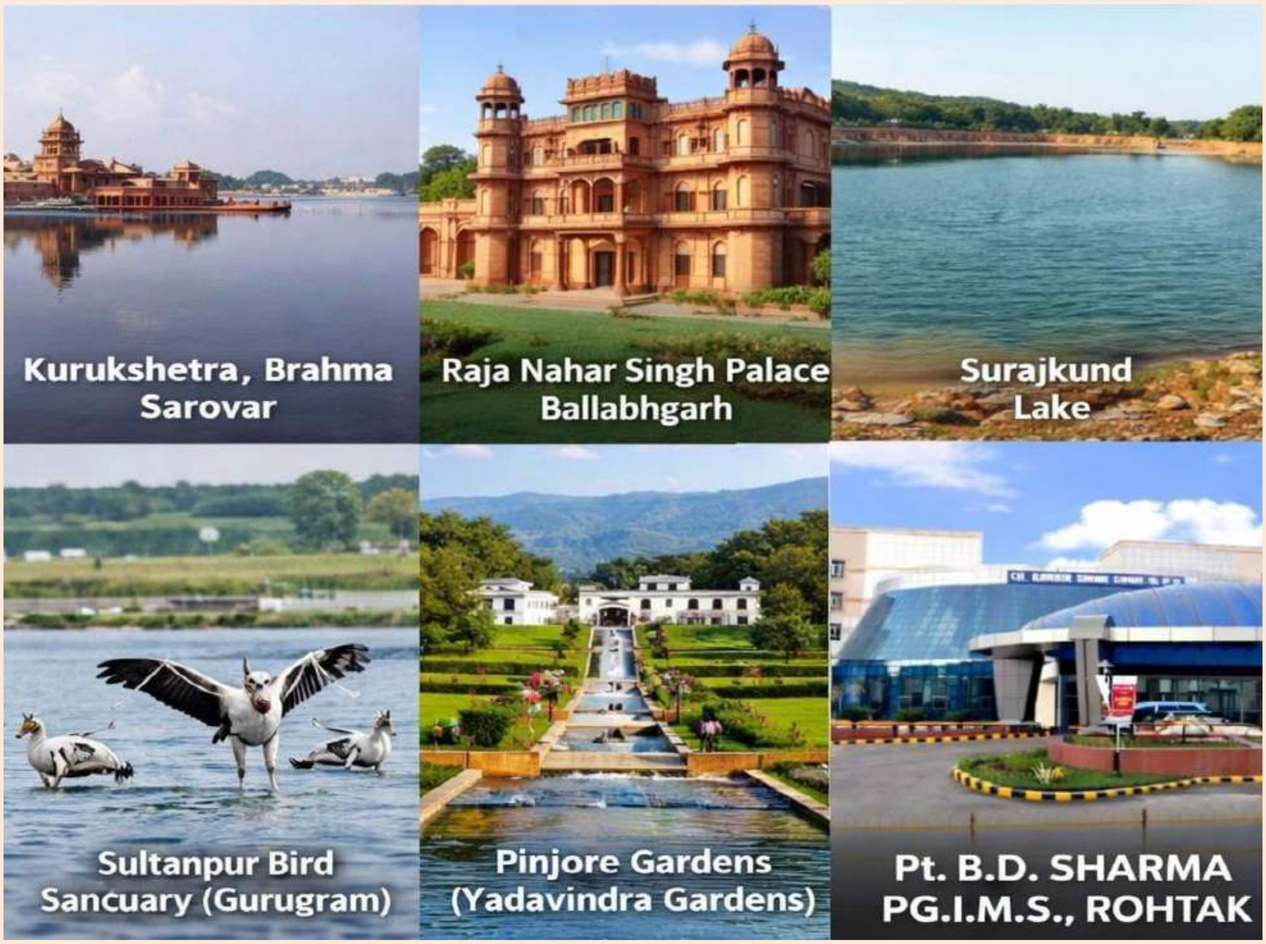
NIGF HARYANA NEWSLETTER

Issue1, January 2026

Preventive Oncology in Women



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Dr Meenakshi B Chauhan/Dr Vandana Bhuriya

"The first step toward change is awareness. The second step is acceptance."

Nathaniel Branden

From the Desk of Chairman, NIGF

Dr Sharda Jain

Secretary General

DELHIGYNAECOLOGISTFOR UM

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Cervical Cancer Prevention:Towards a Cervical Cancer–Mukta BHARAT

This bulletin is dedicated to Cervical Cancer Prevention, with one clear and uncompromising goal: Cervical Cancer – Mukta Bharat.

January, the month of public awareness, must become a month of professional awakening.

This is the time when every gynecologist, every lady doctor, and every nurse must update themselves, re-energize their commitment, and dedicate focused time to counselling, screening and timely treatment.

Cervical cancer is 100% preventable, yet it continues to claim lives due to lack of awareness, delayed screening, and missed opportunities for vaccination. This is unacceptable..that Cervical deaths are more than Maternal Deaths in Bharat.

HPV VACCINATION: From Recommendation to Obsession

We must become obsessed with HPV vaccination—not as an option, but as a responsibility. Vaccination of adolescent girls and young women should be routine.

Equally important is the promotion of HPV vaccination in adolescent and young boys, up to 26 years of age. Male vaccination is not optional—it is essential for breaking the chain of transmission and achieving herd protection.

The 2030 Targets: Our Collective Accountability The global target is clear:

By 2030, mortality due to cervical cancer must fall by at least one-third.

While government-led adolescent vaccination programmes are eagerly awaited, their nation wide roll out and timelines remain difficult to predict.

Therefore, the responsibility rests with us—the medical fraternity. We cannot wait.

We must lead, counsel, screen, vaccinate, and treat—now.

A Call to ACTION

If every gynecologist counsels,

If every lady doctor advocates, If every nurse motivates,

Cervical cancer can become a disease of the past in Bharat.

Let us work together with clarity, commitment, and compassion to ensure that the next generation of Indian women lives free from the fear of cervical cancer.

Mission Mode. No Delay. No Excuses.

Towards Cervical Cancer–Mukta Bharat

Message from NIGF President

Scientific Bulletin on Preventive Oncology for Women

It gives me immense pleasure to present this special scientific bulletin dedicated to **Preventive Oncology in Women**—a theme that is not only timely, but transformative for the future of women's health from NIGF Haryana team led by President Prof. Meenakshi Chauhan.

My sincere congratulations to her and her team for taking out first bulletin of Haryana NIGF on such an important topic which is need of hour.

Cancer continues to be a growing public health challenge, and women disproportionately bear the burden of cancers that are *largely preventable, detectable at early stages, and curable when addressed in time*. Cervical, breast, ovarian, and endometrial cancers together account for a major share of cancer-related morbidity and mortality among Indian women. As obstetricians and gynecologists, we stand at a unique vantage point—often being the **first, most trusted, and most consistent point of contact** for women across their lifespan.

Preventive oncology is no longer limited to screening alone. It encompasses **risk assessment, vaccination, lifestyle modification, early detection, genetic counseling, timely referral, and survivorship care**. From HPV vaccination in adolescence, to opportunistic screening during routine gynecologic visits, to vigilant evaluation of abnormal bleeding or breast symptoms—our everyday clinical decisions can decisively alter outcomes.

This bulletin aims to translate **evidence into practice**. The articles curated here emphasize practical screening protocols, updates on vaccination strategies, emerging biomarkers, the role of imaging, and the importance of multidisciplinary collaboration. Special attention has been given to **India-specific challenges**—late presentation, socio cultural barriers, resource constraints, and the need for cost-effective, scalable solutions.

Equally important is our role as **educators and advocates**. Creating awareness, dispelling myths, empowering women to seek timely care, and integrating preventive oncology into routine OB-GYN practice are responsibilities we must collectively embrace. Prevention is not an added task—it is the most impactful intervention we can offer.

I commend the editorial team and contributors for their scientific rigor and clinical relevance. I hope this bulletin inspires each one of us to strengthen preventive oncology initiatives within our clinics, hospitals, and communities, and to work toward a future where **no woman dies from a preventable cancer**.

Together, let us shift the narrative—from late-stage treatment to **early action, informed prevention, and compassionate care**.

With warm regards,

Dr. Ragini Agrawal
President
NEW INCREDIBLE GYNE FORUM

Message from President NIGF Haryana

I wish all the readers a very happy new year.

It is a great pleasure to release this bulletin under the aegis of Haryana Chapter NIGF at the beginning of the year 2026. January being the month of cervical cancer awareness, this bulletin is dedicated to prevention of gynecological cancers as it extends beyond prevention of cervical cancer only.

By reinforcing prevention as a cornerstone of women's cancer care, we move closer to a future where gynaecologic cancers are detected early, treated effectively and whenever possible prevented altogether.

Full of humility and gratitude I thank Dr Sharda Jain Madam our patron who is the inspiring force towards prevention of women's mortality and morbidity.

I appreciate the vision of Dr Ragini Aggrawal, President of NIGF who guides and encourages gynaecologists to work in community at the grass root level and promote awareness in general population regarding prevention of gynaecologic cancers.

I am highly thankful to all the esteemed teachers who have taken out time to contribute to this bulletin.

I am indebted to Dr Vandana Bhuriya who has carried the difficult task of editing this Bulletin with great enthusiasm.

Let us pledge to decrease the burden of gynecologic cancers in our women.

Jai Hind

Dr Meenakshi B Chauhan
Sr. Professor & Unit Head
President Haryana chapter of NIGF

Message from Co - Editor NIGF Haryana

Preventive oncology stands at the intersection of science, public health, and social responsibility.
Among preventable malignancies, cervical cancer remains a compelling example of how evidence-based interventions—when effectively implemented—can significantly reduce disease burden.

Cervical Cancer Awareness Month serves as a powerful reminder that prevention, early detection, and timely treatment can save lives. Despite being one of the most preventable cancers, cervical cancer continues to pose a significant health burden, particularly in low- and middle-income countries. This month gives us an opportunity not only to spread awareness but also to reaffirm our collective responsibility toward women's health.
As healthcare professionals and stakeholders, we must continue to advocate for evidence-based screening methods such as Pap smear and HPV testing, encourage vaccination among adolescents, and ensure that accurate information reaches every segment of society. Awareness is not a one-time event; it is a sustained effort that requires commitment, collaboration, and compassion.
I hope this collection of articles on preventive oncology would be of use in clinical practice to the gynaecologists and other medical practitioners for increasing their knowledge on preventive oncology.
I would like to express our sincere gratitude to **Dr. Meenakshi Chauhan, President, NIGF, Haryana Chapter** for her exemplary leadership and unwavering commitment to cancer prevention and women's health. Her contributions to awareness initiatives, capacity building, and preventive strategies have significantly strengthened the collective efforts in this domain. Her work continues to inspire clinicians and public health professionals alike.
I also extend our heartfelt thanks to **NIGF** for its continued support and dedication toward advancing preventive oncology.
As we observe Cervical Cancer Awareness Month, let us pledge to transform awareness into action—by encouraging screening, supporting vaccination programs, and advocating for equitable healthcare access. Together, we can move closer to a future where cervical cancer is not a threat, but a preventable chapter in medical history.
Because awareness today ensures healthier tomorrows.

Dr Vandana Bhuriya
Co-editor, Newsletter on Preventive Oncology
Joint Secretary, NIGF, Haryana Chapter

Screening of Cervical Cancer in Low-Resource Countries

Dr Veena Acharya, Mentor, NIGF Women Cancer Prevention Awareness Mission

Introduction

Cervical cancer remains a major global public health challenge, disproportionately affecting **low- and middle-income countries (LMICs)**. Globally, *over 90% of cervical cancer deaths occur in resource-constrained settings*, largely due to limited access to effective screening and treatment services.

Cervical cancer is caused by persistent infection with high-risk human papilloma virus (HPV) types; it is one of the few cancers that can be largely **prevented** through vaccination and early detection of pre-cancerous lesions. Despite this, in many low-resource countries, organized screening programmes are absent or poorly implemented.

Screening aims to detect **pre-invasive cervical lesions**, which if left untreated may progress to invasive cancer over years to decades. Effective screening and timely treatment can reduce both incidence and mortality significantly. However, implementing such programmes in low-resource settings presents unique challenges that necessitate adapted, context-appropriate approaches.

Burden of Cervical Cancer in Resource-Constrained Settings

Cervical cancer is the **second most common cancer** in women in many LMICs and the leading cause of cancer death among women in several regions. In countries without organised screening, coverage remains low, resulting in late presentations and high mortality. Barriers include **limited healthcare infrastructure, lack of trained personnel, poor follow-up systems, low health literacy, and financial constraints**.

Principles and Objectives of Screening

The primary goal of any screening programme is to **identify women with pre-cancerous cervical lesions early**, enabling timely treatment to prevent progression to invasive cancer. Secondary goals include increasing health awareness and incorporating screening into broader reproductive health services. In LMICs, efforts should align with the **WHO Global Strategy for Cervical Cancer Elimination**: 70% of women screened by age 35 and again by age 45.

Screening Modalities in Low-Resource Settings

1. Visual Inspection with Acetic Acid (VIA)

VIA involves applying **5% acetic acid (vinegar)** to the cervix and visually inspecting for aceto white changes indicative of pre-cancerous lesions. The test is **inexpensive, requires minimal equipment, provides immediate results**, and can be performed by trained non-physician providers, making it suitable for low-resource contexts.

Advantages:

- Low cost and simple logistics can be performed by paramedical staff

- Immediate results — enables "**see-and-treat**" strategies
- Can be integrated into primary care and reproductive health services at Primary healthcare centers to reach grass route level.
- **In women between 30 and 40 years of age VIA must be done.**
- **Single lifetime VIA – reduces the incidence of cancer cervix by 26%**

Limitations:

- Operator-dependent and subjective interpretation
- Moderate sensitivity and specificity relative to HPV testing
- Quality assurance and training are vital for reliable results

Several studies have shown that VIA, when performed by trained personnel, is a feasible and effective alternative where cytology is not viable.

2. HPV DNA Testing

HPV DNA testing is currently considered the **gold standard** for primary screening due to **high sensitivity, reproducibility, and negative predictive value**. High-risk HPV testing detects oncogenic HPV types associated with cervical cancer and can be performed on clinician- or self-collected samples.

Advantages:

- Higher sensitivity than VIA and cytology
- Longer screening intervals (often 5 years or more)
- Self-sampling may increase coverage

Challenges in low-resource settings:

- Higher cost of tests and necessary infrastructure
- Need for supply chain and laboratory capacity

WHO recommends HPV testing starting at age 30 in the general population, and earlier (age 25) with more frequent intervals for women living with HIV.

3. Cytology (Pap Smear)

Pap smear cytology has successfully reduced cervical cancer incidence in high-income countries; however, its applicability in LMICs is limited due to infrastructure needs, frequent visits, and quality control challenges. Where resources permit, it may be used in combination with HPV testing or as part of a phased approach.

