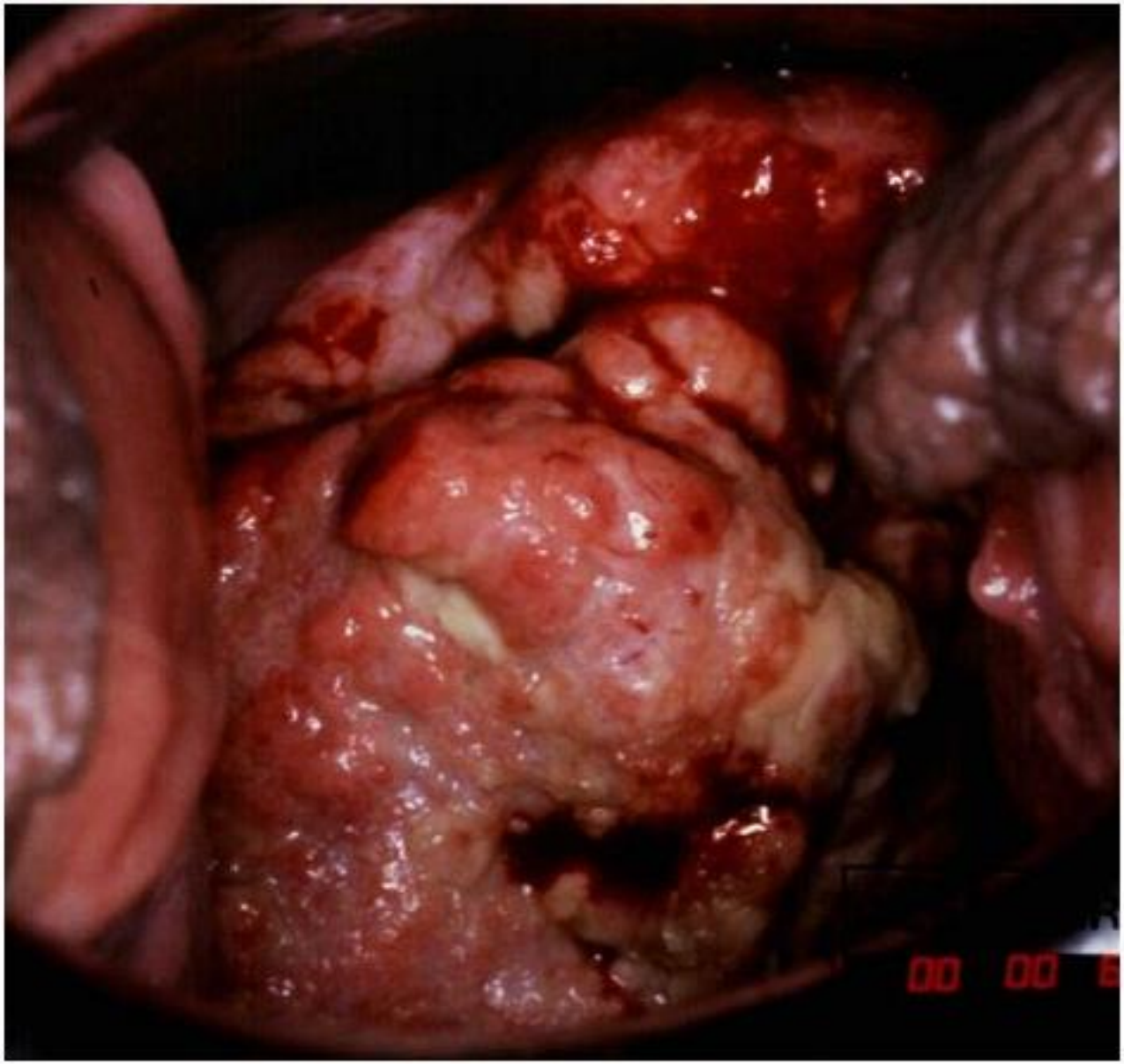
- 604 127 nouveaux cas

- 341 831 décès

➢ mortalité 56%

Mavundza EJ et al, Human Vaccin Immunother (2025)





HPV en TUNISIE

❖ cancer du col de l'utérus :

- 300 nouveaux cas / an
- 185 décès / an

➢ Mortalité 62%

- 70% cancer invasif, inopérable
- coût direct : 25 000 DT / patiente

https://santetunisie.rns.tn/images/tdr_consultant_introductionhpv2024.pdf (Ministère Santé Tunisie)

viruses

MDPI

Article

The Prevalence, Genotype Distribution and Risk Factors of Human Papillomavirus in Tunisia: A National-Based Study

Monia Ardhaoui [1,2,*], Hejer Letaief [3], Emna Ennaifer [1,2], Souha Bougatef [3], Thelja Lassili [1,2], Rahima Bel Haj Rhouma [2], Emna Fehri [1,2], Kaouther Ouerhani [1,2], Ikram Guizani [2], Myriam Mchela [3], Karim Chahed [3], Mohamed Kouni Chahed [4], Mohamed Samir Boubaker [1,4] and Nissaf Bouafif Ben Alaya [3]

1 Department of Human and Experimental Pathology, Institut Pasteur de Tunis, Tunis 1002, Tunisia
2 Laboratory of Molecular Epidemiology and Experimental Pathology, Institut Pasteur de Tunis, Tunis 1002, Tunisia
3 National Observatory of New and Emergent Diseases, Tunis 1002, Tunisia
4 Laboratory of Biomedical Genomics and Oncogenetics, Institut Pasteur de Tunis, Tunis 1002, Tunisia
* Correspondence: ardhaouimonia@gmail.com

❖ étude transversale

- 2012 - 2014
- ONMNE, IPT
- Tunisie / 24 gouvernorats
- première ligne :

CSB, Centres Régionaux de Santé de la Reproduction

Ardhaoui M al al. Viruses (2022)

❖ 1229 femmes

- âge moyen 40 ans (± 4,2)

➢ Frottis cervico-vaginal

- ADN HPV, génotypage

Ardhaoui M al al. Viruses (2022)

