

## GUIDELINE

# German-Austrian guideline on screening for anal dysplasia and anal carcinoma in people living with HIV

David Chromy<sup>1,2</sup>  | Felix Aigner<sup>3</sup> | Jürgen C. Becker<sup>4</sup> | Markus Bickel<sup>5</sup> |  
 Andrea Brunner<sup>6</sup> | Johannes Classen<sup>7</sup> | Monika Hampl<sup>8</sup> | Doris Helbig<sup>9</sup>  |  
 Marcus Hentrich<sup>10</sup> | Franc Hetzer<sup>11</sup> | Christian Hoffmann<sup>12</sup> | Johannes Jongen<sup>13</sup> |  
 Elmar Joura<sup>14</sup> | Reinhard Kirnbauer<sup>1</sup> | Alexander Kreuter<sup>15</sup>  | Gerold Felician Lang<sup>16</sup> |  
 Memo Mokhles<sup>6</sup> | Frank Oellig<sup>17</sup> | Mark Oette<sup>18</sup> | Anja Potthoff<sup>19</sup> |  
 Andreas D. Rink<sup>20</sup> | Andreas Salat<sup>21</sup> | Axel Jeremias Schmidt<sup>22,27</sup> | Robert Siegel<sup>23</sup> |  
 Georg Stary<sup>1</sup> | Ricardo Niklas Werner<sup>24</sup> | Gerhard Weyandt<sup>25</sup> | Ulrike Wieland<sup>26</sup> |  
 Stefan Esser<sup>2</sup>

## Correspondence

Stefan Esser, MD, PhD, Department of Dermatology and Venereology, University Hospital Essen, Hufelandstrasse 55, 45157 Essen, Germany.  
 Email: stefan.esser@uk-essen.de

AWMF Registry No.: 055-007

Guideline valid until: December 31, 2028

Lead Management: Deutsche AIDS-Gesellschaft (DAIG)

Participation of the following scientific societies and working groups:

Österreichische AIDS-Gesellschaft (OEAG)

Österreichische Gesellschaft für Chirurgie (ÖGCH), Arbeitsgemeinschaft für Coloproktologie (ACP)

Arbeitsgemeinschaft dermatologische Onkologie (ADO)

Deutsche Arbeitsgemeinschaft ambulant tätiger Ärztinnen und Ärzte für Infektionskrankheiten und HIV-Medizin (dagnä) e.V.

AIDS Hilfe Wien

Deutsche Gesellschaft für Radioonkologie (DEGRO)

## Summary

People with HIV are up to 100 times more likely to develop anal carcinoma compared to the general population. Diagnosing and treating precursor lesions, specifically high-grade anal dysplasia, can significantly reduce the risk of developing anal carcinoma. This S2k-guideline outlines the factors that increase the likelihood of developing anal carcinoma and its precursors, including advancing age, a low CD4<sup>+</sup> T-lymphocyte nadir, active cigarette smoking, receptive anal intercourse, or persistent infection with high-risk (HR) types of human papillomavirus (HPV). Screening is primarily recommended for all men who have sex with men (MSM) and transgender women with HIV starting at age 35, and all people with HIV starting at age 45.

After inspection and digital anorectal examination, anal cytology is collected. An HR-HPV test may be performed. If clinical abnormalities are present or if cytology shows "ASC-US or worse", a referral for high-resolution anoscopy (HRA) is indicated. If lesions are found during HRA, a biopsy should be obtained. Anal intraepithelial neoplasia (AIN) grade-III or AIN-II p16-positive correspond to high-grade dysplasia and require treatment. The most strongly recommended therapeutic options are electrocautery, 85% trichloroacetic acid, and surgical excision.

Finally, the guideline discusses how these screening recommendations can be applied to individuals without HIV.

## KEYWORDS

anal dysplasia, anal carcinoma, HIV

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial](https://creativecommons.org/licenses/by-nc/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2025 The Author(s). *Journal der Deutschen Dermatologischen Gesellschaft* published by John Wiley & Sons Ltd on behalf of Deutsche Dermatologische Gesellschaft.

Deutsche Gesellschaft für Gynäkologie und Geburtshilfe (DGGG)

Deutsche dermatologische Gesellschaft (DDG)

Arbeitsgemeinschaft Dermatohistologie (ADH) der deutschen dermatologischen Gesellschaft (DGG)

Arbeitsgemeinschaft Proktologie in der deutschen dermatologischen Gesellschaft (DDG)

Deutsche Gesellschaft für Hämatologie und medizinische Onkologie (DGHO)

Deutsche Gesellschaft für Koloproktologie (DGK)

Deutsche Gesellschaft für Infektiologie (DGI)

Österreichische Gesellschaft für Dermatologie und Venerologie (ÖGDV)

Deutschen Gesellschaft für Zytologie (DGZ)

Deutsche Gesellschaft für Gastroenterologie, Verdauungs- und Stoffwechselerkrankungen (DGVS)

Deutsche STI-Gesellschaft (DSTIG)

Deutschen Gesellschaft für Allgemein- und Viszeralchirurgie (DGAV)

Deutsche Aidshilfe (DAH)

Österreichische Gesellschaft für Sexually Transmitted Diseases und dermatologische Mikrobiologie (OEGSTD)

Gesellschaft für Virologie (GfV)

## INTRODUCTION

This document is the concise version of the guideline. The complete version was published online by the *Association of the Scientific Medical Societies in Germany* (AWMF) and is available in German only at <https://register.awmf.org/de/leitlinien/detail/055-007>. Notably, this is the first update to this guideline since its initial publication in 2015.<sup>1</sup> In the revised version, the title has been updated to align with current recommendations for inclusive language. Epidemiological data have also been updated, primarily incorporating the latest analyses of anal carcinoma incidence across various populations. Additionally, new evidence has emerged since the previous version, demonstrating that treatment of high-grade anal dysplasia can reduce the incidence of anal carcinoma. Moreover, we have thoroughly updated the screening recommendations, and the chapter on the treatment of anal carcinoma has been removed, as these topics are covered in a separate S3 guideline on the diagnosis, treatment, and follow-up of anal carcinoma.<sup>2</sup> Furthermore, screening for anal carcinoma in individuals without HIV has also been addressed.