HPV TEST

A positive test indicates HPV infection, but a positive result does not indicate CIN or cervical cancer. HPV Testing has a very high negative predictive value (99.7%), that indicates that the risk of developing Cervical Cancer would be less than 1% Follow up procedures are recommended by pap's test, colposcopy and histopathology **.**

2. HPV Testing with Triage

HPV-positive women can be triaged with VIA, visual inspection with Lugol's iodine (VILI), or cytology to identify those needing treatment, which may be more cost-effective than treating all HPV positives.

3. Screening Intervals

Recommended intervals vary by modality:

- **HPV testing:** every 5 years where feasible; extended intervals (up to 10 years) may be considered in very low-resource settings for the general population.
- **VIA:** rescreen every 3–5 years if negative, balancing resource limitations with disease risk.

Innovations and Emerging Approaches

Self-Sampling for HPV Testing

Self-collection of samples for HPV testing increases screening uptake, especially among women hesitant to undergo pelvic exams. This approach reduces health system burden and can be implemented in community outreach.

AI and Smartphone-Assisted VIA

Emerging technologies are using smart phone imaging and AI to support VIA interpretation, potentially improving accuracy and facilitating screening by lower-level health workers. It help in mass screening program in low resource countries with batter results.

SCREENING STRATEGIES

Recommended Screening Algorithms in Low-Resource Settings

1. **VIA-Based Screening**
   - Age 25–49; every 3–5 years
   - Immediate treatment for VIA+ with cryotherapy ("see-and-treat")
2. **Primary HPV Testing** (Where affordable)
   - Age 30–49; every 5 years
   - Triage with VIA or cytology if HPV positive
3. **Self-Collection HPV With Triage**
   - Outreach and community settings to improve coverage

Screening Modalities: Strengths and Limitations

Modality	Sensitivity	Specificity	Infrastructure Needs	Suitability in Low-Resource Settings
VIA	Moderate	Variable	Low	**High**
Pap Smear	Moderate	High	High	Limited
HPV DNA Test	**High**	Moderate–High	Moderate–High	Excellent with resources

4. *(Adapted from WHO and comparative efficacy studies)*

This model is ideal for low-resource settings where retention for follow-up is poor. With VIA or HPV testing, women with positive results are offered **immediate treatment** (e.g., cryotherapy) during the same visit. This reduces loss to follow-up and improves effectiveness.

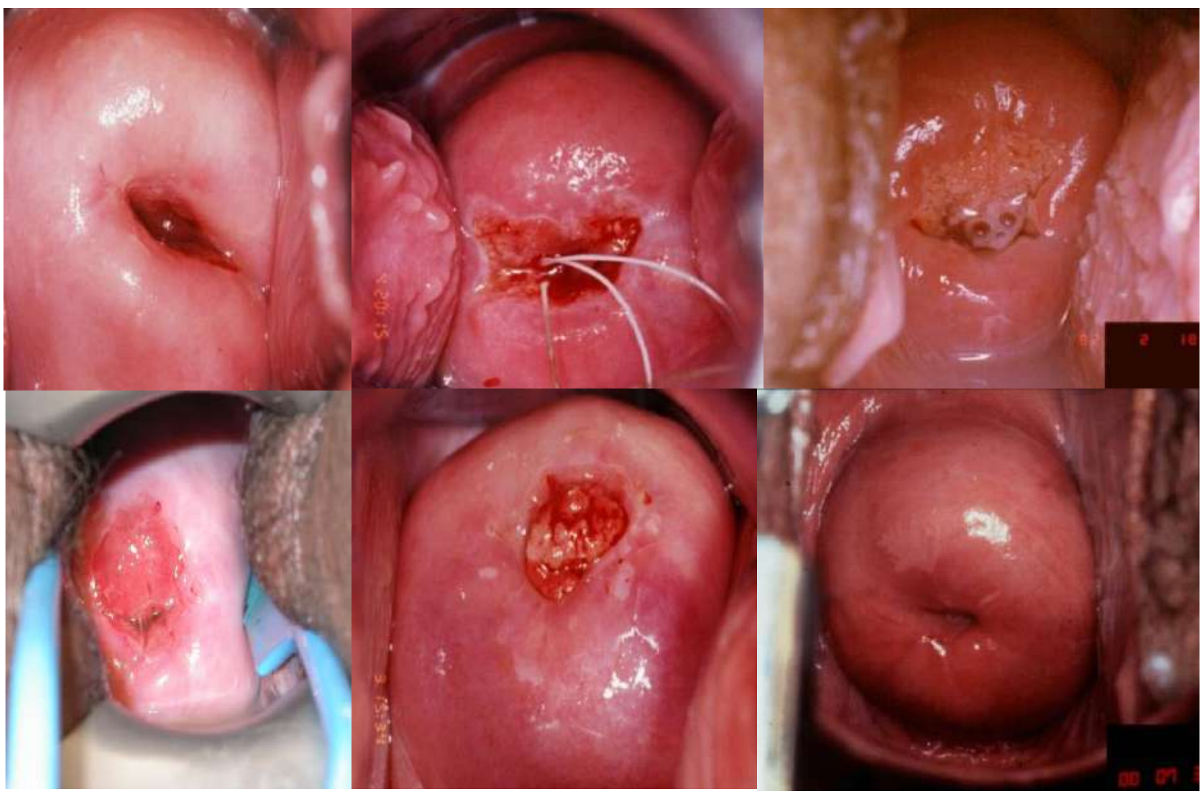
MANAGEMENT OF VIA – POSITIVE ***Single-Visit "Screen-and-Treat"***

- In developing countries 80% women do not return for treatment after screening, this decreases the effectiveness of screening programs of cervical cancer.
- Alternative : VIA Positive patients should be treated with cryotherapy at same visit.
- However it will result in over-treatment and under-diagnosis of endocervical and microinvasive cancer.
- Patients should be followed by HPV test after treatment.

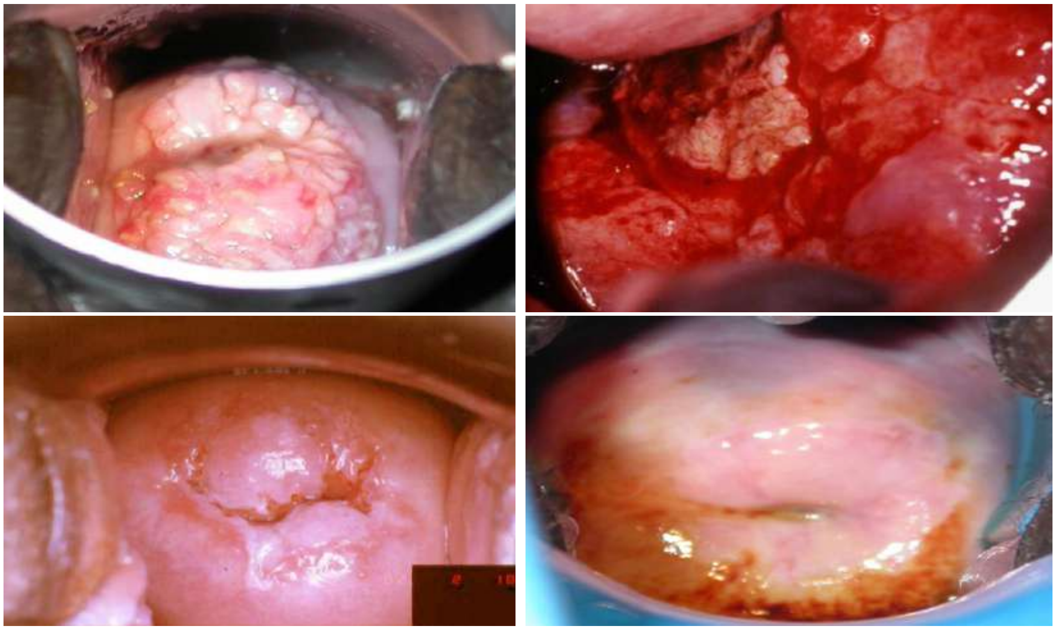
Conclusion

Cervical cancer screening in low-resource countries is feasible and effective when adapted to the local context. **VIA and HPV testing** form the backbone of current strategies, supported by simplified algorithms and task shifting to non-physician health workers. Integration with broader reproductive health services, investments in capacity building, and community engagement are essential to achieving the WHO's elimination targets.

VIA TEST Negative



VIA POSITIVE



VIA positive: **Note the thick, well-defined, opaque acetowhite areas abetting the SCJ in the anterior and posterior lips. The posterior lip lesion is extending into the endocervical canal.**

VIA +: There is a dense white acetowhite area with raised and rolled out margins around the external os involving all four quadrants of the cervix.

Key Points (Ready Reckoner)

1. Cervical cancer disproportionately affects women in low-resource settings due to limited screening and treatment services
2. Early detection of pre-cancerous lesions significantly reduces cervical cancer incidence and mortality
3. Visual inspection with acetic acid (VIA) is a low-cost, practical screening method suitable for rural and resource-constrained areas
4. HPV DNA testing is the most sensitive screening tool and is recommended where resources permit.
5. Screen-and-treat approaches minimize loss to follow-up and improve outcomes in low-resource contexts.
6. Self-sampling for HPV testing may increase screening uptake and reduce barriers.
7. AI-assisted VIA interpretation holds promise for enhancing accuracy and task-shifting.
8. Effective programmes require training, quality assurance, and robust referral systems.
9. Community awareness and engagement are crucial to overcome cultural and educational barriers.
10. Sustainable financing and policy support are essential for long-term impact.

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HPV VACCINATION

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Dr Vandana Bhuriya, Professor, Deptt. Of Obst & Gynae, PGIMS Rohtak

Background

The second most common cancer among women aged 15 -44 years in India is the cervical cancer. India reported approximately 123,907 new cases of cervical cancer, with around 77,348 deaths attributed to cervical cancer.[1] The main risk factor for carcinoma cervix is persistent HPV infection which is a sexually transmitted infection and also, a causative factor in other cancers like Carcinoma vulva, vagina, anal canal, penile cancers, oropharyngeal cancers and genital warts. Based on the oncogenic potential, HPV viruses are categorised into low risk and high-risk types.

1. Low Risk HPV Types- HPV 6, 11, 42, 43, 44, 54, 61, 70, 72, and 81. These are associated with warts and respiratory papillomatosis.
2. High Risk HPV Types- HPV types 16 and 18 are responsible for the majority of HPV-related cancers. Other high-risk types include HPV 31, 33, 35, 39, 45, 51, 52, 56, 58, and 59. The association of high-risk HPV typers with various cancers is shown in Table 1.

Cancer Type	Percentage linked to High-risk HPV type
Cervical Cancer	99-100%
Anal Cancer	90%
Vulvar Cancer	69%
Vaginal Cancer	75%
Oropharyngeal Cancer	70%

Table 1- Association of High-Risk HPV with various cancers.

The most essential requirement for the elimination of carcinoma cervix is to cater the at-risk population of cervical cancer by promotion of Comprehensive cervical cancer prevention strategies. These strategies include vaccination drives, screening and public awareness programmes to create knowledge about this serious health problem.

HPV vaccination

HPV vaccination offers significant protection against the genital and oro-pharyngeal cancers. It is a preventive tool to reduce the burden of diseases associated with HPV infection. HPV vaccine is composed of virus-like particles that stimulate the immune system to produce antibodies against the virus which further reduces the infection and reduce the development of cancers.

TIMING of vaccine- Vaccination is recommended prior to the exposure to the virus, so, it should be given in pre-teens and young adults before they become sexually active. It has been observed that HPV vaccine effectiveness was found to be highest in adolescents of age 9–14 years (74%–93%) when compared to those of age ranging 15–18 years (12% to 90%).[2]

Various types of HPV vaccines available in India are-

1. Bivalent (CERVARIX, targets HPV subtype type 16,18) licensed for females aged 10-45 years; cost ₹3,000 to ₹3,500 per dose
2. Quadrivalent (Gardasil-4; targets HPV subtype type 6,11,16,18) licensed for females aged 9-45 years, cost - ₹2,000 and ₹4,000 per dose.
3. Nonavalent (Gardasil-9; targets HPV subtypes 6,11,16,18,31,33,45,52,58) licensed for females and males aged 9-45 years; cost- ₹10,850 per dose
4. Quadrivalent (Cervavac; targets HPV subtype type 6,11,16,18) licensed for females and males aged 9-26 years; cost- ₹2,000 per dose.

The HPV vaccine dosage schedule is given in Table 2.[3]

Age group	Number of doses	Schedule
FOGSI ICOG GCPR recommendations/ Indian Academy of Pediatrics (IAP) Advisory Committee		
9-14 years	2	0 and 6 months
15-45 years	3	0,2 and 6 months
WHO SAGE Recommendations		
9-14 years	One or two doses	0,6 months
15-20 years	One or two doses	0,6 months
>21 years	Two doses	0,6 months
Males (Gardasil 9, Cervavac)		
9-14 years	2	0 and 6 months
15-45 years	3	0,2 and 6 months
-Reduced dose schedule of HPV vaccine awaits Drug Controller General of India (DCGI) approval. - Cervavac is licensed till 26 years -Immunocompromised and in people living with HIV infection- 3 dosage schedule has to be given.		

Table 2- HPV vaccination recommendations

Side Effects- HPV vaccines are usually safe and well tolerated.Some minor side effects are[4]

1. Injection site reactions like pain (35-88%), redness (5-40%), and swelling (4-35%)
2. Systemic side effects like – headache, dizziness, myalgia, arthralgia
3. Gastrointestinal symptoms (nausea, vomiting, and abdominal pain).

Storage- HPV vaccines are to be stored in refrigerator at 2-8° C, should not be frozen and should be protected from sunlight**.**

Availability- HPV vaccine is available as 0.5ml vial

Route of administration- Intra-muscular

Site of administration- Deltoid muscle

Precautions- Should be injected immediately after removal from refrigerator.

- After administration of vaccine, the recipient of vaccine should be observed for any side effects for at least 15 minutes**.**

Benefits - Vaccination contributes to herd immunity by reducing the prevalence of HPV infections in communities. Herd immunity also protects the unvaccinated individuals. Overall, the HPV infections and the associated cancers will decrease over time.[5]

Some common queries related to HPV vaccination

1. **Why to give HPV vaccine to the kids when they are not sexually active?**
   - Parents should be counselled that vaccines are for primary prevention of cancers and prevention is always prior to the exposure to the disease.
   - Immune response in younger adolescents is better if vaccine is given at an early age
   - At early age, only two doses of HPV vaccine are required as compared to age more than 15 years, when 3 doses of vaccine are required.
2. **If an individual misses the HPV vaccine dose, what is to be done?**
   - Even if an individual misses the dose, there is no need to restart the vaccine schedule. The missed dose can be taken at any time.
3. **Can we switch from one HPV vaccine to another?**
   - Ideally, one should proceed with the same HPV vaccine with which vaccination has been started.
   - If any person wants to take nonavalent vaccine after intake of quadrivalent vaccine, a minimum interval of 12 months should be given between the completion of the quadrivalent vaccine and the initiation of the nonavalent HPV vaccine.
4. **Can other vaccines of immunization schedule be given alongside the HPV vaccine?**
   - Since HPV vaccine is not a live vaccine, it is acceptable to administer any inactivated or live vaccine either during the same visit or at any time before or after receiving the HPV vaccine.
5. **Does the ovarian failure or auto-immune diseases occur with HPV vaccine?**
   - Studies on HPV vaccine and autoimmune diseases and ovarian insufficiency have failed to document any consistent relationship between HPV vaccine and autoimmune diseases or ovarian insufficiency.[6]
6. **Can HPV vaccination be given in pregnancy and lactation?**
   - HPV vaccine should be avoided in pregnancy but can be safely given during lactation without any side effects. If inadvertently given in pregnancy, there is no need of medical termination of pregnancy.
7. **What is to be done if patient conceives after first dose of HPV vaccine?**
   - The remaining doses should be continued after the delivery. There is no need of medical termination of pregnancy.
8. **Whether cervical cancer screening is required after HPV vaccination?**
   - HPV vaccination is not the replacement of cervical cancer screening. Cervical cancer screening should be continued as per the guidelines.
9. **Can HPV vaccine be given during menstruation?**
   - Yes, it can be given during menstruation.