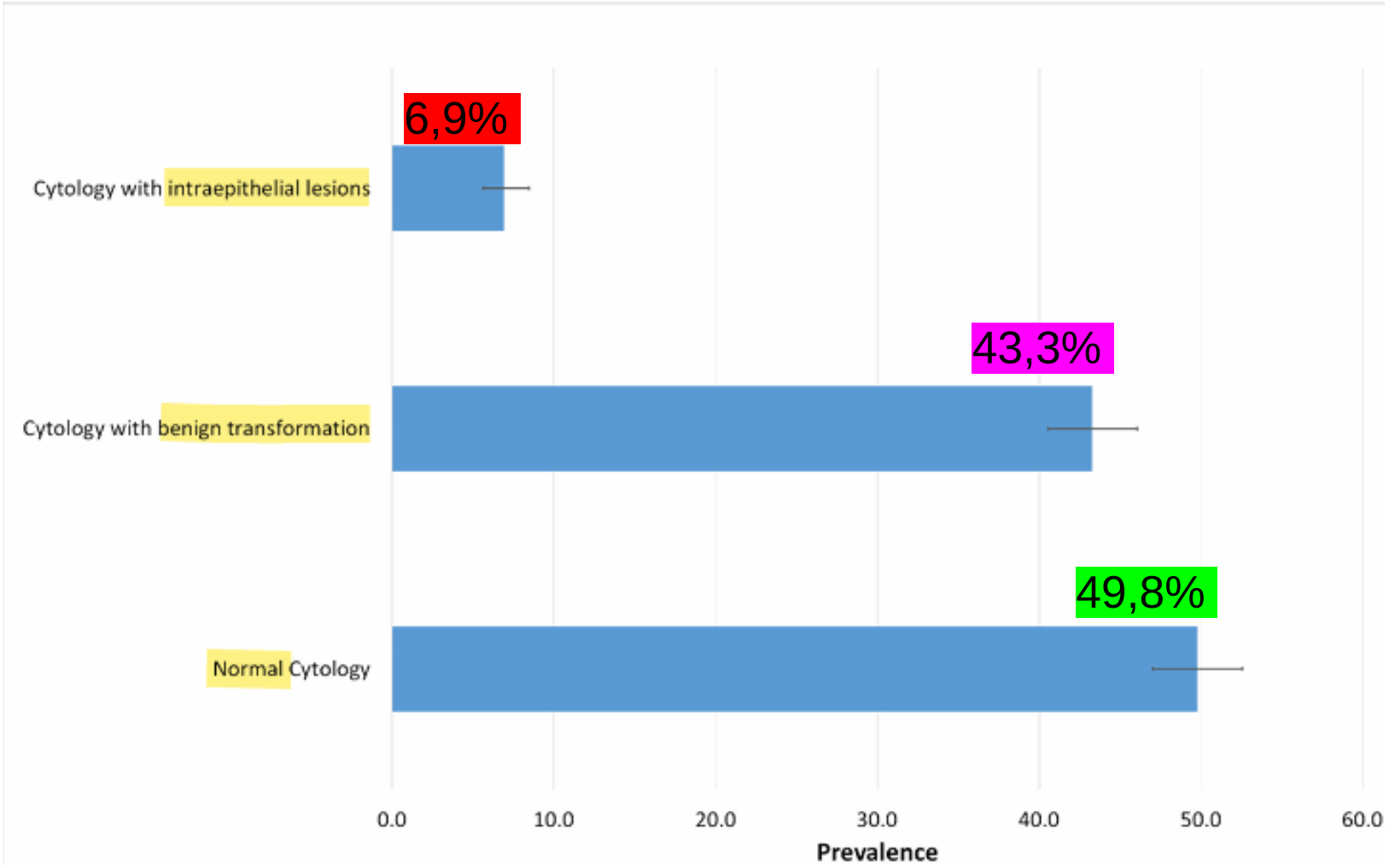


Figure 2. Distribution of cytological profiles of the study population.

Ardhaoui M al al. Viruses (2022)

Prévalence globale du HPV : 7,8%

Ardhaoui M al al. Viruses (2022)

Table 2. Distribution of single and multiple HPV infections.

	Single Infection	Multiple Infection				
		Double	Triple	Quadruple	Quintet	Total
n (%)	75 (78.1%)	12 (12.5%)	7 (7.3%)	1 (1%)	1 (1%)	96 (100%)

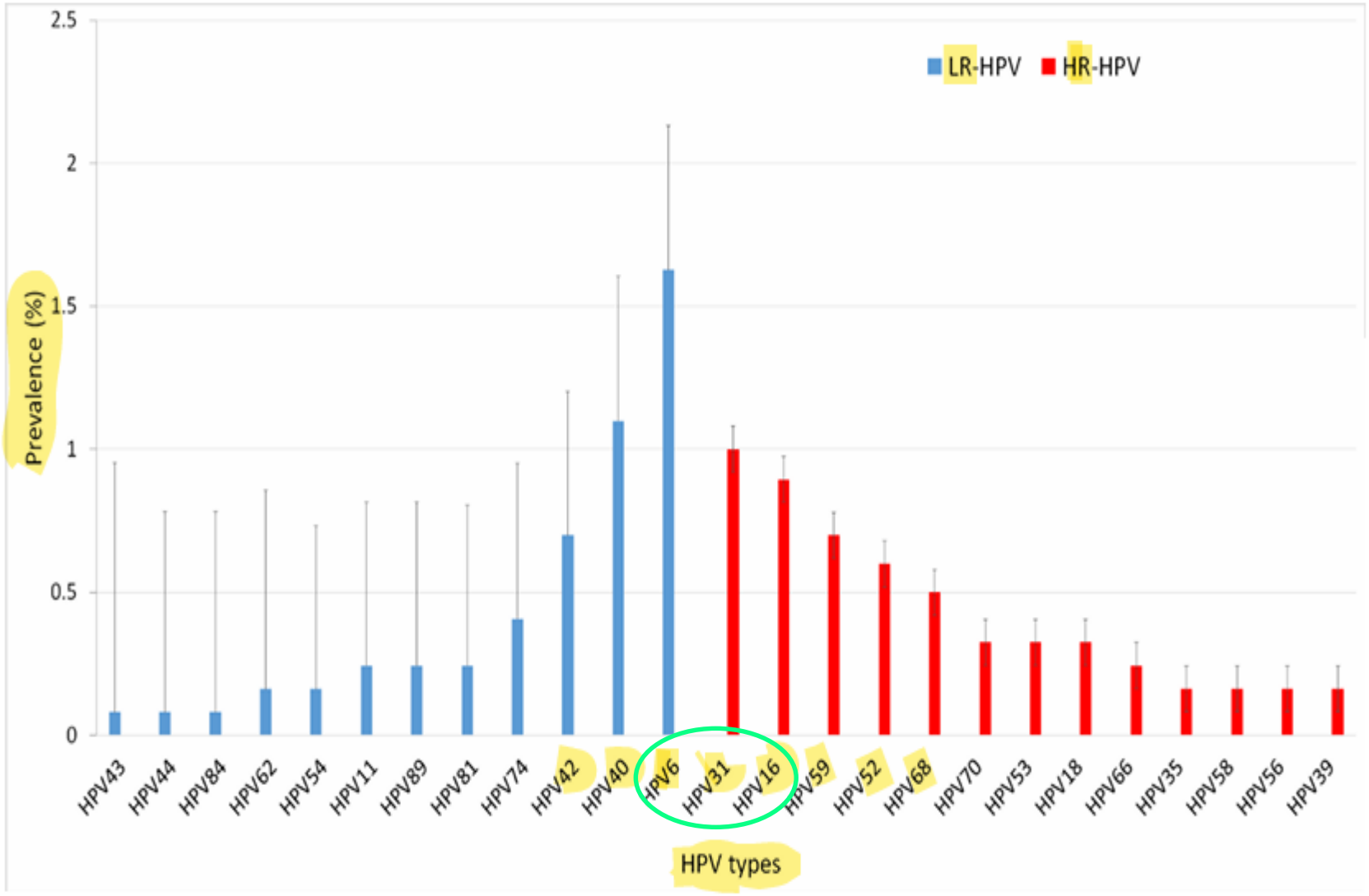
Ardhaoui M al al. Viruses (2022)

Table 3. HPV infection status according to cytology.

	HPV Positive	HPV Negative	*p*
Normal cytology	49 (8%)	563 (92%)	
Cytology with benign transformations	37 (7%)	495 (93%)	0.25
Cytology with intraepithelial lesions	10 (11.8%)	75 (88.2%)	

p: *p* value for the association between HPV status and cytological profile.

Ardhaoui M al al. Viruses (2022)



Ardhaoui M al al. Viruses (2022)

Bel Haj Rhouma *et al. Infectious Agents and Cancer* (2021) 16:52
https://doi.org/10.1186/s13027-021-00392-1

Infectious Agents and Cancer

RESEARCH ARTICLE Open Access

Distribution of human papillomavirus in precancerous and cancerous cervical neoplasia in Tunisian women

Rahima Bel Haj Rhouma[1,2*†], Monia Ardhaoui[1,2†], Emna El Fehri[1,2], Asma Marzougui[1,2], Thalja Laassili[1], Ikram Guizani[2], Med Samir Boubaker[1] and Emna Ennaifer[1,2]

❖ étude rétrospective

- 2016 - 2019

- Institut Pasteur de Tunis

➢ 200 femmes (CIN I 82, CIN II/III 92, cancer du col 26)

ADN HPV et génotypage

Bel Haj Rhouma R et al. Infect Agent Cancer (2021)