## EPIDEMIOLOGY

Compared to the general population, people living with HIV (PLWH) are more frequently affected by non-AIDS defining cancers like anal carcinoma.<sup>3,4</sup> Anal carcinoma is caused by persistent infections with human papillomaviruses (HPV)

in approximately 90%–100% of cases.<sup>5,6</sup> HPV-types are categorized into high-risk (HR) types, which can induce malignant transformation of epithelial cells (notably HPV-16 and HPV-18), and low-risk (LR) types, which are primarily associated with genital warts. Histopathologically, anal carcinomas are typically squamous cell carcinomas.<sup>7</sup> Among women with HIV, the prevalence of anal HR-HPV infection is 33% in those who are HR-HPV-negative in the cervix and 62% in those who are HR-HPV-positive in the cervix.<sup>8</sup> In men, the prevalence of anal HR-HPV varies depending on HIV status and sexual behavior. A pooled analysis of data from 29,000 men across 64 studies found that anal HR-HPV prevalence increased from 6.9% in HIV-negative men who have sex with women (MSW) to 26.9% in MSW with HIV. Prevalence was even higher in men who have sex with men (MSM), rising to 41.2% in HIV-negative (MSM) and 74.3% in MSM with HIV.<sup>9</sup>

According to a 2021 meta-analysis, the highest incidence of anal carcinoma occurs in MSM with HIV, with 85 cases per 100,000 person-years (PY). Other groups, such as heterosexual men with HIV and women with HIV aged 30 years and older, also show elevated incidence rates of 17–37/100,000 PY compared to the general population (1–2/100,000 PY). Additionally, anal carcinoma is more common in MSM without HIV (19/100,000 PY), women with high-grade cervical, vaginal, or vulvar dysplasia (6–48/100,000 PY), and individuals undergoing immunosuppressive therapy (3–13/100,000 PY).<sup>3</sup> By 2035, a significant increase in anal carcinoma incidence is anticipated in individuals aged 65 years and older.<sup>10</sup>

## Rationale for anal carcinoma screening in people living with HIV

Anal carcinoma screening should be considered as secondary prevention following HPV infection, as high-grade anal dysplasia is a precursor to anal carcinoma.<sup>11–13</sup> The 2022 ANCHOR study shows that treating anal dysplasia can significantly reduce the incidence of anal carcinoma.<sup>12</sup> Additionally, it has been shown that anal carcinomas detected through screening are more often identified at earlier stages.<sup>14</sup>

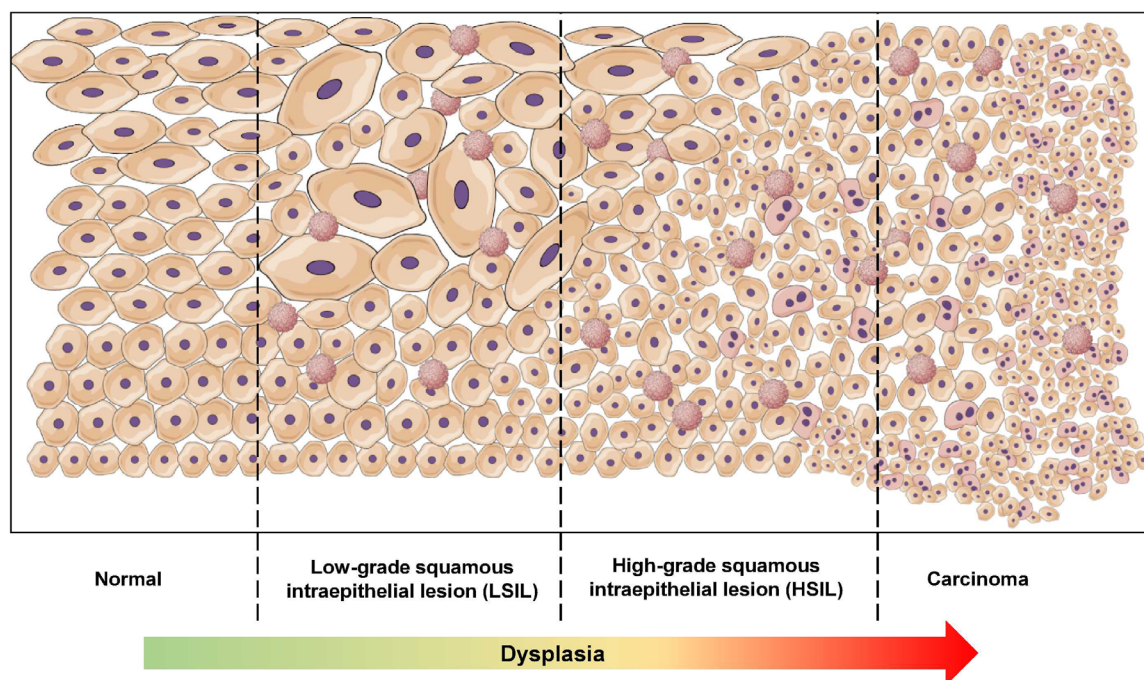
The potential benefits of screening must be balanced against the costs and risks associated with diagnostic and therapeutic procedures. HPV infections and even high-grade anal dysplasia do not necessarily lead to carcinoma; a meta-analysis found that one in 377 cases of high-grade dysplasia transforms into invasive anal carcinoma per year.<sup>15</sup> Conversely, spontaneous regression of high-grade anal dysplasia has been observed, with rates of 23.5 and 30 per 100 PY.<sup>16,17</sup> A modelling analysis on diagnostic methods indicated that, among MSM with HIV aged over 35 years – the population with the highest incidence rate – 922 anal cytologies (with annual screening) or 492 cytologies (with triennial screening) are required to prevent one anal carcinoma. The number needed to screen and the number needed to treat to prevent one anal carcinoma were 331 and 153 for annual screening, and 209 and 134 for triennial screening.<sup>18</sup> These figures are comparable to those for colorectal cancer screening in the general population.<sup>19,20</sup> and lower than those for cervical cancer screening,<sup>21</sup> especially in high-incidence populations. A low CD4<sup>+</sup> T-lymphocyte nadir of less than 200 cells/μl or prolonged severe immunodeficiency further increases the risk of anal carcinoma.<sup>22</sup> In contrast, HPV vaccination status currently plays a minor role in screening for anal dysplasia due to demographic factors (Recommendation 1).

| Recommendation 1.<br>Screening                                                                              | Strength | Consensus strength        |
|-------------------------------------------------------------------------------------------------------------|----------|---------------------------|
| In people living with HIV, we recommend regular screening for high-grade anal dysplasia and anal carcinoma. | ↑↑       | Strong consensus<br>27/28 |
| We recommend treating high-grade anal dysplasia and anal carcinoma.                                         | ↑↑       | Strong consensus<br>28/28 |

## HISTOPATHOLOGIC AND CYTOLOGIC CLASSIFICATION OF ANAL DYSPLASIA

The cytologic classification is based on the revised Bethesda classification of 2015,<sup>23</sup> and includes the following categories: normal results (NILM: negative for intraepithelial lesion or malignancy), low-grade dysplasia (LSIL: low-grade squamous intraepithelial lesion), high-grade dysplasia (HSIL: high-grade squamous intraepithelial lesion), as well as ASC-US (atypical squamous cells of undetermined significance), ASC-H (atypical squamous cells, cannot exclude HSIL), and carcinoma. The histopathological classification of anal intraepithelial neoplasia (AIN) is based on the extent of dysplastic cells in the epithelium and is divided into three grades: AIN1 (involving the lower third of the epithelium), AIN2 (involving the lower two-thirds of the epithelium), and AIN3 (involving the full thickness of the epithelium) (Figure 1, Recommendation 2).<sup>24</sup>