10. Can HPV vaccine lead to infertility?

- There are no such reports which show that HPV vaccine cause infertility. Globally, millions of girls have been vaccinated with HPV vaccine and no correlation with infertility has been proven.

11. Whether HPV vaccination can treat warts or cervical cancer?

- Counselling should be done that HPV vaccine is for prevention from certain strains of HPV and it cannot be used for treatment purpose.

Status of HPV vaccination in India

High cost of HPV vaccine is a significant barrier for HPV vaccination in India. According to the NFHS-5 data, less than 1% of girls are being vaccinated of HPV vaccine and only 2% of Indian women have undergone cervical cancer screening.[7]

Key strategies to improve HPV vaccination in India[8]

1. Implementation of mandatory HPV vaccination in schools and colleges.
2. Inclusion of HPV vaccination in universal immunisation programme.
3. Involvement of community leaders to advocate for HPV vaccination by focussing on benefits of HPV vaccination.
4. Breaking the socio-cultural barriers which prohibit HPV vaccination by communicating the safety profile of the HPV vaccine with help of awareness campaigns and educational programs.
5. Pro-active immunisation program with artificial intelligence (AI)-driven surveillance and resource allocation in rural areas (as was followed in Covid pandemic).

Key Points

- HPV vaccine provides major protection against HPV infections and the HPV associated cancers.
- Quadrivalent and nonavalent vaccines are available in India.
- Vaccine should be given in younger adolescents (9-14 years) for the maximum immune response.
- HPV vaccine is gender-neutral, should be given in females as well as males; protects from carcinomas of cervix, vulva, vagina, anal canal, oropharyx and genital warts.
- The side effects of vaccine are minimal and of short duration.
- HPV vaccination drive should not be a personal choice but it is responsibility towards community, thereby, preventing HPV infections globally and prevent the HPV-associated cancers.

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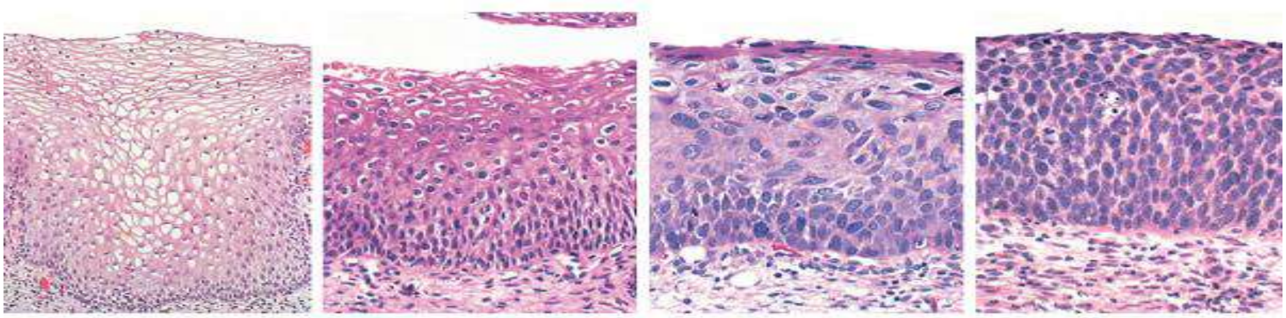
CERVICAL INTRAEPITHELIAL NEOPLASIA-MANAGEMENT

Dr Richa Kansal, Professor & Head, Deptt. of Obst & Gynae, KCGMC Karnal
Dr Isha Bansal (KCGMC,Karnal)

Introduction

Cervical intraepithelial neoplasia (CIN) is a premalignant lesion of the cervix and a key focus in gynecologic oncology because of its potential progression to invasive cervical cancer. Its prevalence varies globally, but widespread cervical screening and early intervention have significantly reduced cervical cancer incidence and mortality[1]. CIN is usually asymptomatic and detected through routine screening. Diagnosis follows a stepwise approach, from cytology and HPV testing to colposcopy and biopsy, in line with international guidelines. Contemporary management uses risk-based algorithms, emphasizing individualized care, conservative management in younger women, and vigilant follow-up to prevent disease progression[2].



Courtesy:https://medicoapps.org/wp-content/uploads/2018/08/Cervical-intraepithelial-neoplasia-CIN.png

Traditional treatment approaches for CIN

Conventional treatments for CIN encompass a variety of ablation and excisional methods, including cryotherapy, LEEP, and cone biopsy[3]. The aim of these conventional treatments is to eradicate abnormal cervical tissue effectively while simultaneous preservation of the overall health and function of the cervix. Each method presents its own set of advantages and considerations, with the choice of treatment dependent on factors such as the extent of the lesion, patient characteristics, and the objective of eradicating the abnormal tissue to prevent progression to cervical cancer

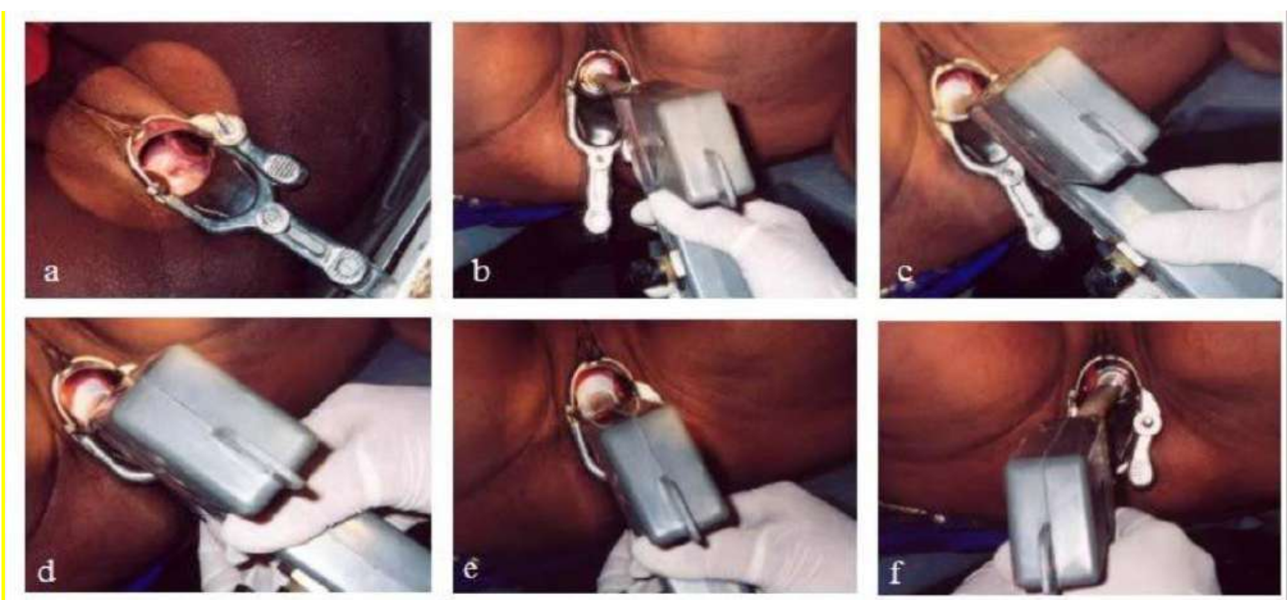
Ablative Therapies

Ablative therapies for Cervical Intraepithelial Neoplasia (CIN) destroy abnormal cervical tissue using methods like **Cryotherapy** (freezing), **CO2 Laser**, and **Thermal Ablation** (heat, also cold coagulation), offering effective treatment without removing tissue, Effective for CIN, especially in low/middle-income countries (LMICs) where resources for excisional methods (like LLETZ) might be limited. Can be performed by various healthcare workers, often without anesthesia. making them ideal for resource-limited settings but requiring prior exclusion of invasive cancer Unlike excision, it doesn't yield a tissue sample for pathology, so accurate diagnosis is crucial beforehand. WHO suggests cryotherapy or thermal ablation for confirmed CIN2+, depending on local resources.

a. **Cryotherapy**: Cryotherapy Uses freezing (CO2 or N2O gas), also known as cryo-cautery, involves freezing abnormal tissue to destroy it effectively and has been a historically popular method for treating CIN . It is a widely used destructive technique WITH cure rates for CIN3 ranging from 77% to 93% in early studies, with some variability in success rates.
b. **Thermal Ablation (Cold Coagulation)**: Thermal coagulation, also known as cold coagulation, uses heated probe (100°C) for 20-40s, and has emerged as an alternative to cryosurgery, particularly in resource-limited settings. It is Simple, portable, good for primary care.
c. **CO_2 Laser**: Precise tissue destruction with a laser beam; usually less pain/swelling than other methods.

Adverse Effects: Mild pain, cramping, watery/bloody discharge, often temporary.
Late Complications: Very few with ablation; a key advantage is *no increased risk of preterm birth*, unlike some excisions.
Follow-Up: Regular Pap tests/HPV testing post-treatment to monitor for recurrence, especially for HIV-positive women.

ABLATION DEVICES



Cryotherapy in process

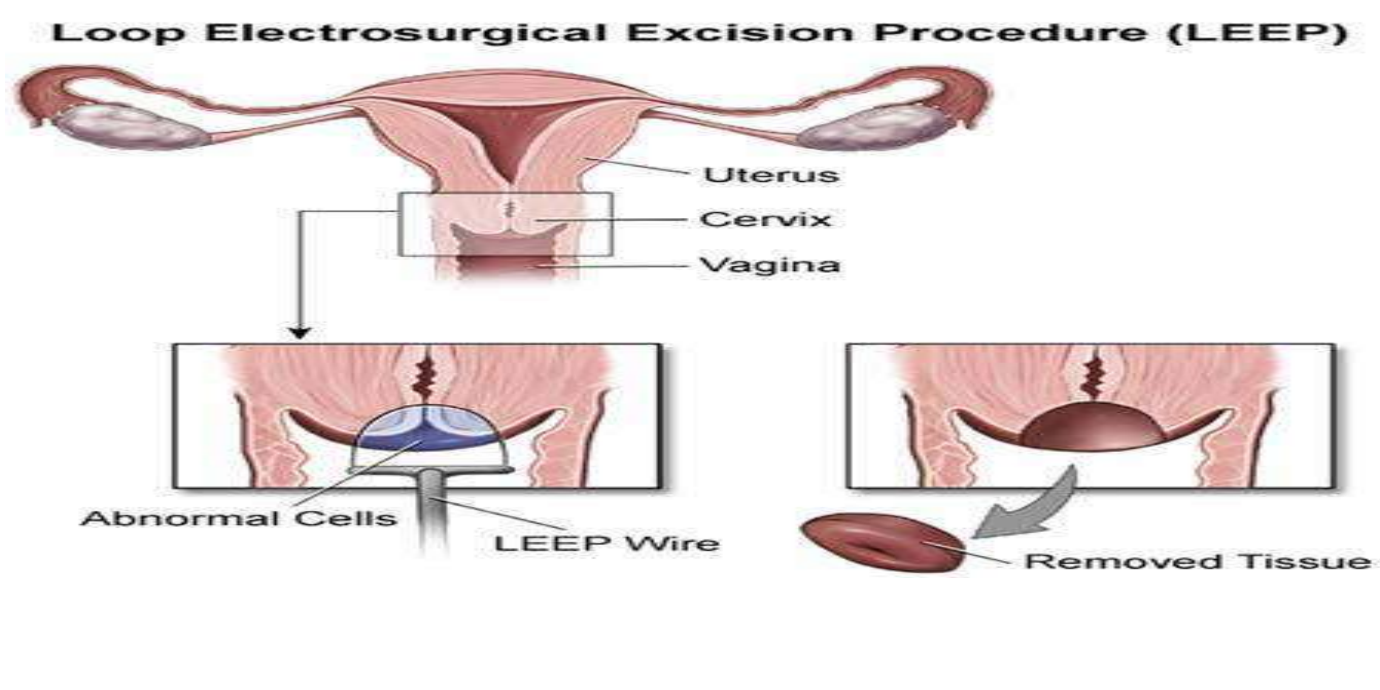
Courtesy:**Colposcopy and treatment of cervical intraepithelial neoplasia: a beginners' manual, Edited by J.W. Sellors and R. Sankaranarayanan**

https://screening.iarc.fr/colpochap.php?chap=12.php&lang=1

Excisional Procedures

Cervical Intraepithelial Neoplasia (CIN) diagnostic excisional procedures, like LEEP (Loop Electrosurgical Excision Procedure) and Cold Knife Conization (CKC), remove abnormal cervical tissue for diagnosis and treatment, targeting the transformation zone (TZ) to eradicate precancerous cells while preserving tissue for pathology.

- **Loop Electrosurgical Excision Procedure (LEEP):** Loop removes abnormal tissue using a thin heated wire loop electrode ensures precise removal of the affected area faster, less bleeding, good for most CIN, lower cost.
- **Cold Knife Conization (CKC):**which may involve cold-knife excision or conization often with curettage., is a surgical approach to remove a cone-shaped piece of tissue from the cervix for further examination and treatment Traditional method, often under general anesthesia, gives excellent margins but higher risk of complications/infertility.
- **Laser Conization:** Ablates or excises tissue with laser. Uses laser for excision, less common than LEEP/CKC.The process involving colposcopy guided excision (CKC, LEEP, laser), specific post-op care (managing discharge, bleeding, pain), and monitoring for complications like bleeding, infection, perforation, and potential late effects on future pregnancies, with LEEP often favored over CKC for better margins and lower costs, while balancing recurrence risk and potential preterm birth risk[4]. Choosing method based on lesion size, patient factors, provider skill, resource availability.