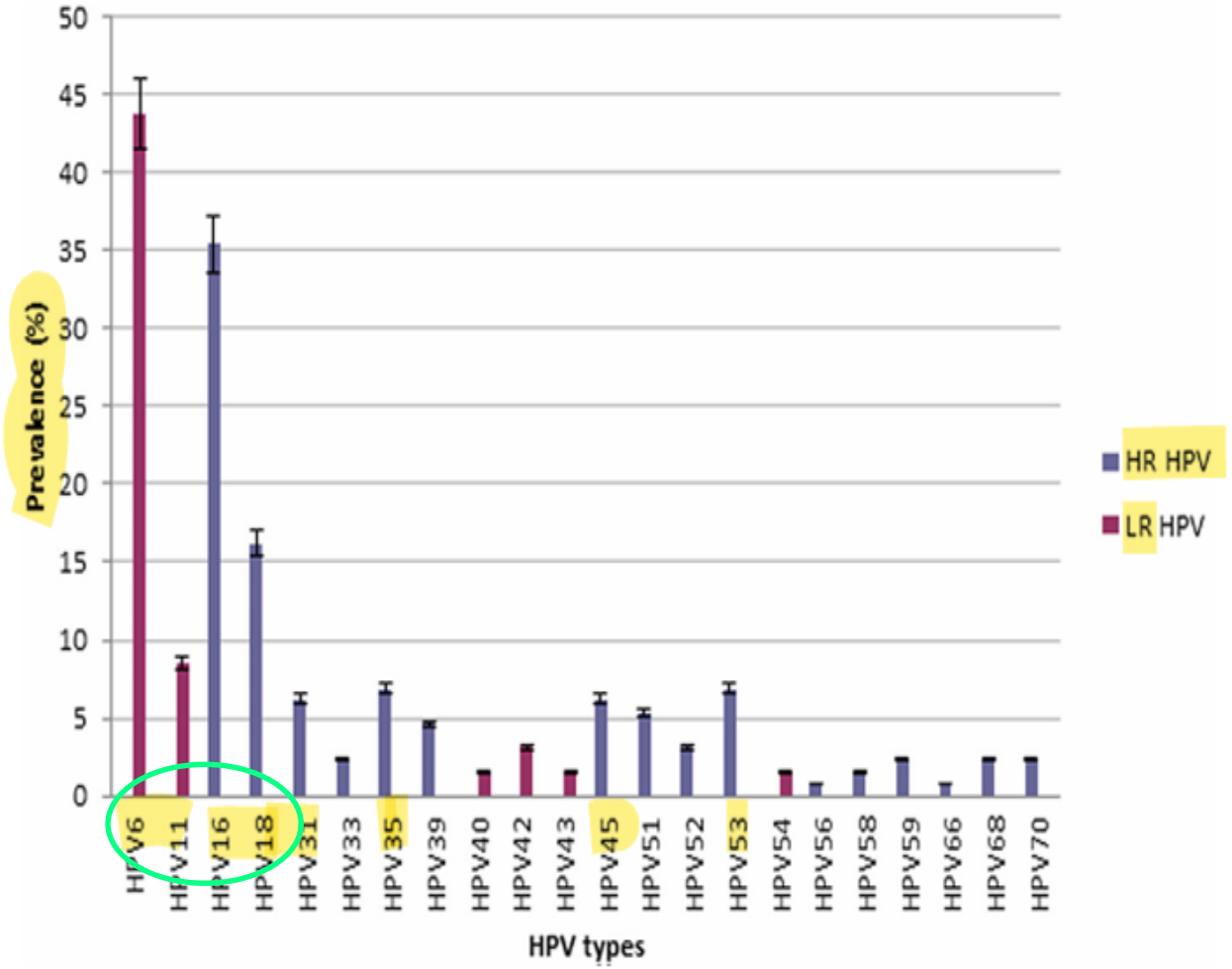


Fig. 3 Distribution of HR-HPV and LR-HPV genotypes intraepithelial cervical neoplasia. Error bars: percentage error 5%

Bel Haj Rhouma R et al. Infect Agent Cancer (2021)

Table 3 Distribution of HR-HPV types according to cervical intraepithelial neoplasia

	CC	CINI	CINII/CINIII	Total
	n (%)	n (%)	n (%)	
HPV16	9 (24.3%)	21 (56.7%)	7 (18.9%)	37
HPV18	8 (53.3%)	2 (13.3%)	5 (33.3%)	15
HPV31	0 (0.0%)	7 (100.0%)	0 (0.0%)	7
HPV33	0 (0.0%)	2 (100.0%)	0 (0.0%)	2
HPV35	2 (25%)	3 (37.5%)	3 (37.5%)	8
HPV39	0 (0.0%)	5 (100.0%)	0 (0.0%)	5
HPV45	4 (57.5%)	1 (14.2%)	2 (28.5%)	7
HPV51	0 (0.0%)	5 (83.3%)	1 (16.6%)	6
HPV52	0 (0.0%)	3 (100.0%)	0 (0.0%)	3
HPV53	3 (37.5%)	5 (62.5%)	0 (0.0%)	8
HPV56	0 (0.0%)	1 (100.0%)	0 (0.0%)	1
HPV58	2 (100.0%)	0 (0.0%)	0 (0.0%)	2
HPV59	3 (100.0%)	0 (0.0%)	0 (0.0%)	3
HPV66	2 (50.0%)	2 (50.0%)	0 (0.0%)	4
HPV68	1 (100.0%)	0 (0.0%)	0 (0.0%)	1
HPV70	0 (0.0%)	3 (100.0%)	0 (0.0%)	3

Bel Haj Rhouma R et al. Infect Agent Cancer (2021)

RESEARCH ARTICLE

Type-Specific Human Papillomavirus Distribution in Invasive Squamous Cervical Carcinomas in Tunisia and Vaccine Impact

Emna Ennaifer[1,3]*, Faten Salhi[1,3], Thalja Laassili[1,3], Emna Fehri[1,3], Nissaf Ben Alaya[2], Ikram Guizani[1], Samir Boubaker[3]

[1]HPV Research Unit, Laboratory of Molecular Epidemiology and Experimental Pathology Applied to Infectious Diseases, [3]Department of Human and Experimental Pathology, Pasteur Institute of Tunis, [2]National Observatory of Novel and Emergent Diseases, Tunis,

❖ 2001 - 2011

- IPT, La Marsa, Nabeul, Sfax

➢ 89 femmes / cancer du col de l'utérus

- ADN HPV et génotypage

Ennaifer E al al. Asian Pac J Cancer Prev (2015)

ADN HPV positif : 100%

Ennaifer E al al. Asian Pac J Cancer Prev (2015)

Table 1. Proportional Distribution of HR-HPV Types that were Detected in this Series of Invasive Cervical Carcinoma

HR-HPV type	Total	%	Single infections number	Single infections %	Mixed infections number	Mixed infections %
16	66	86.6	26	34.2	40	52.6
18	35	46	6	7.89	29	38.1
35	20	26.3	21	2.63	18	23.6
45	17	22.3	0	1.3	16	21
59	14	18.42	0	0	14	18.4
66	8	10.52	0	0	8	10.52
73	6	8.45	0	0	6	8.45
58	7	9.2	0	0	7	9.2
53	5	6.5	0	0	5	6.5
68	4	5.2	0	0	4	5.2
33	1	1	0	0	1	1
31	1	1	0	0	1	1

Ennaifer E al al. Asian Pac J Cancer Prev (2015)

VACCINS ANTI-HPV

❖ nombre de sérotypes :

- Bivalent : HPV 16, 18
- Tétravalent : HPV 16, 18, 6, 11
- Nonavalents : 16, 18, 6, 11, 31, 33, 45, 52, 58

Ardhaoui M al al. Viruses (2022)

VACCINS ANTI-HPV

❖ nombre de doses :

➢ 3 doses : premiers vaccins approuvés (2006)

- âge > 14 ans

- immunodéprimés / VIH

➢ 2 doses, à 6 mois d'intervalle (5 - 13)

➢ dose unique

Mavundza EJ et al, Human Vaccin Immunother (2025) / OMS (2022)
Wu S et al. Viruses Lancet Reg Health Eur (2025)

VACCINS ANTI-HPV

❖ Calendriers vaccinaux nationaux : 143 pays

- 2 doses : 90 pays

- dose unique : 53 pays

Wu S et al. Viruses Lancet Reg Health Eur (2025)

Taylor & Francis
Taylor & Francis Group

Human Vaccines & Immunotherapeutics

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/khvi20

Human papillomavirus (HPV) vaccine clinical trials: A cross-sectional analysis of clinical trials registries