The *Lower Anogenital Squamous Terminology* (LAST) project recommends considering HPV-associated changes in histological evaluation and proposes a two-tiered classification using “LSIL” and “HSIL” – analogous to the cytological classification.<sup>25</sup> Therefore, AIN2 lesions are further evaluated using p16 immunohistochemistry: p16-negative cases are classified as LSIL, while p16-positive cases are classified as HSIL (only lesions showing “en-bloc” staining are classified as “p16-positive”).<sup>25</sup> Some data suggests that p16-positive AIN2 HSIL has a lower progression rate compared to AIN3 HSIL, which may limit the applicability of this dichotomous classification.<sup>26</sup> An alternative classification differentiates between “low-grade” AIN (LGAIN) and “high-grade” AIN (HGAIN), where HGAIN includes AIN2 and AIN3 lesions, and LGAIN corresponds to AIN1 or lesions with lower grades of dysplasia.<sup>27</sup> A comparison of these classifications can be found in Table 1. In 2012, the LAST project introduced the term “superficially invasive squamous cell carcinoma (SISCCA),” referring to a minimally invasive carcinoma defined in the anal canal by the following criteria: (1) invasion depth ≤3 mm measured from the basement membrane, (2) maximum horizontal extent ≤7 mm, (3) of the completely resected lesion.<sup>25</sup> No further therapy is required if a lesion meeting these criteria is resected with a margin of 0.5 cm.<sup>2</sup> Additional details regarding the diagnosis and treatment of (early invasive) anal carcinomas can be found in the corresponding (German-Austrian) S3 guideline.<sup>2</sup>



**FIGURE 1** Continuum of anal dysplasia. Schematic of the progression of anal dysplasia. Starting on the left, normal epithelium is displayed. Further right, HPV-induced changes, including koilocytes, occur increasingly and atypical keratinocytes can be found in the upper layers of the epithelium.

| Recommendation 2.<br>Nomenclature                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Strength | Consensus<br>strength     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|
| We recommend that the cytological evaluation of anal swabs be conducted according to the revised Bethesda classification of 2015, distinguishing between "Normal" / "NILM (negative for intraepithelial lesion or malignancy)," "ASC-US (atypical squamous cells of undetermined significance)," "ASC-H (atypical squamous cells, cannot exclude HSIL)," "LSIL (low-grade squamous intraepithelial lesion)," "HSIL (high-grade squamous intraepithelial lesion)," and "CA (squamous cell carcinoma)." | ↑↑       | Strong<br>consensus 25/25 |
| We recommend that the histopathological classification distinguish between "Normal mucosa," "Condylomata acuminata," "Anal intraepithelial neoplasia (AIN) 1," "AIN 2," "AIN 3," and "Carcinoma."                                                                                                                                                                                                                                                                                                     | ↑↑       | Strong<br>consensus 26/26 |
| We suggest performing immunohistochemical evaluation using p16 for all AIN 2 lesions. Lesions with "en bloc" positivity should be classified as high-grade dysplasia, while p16 partial or negative lesions should be considered low-grade.                                                                                                                                                                                                                                                           | ↑        | Strong<br>consensus 24/24 |
| A dichotomous histopathological reporting as "LSIL" and "HSIL" in addition to "AIN 1," "AIN 2," and "AIN 3" according to the criteria of the LAST project may be considered.                                                                                                                                                                                                                                                                                                                          | ⇔        | Strong<br>consensus 26/26 |

| Recommendation 2.<br>Nomenclature                                                                                                                                                                                                                                           | Strength | Consensus<br>strength     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|
| We suggest that, in addition to conventional pathological staging, the histopathological examination of a resected anal carcinoma should assess whether the criteria for a "superficially invasive squamous cell carcinoma (SISCCA)" according to the LAST project are met. | ↑        | Strong<br>consensus 24/25 |

## DIAGNOSTICS, TESTING STRATEGIES AND SCREENING METHODS FOR ANAL DYSPLASIA

### Anal cytology

Anal cytology is a screening tool known for its ease of use and low cost.<sup>28</sup> However, its diagnostic accuracy is limited. Depending on the threshold for referral to HRA, based on the "severity level" of the cytological findings, there may be either good sensitivity with poor specificity, or vice versa.<sup>29</sup>

Cytology should be collected with the patient in the lithotomy or left lateral position. During the examination, cells from the anal transformation zone are collected using a swab and placed on a slide for evaluation. Patients should be advised to refrain from receptive anal intercourse and using enemas for 24 hours prior to the examination, as these factors can reduce the number of collectable cells.

TABLE 1 Grading of anal dysplasia.

| Grade of dysplasia                       | Cytologic grading of anal dysplasia (Bethesda) <sup>23</sup> | Histopathologic grading of anal dysplasia (LAST) <sup>25</sup> | Alternative terminology | E6/E7-mRNA positive <sup>58,59</sup> | Host-cell methylation marker positivity (ZNF582, ASCL1, SST) <sup>27</sup> |
|------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------|-------------------------|--------------------------------------|----------------------------------------------------------------------------|
| Undetermined                             | ASC-US<br>ASC-H                                              | -<br>-                                                         | -<br>-                  | 48%–80%<br>-                         | -<br>-                                                                     |
| Negative                                 | NILM                                                         | Normal                                                         | -                       | 23%–39%                              | Negative                                                                   |
| No or low-grade dysplasia                | LSIL                                                         | Condyloma                                                      | LGAIN                   | 68%–86%                              | -                                                                          |
| Low grade dysplasia                      | LSIL                                                         | AIN 1                                                          |                         |                                      | ↔                                                                          |
| Moderate dysplasia                       | LSIL                                                         | AIN 2, p16 negative                                            | HGAIN/AIN2+             |                                      | ↑                                                                          |
| High-grade dysplasia/CIS                 | HSIL                                                         | AIN 2, p16 positive                                            |                         | 95%–100%                             | ↑↑                                                                         |
|                                          | HSIL                                                         | AIN 3                                                          |                         |                                      |                                                                            |
| Superficial (minimal-invasive) carcinoma | CA                                                           | SISCCA                                                         |                         | 100%                                 | ↑↑↑                                                                        |
| Invasive carcinoma                       | CA                                                           | CA                                                             |                         |                                      |                                                                            |

Abb.: ASC-H, atypical squamous cells, cannot exclude HSIL; ASC-US, atypical squamous cells of undetermined significance; AIN, anal intraepithelial neoplasia; CA, carcinoma; CIS, carcinoma in situ; HGAIN, high-grade AIN; HSIL, high-grade squamous intraepithelial lesion; LGAIN, low-grade squamous intraepithelial lesion; LSIL, low-grade squamous intraepithelial lesion; NILM, negative for intraepithelial lesion or malignancy; SISCCA, superficially invasive squamous cell carcinoma.

Similarly, contamination from lubricants, Vaseline, or other substances should be avoided for 24 hours before the examination.