Courtesy:**https://www.obgynecologistnyc.com/wp-content/uploads/2016/09/LEEP-procedure.jpg**

Choosing Treatment: Excision vs. Ablation

Aspect	Excision (LEEP/LLETZ)	Ablation
Diagnostic value	Provides tissue for histopathology to confirm grade, exclude invasive cancer, and assess margins; essential when cancer is suspected or findings are unclear	No tissue sample obtained; diagnosis relies on prior cytology/biopsy
Effectiveness	Highly effective with excellent cure rates for CIN 2/3; superior diagnostic assurance	Also highly effective, though cure rates for high-grade CIN may be slightly lower
Impact on pregnancy	May slightly increase risk of preterm birth, particularly with deeper excisions	Preferred option for women planning future pregnancies due to minimal obstetric impact
Morbidity	Higher procedural morbidity compared with ablation	Lower morbidity, less pain, and quicker recovery
Ideal indications	High-grade lesions (CIN 2/3), large lesions, suspected glandular disease, or when margin status is important	Low-grade CIN (CIN 1), selected CIN 2, resource-limited settings, or when tissue diagnosis is not critical

Topical Treatment

Cidofovir, Imiquimod, all-trans retinoic acid, and 5-FluoroUracil have been proposed as agents for topical treatment of CIN lesions and could advantageously be used as an alternative to surgery in treating HPV-associated precancerous lesions of the cervix, especially for the LMICs. Overall, the remission rates of CIN2 ranged from 43 to 93%.

Minimally Invasive Treatment Modalities

A. **Thermal ablation** involves modalities applying thermal energy to heat or cool tissue to cytotoxic levels, typically less than -40°C or more than 60°C, to induce tumor destruction. These include -
    a. **Radiofrequency ablation (RFA)**
    b. **Microwave ablation (MWA)**
    c. **Laser ablation (LA**)
    d. **High-intensity focused ultrasound**,
    e. **Irreversible electroporation**

These modalities, each tailored to specific indications and optimal uses, offer minimally invasive approaches for patients who may not be suitable for surgery or have failed other treatments, such as chemotherapy or radiotherapy[5].

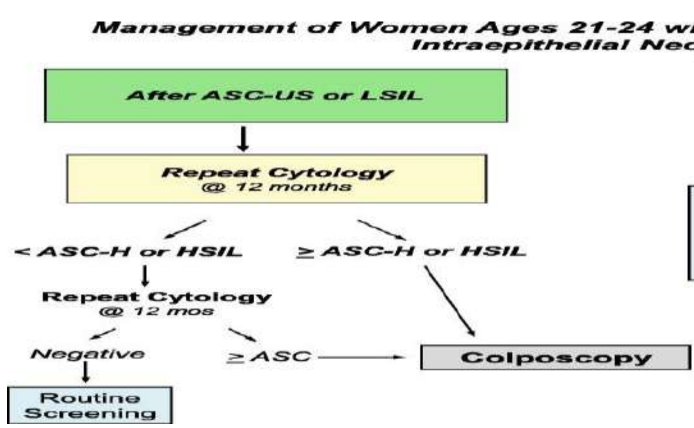
B. **Photodynamic therapy**: offers minimal scarring, no known long-term side effects, outpatient procedures, and precise antitumor activity compared to interventions like surgery.

Treatment Guidelines[6]

Treatment guidelines are stratified by age, distinguishing patients younger than 25 years from those aged 25 years and older, due to the high rates of spontaneous regression of HPV infection and CIN 2, and the very low incidence of cervical cancer in individuals under 25 years.

Diagnosis category	Patient management as per age	
	< 25 Years	**≥ 25 Years**
Histologic LSIL (CIN 1) with HSIL Cytology	• Observation is the standard dictum. • Annual cytology with colposcopy recommended in persisting lesions or with high-grade cytology	• Observation with repeat colposcopy/cytology at 12 months • excisional procedure to be considered in cases with high-grade cytology
Histologic LSIL (CIN 1) with ASC-H Cytology: (higher chance of underlying high-grade disease)	• Colposcopy recommended • Immediate treatment without histologic confirmation not recommended	• LSIL's high regression rate with ASC-H's concerns- needs to be balanced • Close observation with cytology/colposcopy • Excision considered with persistence or other risk factors (like multiple pregnancies)
CIN 1 Preceded by LSIL or less	• Observation with follow-up cytology at 12-month intervals. • Referral back to colposcopy if repeat cytology is HSIL or worse • Return to routine screening in cases with 2 consecutive -ve cytology test reports.	• Observation with surveillance (cytology/HPV co-testing) recommended using HPV test every 12 months or repeat cytology every 6-12 months.
Persistent CIN 1 ≥ 2 yrs	• Continued observation or treatment with the decision based on factors like reliability of follow-up, and other risk factors.	
Preceded by ASC-H or HSIL (cytology): (considered high-risk)	• Observation. • Colposcopy or diagnostic excision is recommended, balancing regression risk and treatment side effects • Biopsy-confirmed CIN 1 managed with surveillance as per standard protocol.	• Colposcopy and biopsy • Treatment required in highly suspicious or confirmed higher-grade lesion • Diagnostic excision (LEEP/cone) recommended
CIN 1 (Preceded by AGC)	• Requires comprehensive workup to exclude glandular neoplasia	• Needs colposcopy with endocervical sampling and

	• Diagnostic excision, if required	possibly an endometrial biopsy, to rule out more severe glandular disease or cancer. • Excisional procedure to rule out underlying adenocarcinoma in situ or cancer.
CIN 2, 3 General Management	• Observation with serial colposcopy and cytology every 6 months generally preferred over immediate treatment, • Treatment considered if the lesion persists for a significant period (e.g., 2 years) progression to CIN 3 or cancer is suspected. or if there are other specific clinical concern	• Both excisional procedures (like LEEP or conization) and ablative therapies (like cryotherapy) acceptable, provided the endocervicalcanal not involved • Excision (LEEP/cone) or ablation (laser, cryotherapy) for visible lesions • Diagnostic excision if colposcopy is inadequate. • Expedited treatment without a preceding biopsy preferred for high-risk features (e.g., HSIL cytology with positive HPV 16) and an immediate risk of CIN 3+ ≥60%,
Histologic HSIL (CIN 2/3)	• With histologic HSIL (CIN 3), treatment is recommended, and observation is unacceptable • With histologic HSIL (CIN 2), observation is Preferred, and treatment is acceptable	• Ablation (cryo, laser) or excision (LEEP, cone biopsy) for CIN 3 • CIN-2 observed initially in young, compliant patients
CIN 2 with High Pregnancy Concerns	Observation (cytology/colposcopy every 6-12 months) preferred over excision to minimize preterm birth risk associated with larger excisions, especially in young and compliant patients.	



Algorithm for the Management of Women Ages 21-24 with No Lesion or Biopsy-confirmed Cervical Intraepithelial Neoplasia-grade 1 (CIN1)

SPECIAL POPULATIONS

Pregnant patients	● Management strategies altered to minimize risk to the pregnancy ● Definitive treatment delayed until after delivery with biopsy often deferred unless high suspicion ● Vaccination recommended postpartum.
Adolescents inadvertently screened	● Close observation due to high rates of spontaneous regression of lesions in this age group. ● Screening starts with sexual activity; ● Immunocompromised adolescents screened earlier (e.g., 6 months after activity).
Immunocompromised patients (higher risk of persistent HPV infection and CIN progression)	● More intensive screening and management protocols required ● 3 doses of vaccination recommended ● Increased screening frequency (e.g., 6-month intervals initially) recommended.
Patients with compliance issues	● Strategies focus on ensuring follow-up and treatment completion ● Use different testing modalities or more immediate treatment options

Management of Sexual Partners:

Management of sexual partners generally focuses on HPV prevention along with their own health and screening needs. It involves screening partners, especially males, who should be aware of HPV transmission and consider vaccination to reduce overall risk, though treatment isn't typically the primary goal

- **Male partners:** do not typically require specific testing or treatment solely because their female partner has CIN. Penile cancer screening is not standard.
- **Female partners:** should adhere to standard cervical cancer screening guidelines based on their age and medical history.

Vaccination in CIN-

Prophylactic vaccines prevent new infections but have limited impact on existing ones; therapeutic vaccines are in development.

- **HPV vaccination:** cornerstone of prevention. Recommended for all eligible individuals, after a CIN diagnosis, including those with existing CIN, as it protects against new high-risk HPV types and reduces the risk of recurrence.
- **Therapeutic vaccines:**
    - Multiple types of therapeutic vaccines[7] have been developed to target HPV E6 and E7 proteins and prevent CIN progression:
        - Peptide/protein-based vaccines
        - Nucleic acid-based vaccines (DNA/RNA)

    - Live vector-based vaccines (bacterial or viral)
- Clinical trials show these vaccines are tolerable and immunogenic, eliciting responses such as:
    - E7-specific cytotoxic T lymphocyte (CTL) responses
    - HPV-specific IFNγ-associated T-cell responses
- Reported efficacy in regressing CIN 2/3 lesions to CIN1 or normal ranges from 17% to 59%.
- Emerging approaches include engineered T-cell therapy and novel DNA/RNA, peptide, and protein vaccines to further enhance immune response against HPV-related cervical lesions.
- These strategies focus on antigen-specific immune activation to improve prevention and treatment of cervical cancer.

Immunotherapy[8]

Immunotherapy approaches, encompassing therapeutic vaccines and immune checkpoint inhibitors, present novel pathways for managing CIN-

- Pembrolizumab, administered alone or in conjunction with chemotherapy, augments immune response against cancer cells
- Novel immune checkpoints like CTLA-4, TIGIT, LAG-3, TIM-3, and A2AR have been shown to enhance antitumor potency
- Combination regimensmay improve treatment outcomes-
    - GX-188E therapeutic DNA vaccine combined with Pembrolizumab
    - PD-1/PD-L1 inhibitors with various immunotherapies or biotherapies

Potential Areas for Future Research and Innovation

- Future research should address gaps in cervical cancer screening, treatment delivery, and awareness by integrating innovative, technology-driven approaches.
- Advanced artificial intelligence (AI) and machine learning (ML) models can enhance screening accuracy and facilitate early detection of cervical precancerous lesions.
- AI-based systems such as Cervi CARE AI have shown promising results in accurately identifying CIN, improving colposcopic assessment, standardizing impressions, and guiding biopsy decisions[9].
- Computational models using demographic, HPV, and lifestyle data can predict CIN progression, support conservative management, and personalize treatment strategies through tools such as neural networks and support vector machines.
- AI-powered image analysis can improve screening precision and reduce observer variability.
- Digital health platforms enable real-time health data management, patient education, remote monitoring, and personalized care delivery.

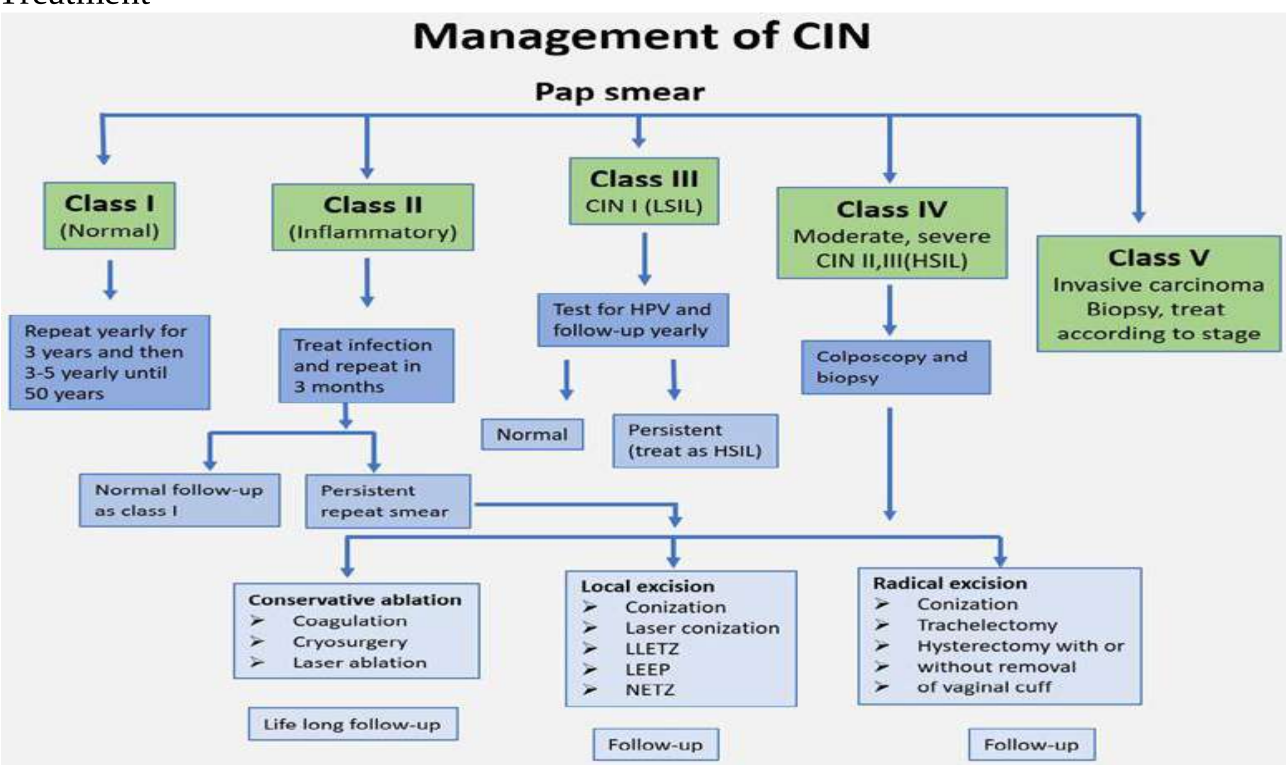
Collectively, these technologies have the potential to transform cervical cancer prevention and management by improving patient-centered care beyond traditional approaches.

Remaining Challenges in CIN Management

The clinical course of untreated CIN 2 continues to be a topic of discussion, with research suggesting significant regression rates along with the possibility of advancing to more severe stages such as CIN 3 or invasive cancer [10] The persistent challenges in managing CIN focus on reaching a consensus in clinical practice, increasing awareness about the natural history of CIN 2, refining criteria for management strategies, and developing personalized treatment plans to improve patient outcomes and reduce the impact of cervical cancer

Key points

- The management of Cervical intraepithelial neoplasia (CIN) is influenced by avariety of factors like age, lesion grade (CIN 1, 2, 3), and HPV status.
- Close monitoring, appropriate follow-up, and personalized treatment approaches are essential for minimizing risks and ensuring successful outcomes for patients undergoing treatment for CIN.
- Special considerations exist for pregnancy (defer treatment), immunocompromised individuals (more aggressive surveillance), and vaccine candidates (vaccination recommended).
- Low-grade (CIN 1) often undergo spontaneous regression in young women (<25 yrs) and require only surveillance.
- High-grade (CIN 2/3) usually need treatment (LEEP/cryo/) to prevent cancer, even in younger patients.
- Continued surveillance with HPV testing or co-testing at 3-year intervals is recommended for at least 25 years after treatment for CIN 2, CIN 3, or AIS, as the risk remains elevated.
- Treatment [11] -



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COLPOSCOPY- WHEN AND HOW

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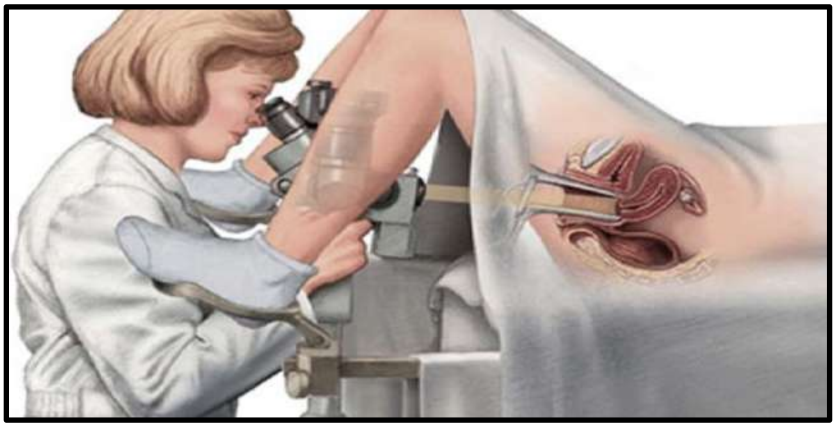


The colposcope is an endoscopic instrument that is used to study the epithelium of the vagina and cervix in vivo under adequate illumination and magnification.