Edison Johannes Mavundza, Tshiamo Moshading Mmotsa & Duduzile Ndwandwe

N = 437 essais cliniques

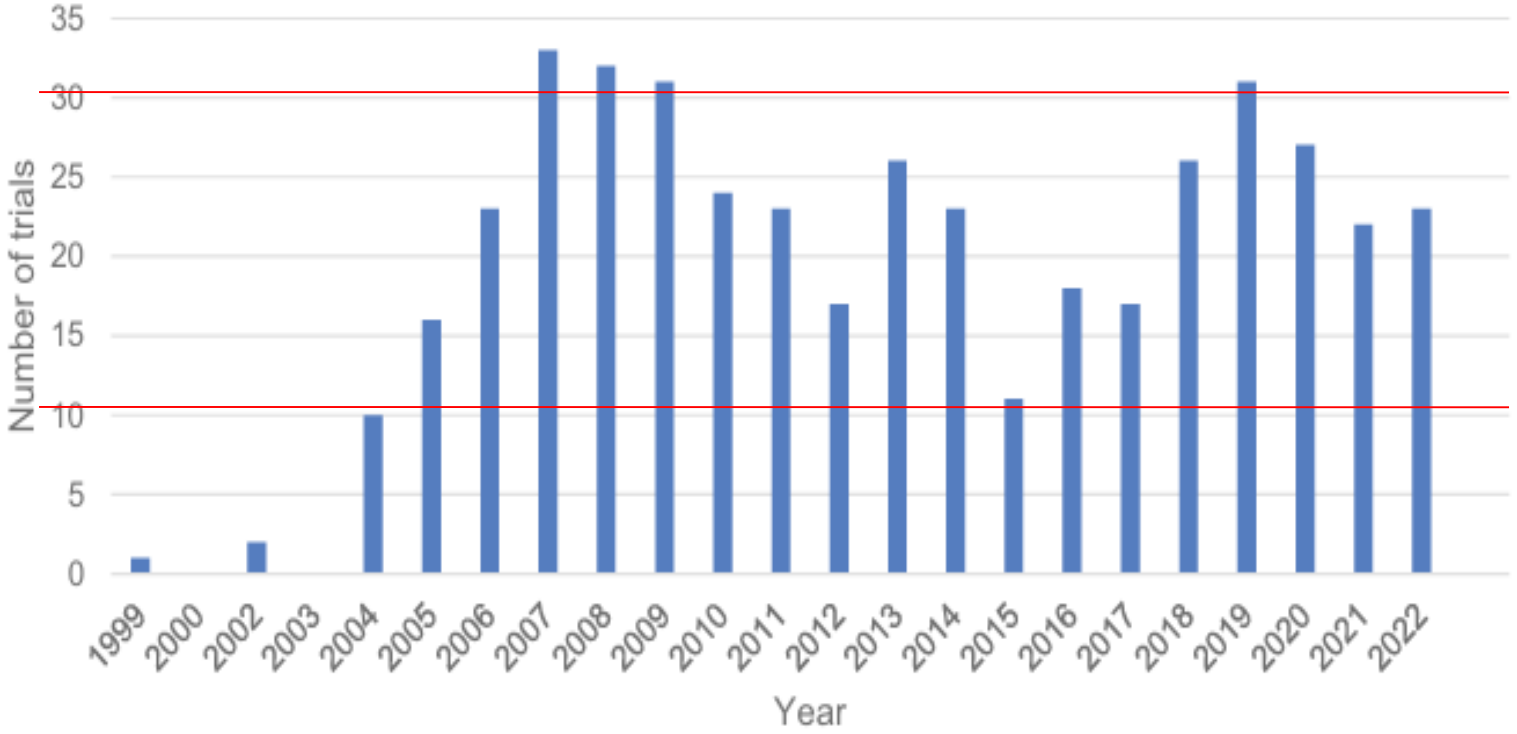


Figure 1. Registered HPV vaccine clinical trials by year.

Mavundza EJ et al, Human Vaccin Immunother (2025)

OXFORD

Journal of the National Cancer Institute Monographs, 2024, **2024(67)**, 329–336

https://doi.org/10.1093/jncimonographs/lgae032

Monograph

HPV16/18 antibodies 16-years after single dose of bivalent HPV vaccination: Costa Rica HPV vaccine trial

Carolina Porras, MSc,[1,*] Byron Romero, MD,[1] Troy Kemp, PhD,[2] Romain Fantin, MSc,[1] Rolando Herrero, PhD,[1] Allan Hildesheim, PhD,[1] Rebeca Ocampo, MD,[1] Mónica S. Sierra, PhD,[3] Mitchell H. Gail, MD, PhD,[3] John Schussler, BSc,[4] John T. Schiller, PhD,[5] Douglas R. Lowy, MD,[5] Ligia A. Pinto, PhD,[2] Danping Liu, PhD,[3,‡] Aimée R. Kreimer PhD,[3,‡] on behalf of the Costa Rica HPV Vaccine Trial Study Group

Conclusions: HPV-16/18 seropositivity remained exceedingly high 16 years after vaccination. Over 5 years, small declines in antibodies were observed. Women should have protection for at least 20 years and likely much longer at the observed rate of decline.

Porras C et al. J Natl Cancer Inst Monogr (2024)

Community intervention of a single-dose or 2-dose regimen of bivalent human papillomavirus vaccine in schoolgirls in Thailand: vaccine effectiveness 2 years and 4 years after vaccination

Suchada Jiamsiri, MD, MPH,[1] Chulwoo Rhee, MD, MS,[2,*] Hyeon Seon Ahn, MS,[2] Hyeong-Won Seo, PhD,[2] Worrawan Klinsupa, MS,[1] Sunju Park, MA,[2] Jinae Lee, PhD,[2] Nakorn Premsri, MD,[3] Chawetsan Namwat, MD,[1] Patummal Silaporn, MD, MPH,[1] Jean-Louis Excler, MD,[2] Deok-Ryun Kim, PhD,[2] Yun Chon, PhD,[2] Joshua N. Sampson, PhD,[4] Pornjarim Nilyanimit, PhD,[5] Sompong Vongpunsawad, PhD,[5] Nimesh Poudyal, MD,[2] Lauri E. Markowitz, MD,[6] Gitika Panicker, PhD,[6] Elizabeth R. Unger, MD, PhD,[6] Supachai Rerks-Ngarm, MD,[1] Yong Poovorawan, MD,[5] Julia Lynch, MD[2]

Conclusions: Our study demonstrated that both single-dose and 2-dose HPV vaccination significantly decreased HPV-16/18 point prevalence 2 years and 4 years after vaccination. Crude vaccine effectiveness at 4 years after vaccination was greater than 90% for both the single-dose and 2-dose regimens; the single-dose regimen was not inferior to the 2-dose regimen. These data show that a single dose of HPV vaccine provides high levels of protection when administered to schoolgirls younger than 15 years of age.

Jiamsiri S et al. J Natl Cancer Inst Monogr (2024)

OXFORD

Journal of the National Cancer Institute Monographs, 2024, 2024(67), 337–345

https://doi.org/10.1093/jncimonographs/lgae041

Monograph

Impact of single-dose HPV vaccination on HPV 16 and 18 prevalence in South African adolescent girls with and without HIV

Sinead Delany-Moretlwe, MBBCh, PhD,[1,*] Dorothy A. Machalek, PhD,[2,3] Danielle Travill, MBBCh, MSc,[1] Kathy Petoumenos, PhD,[2] Dorothy C. Nyemba, MSc,[1] Zizipho Z.A. Mbulawa, PhD,[4] Nontokozo Ndlovu, MPH,[1] John M. Kaldor, PhD,[2,‡] Helen Rees, MBBS, DSc[1,‡]

Conclusion: These data provide reassuring evidence of single-dose impact on population-level HPV 16 and 18 prevalence in a South African population, irrespective of HIV status.

Delany-Moretlwe S et al. J Natl Cancer Inst Monogr (2024)

Potential population-level effectiveness of one-dose HPV vaccination in low-income and middle-income countries: a mathematical modelling analysis

Élodie Bénard, Mélanie Drolet, Jean-François Laprise, Guillaume Gingras, Mark Jit, Marie-Claude Boily, Paul Bloem, Marc Brisson

Lancet Public Health 2023; 8: e788–99

See Comment page e748

Département de médecine sociale et préventive, Université Laval, Québec City, QC, Canada (É Bénard MSc, Prof M-C Boily PhD, Prof M Brisson PhD); **Centre de**

Summary

Background Given the accumulating evidence that one-dose vaccination could provide high and sustained protection against human papillomavirus (HPV) infection and related diseases, we examined the population-level effectiveness and efficiency of one-dose HPV vaccination of girls compared with two-dose vaccination, using mathematical modelling.

Methods In this mathematical modelling study, we used HPV-ADVISE LMIC, an individual-based transmission-dynamic model independently calibrated to four epidemiologically diverse low-income and middle-income countries (LMICs; India, Nigeria, Uganda, and Viet Nam). We parameterised and calibrated the model using sexual behaviour

Interpretation One-dose routine vaccination could avert most of the cervical cancers averted with two-dose vaccination while being more efficient, provided the duration of one-dose protection is greater than 20–30 years (depending on the LMIC). The doses saved by introducing one-dose routine vaccination could offer the opportunity to vaccinate girls before they age out of the vaccination window of 9–14 years and, potentially, to vaccinate boys or older age groups.