To obtain cytology, a nylon flocked swab moistened with saline is inserted into the anal canal and slowly withdrawn with firm, circular motions. The swab is then rolled onto a slide, and a cytological fixative (based on the requirements of the collaborating pathology laboratory) is sprayed onto it.<sup>30–33</sup> Alternatively, liquid-based cytology using a cytobrush can be employed. After brushing the transformation zone and surrounding area, the brush is rinsed in a transport container with the carrier solution for at least 30 seconds.<sup>34,35</sup> An adequate cytology smear should contain at least 2,000–3,000 nucleated squamous epithelial cells, corresponding to approximately 1–2 nucleated squamous epithelial cells per field of view under high magnification.<sup>36</sup> Note: Properly performing sample collection for anal cytology is generally uncomfortable for the patient (Recommendation 3).

| Recommendation 3.<br>Cytology                                                                                                                                                                                                                                                                                                      | Strength | Consensus strength            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------|
| We <i>suggest against</i> performing an anal cytology as part of anal carcinoma screening if the following apply to the person being examined:<br>1. Anal lavage or receptive anal intercourse within 24 hours before the sample collection and/or<br>2. suspicion of/diagnosed acute bacterial infection of the anorectal region. | ↓        | <b>Strong consensus</b> 25/25 |
| We <i>suggest</i> that anal cytology be performed as the first intra-anal examination measure to avoid contamination (e.g., from lubricant, blood, or acetic acid).                                                                                                                                                                | ↑        | <b>Strong consensus</b> 26/26 |
| We <i>recommend</i> that anal cytology be performed using:<br>1. An NaCl-moistened nylon flocked or polyester swab and a glass slide with fixative solution, or<br>2. liquid-based cytology (cytobrush and solution).                                                                                                              | ↑↑       | <b>Strong consensus</b> 26/26 |
| Self-collection of anal cytology <i>may be considered</i> , provided appropriate instructions have been given.                                                                                                                                                                                                                     | ↔        | <b>Strong consensus</b> 27/28 |

## HPV

Various commercially available polymerase chain reaction (PCR) or hybrid capture systems can be used for the detection of HPV DNA from swabs or biopsies.<sup>37–39</sup> Some PCR test systems allow for genotyping of all relevant HR-HPV types.<sup>37,39,40</sup> While the detection of HR-HPV for predicting AIN in people with HIV is highly sensitive for predict-

ing AIN, it has low specificity.<sup>29</sup> HR-HPV can often be detected even in the absence of visible mucosal lesions, which explains the low specificity. Several studies have suggested a combined diagnostic approach using both cytology and HR-HPV detection. For example, one study showed that a stepwise algorithm, starting with cytology followed by an HR-HPV test, improved sensitivity for detecting histological HSIL compared to cytology alone (85% vs. 97%), although specificity remained low (24%–28%).<sup>41</sup> (Recommendations 4–6).

| Recommendation 4.<br>HPV-testing                                                                                                                         | Strength | Consensus strength            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------|
| A HR-HPV DNA and/or HR-HPV oncogene mRNA detection as part of anal carcinoma screening <i>may be considered</i> in addition to the recommended measures. | ⇔        | <b>Strong consensus</b> 27/27 |
| Alternatively, HR-HPV reflex testing or p16/Ki-67 staining of the anal cytology <i>may be considered</i> starting from an ASC-US result.                 | ⇔        | <b>Strong consensus</b> 24/25 |

| Recommendation 5.<br>Methylation markers                                                                                           | Strength | Consensus strength            |
|------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------|
| Assessing host cell methylation markers from anal swabs and/or histological material of anal dysplasias <i>may be considered</i> . | ⇔        | <b>Strong consensus</b> 23/23 |

| Recommendation 6.<br>Microbiome                                                                                                              | Strength | Consensus strength            |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------|
| We <i>recommend</i> against performing an anal microbiome analysis for the detection of anal dysplasias as part of anal carcinoma screening. | ↓↓       | <b>Strong consensus</b> 26/26 |

## Digital anorectal examination

A comprehensive discussion of the digital anorectal examination (DARE), including the procedural workflow and quality standards, was published in 2019 by Hillman et al., in collaboration with the *International Anal Neoplasia Society*.<sup>42</sup> Changes in the anal canal as small as 3 mm can be reliably detected by both medical personnel and the patients themselves.<sup>43</sup> As a simple and cost-effective measure, DARE can complement other diagnostic methods for anal carcinoma and serve as a screening tool when HRA is unavailable. A DARE should always be performed as part of HRA

(Recommendation 7), as it provides valuable insights for the subsequent examination, including:

1. Sphincter tone,
2. pain sensitivity,
3. stenosis and scarring,
4. presence of blood or mucus,
5. filling level of the rectal ampulla.

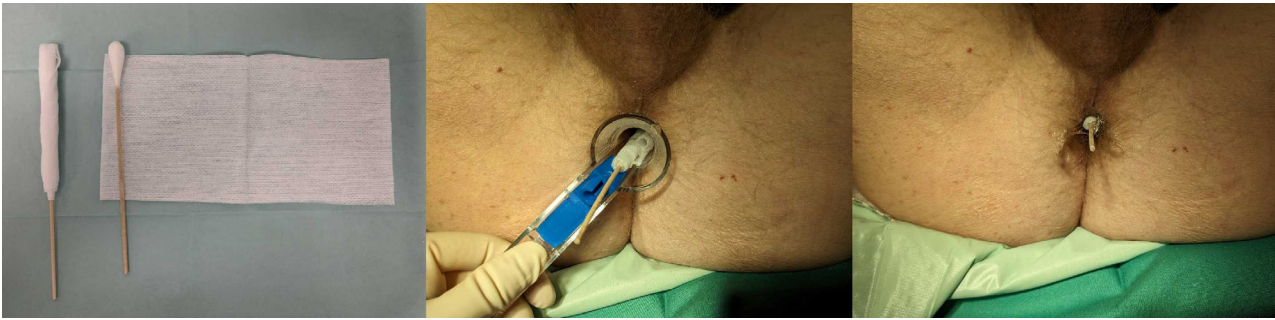
| Recommendation 7.<br>Digital anorectal examination                                                                    | Strength | Consensus strength            |
|-----------------------------------------------------------------------------------------------------------------------|----------|-------------------------------|
| We <i>recommend</i> that a digital anorectal examination be performed at the beginning of a high-resolution anoscopy. | ↑↑       | <b>Strong consensus</b> 26/26 |