The magnification usually used is between 5X and 20X.

Initially, cytology and colposcopy were viewed as competitive tests for cervical cancer screening; however, it was soon realized that the two tests complement each other in the screening and early detection of cervical cancer.

Colposcopy is best performed in concert with cytology. To quote Burke and coworkers, "Colposcopy is best learned at the pathologist's bench." Histopathology remains the gold standard for the diagnosis of intraepithelial neoplasia and invasive cancer.The colposcopic image depends on the interaction between the surface epithelium and the underlying stroma[1] The epithelium acts like a filter through which light passes. It is colorless, while the stroma appears red because it contains blood vessels. This redness is seen through the epithelium during colposcopy.

The color seen on colposcopy depends on how much light is **reflected and absorbed** by the tissues. This is influenced by tissue pigments and the amount of hemoglobin in red blood cells. **The amount of reflected light further depends on the thickness and structure of the epithelium and on the vascularity and nature of the underlying stroma**. In 1925, Hinselmann found that acetic acid makes cervical mucus coagulated and causes abnormal cervical cells to turn white. This happens because acetic acid affects the proteins in the cells. In 1936, he identified punctation and mosaic patterns, which are seen in precancerous lesions of the cervix. He also used iodine solution to stain the cervix to help detect abnormal areas more clearly.Koller observed that using acetic acid and Schiller's iodine made it hard to see blood vessel patterns in the cervix. To solve this, he introduced the saline technique in 1963, which helped in better viewing of the blood vessel structure of the cervix.

TYPES OF COLPOSCOPY

- Routine Colposcopy

Routine colposcopy means examining the cervix during every gynecological check-up.
Pros: It takes only about 5 extra minutes for an experienced doctor and gives immediate information about the transformation zone, where abnormal cells usually develop.
Cons: It is not always quick or easy and may cause harm if done by an inexperienced clinician. Due to heavy patient load, routine use may lead to rushed and poor-quality examinations.

- Screening Colposcopy

Screening colposcopy is used specifically to screen for cervical cancer, often in conjunction with other methods like the Pap smear or HPV testing.
Key points: Some believe it should be incorporated into screening programs because Pap smears have a notable false-negative rate. In developing countries, issues like a lack of resources and high dropout rates make instantaneous results from colposcopy appealing for a one-time screening approach.

- Selective colposcopy- only when indicated, preferred by the majority of colposcopists.

INDICATIONS FOR COLPOSCOPY

The indications are as follows:

- Evaluation of the woman with squamous or glandular cell abnormalities on Pap smear, with no gross lesion on the cervix or vagina
- Persistence of inflammatory cells despite adequate treatment
- Presence of keratinized cells[2]
- Women with postcoital bleeding, intermenstrual bleeding, persistent discharge despite appropriate treatment and postmenopausal bleeding[3]
- Naked eye examination reveals an "unhealthy" cervix or vagina suspicious of malignancy, especially one with significant aceto-whitening after acetic acid wash
- Evaluation of women with a positive screening high-risk human papillomavirus (HPV) DNA test, including those with a negative Pap smear
- Treatment of women with cervical intraepithelial lesion (CIN)
- Monitoring of women treated for biopsy proven CIN
- Evaluation of women with anogenital condylomas
- Preoperative evaluation of women diagnosed to have stage I cervical cancer on biopsy (to rule out involvement of vagina)
- Evaluation of women exposed to diethylstilbestrol (DES) in utero

HOW TO DO COLPOSCOPY ?

History:

Take a detailed history and record it in the colposcopy evaluation form.

Written Informed Consent:
Obtain written consent for colposcopy and biopsy, if needed, in the same sitting.

Examination:
Colposcopy should ideally be done under optimal hormonal conditions, **but no patient should be turned away because she is not in the correct phase of her menstrual cycle.**

Women with Normal Menstrual Cycles
Colposcopy is best performed between the **8th and 12th day of the cycle**, when cervical mucus is clear and the external os is open.

Women Using IUCD
Women with IUCD usually have thick cervical mucus. **Ethinyl estradiol may be given for 7 days before examination to improve visibility.** If IUCD replacement is needed, it should be done after the Pap smear report. In abnormal reports, the IUCD should be removed in the next cycle and colposcopy performed after 1 month, as IUCD strings can interfere with examination and biopsy

Women Using Combined Oral Contraceptive Pills (COCPs)
Cervical mucus remains thick and opaque throughout the cycle.
Normal cervical mucosa returns only after ~2 months of stopping COCPs.
Preferred approach:
Use sequential OCPs in the next cycle and perform colposcopy in the progestogenic phase, or
Stop COCPs and give ethinyl estradiol + progestogen sequentially.
Ethinyl estradiol dose: ≤ 50 µg (higher doses not required).
Contraceptive protection is inadequate → advise alternative contraception

Postmenopausal Women
Give **ethinyl estradiol 10 µg orally for 7–10 days** (if not contraindicated). **Purpose:** improves epithelial maturation and visibility of abnormal areas. Perform pelvic ultrasound to check endometrial thickness before giving estrogen. Do colposcopy on the last day of estrogen therapy (atrophy returns quickly). This dose does not cause withdrawal bleeding.
Short-term strong estrogen is better than long-term weak estrogen.
Ethinyl estradiol (oral) preferred over estradiol/estriol or vaginal route. Transdermal estrogen gel may be used for 10–14 days with good results.

Women Who Have Undergone Hysterectomy
Subtotal hysterectomy (ovaries preserved):
If ovarian function is doubtful, give:
Ethinyl estradiol orally for 7–10 days,or Transdermal estrogen gel for 10–14 days.

Total Hysterectomy (ovaries preserved):

- Refer for colposcopy based on standard clinical indications.

Position of the Patient-

Most cases are examined in the lithotomy position.
Extended lithotomy may be needed if the cervix is high or flush with the vault.
Adjust the couch, stool, and colposcope for proper visualization.

Choice of the Speculum-

Usually bivalve self-retaining speculum Choose appropriate size, non-serrated, matt finish.
If the cervix is high/flush/forward → Sims speculum + anterior wall retractor .
Cervix can be re-centered with a cotton swab.
Lax vaginal walls: use retractors or condom over speculum.

Identification of New Squamocolumnar Junction (SCJ)-

New SCJ forms due to squamous metaplasia over exposed columnar epithelium , seen inside the transformation zone.
Proximal to the original SCJ Identified as the inner margin of acetowhite area after applying 5% acetic acid.
Appears as a sharp line between acetowhite metaplastic squamous epithelium and columnar epithelium.
Lugol's iodine: new SCJ separates iodine-positive mature squamous epithelium from iodine-negative columnar/metaplastic epithelium

Types of Transformation Zone-

Type 1: Entire squamocolumnar junction (SCJ) fully visible on ectocervix
Type 2: SCJ partly on ectocervix and partly in endocervical canal, fully visible
Type 3: SCJ partly or completely inside endocervical canal, not fully visible

DOCUMENTATION COLPOSCOPY FINDINGS[4][5]

Colposcopic features useful for assessment and interpretation include-

- Response to acetic acid
- Surface contour
- Margin of lesion
- Punctation and mosaic pattern, and intercapillary distance
- Appearance of blood vessels
- Atypical vessels Appearance of gland openings
- Iodine uptake
- Leukoplakia (previously termed keratosis)

GRADING OF COLPOSCOPY-

Grade I (Insignificant/Not suspicious): Acetowhite epithelium shiny or semitransparent Borders not necessarily sharp, often ill-defined With or without fine-caliber vessels.No atypical vessels Small intercapillary distance Vascular pattern usually regular Predicted histology:

Normal / benign changes or CIN 1.
Grade II (High-grade lesion): Dense acetowhite epithelium (thick, opaque, persistent) Sharp, well-defined margins Coarse punctation Coarse mosaic pattern Inner border sign may be present Ridge sign may be seen Rapid onset and slow fading of acetowhitening Partial or complete iodine non-uptake (iodine negative area) Suggestive of HSIL (CIN 2 / CIN 3)
Grade III (Highly significant/Highly suspicious): Very white or gray opaque acetowhite epithelium Sharp, well-defined borders Irregular surface contour
Dilated, irregular vessels Coarse vascular patterns (punctation/mosaic), often atypical Micro-exophytic epithelium may be present May show ridge sign, inner border sign Predicted histology: CIN 2–3 (HSIL)

1. Modified Reid's Colposcopic Index (RCI)[6]for objective assessment of cervical lesions. Parameters and Scoring

Each parameter is scored 0–2.

1. Margin and Surface Configuration
Indistinct, feathered margins: 0
Regular, smooth, well-defined margins: 1
Rolled, peeling edges; internal demarcations: 2

2. Color of Acetowhite Area
Shiny, translucent, faint acetowhitening: 0
Intermediate gray-white: 1
Dense, opaque, dull white: 2

3. Vascular Pattern
Fine/uniform vessels, no abnormality: 0
Fine punctuation or mosaic: 1
Coarse punctuation or coarse mosaic: 2

4. Iodine Staining (Schiller Test)
Mahogany brown (iodine positive): 0
Partial uptake / speckled: 1
Mustard yellow (iodine negative): 2

Total Score: 0 – 8

Interpretation
0–2 → Benign/CIN 1 (Low-grade lesion)
3–5 → CIN 1–2 (Intermediate lesion)
6–8 → CIN 2–3 (High-grade lesion)

2. <u>SWEDE SCORE</u>[7][8]

Swede score	0	1	2
Aceto uptake	Zero or transparent	Shady, milky (not transparent not opaque)	Distinct, opaque white
Margins/surface	Diffuse	Sharp but irregular, jagged, "geographical" satellites	Sharp and even, difference in surface level incl "cuffing"
Vessels	Fine, regular	Absent	Coarse or atypical
Lesion size	<5mm	5-15mm or 2 quadrants	>15mm or 3-4 quadrants or endocervically undefined
Iodine staining	Brown	Faintly or patchy yellow	Distinct yellow
			Total score

Swede score (minimum 0; maximum 10):

- Total score 0–4: normal/CIN1
- Total score 5–6: CIN2/CIN3
- Total score 7–10: CIN3/Cancer

METHODS OF COLPOSCOPY

1. Saline method
2. Classical (Extended) method

Saline Method

Devised by Koller; developed by Kolstad & Stafl Cervical mucus removed using saline-moistened swabs Cervix & vagina flooded with normal saline

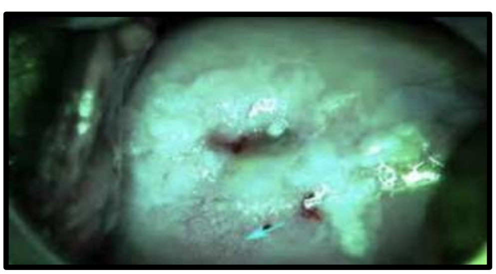
Assesses:

- Gross lesions
- Epithelial opacity
- Vascular patterns

Green filter applied:

Vessels appear dark black on translucent epithelium Abnormal epithelium may stand out. <u>Must precede acetic acid application</u>

***VISUALISATION OF CERVIX UNDER GREEN FILTER*(Fig 1)**



(Fig.1 Source-Atlas of Colposcopy:Principles and Practices/Activity 6

Classical / Extended Method

Most widely used technique

Excess mucus removed with dry/saline swab Cervix swabbed with dilute acetic acid.

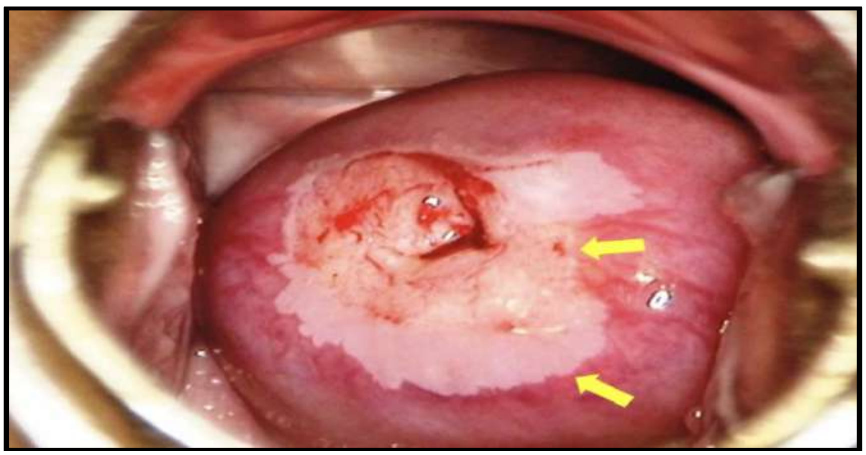
- Recommended strength: **3–5%**
- 3% preferred (effective, less irritation)

- **Precautions with acetic acid: Verify strength before use**

Avoid concentrated solutions → prevents chemical burns

Acetowhitening effect: Seen in epithelium with high nuclear-cytoplasmic ratio.

VISUALISATION OF CERVIX AFTER ACETIC ACID APPLICATION **(Fig 2)**



(Fig. 2 Source-CANCER SCREENING IARC/Atlas of visual inspection of the cervix with acetic acid for screening, triage, and assessment for treatment)

- Appears within 1–3 minutes
- Transient, reappears on reapplication
- Use gentle compression, avoid rubbing → prevents bleeding
- Excess pooled acid should be removed for clear visualization Green filter helps identify atypical vessels, punctation, mosaic

Wait at least 1 minute before recording findings

Most important part of colposcopy

- New squamocolumnar junction (SCJ) must be fully visualized
- If not on ectocervix → search within cervical canal
- Critical site for detecting premalignant and malignant lesions

IODINE TEST (SCHILLER'S TEST)
VISUALISATION OF CERVIX AFTER IODINE APPLICATION**(Fig 3)**


(Fig. 3 Source-Atlas of visual inspection of the cervix with acetic acid for screening, triage, and assessment for treatment)

- Final step of colposcopic examination
- Speculum reinserted; cervix and vagina painted with iodine
- Solutions used:

Lugol's iodine (preferred)
Schiller's iodine

- Aqueous solution only
  Alcohol-based iodine damages epithelium Interferes with histopathological assessment
- 50% Lugol's solution preferred
  Adequate staining
  Safe and effective

Clinical Value
✖Some experts feel iodine test adds little to cervical assessment
✖May obscure fine vascular detail
✔Dark brown staining → mature metaplasia
▪ No suspicion of abnormality
▪ Unnecessary biopsy avoided
✔Extremely useful in vaginal colposcopy

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Screening controversies in ovarian cancer

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Ovarian cancer is the foremost cause of gynecological cancer death and is overall one of the most frequent causes of fatal malignancy in women. It carries a lifetime risk of approximately 2% for a woman.[1]

Ovarian cancer often presents with vague and nonspecific symptoms, resulting in more than 70% of women being diagnosed at an advanced stage (stage III or IV), which is associated with poor survival outcomes. One-year survival declines substantially from 93.5% in stage II disease to approximately 71% in stage III, contributing to a high mortality-to-incidence ratio.[2] Consequently, effective screening has the potential to reduce mortality by enabling earlier detection when the disease is more curable.