Bénard E et al. Lancet Public Health (2023)

The Journal of Infectious Diseases

EDITORIAL

Strong Herd Effects of Human Papillomavirus Vaccination

Harrell W. Chesson, PhD[1], Lauri E. Markowitz, MD[2]

[1] National Center for HIV, Viral Hepatitis, STD, and TB Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia; [2] National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia

Key words: human papillomavirus; vaccine; HPV; models; vaccine impact

Substantial health benefits of human papillomavirus (HPV) vaccination have been observed in many settings around the world and are due to both high direct and indirect vaccine effects.[1-3] HPV vaccines have high efficacy for those vaccinated and vaccinated persons provide indirect protection to those who remain susceptible to infection, through reductions in exposure to HPV.[4,5] Indirect protection provided by vaccination has been observed for many vaccines and is referred to as "herd immunity," "herd protection," or "herd effects."[6-8] Although these terms are frequently

THERAPEUTIC ADVANCES in
Vaccines and Immunotherapy

Systematic Review

Acceptability of human papillomavirus vaccination in the United Kingdom: a systematic review of the literature on uptake of, and barriers and facilitators to HPV vaccination

Anna Karakusevic and Anna M. Foss

Ther Adv Vaccines Immunother

2024, Vol. 12: 1–18

DOI: 10.1177/25151355241308313

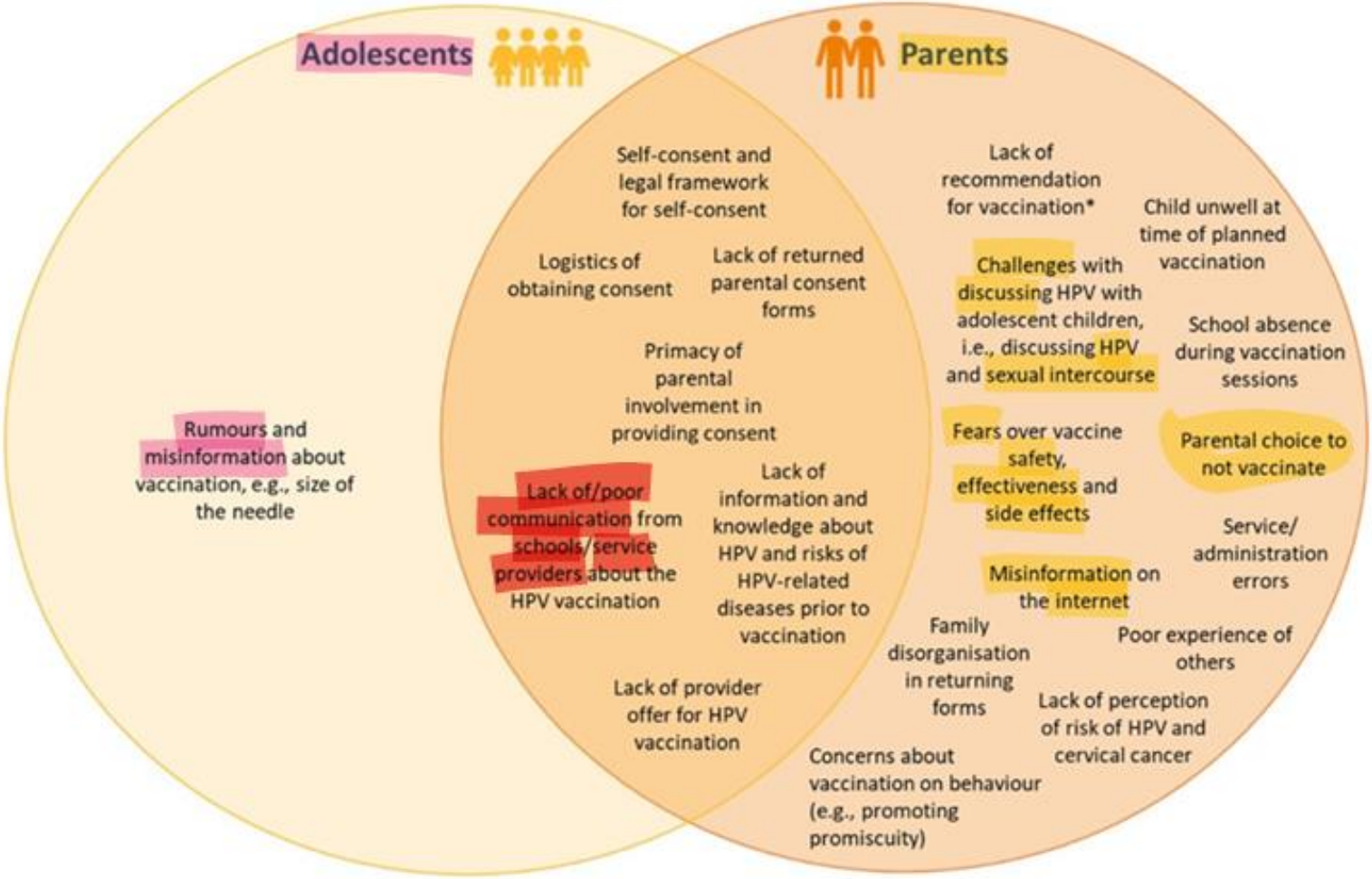


Figure 2. Venn diagram illustrating barriers to vaccination reported by adolescents and parents.[23,29–31,34,35,37,39–46]

*Vaccination was not recommended for adolescent boys in the NIP at the time of the study.[23]

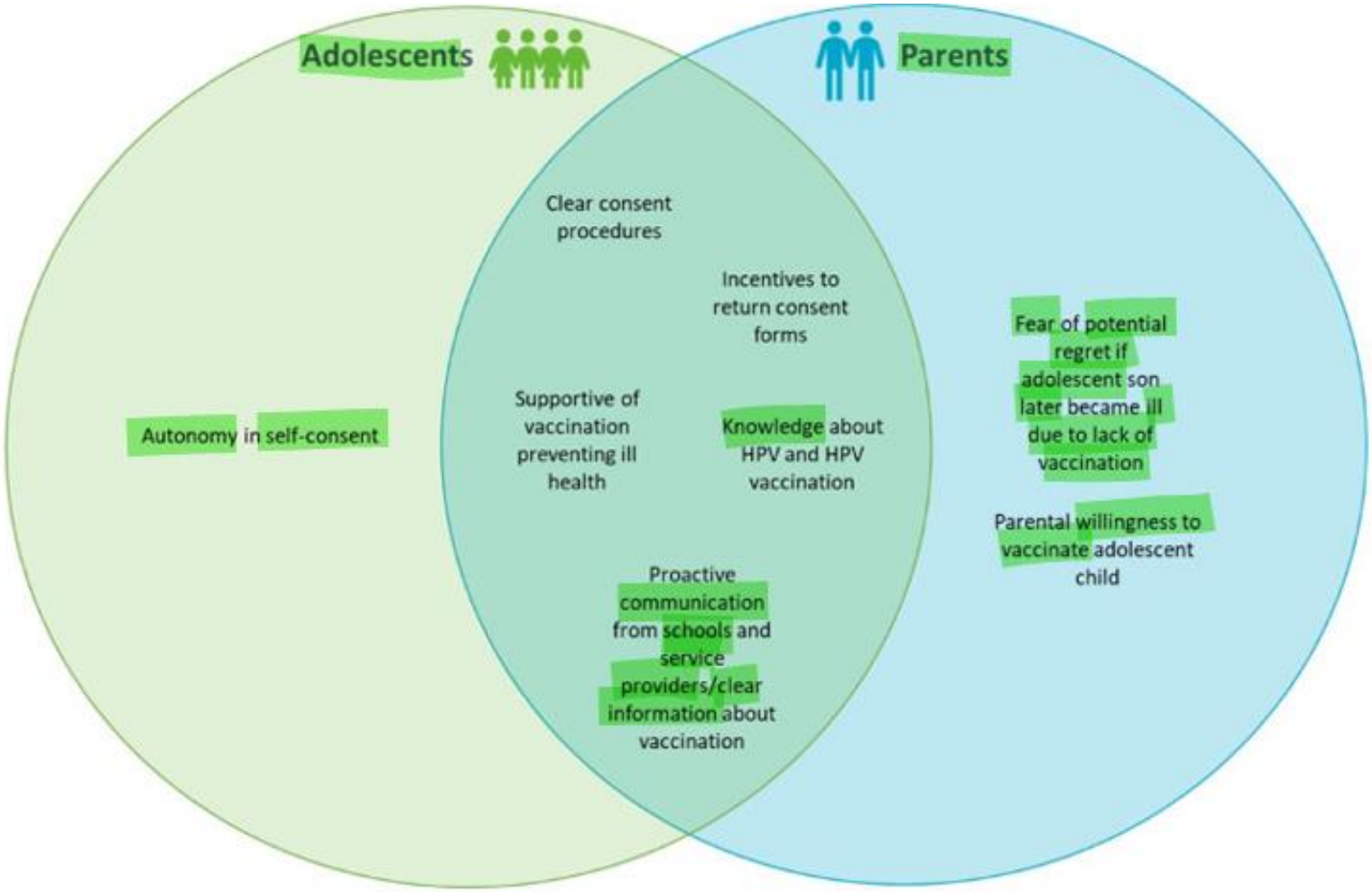


Figure 3. Venn diagram illustrating facilitators to vaccination reported by adolescents and parents.[23,30–32,34,37,38,40,42,43,46]

medicina

MDPI

Review

The Effectiveness of Interventions Targeting Adolescents in HPV Vaccination—A Scoping Review

Camelia Florina Iova [1], Lucia Georgeta Daina [2], Mădălina Diana Daina [1] and Timea Claudia Ghitea [3,*]

[1] Faculty of Medicine and Pharmacy, Doctoral School, University of Oradea, 410081 Oradea, Romania; camyowa@yahoo.com (C.F.I.); diana_daina98@yahoo.com (M.D.D.)