## High resolution anoscopy

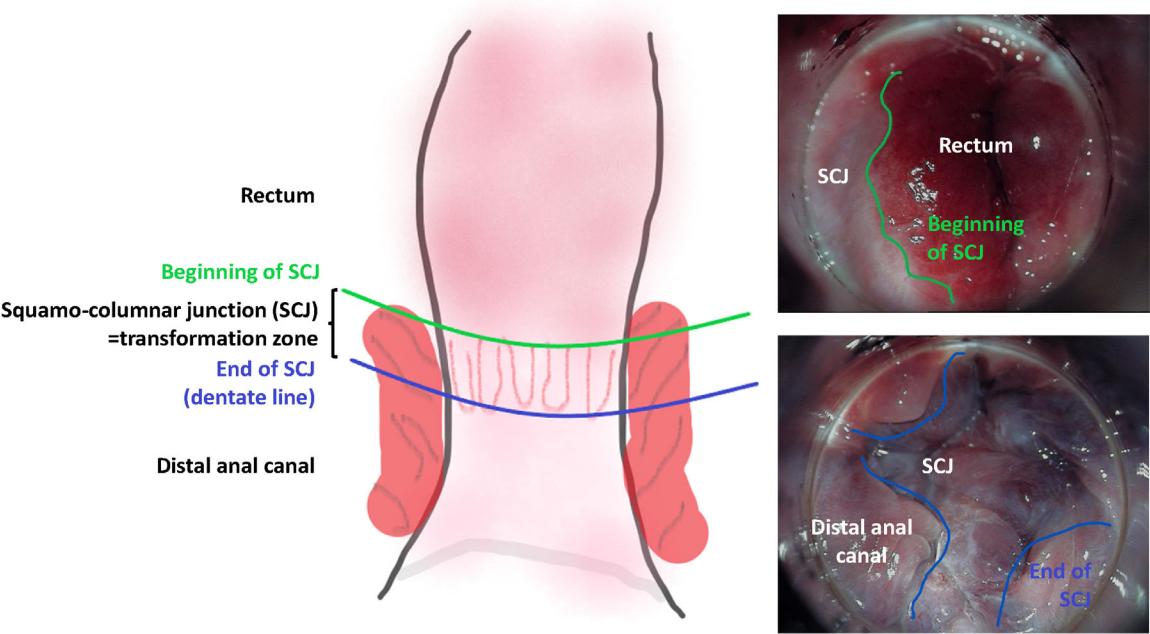
High-resolution anoscopy (HRA) is the internationally recognized gold standard for evaluating anal dysplasia. Studies on PLWH have demonstrated that HRA improves the diagnosis of high-grade AIN or anal carcinoma recurrences.<sup>44–49</sup> However, it is important to note that the availability of HRA is limited in Germany and Austria (Recommendation 8).

During HRA, the anal canal epithelium is examined under magnification of up to 30 x. An anoscope is inserted into the anal canal, and an appropriate optical device (typically a colposcope) provides sufficient magnification, though devices from ENT/dental or gastroenterological endoscopes can also be used). A detailed methodological description of HRA was published in 2016 by Hillman et al. in collaboration with the *International Anal Neoplasia Society*.<sup>50</sup> Alternatively, gastroenterological endoscopes can be used for anal chromoendoscopy (ACE), as their optical magnification also provides high-quality imaging, as demonstrated in a study involving 211 patients.<sup>49</sup> Preparation with an enema or other bowel cleansing is not required, except for ACE.

High-resolution anoscopy can be performed either in a standard examination room or in a procedure room/operating room; provided local hygiene guidelines are followed, particularly concerning smoke evacuation during the treatment of HPV-associated lesions. High-resolution anoscopy should always be conducted with assistance. The patient is positioned in the left lateral or lithotomy position. Initially, a gauze soaked in 5% acetic acid (Figure 2) is inserted into the anal canal via the anoscope and left in place for 1–2 minutes. Acetic acid stains dysplastic epithelium white, although it can also stain metaplastic epithelium or scar tissue. For a thorough HRA, the entire anus must be examined. The distal rectum is first inspected, and as the anoscope is withdrawn, the transformation zone, distal anal canal, and perianal region should be fully assessed in their entirety (Figure 3). Lugol's



**FIGURE 2** Preparation with 5% acetic acid. Before starting high-resolution anoscopy, a cotton swab with 5% acetic acid should be applied for 1–2 minutes to better contrast for the consecutive examination. The combination of a cotton swab and a fleece compress usually works well. The swab can easily be inserted as follows: The anoscope is inserted, the guiding plug is removed, the swab is inserted into the anoscope, and the anoscope is removed with the swab remaining in the anal canal.



**FIGURE 3** Diagram of the anal canal. The schematic of the anal canal displays the intraanal area affected by anal dysplasia. The transformation zone defines the beginning of the epithelium and appears as acetowhite after applying acetic acid. Anal papillae in the distal anal canal define the dentate line and, therefore, the end of the transformation zone.

iodine solution may also be applied. Finally, it is crucial to biopsy any unclear lesions.

| Recommendation 8.<br>High-resolution anoscopy                                                                                                                                           | Strength | Consensus<br>strength     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|
| We recommend that high-resolution anoscopy (if indicated combined with biopsy for histopathological examination) be performed as the gold standard for the diagnosis of anal dysplasia. | ↑↑       | Strong<br>consensus 26/26 |
| We recommend that the entire anus and perianus be inspected during high-resolution anoscopy.                                                                                            | ↑↑       | Strong<br>consensus 26/26 |

| Recommendation 8.<br>High-resolution anoscopy                                                                                                    | Strength | Consensus<br>strength     |
|--------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|
| We recommend using 5% acetic acid to stain the epithelium during high-resolution anoscopy.                                                       | ↑↑       | Strong<br>consensus 24/24 |
| The use of Lugol's solution (iodine test) may be considered during high-resolution anoscopy.                                                     | ⇔        | Strong<br>consensus 24/24 |
| We recommend that all epithelial lesions during high-resolution anoscopy be biopsied if high-grade dysplasia cannot be definitively excluded.    | ↑↑       | Strong<br>consensus 26/26 |
| We suggest that, if high-resolution anoscopy is not available, at least a conventional anoscopy without optical magnification should be offered. | ↑        | Strong<br>consensus 25/26 |

