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“Greatest potential of HPV self-sampling may lie in its implementation in low and middle income countries”

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EUROGIN 2025 recently concluded in Portugal as one of the most prestigious conferences in the field, bringing together top scientists, clinicians, and public health experts to discuss the latest advancements in HPV testing, cervical cancer prevention, and diagnostic innovations. To understand more about the latest advancements in HPV diagnostics and genotyping, BioSpectrum interacted with a distinguished researcher specialising in HPV diagnostics and molecular virology, Dr Anja Ostrbenk from University of Ljubljana, Slovenia.

Could you please highlight the impact of emerging diagnostic technologies and their role in improving global cervical cancer screening efforts?

It has been well established that HPV-based testing confer better safety against invasive cervical cancer and its precursors compared to previously cytology-based testing but the caveat of this is its lower specificity. Hence, several recent technological advances have focused on subsequent triage of HPV screen-positive women following the “equal management of equal risk” concept, where the screening outcome is followed by only a few simple action paths to simplify management and reduce over-referrals and over-treatments within cervical cancer prevention programmes. Currently, the most commonly used triage strategies include reflex cytology, dual-stain cytology approach and partial, extended or full genotyping.

There is also growing interest on assessing the clinical value of viral and host methylation and other potential biomarkers. Of these, genotyping is currently the only method that simultaneously provides additional information. Initial research focused

mainly on separating HPV16 and HPV18 – as a result of their implication in approximately 70% of cervical cancer cases worldwide – leading in the development of first generation of HPV assays that separately report HPV16 and HPV18 from other high-risk (hr) HPV types.

However, new insights into risk stratification - where different HPV genotypes has extremely different risk of underlying cervical precancerous lesion - led to development of second generation of HPV assays that enable extended or full genotyping. These information offer better stratification and follow-up of HPV-positive screen women. In addition, importance of HPV types may also differ depending on geographical location.

Some countries such as Sweden, Denmark and Norway have already moved to such an approach, where HPV types are embedded in the national algorithms for HPV screening and women are followed up differently based on their detected HPV genotype.

Could you please share details of the research projects being led by University of Ljubljana towards developing new diagnostic solutions for HPV detection?

Several research projects are currently underway at the Institute of Microbiology and Immunology, which is part of the Faculty of Medicine, University of Ljubljana. A number of new HPV assays coming onto the market are being evaluated to assess whether they adhere to validation requirements set by international guidelines for HPV DNA tests. Such validations are crucial to ensure that only clinically validated HPV assays are used in clinical practice. A recent review of our research group identified more than 264 distinct HPV assays in the market, but less than 20% of them have published evidence on their key performance characteristics, leaving 80% of HPV tests sold and used in daily clinical practice and research worldwide, with unknown but potentially harmful consequences for the women screened. In addition, several triage methods are currently being validated to facilitate the transition from cytology to fully molecular cervical cancer screening.

Furthermore, a large, nation-wide cross-sectional study is currently ongoing that will assess the early impact of HPV vaccination on the burden of hrHPV infection and HPV-related disease in girls vaccinated at 11-12 years of age and provide evidence-based data for improvement of prevention strategy not only for Slovenia but also for broader Central and Easter European region to ensure that women are offered the most effective screening intervention. The current situation in Slovenia represents a unique research model, as on average 50% of women now participating in the screening program have been vaccinated, resulting in an even distribution between HPV vaccinated and non-vaccinated women.

Another interesting project we have, is evaluating the acceptability of HPV vaccination and identifying determinants of decision for the vaccination among younger Slovenian women who were vaccinated against HPV before first sexual contacts, and in women who were not offered HPV vaccination as part of the national vaccination program but are still eligible for HPV vaccination, which will help with the assessment whether national HPV vaccination strategy should be extended to other age groups as well.

What is the current investment scenario from both the public & private sector in Europe (particularly Slovenia), to eliminate cervical cancer?

Large inequalities can be observed across Europe, where some high-income and Western European countries, such as some regions of Sweden, have already reached the WHO elimination target, while in Romania a woman is diagnosed with cervical cancer every two hours.

Several ongoing initiatives aim to minimise the inequalities across Europe, supported by a relatively high level of political commitment. For example, Europe's Beating Cancer Plan will support Member States' efforts to routine vaccination against HPV of girls and boys – in order to eliminate cervical cancer (and other cancers related to HPV), with the aim to vaccinate at least 90% of the EU target population of girls and to significantly increase the vaccination of boys by 2030.

The plan also includes putting forward a new EU-supported cancer screening scheme to help member states ensure that 90% of the EU population who qualify for cervical cancer screening are offered screening by 2025. These initiatives will be further supported by the EUCervScreen QA project, which will update the European clinical practice guidelines, covering cervical cancer prevention from HPV vaccination, cervical screening, diagnosis, and treatment of precancerous lesion and develop a European quality assurance scheme for the entire cancer care pathway.

Another example is the ReThinkVaccination project, led by Romania, which vaccinated less than 2% of the target population

in 2008 and is now implementing a new vaccination program for girls aged 11-18 and a national cervical cancer screening programme. Project aims are to reduce vaccination inequalities through communication and education and further support other EU Member States in rethinking HPV vaccination campaigns.

Slovenia already has a long and successful history of the cervical cancer screening programme, which was established in 2003 and has drastically reduced the incidence of cervical cancer from 15.3 in 2003 to 6.2 in 2023. In addition to screening, Slovenia provides free of charge HPV vaccination to girls in the sixth grade of primary school since 2009, which was extended to boys in 2019, with a catch-up program for both genders. Nevertheless, efforts are being made to improve vaccination rates, which have been steadily declining in recent years, and the urgently needed introduction of an HPV-based screening programme.

What more needs to be done to strengthen research for women healthcare across the globe?

Regardless of the recent advances and efforts, we lose one woman every 90 seconds to cervical cancer, 90% of whom live in low-income countries. Although some countries are well on their way to reach the WHO strategy on elimination of cervical cancer, reaching 90-70-90 target, where 90% of the girls are fully vaccinated with the HPV vaccine by the age of 15, 70% of women are screened at least once in their lifetime by the age of 35 and possibly again by the age of 45 using a high-performance test (e.g. HPV test) and 90% of women with precancerous or cancerous lesion are treated and managed by 2030, other countries are lagging behind.

To achieve this goal, more efforts need to be made to facilitate the introduction of HPV vaccination in national programmes in low and middle income countries (LMIC) adopting the strategy to target multiple-age and gender neutral cohorts. In addition, broader accessibility to cervical cancer screening and high participation rates are crucial to reduce the incidence of cervical cancer. In this context, HPV self-sampling has emerged as a promising alternative to clinician-collected specimens, offering safe and more convenient way for screening. HPV self-sampling is already offered as a primary screening approach in the Netherlands, Sweden, Australia and Malaysia, but the greatest potential may lie in the implementation of this method for more feasible and cost-effective screening programmes in LMIC.

In addition, the recently published Target Product Profiles (TPP) guidelines for accelerating the second WHO target for screening provide guidance for developing new HPV tests that align with public health priorities, emphasizing access, validity, equity and affordability. They aim to direct HPV test developers and manufacturers to prioritise new (molecular) diagnostic technologies that will contribute to countries' effort to reduce the burden of cervical cancer burden, especially in low-resource settings.

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