Interventions directed at adolescents, combined with strategies involving parents and healthcare professionals, can play an important role in improving HPV vaccination rates. Educated adolescents must be involved in decisions about their own health and can be a valuable source of information for their peers and parents.

Iova C F et al. Medicina (2024)

VACCINATION ANTI-HPV EN TUNISIE

BMJ Open

Cost-effectiveness of human papillomavirus (HPV) vaccination in Tunisia: a modelling study

Hyem Khiari ,[1] Karima Makni,[2] Khedija Meddeb,[1] Olfa Jaidane,[1] Mohamed Hsairi[1]

Conclusion This study showed that compared with screening alone, the implementation of HPV vaccination in addition to the current cytology screening programme in Tunisia would be considered cost-effective on the basis of the threshold GDP per capita. Improvement of the current screening programme itself also remains important and provides further potential to achieve optimal cervical cancer prevention strategies.

Khiari H et al. BMJ open (2024)

J PREV MED HYG 2018; 59: E30-E35

ORIGINAL ARTICLE

Awareness and knowledge about cervical cancer prevention methods among Tunisian women

R. GAMAOUN
Faculty of Pharmacy, University of Monastir, rue Ibn Sina, Monastir, Tunisia; Epidemiology and Preventive Medicine Department, Fattouma Bourguiba Hospital, Monastir, Tunisia

2016, région de sousse

422 femmes

questionnaire semi-directif

Conclusions. *The knowledge and awareness of HPV infection and cervical cancer among Tunisian women was found to be moderate (around 40%) and the acceptability of the anti-HPV vaccine was found to be high (over 80%). These results are concordant with the results of other studies conducted in other MENA countries.*

Gamaoun R. J Prev Med Hyg (2018)

363 (80.3%) were interested in receiving the anti-HPV vaccine for themselves, 387 (86%) for their daughters and 405 (90%) approved the introduction of the anti-HPV vaccine in the Tunisian national program of vaccination.

Gamaoun R. J Prev Med Hyg (2018)

Arrêté du ministre de la santé du 21 février 2025, fixant la liste des vaccinations obligatoires.

Le ministre de la santé,

Vu la Constitution,

Vu le décret beylical du 5 mai 1922, relatif aux vaccinations obligatoires en Tunisie, ensemble les textes qui l'ont modifié ou complété dont le dernier en date le décret n° 76-1097 du 15 décembre 1976.

Arrête :

Article premier - Sont obligatoires, les vaccinations contre les maladies suivantes :

- Tuberculose,
- Poliomyélite,
- Diphtérie,
- Tétanos,
- Coqueluche,
- Rougeole,
- Hépatite Virale type B,
- Rubéole,
- Maladies dues à Haemophilus Influenzae type B,
- Maladies dues à Pneumocoque,
- Hépatite virale type A,
- Virus du papillome humain.

Les différentes vaccinations prévues à l'alinéa premier du présent article sont administrées selon un calendrier fixé, et régulièrement actualisé, par le ministère de la santé.

Les services compétents du ministère de la santé déterminent les personnes concernées par ces vaccinations obligatoires, dont ne sont exceptées que celles ayant une contre-indication médicale établie.

Art. 2 - Les vaccinations sont effectuées à titre gratuit dans les structures sanitaires publiques et dans le milieu scolaire.

VACCINATION ANTI-HPV EN TUNISIE

- Vaccin bivalent HPV 16, 18

- dose unique

- à l'âge de 12 ans

VACCINATION ANTI-HPV EN TUNISIE

- écoles primaires

  CSSB

- 120 000 vaccins

- premières vaccinations : 07 avril 2025

Vaccin anti-HPV bivalent 16, 18 (Cervarix)*

Vaccin anti-HPV bivalent 16, 18 (Cervarix)*

❖ seringue pré remplie

0,5 ml

- protéines L1 HPV 16 20 µg / HPV 18 20 µg
- IM, région deltoïdienne

https://ec.europa.eu/health/documents/communityregister/2021/20210430151730/anx_151730_fr.pdf

Vaccin anti-HPV bivalent 16, 18 (Cervarix)*

- contre-indication :

  hypersensibilité aux substances actives ou à l'un des excipients

https://ec.europa.eu/health/documents/communityregister/2021/20210430151730/anx_151730_fr.pdf

Vaccin anti-HPV bivalent 16, 18 (Cervarix)*

- Grossesse, Allaitement :

  pas d'étude spécifique

https://ec.europa.eu/health/documents/communityregister/2021/20210430151730/anx_151730_fr.pdf

Vaccin anti-HPV bivalent 16, 18 (Cervarix)*

- Fertilité :

  aucune donnée disponible

https://ec.europa.eu/health/documents/communityregister/2021/20210430151730/anx_151730_fr.pdf

Vaccin anti-HPV bivalent 16, 18 (Cervarix)*

❖ Effets indésirables :

➢ Très fréquents (≥ 10%) :

- réactions au site d'injection
- céphalées, asthénie, myalgies

https://ec.europa.eu/health/documents/communityregister/2021/20210430151730/anx_151730_fr.pdf

Vaccin anti-HPV bivalent 16, 18 (Cervarix)*

❖ Effets indésirables :

➢ Fréquents (1 - 10%) :

- fièvre, arthralgies
- prurit, éruption cutanée
- troubles digestifs

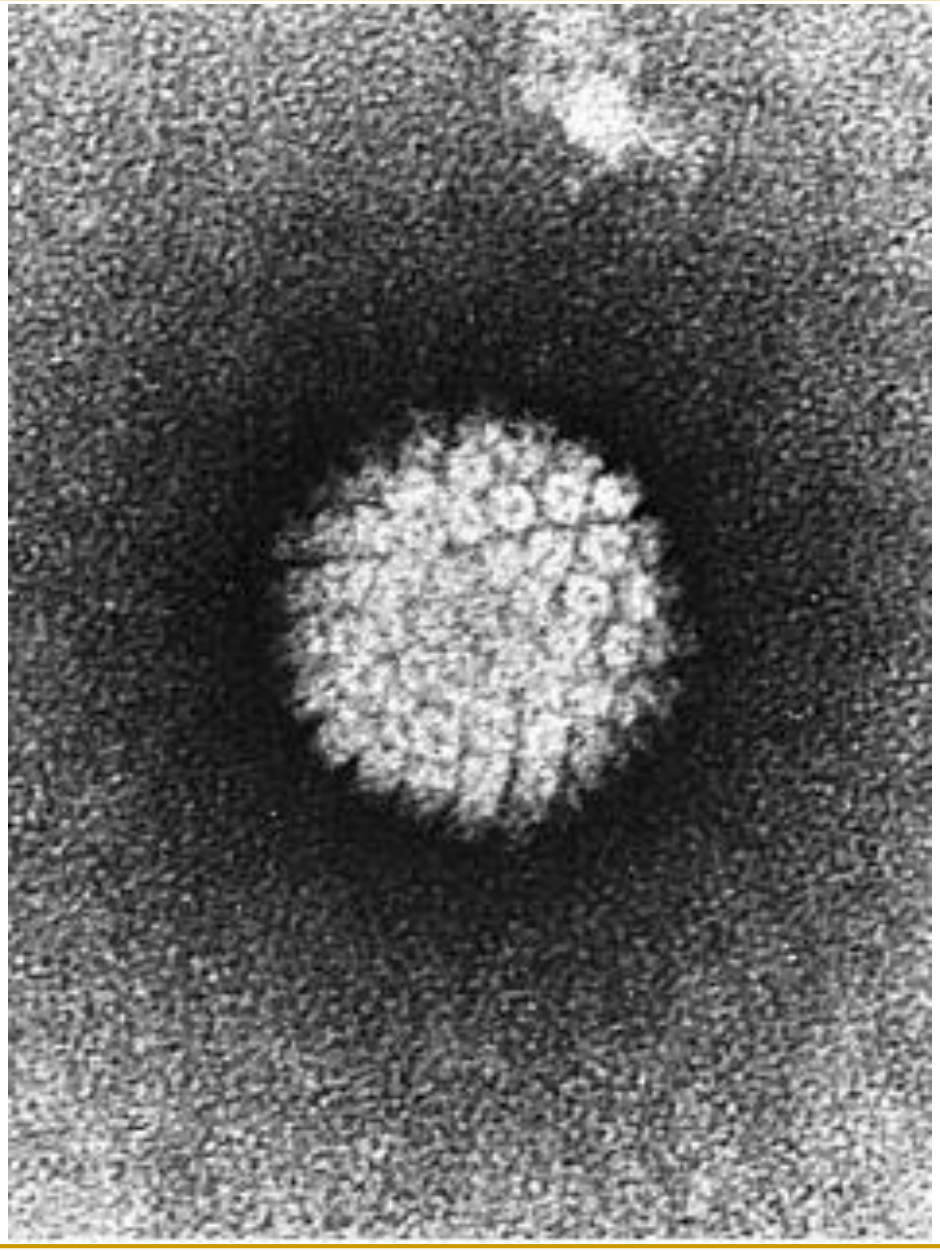
https://ec.europa.eu/health/documents/communityregister/2021/20210430151730/anx_151730_fr.pdf