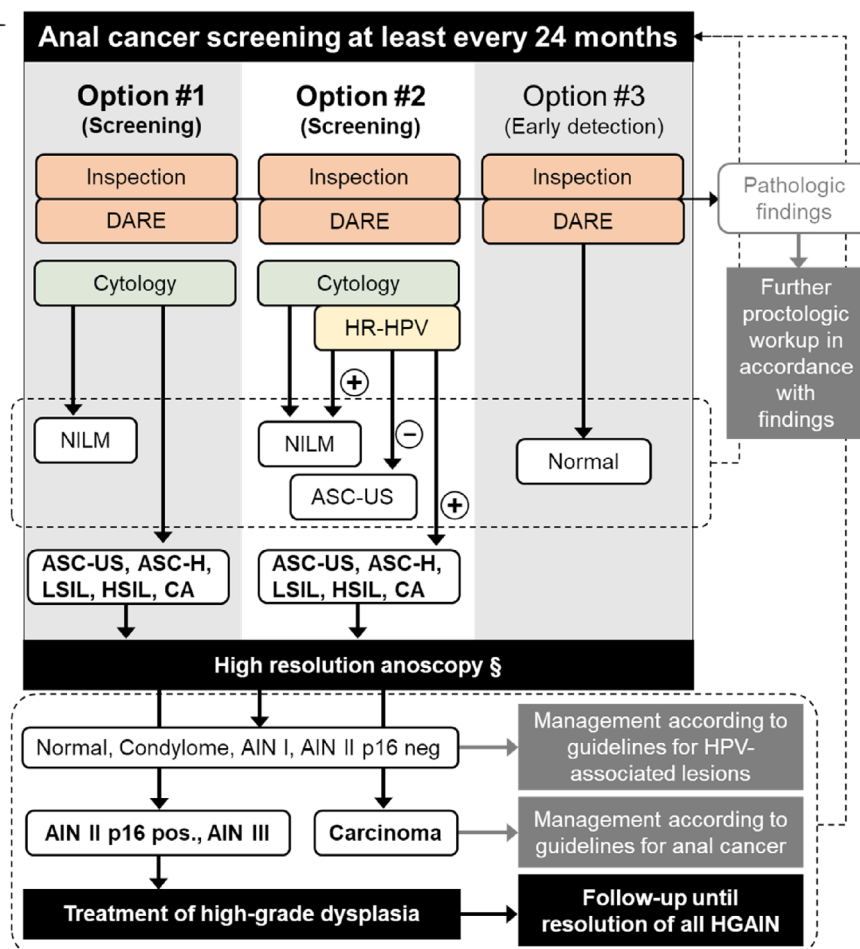
## Target population

### People with HIV

- HIV+ with CIN-III, VIN-III, PIN-III
- HIV+ with CD4+Nadir <200c/μL
- HIV+ MSM/TGW ≥35 years
- HIV+ ≥45 years

### People with/without HIV

- MSM/TGW ≥45 years
- Women with VIN-III
- ≥10 years SOTR
- <10 SOTR or other immunosuppressive therapy
- Women with persisting cervical HPV16 and/or CIN-III
- People with persisting anogenital warts



**FIGURE 4** Algorithm for anal carcinoma screening. The target populations are listed on the left side, with the highlighted groups designated as priority, while the screening process is outlined on the right side. Option #3 differs from Option #1 and Option #2 and is designed to enable all current healthcare providers to begin anal carcinoma screening immediately (further details can be found in the text of this guideline). <sup>§</sup>If high-resolution anoscopy is unavailable, a conventional anoscopy without optical magnification may be offered. The potentially lower sensitivity of this method for detecting anal dysplasia, despite the same examination burden, should be discussed with patients. *Abbr.*: ASC-H, atypical squamous cells, cannot exclude HSIL; ASC-US, atypical squamous cells of undetermined significance; AIN, anal intraepithelial neoplasia; CA, carcinoma; CIN, cervical intraepithelial neoplasia; DARE, digital ano-rectal examination; HGAIN, high-grade AIN; HPV, human papillomavirus; HRA, high-resolution anoscopy; HR-HPV, high-risk HPV; HSIL, high-grade squamous intraepithelial lesion; LSIL, low-grade squamous intraepithelial lesion; MSM, men who have sex with men; NILM, negative for intraepithelial lesion or malignancy; PIN, penile intraepithelial neoplasia; SOTR, solid organ transplant recipients; TGW, transgender women; VIN, vulvar intraepithelial neoplasia

## Screening algorithm

If screening is primarily based on cytology (Option #1), HRA is recommended starting from an ASC-US (Figure 4, Recommendations 9, 10). Alternatively, HR-HPV testing may be added (Option #2). In cases of ASC-US with a HR-HPV negative result, HRA may be omitted. For HR-HPV positive results with normal cytology, HRA is not recommended, but follow-up screening should be scheduled within 12 months. If any abnormalities are found during inspection and/or palpation, a conventional proctologic examination, with or without treatment, may be appropriate before performing

an HRA (e.g., in cases of fistula or extensive hemorrhoids). If HRA is severely limited or unavailable for further diagnostics, only inspection and digital ano-rectal examination should be performed, and cytology should be omitted (Option #3). This option is primarily for early detection of anal carcinoma and does not aim to detect or treat high-grade anal dysplasia. Option #3 allows the existing healthcare network for PLWH to immediately offer anal carcinoma prevention (early detection) until necessary diagnostic resources or referral networks are established, at which point a shift to Option #1 or #2 should be considered.

| Recommendation 9.<br>Screening population                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Strength | Consensus strength            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------|
| We <i>recommend</i> that anal carcinoma screening is offered to <ul style="list-style-type: none"> <li>- MSM with HIV starting at the age of 35,</li> <li>- transgender women with HIV starting at the age of 35,</li> <li>- all people living with HIV starting at the age of 45, and irrespective of age,</li> <li>- people living with HIV and high-grade cervical-, vulvar- or penile dysplasia, and</li> <li>- people living with HIV and a CD4<sup>+</sup> T-lymphocyte nadir &lt; 200 per µl.</li> </ul> | ↑↑       | <b>Strong consensus 28/28</b> |
| We <i>suggest</i> that, irrespective of age, anal carcinoma screening is offered to <ul style="list-style-type: none"> <li>- people living with HIV and persisting anogenital warts,</li> <li>- women living with HIV and persisting cervical HPV-16 (&gt;1 year), and</li> <li>- people living with HIV and immunosuppressive therapy.</li> </ul>                                                                                                                                                              | ↑        | <b>Strong consensus 28/28</b> |
| We <i>suggest</i> that screening for anal dysplasia and anal carcinoma be performed at least every 24 months, provided no anal epithelial lesions are present.                                                                                                                                                                                                                                                                                                                                                  | ↑        | <b>Strong consensus 27/28</b> |

If abnormalities are detected during HRA, histopathological diagnostics should be pursued. In cases of AIN II (p16-positive) or AIN III, treatment should always be carried out, as a reduction in anal carcinoma incidence has been demonstrated.<sup>12</sup> After treatment, regular follow-up is recommended until all high-grade dysplasia has remitted, with a low-threshold for histological follow-up. Currently, there is no data showing a reduction in anal carcinoma risk by treating low-grade dysplasia. Whether treatment should be applied to histologically confirmed low-grade dysplasia should be decided on a case-by-case basis. Treatment is especially indicated in cases of clinically visible lesions or bothersome condylomata. This approach also allows for complete histopathological evaluation, as high-grade dysplasia can clinically resemble condylomata, particularly in the target population discussed here.<sup>51</sup> If a biopsy during follow-up after therapy shows only low-grade dysplasia or condylomata, no further treatment is needed for anal carcinoma prevention.

