Thermal Ablation

Cost-effective and safe for the treatment of cervical precancer

International Agency for Research on Cancer

World Health Organization

IARC Evidence Summary Brief No. 7

Introduction

Cervical cancer remains a leading cause of cancer-related mortality among women in low- and middle-income countries. Effective treatment of precancerous lesions detected during cervical screening is critical to reduce the incidence of cervical cancer.

For decades, cryotherapy was one of the major modalities available for ablative treatment of precancerous lesions. However, the high cost, unreliable supply, quality concerns, and portability issues associated with the refrigerant gas that is essential for the procedure posed significant barriers to the scaling up of cryotherapy in low- and middle-income countries.

The electrically powered benchtop thermal ablation device, initially known as the cold coagulator, was also available on the market but remained underutilized because of its high cost and limited data on its effectiveness. Realizing the potential of thermal ablation as a more realistic alternative to cryotherapy, IARC conducted multiple studies in research and programmatic settings to generate evidence on the efficacy, safety, feasibility, scalability, and cost–effectiveness of thermal ablation.

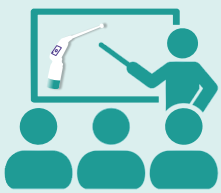
IARC research in Zambia in collaboration with Professor Groesbeck Parham, Dr Leeya Pinder, and their team contributed to the development, field-testing, and evaluation of a portable, battery-operated, and low-cost thermal ablation device, which was field-tested through a large randomized trial.

Key evidence messages

- Thermal ablation is clinically effective and safe for the treatment of eligible cervical precancer.
- Thermal ablation, in an IARC study, is the most cost-effective treatment option for cervical precancer (with a cost of US$ 13.50 per treated woman).
- Use of thermal ablation devices is scalable and is endorsed by WHO.
- Further research is needed into how the microbiome of the cervix and other factors can guide personalized follow-up care.

Call to action

Policy-makers should continue to support thermal ablation, which is being deployed in many countries worldwide.



Governments should make provision for training of nurses and other health professionals in thermal ablation, within the regulatory context of their specific context.

Programmes should ensure post-treatment follow-up care, particularly for women living with HIV because of higher risk of recurrence.

Governments should prioritize procurement and implementation strategies for thermal ablation in low- and middle-income countries, **supporting sustainable inclusion** in health benefit packages.

IARC Evidence Summary Briefs summarize selected research results. They are not a systematic review of all the evidence.

Microbiome and subgroup insights among women living with HIV

A substudy nested in the Zambia trial suggested that the vaginal microbiome may affect how well cervical precancer treatment works, especially in women living with HIV. The study showed that successful healing in the cervical transformation zone was linked to higher levels of *Lactobacillus* in the vaginal environment. In contrast, treatment failure was associated with increased levels of *Sneathia* and *Prevotella*.

These results indicate that the vaginal microbiome could serve as a biomarker to guide personalized follow-up care. More research is needed to confirm this link and to improve treatment strategies especially for women living with HIV.

"In low-resource settings, where health systems and governments must navigate competing economic priorities, the widespread adoption of effective, accessible, and affordable technologies is not merely an option but a necessity. Thermal ablation directly meets this need, making it a critical tool for scaling up cervical precancer treatment."

– Dr Leeya Pinder,
University of Cincinnati College of Medicine, USA

Thermal ablation is now recommended by the World Health Organization (WHO) as a treatment option for eligible women. Women who screen positive are eligible for ablative treatment if the lesion is fully visible on the ectocervix (occupying less than 75% of the ectocervix) and does not extend into the endocervix, the transformation zone (the area where most cervical precancers develop) is type 1 or treatable type 2, and there is no suspicion of invasive cancer. Thermal ablation is an emerging alternative modality for treating cervical precancers, and it is particularly suited for low- and middle-income countries.