Ovarian cancer risk varies widely across the population, supporting the need for targeted screening strategies. Two main groups are recognized:

1. The general population has a lifetime ovarian cancer risk of approximately 1–2%.
2. A high-risk group, defined by family history and genetic mutations, has a lifetime risk of 10% or more. [1]

Risk factorsfor ovarian cancer:

- Older age
- Genetic mutations(BRCA 1, BRCA2, MLH1, OR MSH2 and Lynch syndrome)
- Family history of breast and ovarian cancer
- Individual history of breast or other cancers
- Early menarche, late menopause
- Null parity
- Endometriosis and hormone replacement therapy
- Dietary fat
- Tobacco smoking for mucinous tumors
- Obesity, infertility, talc powder, radiotherapy have controversial role in ovarian cancers

Protective factors for ovarian cancer:

- Parity
- Oral contraceptive use
- Tubal ligation and salpingectomy are protective, supporting a tubal origin for ovarian cancer.
- Smoking

Screening modalities

Currently, no screening program for ovarian cancer exists for the general population. However, the current clinically available approaches for ovarian cancer screening are:

1. Pelvic examination,

2. Imaging of the adnexa by transvaginal ultrasound
3. Protein biomarkers : cancer antigen 125 (CA125), HE4, CA 19-9.

Pelvic examination

The American College of Obstetricians and Gynecologists (ACOG) suggests vigilance for the early signs and symptoms of ovarian cancer, such as abdominal or pelvic pain and unexplained weight loss, and these symptoms be evaluated by pelvic examination, CA-125, or ultrasound. The U.S. Preventive Services Task Force (USPSTF) states that there is not enough evidence for or against routine screening with pelvic examination and is unsure of the benefits versus the harms because of the lack of studies (USPSTF, 2017).[3]The American Academy of Family Physicians (AAFP) recommends against pelvic exams – Grade D for evidence of little benefit and possible harm (AAFP). [4]

Transvaginal ultrasound (TVS)

Transvaginal ultrasound (TVS) allows direct imaging of the adnexa and can identify ovarian pathology through morphological abnormalities or features associated with increased ovarian cancer risk, like enlarged ovarian volume. However, many aggressive ovarian cancers spread at an early stage, before tumors become large enough to be detected sonographically. This limitation was evident in the multimodal arm of the UKCTOCS trial, where rising serum CA125 levels were observed in several women despite normal ultrasound findings.[5]
A further drawback of TVS is the subjective nature of image interpretation, which limits its reliability as a first-line screening tool for the general population and necessitates the involvement of large numbers of trained sonographers. In UKCTOCS, even with structured training, accreditation, and quality assurance measures that improved ovarian visualization, substantial inter-observer variability persisted in distinguishing normal postmenopausal ovaries, both between sonographers and among expert reviewers. Technical challenges also reduce diagnostic accuracy, particularly in older postmenopausal women with small ovaries, in women with higher body mass index, and in those who have undergone procedures such as hysterectomy, tubal ligation, or unilateral oophorectomy.
Additional limitations include poor visualization of the fallopian tubes and difficulty detecting tumors smaller than 1 cm in diameter. To address these shortcomings, advanced imaging approaches aimed at enhancing resolution, such as Doppler flow assessment, microbubble contrast-enhanced ultrasonography, and photoacoustic imaging, are being explored. Experimental imaging strategies in animal models, including the use of immune-based markers such as engineered macrophages and nanoprobe technologies, also show promise for improving the detection of early-stage disease in the future.

CA125

CA125 is an epithelial cell surface glycoprotein involved in promoting cancer cell growth and metastasis. It is the most widely used biomarker for ovarian cancer. Elevated serum levels of CA125 (>35 U/mL) were present in approximately 80% of women with ovarian cancer. Despite its widespread use, clinical trials have demonstrated that CA125 alone has limited sensitivity for early-stage disease, restricting its utility as a screening tool. In the pre-operative setting, CA125 provides only modest improvement in distinguishing malignant from benign ovarian masses when used within multimodal diagnostic approaches.

Otherbiomarkers:HE4andCA19-9

For less common ovarian cancer subtypes, human epididymis protein 4 (HE4) and cancer antigen 19-9 (CA19-9) have shown utility. HE4, like CA125, is a surface glycoprotein and is elevated in serous and endometrioid tumors, but not in clear-cell or mucinous tumors. Changes in HE4 levels may occur 2–3 months earlier than CA125, suggesting potential for earlier detection in these subtypes. In 2008, the FDA approved HE4 for monitoring known epithelial ovarian cancer, demonstrating equivalence to CA125 in tracking disease progression. However, like CA125, HE4 is not approved for pre-operative diagnosis and should always be interpreted alongside imaging and clinical assessment.

CA19-9, a monosialoganglioside, is primarily associated with gastrointestinal tumors but is also elevated in some primary mucinous ovarian carcinomas. Evidence on its preoperative diagnostic value in distinguishing malignant from benign mucinous ovarian tumors is conflicting, and its use remains largely adjunctive rather than definitive.

Combining these markers with CA125 has not shown to improve its efficacy in screening of ovarian cancer.[6]

Whether to screen or not for ovarian cancer?

A successful screening strategy should be safe, accessible, and cost-effective, balancing the physical and psychological burden of screening against the opportunity to offer early treatment with curative intent. However, the development of a screening program for ovarian cancer is challenging because of :

1. Low incidence
2. Risk of false-positive results leading to unnecessary surgical interventions
3. Overdiagnosis
4. Failure to identify a histological precursor lesion
5. Failure to identify a molecular event that precedes malignant transformation
6. Psychological stress
6. Financial burden

Recently, the United States Preventive Services Task Force (USPSTF) reviewed the evidence on benefits and harms of screening for ovarian cancer in asymptomatic women, not known to be at high risk for ovarian cancer. The USPSTF found that screening for ovarian cancer conferred no mortality benefit and that harms in the form of false-positive screening test results and subsequent surgery were moderate to substantial. Therefore, the USPSTF recommended against screening for ovarian cancer in asymptomatic women (level D) who are not at high risk for the disease.[6]The American Cancer Society and the American College of Obstetrician and Gynecologists (ACOG) also do not recommend screening for ovarian cancer in average-risk women. However, the ACOG does recommend that the evaluation of high-risk women may include transvaginal ultrasound and CA-125 testing in addition to the physical examination.

Screening in high risk population

Approximately, 5–10% of ovarian cancers are attributed to genetic mutations. Mutations in the BRCA1 and BRCA 2 genes increase the risk of developing both breast and ovarian cancer. The life time risk of developing ovarian cancer (up to the age of 70 years) is 40% (95% CI, 35–46%) for carriers of BRCA1 mutation and 18% (95% CI, 13–23%) for BRCA2 mutation

carriers. Lynch syndrome or hereditary nonpolyposis colorectal cancer (HNPCC) is a syndrome secondary to mutations in the mismatch repair genes (MMR)—MLH1, MSH2, MSH6 and PMS2, which not only increases the risk of developing colorectal cancer but also ovarian and endometrial cancer in female carriers. The estimated cumulative risk of ovarian cancer by age of 70 years for women with Lynch Syndrome is around 10%.
For women with genetic mutations or high risk, ovarian cancer screening using a combination of CA-125 and TVS should be done. MSK begins screening women with mutations in BRCA1 or the mismatch repair genes MLH1, MSH2, and MSH6 between 30 and 35 years of age. For women with BRCA2 mutations, screening is initiated between 35 and 40 years of age. The National Comprehensive Cancer Network (NCCN) recommends risk-reducing salpingo-oophorectomy (RRSO) in women with BRCA1/2 mutations after 35 years of age. In women not undergoing RRSO, transvaginal ultrasound combined with serum CA-125 may be considered at the clinician's discretion starting at the age of 30–35 years (NCCN Guidelines Version 3.2019). For women carrying high-risk genetic mutations, including BRCA1, BRCA2, and mismatch repair genes, MSK supports screening with CA125 and TVS beginning in early adulthood.[7]

Table 1 Key interventional trials in ovarian cancer screening.

Trial Name, Design, Year	**Participants**	**Screening methods**	**Results**	**Additional remarks**
Prostate, Lung, Colorectal and Ovarian Cancer Screening Trial (PLCO) (Randomised controlled trial (RCT 2011)[8]	78,286 women aged 55–74 • Screen: 39,105 • Control: 39,111	Six annual serum CA125 tests (cut-off >35 U/mL) plus transvaginal ultrasound for first four years	At 15-year follow-up: no reduction in ovarian cancer mortality (RR 1.06; 95% CI 0.87–1.30). No difference in stage distribution between screened and control groups	Demonstrated lack of benefit of CA125 cut-off–based screening in general population
UK Collaborative Trial of Ovarian Cancer Screening (UKCTOCS) (2016, RCT)[5]	202,638 women aged 50–74 • Multimodal screening (MMS): 50,640 • Ultrasound (USS): 50,639 • Control: 101,359	1. MMS: Annual longitudinal CA125 interpreted using ROCA, followed by transvaginal ultrasound and repeat CA125 if abnormal 2. USS: Annual transvaginal ultrasound with repeat imaging if abnormal	At median 11.9 years: **MMS** – Non-significant average mortality reduction of 15% (95% CI −3 to 30; p=0.10). Delayed mortality reduction: 0–7 years 8%, 7–14 years 23% (95% CI 1–46). Significant increase in Stage I–II disease (36.1% vs 23.9%; p=0.00013). **USS** –	Follow-up ongoing as mortality curves continued to diverge. MMS appears cost-effective under UK willingness-to-pay thresholds. No long-term psychosocial harms reported

Trial Name, Design, Year	Participants	Screening methods	Results	Additional remarks
			Non-significant average mortality reduction of 11% (95% CI −7 to 27; p=0.21). No stage shift observed	
Japanese Shizuoka Cohort Screening Study (Multicentre RCT 2008)[9]	82,487 women • Screen: 41,688 • Control: 40,799	Annual CA125 (cut-off >35 U/mL) plus transvaginal ultrasound	Intention-to-screen analysis showed non-significant increase in Stage I disease (63% vs 38%; p=0.23)	Stage analysis included borderline epithelial ovarian cancers. No mortality data published
University of Kentucky Study (Single-centre, single-arm prospective interventional trial 2013)[10]	25,327 women aged 25–92	Annual transvaginal ultrasound with repeat imaging if abnormal	Compared with unscreened institutional cohort: significantly improved 5-year survival (74.8% ±6.6% vs 53.7% ±2.3%; p<0.001)	Results subject to lead-time bias and absence of randomised control
UK Familial Ovarian Cancer Screening Study (UK FOCSS) Phase 1 (Single-arm prospective interventional trial 2017)[11]	3,563 high-risk women	Annual CA125 plus transvaginal ultrasound	Women not screened in year before diagnosis were more likely to present with >Stage IIIC disease (85.7% vs 26.1%; p=0.009)	Suggested benefit of regular screening in high-risk populations
UK Familial Ovarian Cancer Screening Study (UK FOCSS) Phase 2 (Single-arm prospective interventional trial 2017)[12]	4,348 high-risk women	4-monthly CA125 interpreted using ROCA plus annual transvaginal ultrasound	Compared with cancers diagnosed >1 year after last screen: • Increased low-volume disease (Stage I–IIIa vs IV) (63% vs 6%; p=0.0004) • Non-significant increase in complete	Demonstrated improved surgical outcomes in screen-detected cancers

Trial Name, Design, Year	Participants	Screening methods	Results	Additional remarks
			cytoreduction (95% vs 72%; p=0.09) • Reduced use of neoadjuvant chemotherapy (5% vs 44%; p=0.008)	
US Cancer Genetics Network / Gynaecologic Oncology Group Trials (Single-arm prospective interventional trial 2019)[13]	3,692 high-risk women	3-monthly multimodal screening with CA125 interpreted using ROCA		

In the Prostate, Lung, Colorectal, and Ovarian (PLCO) Screening Trial, CA125 alone had a positive predictive value of just 4%, which increased to 26.5% when combined with transvaginal ultrasound (TVU). However, even this combination did not lead to a demonstrable improvement in survival after 15 years of follow-up. Among 28,506 women with both CA125 and TVU results, only 2% showed abnormalities in both tests, highlighting the low concordance and limited utility of CA125 for general population screening (table 1).

The UK Collaborative Trial of Ovarian Cancer Screening (UKCTOCS) was a large randomized controlled trial involving 202,638 postmenopausal women aged 50–74 years who were not considered to be at high genetic risk for ovarian cancer. While the study reported some improvement in survival among screened women, the results were not statistically significant, underscoring the limitations of CA125-based screening. Moreover, CA125 is less effective in diagnosing non-serous subtypes such as mucinous or endometrioid ovarian cancers, where expression is lower. Epidemiological factors, including age, race, ethnicity, and obesity, also influence CA125 serum levels independently of disease, further reducing its reliability as a standalone screening biomarker. Nonetheless, CA125 remains valuable as a postoperative marker for monitoring treatment response and detecting disease recurrence.

The earlier UK Pilot Trial, which evaluated CA125 using a single cut-off value, similarly demonstrated no significant difference in ovarian cancer mortality between screened and unscreened women. Mortality rates were lower in the screened group, but the difference did not reach statistical significance, highlighting the limitations of single-threshold CA125 screening.

From a biological perspective, ovarian cancers are broadly classified into Type I (low-grade) and Type II (high-grade, aggressive) tumors, each with distinct molecular characteristics. Low-grade cancers are associated with alterations in the KRAS and BRAF pathways, while high-grade serous cancers are strongly linked to TP53 mutations. Current screening modalities are more likely to detect indolent low-grade tumors, which has minimal impact on survival outcomes for aggressive high-grade cancers that account for the majority of ovarian cancer deaths.

Molecular research continues to advance understanding of ovarian cancer pathogenesis. Studies have demonstrated that dysregulation of transforming growth factor-beta (TGF-β) signaling, mediated by genes such as PITX2, SNAI1 and MMP9, promotes epithelial-to-mesenchymal transition and tumor invasiveness. These findings highlight the potential role of gene expression profiling and molecular biomarkers in future screening strategies, early detection, and personalized treatment approaches. Ongoing research in this field offers hope that more effective and biologically targeted screening tools may ultimately reduce ovarian cancer mortality.