The optimal screening interval is currently undetermined. Recent modelling (with 1–3 year intervals),<sup>18</sup> has shown that shorter intervals require more examinations to prevent anal carcinoma, while longer intervals reduce the screening burden but increase the proportion of anal carcinomas that could have been prevented by treating precursors or high-grade dysplasia. Therefore, we recommend offering screening to the target population 12–24 months. Various individual factors can positively or negatively influence the incidence of anal carcinoma. However, the interplay of these factors has not been systematically analyzed to date. As a result, the interpretation of each patient's risk

| Negativity/<br>Reduction                  | Positivity/<br>Increase             |
|-------------------------------------------|-------------------------------------|
| <b>Individual risk for anal dysplasia</b> |                                     |
|                                           | Age                                 |
|                                           | Duration of HIV infection           |
|                                           | MSM & TGW                           |
|                                           | Cigarette smoking                   |
|                                           | Other immunosuppression             |
|                                           | CD4 <sup>+</sup> -Nadir             |
|                                           | Current HIV viral load              |
|                                           | High-risk HPV detection             |
|                                           | Persisting HPV-associated lesions   |
|                                           | History of AIN, PIN, CIN and/or VIN |
|                                           | HPV vaccination until age 26        |

**FIGURE 5** Cofactors influencing the incidence of anal dysplasia. Green indicates a lower, while red indicates a higher risk for anal dysplasia. Each row represents a specific factor, with its trend towards a decrease (negative) or an increase (positive) visually represented by the corresponding color. Examples: (1) increasing age is associated with a higher risk of anal dysplasia, and (2) the absence of HPV vaccination before age 26 is associated with a greater occurrence of anal dysplasia. *Abbr.*: AIN, anal intraepithelial neoplasia; CIN, cervical intraepithelial neoplasia; HPV, human papillomavirus; MSM, men who have sex with men; PIN, penile intraepithelial neoplasia; TGW, transgender women; VIN, vulvar intraepithelial neoplasia.

profile is the responsibility of the treating physician, who can adjust the screening intervals on a case-by-case basis. A summary of the known influencing factors is provided in Figure 5.

| Recommendation 10.<br>Screening methods                                                                                                       | Strength | Consensus strength            |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------|
| We <i>recommend</i> that an anal carcinoma screening include an inspection, a digital anorectal examination, and an anal cytology.            | ↑↑       | <b>Strong consensus 27/27</b> |
| We <i>recommend</i> that further diagnostics be conducted in case of an abnormal findings during inspection or digital anorectal examination. | ↑↑       | <b>Strong consensus 28/28</b> |
| We <i>recommend</i> that high-resolution anoscopy be performed in case of the following anal cytology findings: "ASC-H," "LSIL," and "HSIL."  | ↑↑       | <b>Strong consensus 26/26</b> |
| We <i>suggest</i> that high-resolution anoscopy be performed in case of the following anal cytology finding: "ASC-US."                        | ↑        | <b>Strong consensus 26/26</b> |
| HR-HPV testing (with or without genotyping) <i>may be considered</i> in addition to cytology.                                                 | ↔        | <b>Strong consensus 26/27</b> |

| Recommendation 10.<br>Screening methods                                                                                                         | Strength | Consensus strength            |
|-------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------|
| In cases of HR-HPV negativity and "ASC-US" in the anal cytology, further evaluation with high-resolution anoscopy <i>may be omitted</i> .       | ↔        | <b>Strong consensus</b> 25/25 |
| We <i>suggest</i> that if anoscopy is not available, anal carcinoma screening should include inspection and digital anorectal examination only. | ↑        | <b>Strong consensus</b> 25/26 |

| Recommendation 11.<br>Treatment options                                                                                                                                                                   | Strength | Consensus strength            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------|
| We <i>suggest</i> that the management of histologically diagnosed anogenital warts and low-grade anal dysplasia be conducted according to guidelines for HPV-associated lesions of the anogenital region. | ↑        | <b>Strong consensus</b> 27/27 |

## TREATMENT OF ANAL DYSPLASIA

High-grade anal dysplasia, including p16-positive AIN II, AIN III, as well as their histological equivalents, HSIL or HGAIN, should be treated. An overview of the different treatment options is provided in Table 2. A detailed discussion and description of all methods can be found in the full version of this guideline (German only, <https://register.awmf.org/de/leitlinien/detail/055-007>) (Recommendation 11).

| Recommendation 11.<br>Treatment options                                                                                                                                                                                                              | Strength | Consensus strength            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------|
| We <i>suggest</i> treatment of histologically confirmed high-grade anal dysplasia with the following methods:<br>- electrocautery (including Argon-plasma-coagulation),<br>- trichloroacetic acid or<br>- surgical excision.                         | ↑        | <b>Strong consensus</b> 26/26 |
| The following methods <i>can be considered</i> for treatment of histologically confirmed high-grade anal dysplasia:<br>- CO <sub>2</sub> -laser,<br>- radiofrequency ablation,<br>- cryotherapy,<br>- infrared coagulation or<br>- imiquimod.        | ↔        | <b>Strong consensus</b> 26/26 |
| The following methods <i>can be considered</i> for treatment of histologically confirmed high-grade anal dysplasia on a case-by-case basis:<br>- topical 5-fluorouracil 5%,<br>- photodynamic therapy,<br>- radiation therapy or<br>- sinecatechins. | ↔        | <b>Strong consensus</b> 25/25 |
| A combination of different methods for the treatment of histologically confirmed high-grade anal dysplasia <i>may be considered</i> .                                                                                                                | ↔        | <b>Strong consensus</b> 27/27 |
| We <i>recommend</i> follow-up assessments after treatment of high-grade anal dysplasia.                                                                                                                                                              | ↑↑       | <b>Strong consensus</b> 27/27 |

## Recommendations for people without HIV

This guideline primarily focuses on PLWH, who are statistically at a significantly higher risk of anal dysplasia and anal carcinoma compared to the general population. However, there are also certain groups of individuals who, despite testing negative for HIV, face a considerably increased risk of anal carcinoma. In Germany and Austria, these groups have not yet been addressed in any existing guidelines. For this reason, the guideline committee has decided to provide recommendations on how the findings of this guideline can be applied to people without HIV (Recommendation 12).

Two studies,<sup>52,53</sup> included in the meta-analysis by Clifford et al., reported an age-dependent incidence rate of anal carcinoma in MSM without HIV, which was 19/100,000 PY.<sup>3</sup> For women with vulvar intraepithelial neoplasia (VIN) grade III, the incidence rate of anal carcinoma was 48/100,000 PY. For individuals who had undergone organ transplantation for ten or more years, the incidence was significantly higher: 25/100,000 PY for men and 50/100,000 PY for women.<sup>3</sup> Screening for anal carcinoma in people without HIV can only be justified based on the elevated incidence of the disease in these subpopulations. A 2021 study demonstrated that the spontaneous regression of anal dysplasia in MSM, regardless of HIV status, is influenced solely by persistent HPV-16 detection, not by HIV status itself.<sup>54</sup> In individuals without HIV, the natural progression or regression of anal dysplasia is less well studied than in PLWH. For example, the ANCHOR Study, which focused solely on PLWH,<sup>12</sup> indicates that treatment of high-grade anal dysplasia likely reduces the risk of anal carcinoma in people without HIV as well.