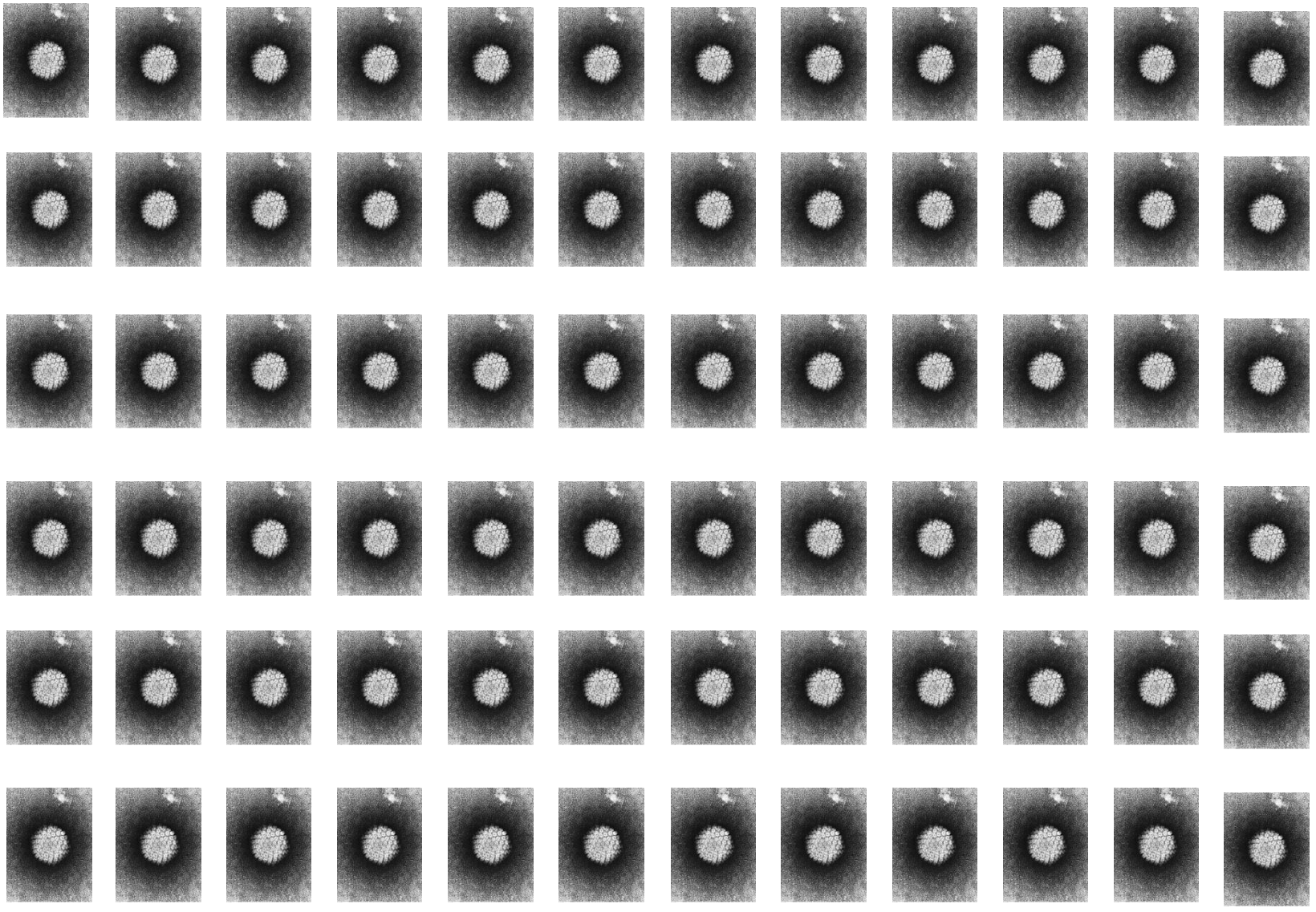
CONCLUSION

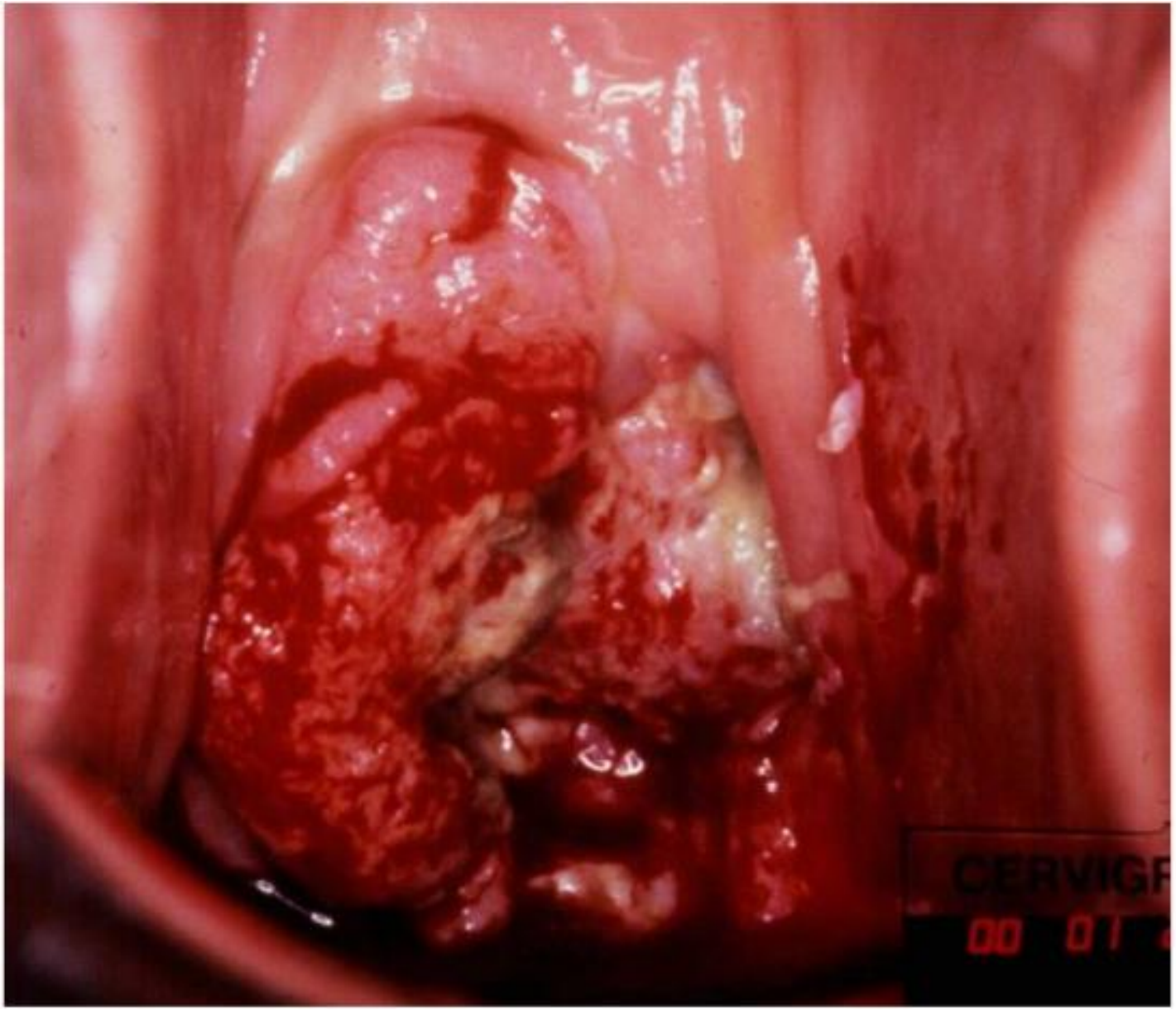
Sans vaccination anti-HPV

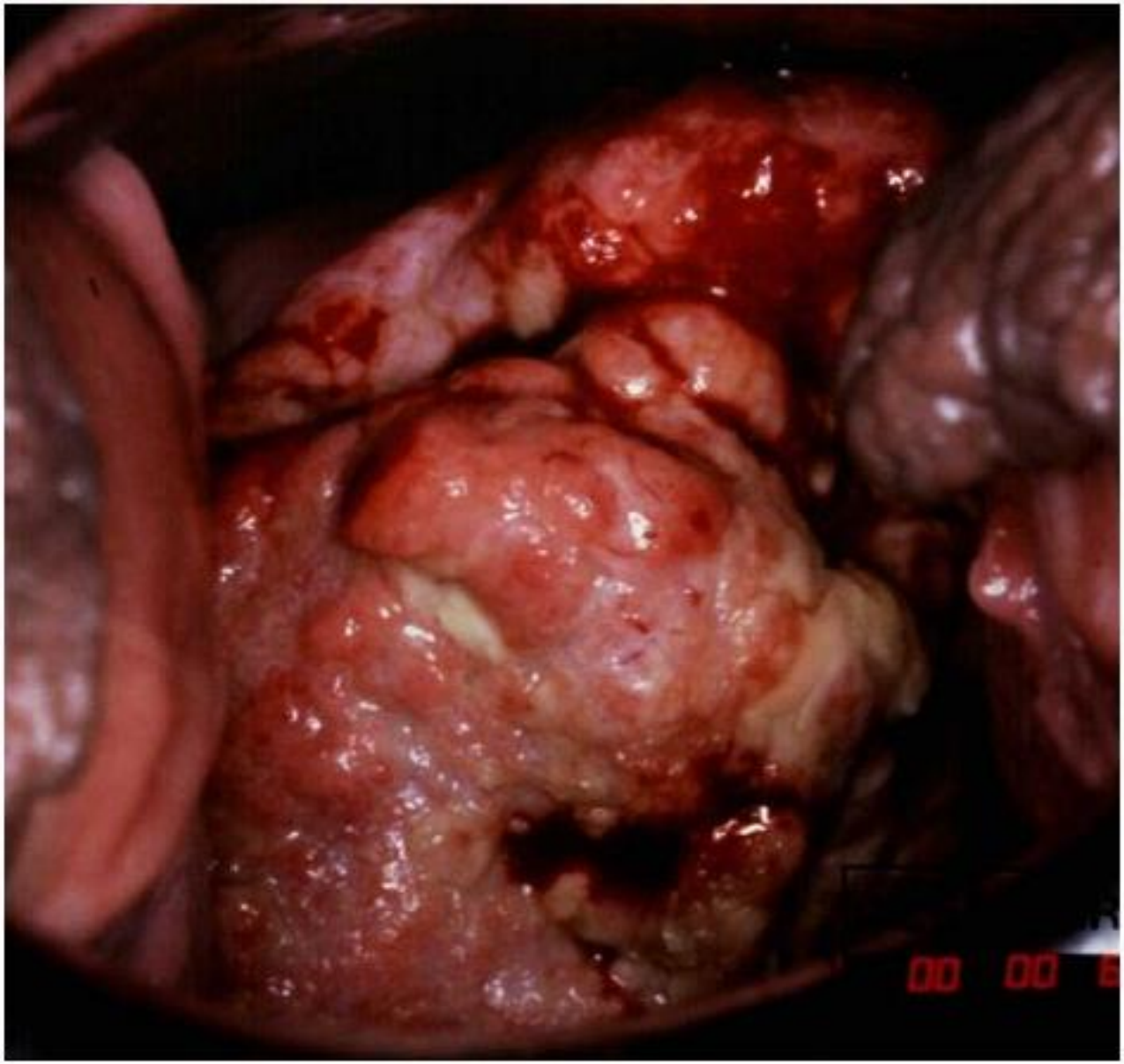
Ni

Dépistage du cancer du col de l'utérus (FCV)









Vaccination anti-HPV

ET

Dépistage du cancer du col de l'utérus (FCV)

Le doute est un état mental désagréable, mais la certitude est ridicule.