Key points

- Ovarian cancer is a leading cause of cancer-related death among women.
- Major challenges in ovarian cancer screening include the unknown origin of tumor cells, the absence of well-defined precursor lesions, the low positive predictive value of existing screening modalities, the substantial risks associated with interventions prompted by screening findings, and the failure of current screening approaches to demonstrate a meaningful reduction in mortality.
- Ovarian cancer screening is not currently recommended in general population.
- In high-risk women, screening with CA-125 and Transvaginal ultrasound can be considered.

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Lifestyle Modification: The Cornerstone of Women's Cancer Prevention

From Awareness to Action in Preventive Oncology

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Introduction: The Imperative for Prevention in Women's Oncology

Cancer has emerged as one of the most formidable public health challenges affecting women globally and in India. According to the **ICMR–National Cancer Registry Programme (NCRP)**, breast cancer is now the most common cancer among Indian women, while cervical, ovarian, endometrial, colorectal, and lung cancers continue to contribute substantially to morbidity and mortality[1]. Alarmingly, nearly two-thirds of women with cancer in India present at advanced stages, when treatment outcomes are suboptimal and the economic and psychosocial burden is immense.

Despite remarkable advances in oncology, incidence rates of many lifestyle-related cancers continue to rise. This paradox highlights a critical gap: insufficient emphasis on **primary prevention**. The World Health Organization estimates that **30–50% of all cancers are preventable** through lifestyle modification, vaccination, and early detection[2]. Preventive oncology must therefore move to the forefront of women's healthcare, and lifestyle modification must be recognized as its foundation. Lifestyle factors contribute to nearly half of all cancers worldwide.

As obstetricians, gynecologists, and leaders of professional associations, we occupy a unique position—interacting with women across the life course—to influence behaviors that shape cancer risk long before disease develops.

Biological Basis: Lifestyle as an Epigenetic Regulator

Cancer development is a multistep process involving genetic susceptibility interacting with environmental and lifestyle exposures. While inherited genetic mutations account for a minority of cancers, **epigenetic alterations induced by lifestyle factors** play a dominant role in carcinogenesis[3].

Unhealthy lifestyle behaviors influence key oncogenic pathways:

- Chronic low-grade inflammation
- Insulin resistance and hyperinsulinemia
- Excess estrogen exposure and altered hormone metabolism
- Oxidative stress and DNA damage
- Gut microbiome dysbiosis
- Impaired immune surveillance

These mechanisms are particularly relevant to **hormone-dependent and metabolic cancers** such as breast, endometrial, ovarian, colorectal, and lung cancers, which are increasingly common among Indian women[4].

Diet and Nutrition: The Foundation of Cancer Prevention

Dietary Patterns and Cancer Risk

Diet is one of the most powerful and modifiable determinants of cancer risk. Large epidemiological studies consistently demonstrate that **overall dietary patterns**, rather than isolated nutrients, determine cancer risk.

The **World Cancer Research Fund (WCRF)** recommends diets that are predominantly plant-based, rich in fruits, vegetables, whole grains, legumes, nuts, and seeds, and low in processed foods, red meat, added sugars, and unhealthy fats[5]. Such dietary patterns are associated with reduced risk of breast, colorectal, and endometrial cancers.

Protective Mechanisms of a Healthy Diet

- **Dietary fiber** lowers circulating estrogen levels by enhancing fecal excretion and improves insulin sensitivity, reducing breast and endometrial cancer risk[6].
- **Antioxidants and phytochemicals** neutralize free radicals and protect against oxidative DNA damage.
- **Healthy fats**, particularly omega-3 fatty acids, reduce chronic inflammation and may inhibit tumor proliferation.
- **Gut microbiota modulation** through fiber-rich diets influences estrogen metabolism and immune regulation.

Indian Context

Traditional Indian diets—when minimally processed—are inherently protective, incorporating millets, pulses, vegetables, fermented foods, and spices such as turmeric. However, rapid urbanization has led to increased consumption of ultra-processed foods, refined carbohydrates, sugary beverages, and trans fats.

The **ICMR Dietary Guidelines for Indians (2020)** emphasize reducing processed foods, salt, sugar, and saturated fats while increasing plant-based foods—recommendations that directly support cancer prevention[7].

Obesity and Metabolic Health: A Major Oncogenic Driver

Obesity has been classified as a **Group 1 carcinogen** by the International Agency for Research on Cancer[8]. Excess adipose tissue acts as an endocrine organ, producing estrogen through aromatization—particularly significant in postmenopausal women.

Obesity significantly increases the risk of:

- Postmenopausal breast cancer
- Endometrial cancer (3–4-fold increase)
- Ovarian cancer
- Colorectal cancer

Rising obesity rates among adolescent girls and young women in India are particularly concerning, as early-life obesity increases lifetime cancer risk.

The Government of India's **NPCDCS programme** recognizes weight management and healthy lifestyle promotion as core cancer prevention strategies[9].

Physical Activity: Movement as Preventive Medicine

Regular physical activity is one of the most effective and underutilized cancer prevention tools. Evidence demonstrates a clear **dose–response relationship**, with higher levels of activity conferring greater protection[10].

Mechanisms of Protection

Physical activity:

- Reduces circulating estrogen and insulin levels
- Improves immune surveillance
- Decreases chronic inflammation
- Enhances antioxidant defense and DNA repair

The WHO recommends **150–300 minutes of moderate-intensity physical activity per week**, along with muscle-strengthening activities twice weekly[2]. Simple activities such as brisk walking, yoga, cycling, stair climbing, and household work are feasible and culturally acceptable for Indian women.

Encouraging physical activity across the life course—from adolescence to menopause—is critical for sustained cancer prevention.

Tobacco Use: A Preventable Carcinogen

Tobacco is a leading preventable cause of cancer among women.

Active and Passive Smoking

Smoking is associated with cancers of the lung, cervix, breast, and ovary. Passive smoking significantly increases lung and breast cancer risk, particularly among non-smoking women [11].

Smokeless Tobacco

Smokeless tobacco use, prevalent among Indian women, increases the risk of oral, pharyngeal, and cervical cancers. **There is no safe form of tobacco**, and cessation must be a core preventive oncology message.

Lung Cancer in Women: Beyond Smoking

Lung cancer is emerging as a significant cause of cancer-related mortality among women, including non-smokers. Contributing factors include:

- Passive smoking
- Indoor air pollution from biomass fuel
- Outdoor air pollution (PM2.5)
- Occupational exposures

The WHO classifies **air pollution as a Group 1 carcinogen**[12]. Indian women, particularly in rural settings, face high exposure to indoor air pollution due to solid fuel use. Clean cooking fuels, improved ventilation, and air quality regulation are critical preventive strategies.

Colorectal Cancer: An Emerging Female Concern

Colorectal cancer incidence is rising among women in India. Risk factors include low fiber intake, high consumption of processed and red meat, sedentary lifestyle, obesity, smoking, and alcohol use.

Dietary modification, physical activity, weight control, and early screening are essential components of colorectal cancer prevention [5].

Alcohol Consumption: No Safe Threshold

Alcohol consumption increases cancer risk in a dose-dependent manner, particularly for breast cancer. Even low levels increase risk by raising estrogen levels and generating carcinogenic metabolites such as acetaldehyde [13].

Women should be counselled clearly that **alcohol avoidance is an evidence-based cancer prevention strategy**.

Safe Sexual Practices and Cancer Prevention

Sexual health is central to preventing HPV-related cancers, including cervical, vaginal, vulvar, anal, and oropharyngeal cancers.Preventive strategies include:

- Delaying sexual debut
- Limiting multiple sexual partners
- Consistent condom use
- Early diagnosis and treatment of STIs
- **HPV vaccination and regular cervical screening**

FOGSI and national guidelines strongly support HPV vaccination as a key pillar of cervical cancer prevention[14].

Environmental Pollution and Endocrine Disruptors

Women are increasingly exposed to endocrine-disrupting chemicals (EDCs) such as bisphenol-A, phthalates, pesticides, and heavy metals. These act as **xenoestrogens**, influencing breast and reproductive cancers[15].

Reducing exposure through awareness, safer consumer choices, and policy advocacy is an emerging frontier in preventive oncology.

Lifestyle Modification and Screening: A Synergistic Approach

Lifestyle modification complements—not replaces—screening. Integrating lifestyle counselling with screening programs (HPV testing, breast screening, colorectal screening) significantly enhances cancer prevention outcomes[2].

OB-GYN clinics provide ideal opportunities for **life-course preventive counselling** during antenatal, contraceptive, and menopausal visits.

Leadership Role of Professional Associations

Professional associations must lead the shift from reactive to preventive care by:

- Mainstreaming lifestyle counselling in routine practice
- Training members in preventive oncology communication
- Aligning with national programs (NPCDCS, National Cancer Control Programme)
- Advocating for cleaner environments and healthier communities

Preventive oncology must become a **professional mandate**.

Conclusion: Prevention as Empowerment

Lifestyle modification is the most powerful, cost-effective, and equitable strategy to reduce women's cancer burden. Prevention empowers women, strengthens families, and builds resilient health systems.

As clinicians and leaders, our responsibility extends beyond treatment—to **education, advocacy, and prevention**. By championing lifestyle modification, we can move toward a future where women's cancers are not only treated, but truly prevented.

■ KEY MESSAGES: LIFESTYLE & WOMEN'S CANCER PREVENTION

- **30–50% of women's cancers are preventable.**
- Healthy diet and regular physical activity are **biological cancer modifiers**.
- Obesity is a major risk factor for breast, endometrial, and colorectal cancers.

- **No form of tobacco or alcohol is safe.**
- Lung cancer in women is rising due to smoking and air pollution.
- Colorectal cancer is increasing with dietary and lifestyle transition.
- Safe sexual practices and HPV vaccination are essential for cervical cancer prevention.
- Lifestyle counselling should be part of **every OB-GYN consultation**.
- Preventive oncology is a **professional and social responsibility**.

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Screening for Breast Cancer

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Chairperson, Breast Cancer Awareness Mission, NIGF

Introduction

Breast cancer screening refers to the systematic search for breast cancer in women who do not yet have symptoms of the disease. The primary objective of screening is early detection, when the disease is still localized and treatment outcomes are significantly better. Early-stage breast cancer is easier to treat, requires less aggressive therapy, and is associated with higher survival rates. Screening and early detection therefore hold immense potential in reducing breast cancer mortality.

Breast cancer has emerged as a major public health concern globally and in India. According to GLOBOCAN 2020 [1] data released by the International Agency for Research on Cancer (IARC) and the World Health Organization (WHO), breast cancer has surpassed lung cancer as the most commonly diagnosed cancer worldwide. In India, the burden is particularly alarming—every 13 minutes, a woman loses her life to breast cancer. Despite relatively lower incidence rates compared to some Western countries, mortality in India remains high due to late diagnosis and lack of organized screening programs.

Gynecologists are often the first point of contact for women with breast-related concerns. This places them in a crucial position to promote breast awareness, initiate screening, and ensure timely referral. Adopting a structured approach such as the "Rule of 3" or Triple Assessment strategy can significantly improve early detection rates and save lives.

The Breast: An Organ of Growing Concern

The breast is a dynamic organ that undergoes continuous physiological changes throughout a woman's life, influenced by hormonal fluctuations during puberty, menstruation, pregnancy, lactation, and menopause. Structurally, the breast consists of milk-producing glands (lobules), ducts that carry milk to the nipple, connective tissue (stroma), fat, blood vessels, lymphatics, and muscles beneath.

Understanding normal breast anatomy is fundamental to recognizing pathological changes. The lobules are organized into clusters that drain into ducts, which converge at the nipple. The surrounding stroma provides structural support, while the axillary tail of Spence extends into the armpit region, making axillary examination an essential component of breast evaluation.

Hormonal Influence on the Breast

Estrogen and progesterone are the primary hormones influencing breast development and function. Produced by the ovaries under the control of the hypothalamic-pituitary-ovarian (HPO) axis, these hormones circulate throughout the body via the bloodstream and regulate the menstrual cycle. They also stimulate breast tissue growth and differentiation.

However, the same hormones that support normal breast physiology can also promote the growth of hormone-sensitive breast cancers. Prolonged exposure to estrogen and progesterone—whether endogenous or exogenous—has been associated with an increased risk of breast cancer. This hormonal influence underscores the importance of individualized risk assessment and appropriate screening strategies.

What Can Be Offered for Breast Cancer Screening?

Effective screening for breast cancer involves a combination of strategies aimed at early detection:

- Teaching breast self-examination (BSE)
- Performing clinical breast examination (CBE)
- Utilizing appropriate imaging modalities
- Offering genetic testing when indicated
- Encouraging lifestyle modifications to reduce risk

Among these, the integration of self-Breast awareness, clinical assessment, and imaging forms the cornerstone of screening, especially in low- and middle-income countries like India.
Regular screening, early detection, and timely referral must therefore be the guiding principles of breast cancer control programs.

ASBrS Breast Cancer Screening Guidelines Recommendations[3]

- **Women age 25 yrs should undergo formal risk assessment for breast cancer.**
- **Women with an average risk of breast cancer should initiate yearly screening mammography at age 40**
- **Women with higher than average risk of breast cancer should undergo yearly screening mammography and be offered yearly supplemental imaging. This screening should be initiated at the risk based age starting from 25-30 yrs**
- **Screening mammography should cease when life expectancy is <10 years.**

Summary of ASBrS Recommendations for Breast Cancer Screening

Women with average Risk	Women with non dense breasts (A & B density)	Annual Mammography(3D preferred modality) Starting at age 40, no need for supplemental imaging
	Women with increased breasts density (C & D density)	Annual Mammography(3D preferred modality) Starting at age 40, & Consider supplemental imaging
Women with higher then average Risk	• hereditary susceptibility from pathogenic mutation carrier status • Prior chest wall radiation age 10-30	Annual MRI stating at age 25 annual mammography (3D preferred modality)starting age 30
	• Predicted life time risk >20 % by any model • strong family history	Annual mammography (3D preferred modality)& Access to supplemental imaging (MRI preferred modality) starting at age 35 when recommended by their physician
Women with Prier history of breast cancer age >=50 with non dense breast		Annual mammography (3D preferred modality)
Women with Prier history of breast cancer age <=50 with non dense breast		Annual mammography (3D preferred modality) & access to annual supplemented imaging (MRI preferred modality) when recommended by their physican

- ***All Women to undergo risk assessment at age 25-30 yrs and updated at appropriate intervals.**

BREAST CANCER RISK FACTORS [4]

Breast cancer risk factors can be broadly classified into **non-modifiable** and **modifiable** factors. Non-modifiable risk factors include increasing age, female gender, positive family history of breast cancer, personal history of previous breast cancer, early menarche, late menopause beyond 55 years, increased breast density, exposure to chest irradiation between the ages of 10 and 30 years, and the presence of **BRCA-1 or BRCA-2 gene mutations**. Modifiable risk factors include obesity, alcohol consumption and smoking, long-term use of menopausal hormone therapy, prolonged use of combined oral contraceptive pills, late age at first childbirth, and absent or reduced breastfeeding practices. Family history of breast, ovarian, prostate, pancreatic cancer, colon or endometrial cancer in 1st degree relatives, Mother, Sister or daughter with breast cancer age < 50, B/L Breast Cancer Female Family Members/mother, grandmother, sister, aunt, daughter >3 with breast cancer regardless of age of onset or >2 with ovarian cancer or 1 with breast cancer and another with ovarian cancer (Refer for Genetic Counselling also).