Thermal ablation is an effective treatment option

In a study initiated in 2017 in Zambia, a total of 3124 women with screen-positive cervical lesions were randomized to receive thermal ablation, cryotherapy, or large loop excision of the transformation zone (LLETZ); 58.7% of the women were HIV-positive. Treatment success at 12 months was defined as the absence of cervical lesions (by visual inspection of the cervix with acetic acid; VIA) and/or a negative human papillomavirus (HPV) test.

The trial demonstrated that the success rates of thermal ablation were at least as good as those of cryotherapy and LLETZ. The treatment success rates at 12 months were 74.0% for thermal

Preparation of a portable thermal ablation device at First Level Hospital in Lusaka, Zambia, by Nurse Gloria Mwale.

Implications for policy

- **WHO recommends thermal ablation as a safe and effective ablative treatment for eligible women with fully visible cervical lesions.**
- **Results from IARC studies support the WHO recommendation and provide evidence to help countries adopt thermal ablation in screen-and-treat programmes. These programmes, which are widely used in low- and middle-income countries, treat women who test positive during screening immediately, without waiting for laboratory confirmation of disease.**
- **The study results also highlight that follow-up at 12 months is essential, especially for women living with HIV.**
- **To support the WHO Cervical Cancer Elimination Initiative, global access agreements have enabled the availability of thermal ablation devices through procurement support from the United Nations Children's Fund (UNICEF) to public sector buyers in low- and middle-income countries at reduced purchase prices (starting from US$ 925 per unit, without freight and customs clearance), making them an affordable and scalable solution for cervical precancer treatment.**

Current adoption of thermal ablation

According to the Clinton Health Access Initiative (CHAI) and Unitaid, thermal ablation devices have been deployed across 112 countries in Africa, Asia, and South America by October 2025. These efforts are part of a multicountry initiative to scale up cervical cancer prevention services. Kenya, Nigeria, Rwanda, and Uganda are frequently cited as early adopters and showcase countries for integrating thermal ablation into primary care settings.

"Limited access to affordable, effective technologies is a major contributor to the high rates of death from cervical cancer among women in low- and middle-income countries. For too long, product development and pricing have been driven by the priorities of high-income markets, often overlooking the realities on the ground in low- and middle-income countries. We urge technology developers to shift towards inclusive, partnership-driven innovation – working alongside institutions in low- and middle-income countries to co-create scalable, low-cost solutions."

– Professor Groesbeck Parham,
University of Cincinnati Research and Training Alliance, Zambia

ablation, 71.1% for cryotherapy, and 71.4% for LLETZ. Among women living with HIV, the treatment success rates were lower overall but remained comparable across all treatment arms: 62.2% for thermal ablation, 60.9% for cryotherapy, and 62.7% for LLETZ.

These findings are aligned with evidence used by the WHO guidelines on cryotherapy and thermal ablation, supporting the use of thermal ablation as an effective treatment option for cervical precancer in the general female population.

Safety and patient-reported outcomes and cost-effectiveness

Thermal ablation was demonstrated to have low rates of moderate to severe pain (3.6%) and minimal adverse events. The level of satisfaction of patients who received thermal ablation, cryotherapy, or LLETZ exceeded 99%. Thermal ablation was preferred by providers because of its ease of use, a dramatically shorter treatment time, and the portability of the device. No serious treatment-related complications have been reported.

In addition, thermal ablation was shown to be the most cost-effective option in the economic evaluation performed by IARC scientists in the Zambian context. In a routine scenario (integrated into clinical services), costs per treated woman were US$ 13.50 for thermal ablation, US$ 16.40 for cryotherapy, and US$ 35.70 for LLETZ. Thermal ablation offered lower costs than the other methods, with similar effectiveness. These findings provide a strong justification to include thermal ablation as part of national cervical cancer prevention.

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For more information about this project, please email Dr Partha Basu at basup@iarc.who.int.

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The responsibility for the primary data lies entirely with the corresponding authors of the primary peer-reviewed publications.

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