(Voltaire)

QQcitations


“
Deux hommes, s'ils veulent s'entendre, ont dû d'abord se contredire. La vérité est fille de discussion, non pas fille de sympathie.
Gaston Bachelard
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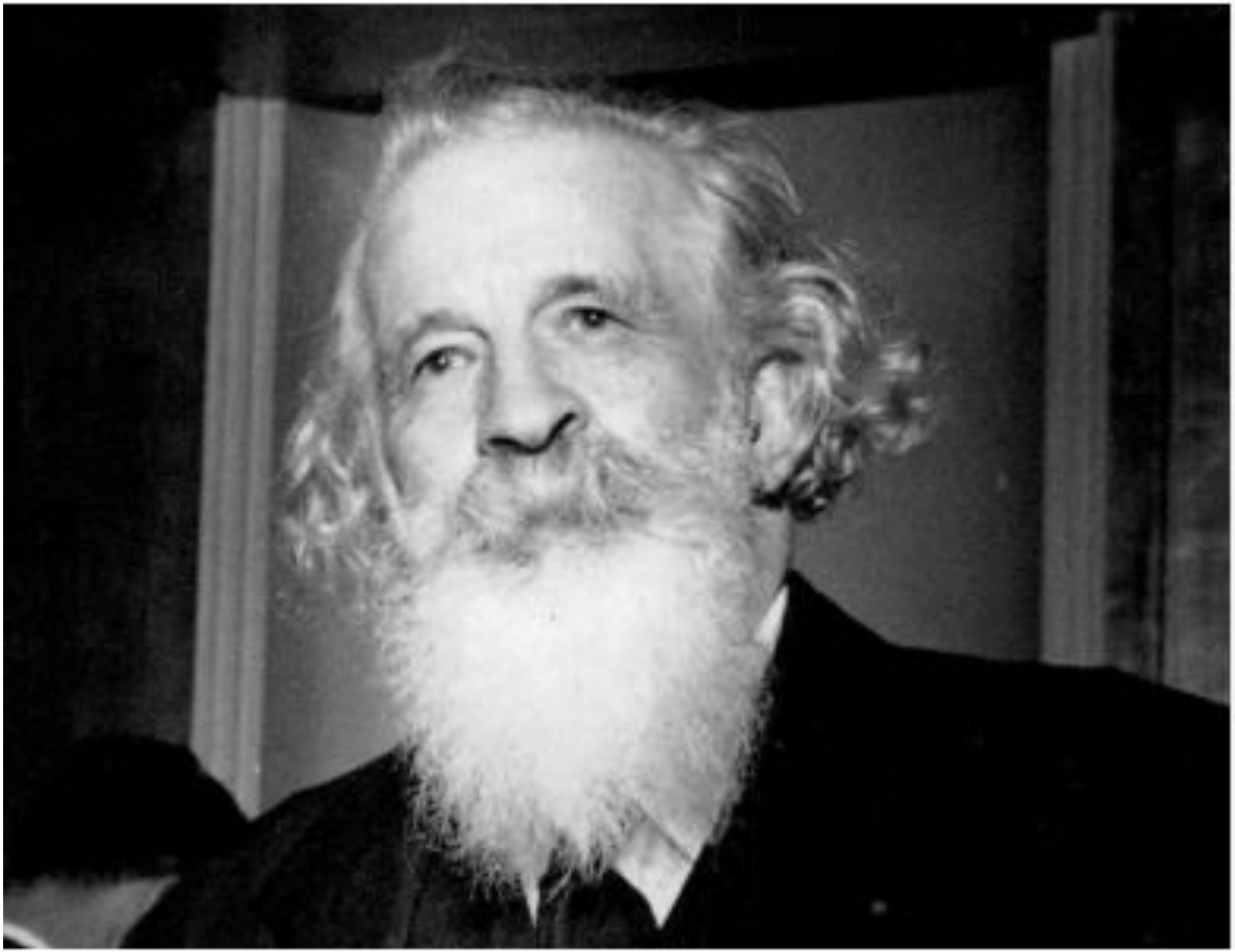

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