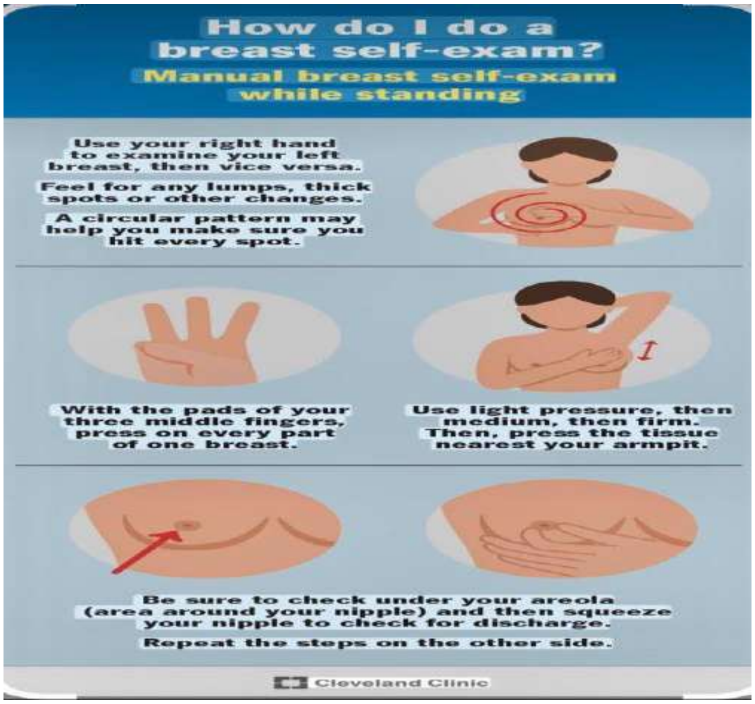
SCREENING GUIDELINES (2023) (ACS, ACR, ASBrS)

Population Group	Primary Method	Frequency
Average Risk (age 40–70)	Mammography 2D or 3D	Annual or Biennial
High Risk > 20% of lifetime risk	Mammography + Annual MRI	Starting at age 25–30
Dense Breasts	Mammography + Supplementary USG or MRI	

Breast Self-Examination (BSE) (figure 1)

Breast self-examination is a simple, cost-free method that empowers women to become familiar with their own breasts and detect changes early. Women are advised to perform BSE monthly, preferably during the postmenstrual phase. BSE should ideally begin at the age of 20 years.

In resource-poor settings like India, BSE plays a vital role in breast cancer awareness. Teaching women to recognize abnormalities ensures that they seek medical attention promptly when changes are noticed



.(source Cleveland Clinic) .Figure1

Clinical Breast Examination (CBE)

Obtain consent: Explain procedure to patient and ensure informed consent.

Initial inspection is done with the patient seated.

Inspection: Visually inspect the breasts, axillae, supraclavicular areas, comparing both for symmetry, size, shape, and contour.

- Arms at Side: Observe for skin changes (erythema, dimpling, puckering, *peau d''orange,* ulceration) and nipple changes (inversion, retraction, discharge, or crusting).
- Hands on Hips (Pectoral Flexion): Ask the patient to press her hands firmly on her hips to contract the pectoral muscles. This maneuver exaggerates any tethering or fixation of underlying masses to the chest wall.
- Arms raised overhead: Ask the patient to raise her arms over her head. This position helps to reveal dimpling or retraction not revealed otherwise.

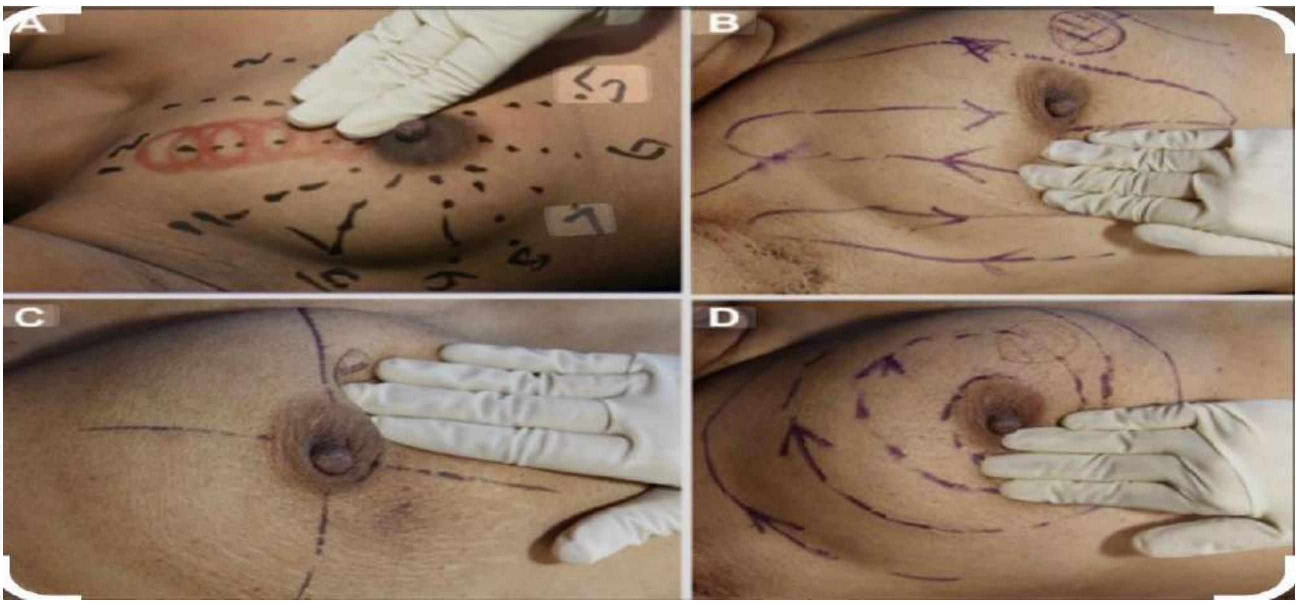
Leaning Forward: For women with large breasts, an additional inspection while leaning forward may help reveal contour changes

Palpation (Supine position) (figure 2)Palpation should be. Performed using the pads of the middle three fingers. Use a consistent pattern (eg., vertical strip method, Concentric circles, or radial spoke method) to ensure the entire breast. , from the clavicle to the sixth rib and from sternum to axila , is covered. Pressure Levels: Apply three levels of pressure at each spot to feel superficial, intermediate and deep tissue down to the chest wall. Examine the Tail of Spence. Nipple-Areola Complex: Gently press the areola with thumb and forefinger to assess for spontaneous or expressible discharge. Note the color and consistency of any discharge. Lymph Node Examination: Palpate regional lymph nodes for enlargement, firmness, fixity. Axillary Lymph Nodes Supraclavicular and Infraclavicular Nodes: Palpate the areas above and below the collarbone.

Documentation: Note the location of abnormality in clock-face configuration, size, shape, texture, mobility, and tenderness.

Signs and Symptoms of Breast Cancer. Although screening targets asymptomatic women, awareness of warning signs remains crucial. Common symptoms include a painless lump or thickening in the breast, changes in breast size or contour, nipple retraction, discharge or bleeding from the nipple, redness or dimpling of the skin resembling an orange peel (peau d'orange), and changes in the color or appearance of the areola. Any of these signs warrant immediate medical evaluation.

Clinical Breast Examination-Palpation. Figure 2.



(source-DirectScience.com)

Mammography

(Mammography picture to be used here – woman undergoing breast X-ray)

Mammography is the most common and widely accepted imaging modality for breast cancer screening. It uses low-dose X-rays to detect early-stage breast cancers before they become clinically palpable. Mammography remains the gold standard screening tool for average-risk women.

Randomized trials have shown that mammographic screening can reduce breast cancer mortality by 25–30% after 5–7 years of follow-up. Mammography can detect lesions as small as 1 mm to 1 cm, including stage 0 (ductal carcinoma in situ), allowing for early intervention and potential cure.

Digital breast tomosynthesis, also known as 3D mammography, is a newer advancement that improves cancer detection rates, particularly in women with dense breasts, and reduces recall rates for additional testing. Mammography is ideally performed during the postmenstrual phase.

Ultrasonography

Ultrasonography is an important adjunct to mammography, especially in women under 50 years of age and those with dense breasts. It helps differentiate solid from cystic lesions, characterize masses, detect lymph node involvement, and guide biopsies. Ultrasound is safe during pregnancy and lactation and enhances diagnostic accuracy when combined with mammography.

Magnetic Resonance Imaging (MRI)
Breast MRI is a highly sensitive imaging modality used as a supplementary tool when mammography and ultrasonography are inconclusive. It is particularly valuable in high-risk women, including BRCA mutation carriers, and is recommended annually along with mammography starting at age 30 or earlier based on family history. MRI is also useful for evaluating implant-related issues, multicentric disease, and treatment response.

Genetic Screening and High-Risk Women
BRCA genes are tumor suppressor genes responsible for DNA repair. Mutations in these genes significantly increase the risk of breast and ovarian cancers. Genetic testing is recommended for women with strong family histories, early-onset cancers, bilateral disease, or male breast cancer in relatives.
High-risk women require intensified screening strategies, including annual mammography and MRI, clinical breast examinations every 6–12 months, and individualized risk-reduction strategies.

Role of the Gynecologist as a Preventive Oncologist
Gynecologists play a pivotal role in breast cancer prevention by creating awareness, promoting healthy lifestyles, teaching BSE, performing CBE, identifying high-risk individuals, and facilitating timely screening and referral. Opportunistic screening in gynecology outpatient departments can bridge the gap created by the absence of organized national screening programs.

Importance of the Triple Assessment Algorithm (Rule of 3)
The Triple Assessment or Rule of 3 is a protocolized approach for evaluating breast lesions and includes;

1. **Clinical assessment** – history taking and clinical breast examination
2. **Imaging** – ultrasonography, mammography, or MRI as indicated
3. **Tissue diagnosis** – biopsy, usually Tru-cut or core needle biopsy

This approach has demonstrated a sensitivity of approximately 99.6% in detecting breast cancer and has standardized the management of nearly all breast lesions. [2] Importantly, it is not the disease itself but delayed diagnosis and associated complications that lead to high mortality. In India, nearly 70% of breast cancer cases are diagnosed at an advanced stage, resulting in lower survival rates (around 60%) compared to approximately 80% in the United States.

Take-Home Messages
 Breast cancer screening plays a crucial role in saving lives.
 Mammography remains the gold standard for screening average-risk women starting at 40 years of age.
 Breast self-examination (BSE) and clinical breast examination (CBE) are especially valuable in low-resource settings.(FIGO Breast Committee)[5].
 Adherence to the **Rule of 3** helps ensure accurate diagnosis and appropriate management.
 In India, opportunistic screening by healthcare providers is essential until organized population-based screening programs are widely implemented

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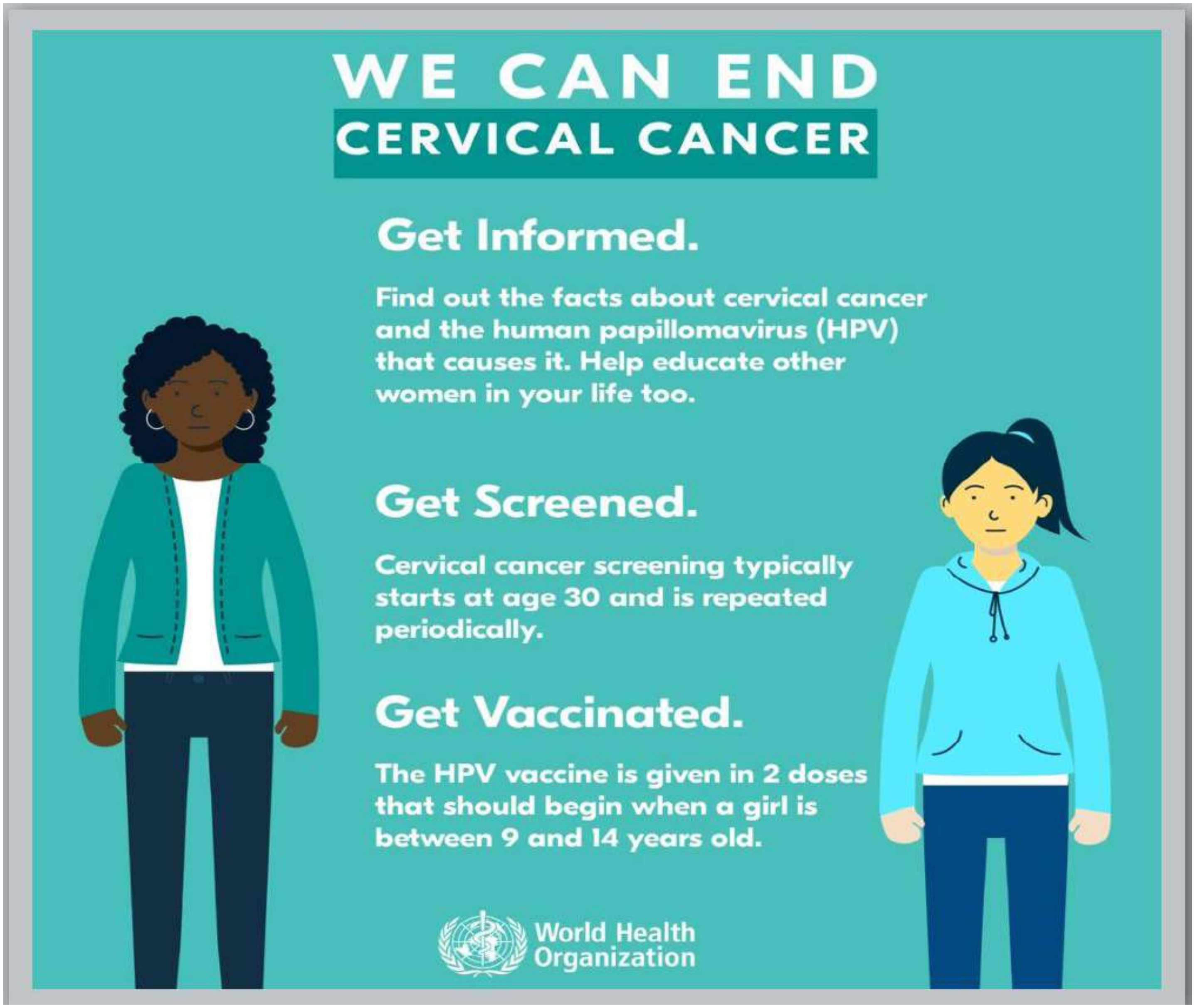
WE CAN END
CERVICAL CANCER
Get Informed.
Find out the facts about cervical cancer and the human papillomavirus (HPV) that causes it. Help educate other women in your life too.
Get Screened.
Cervical cancer screening typically starts at age 30 and is repeated periodically.
Get Vaccinated.
The HPV vaccine is given in 2 doses that should begin when a girl is between 9 and 14 years old.
World Health Organization