Most of the data on the treatment of high-grade anal dysplasia in people without HIV pertains to electrocoagulation. However, based on mechanistic principles, it can be assumed that the treatment options for high-grade anal dysplasia in PLWH are also applicable to those without HIV.<sup>55</sup> Finally, recurrence rates of AIN in people without HIV are reported to be lower than in PLWH.<sup>56,57</sup>

**TABLE 2** Treatment options for high-grade anal dysplasia.

| Overview of available treatment options for high-grade anal dysplasia |                                                       |                                                               |           |                                                                                                                                                         |                                                                                                                                                                        |                      |
|-----------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Therapy                                                               | Mechanism                                             | Application                                                   | Efficacy* | Advantages                                                                                                                                              | Disadvantages                                                                                                                                                          | Reference            |
| <b>Ablative methods</b>                                               |                                                       |                                                               |           |                                                                                                                                                         |                                                                                                                                                                        |                      |
| Electrocautery (and Argon-plasma-coagulation)                         | Thermal destruction with high-frequency voltage (kHz) | Diathermy during anoscopy                                     | 26%–83%   | <ul style="list-style-type: none"> <li>- Cheap</li> <li>- Availability</li> <li>- Efficacy</li> </ul>                                                   | <ul style="list-style-type: none"> <li>- Local anesthesia</li> <li>- Smoke</li> <li>- Complications</li> </ul>                                                         | 57,60–65             |
| Radiofrequency ablation                                               | Thermal destruction with high-frequency voltage (MHz) | Electrode during anoscopy                                     | 58%–100%  | <ul style="list-style-type: none"> <li>- Good safety profile</li> <li>- Treatment of large area possible</li> <li>- Efficacy</li> </ul>                 | <ul style="list-style-type: none"> <li>- General anesthesia</li> <li>- Expensive</li> <li>- Availability</li> <li>- Learning curve</li> </ul>                          | 66–69                |
| Infrared coagulation                                                  | Thermal destruction with infrared light               | During anoscopy                                               | 38%–74%   | <ul style="list-style-type: none"> <li>- Superficial</li> <li>- Less smoke</li> <li>- Low risk of bleeding</li> </ul>                                   | <ul style="list-style-type: none"> <li>- Local anesthesia</li> <li>- Availability</li> </ul>                                                                           | 56,60,70,71,17,72,73 |
| Surgical removal                                                      | Ablation / excision                                   | Shave or excision                                             | 21%–43%   | <ul style="list-style-type: none"> <li>- Histology of the entire lesion</li> </ul>                                                                      | <ul style="list-style-type: none"> <li>- Potentially resource intensive</li> <li>- General anesthesia</li> <li>- Unfavorable safety profile / complications</li> </ul> | 74–76                |
| Trichloroacetic acid 85%                                              | Chemical burn                                         | Application during anoscopy, repeat every 2–4 weeks           | 32%–80%   | <ul style="list-style-type: none"> <li>- Less painful</li> <li>- No smoke</li> <li>- No bleeding</li> <li>- Treatment of large area possible</li> </ul> | <ul style="list-style-type: none"> <li>- Repeated use required</li> <li>- Efficacy</li> <li>- Not suitable for thick lesions</li> </ul>                                | 63,65,77–79          |
| CO <sub>2</sub> -Laser                                                | Laser vaporization                                    | Targeted use during anoscopy                                  | 50%–63%   | <ul style="list-style-type: none"> <li>- Less painful</li> <li>- Low risk of bleeding</li> <li>- Precise</li> </ul>                                     | <ul style="list-style-type: none"> <li>- Expensive</li> <li>- Availability</li> <li>- Smoke</li> </ul>                                                                 | 12,80–83             |
| Cryotherapy                                                           | Liquid nitrogen freezes and destroys tissue           | Liquid nitrogen spray during anoscopy, repeat every 4–6 weeks | 60%       | <ul style="list-style-type: none"> <li>- Good safety profile</li> <li>- Low risk of bleeding</li> </ul>                                                 | <ul style="list-style-type: none"> <li>- Repeated use required</li> <li>- Lack of data</li> </ul>                                                                      | 84                   |

(Continues)

TABLE 2 (Continued)

| Overview of available treatment options for high-grade anal dysplasia |                                               |                                                                           |           |                                                                      |                                                                                  |           |            |
|-----------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------|-----------|----------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------|------------|
| Therapy                                                               | Mechanism                                     | Application                                                               | Efficacy* | Advantages                                                           | Disadvantages                                                                    | Peri-anal | Intra-anal |
| Photodynamic therapy                                                  | Light exposure after photosensitization       | Photosensitizer infusion 48h prior to light exposure utilizing a probe    | 28%–60%   | - Treatment of large area possible                                   | - Painful<br>- Two appointments per treatment                                    | +         | ~          |
| Immunomodulation, antiviral agents and topical chemotherapy           |                                               |                                                                           |           |                                                                      |                                                                                  |           |            |
| Imiquimod 5%                                                          | Stimulates interferon and cytokine production | 3 x/week at night for 12 weeks; administered intraanally as a suppository | 24%–77%   | - Treatment of large area possible<br>- Self-application             | - Magistral formula for suppositories<br>- Duration of treatment                 | +         | +          |
| 5-Fluorouracil 5%                                                     | Topical chemotherapy                          | 2 x/week 1 g during night for 16 weeks                                    | 17%–88%   | - Treatment of large area possible<br>- Self-application<br>- Safety | - Availability<br>- Duration of treatment<br>- Requires an applicator or syringe | ~         | ~+         |
| Cidofovir 1%                                                          | Topical antiviral                             | Daily during night for 5 days, followed by 9 days break. 6 cycles         | 15%–63%   | - Treatment of large area possible<br>- Self-application             | - Availability<br>- Side effects                                                 | –         | ~          |

\*Currently, there is no standardized definition for efficacy following the treatment of high-grade anal dysplasia. In particular, the timing of follow-up assessments varies significantly. The efficacy listed here represents a simplified and generalized interpretation of study results; the rates refer to a complete response at the first post-interventional examination. Further details can be found in the respective references. (+), (–), and (∼) indicate the clinical relevance of this treatment method at the specified location according to expert opinion.

85,86

61,87–92

61,93–95

96,97

| Recommendation 12.<br>People without HIV                                                                                                                                                                                                                                                                                                         | Strength | Consensus strength            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------|
| We suggest offering anal carcinoma screening to the following groups:<br>1. MSM with HIV, starting at age 45,<br>2. transgender women, starting at age 45,<br>and irrespective of age:<br>1. women with vulvar intraepithelial neoplasia III or vulvar carcinoma, and<br>2. individuals 10 or more years post-solid organ transplantation.       | ↑        | <b>Strong consensus</b> 28/28 |
| Anal carcinoma screening <i>may be considered</i> for<br>1. Women with persisting cervical HPV-16 infection lasting more than one year),<br>2. women with high-grade cervical or vaginal intraepithelial neoplasia,<br>3. individuals with persisting ano-genital warts, and<br>4. individuals undergoing long-term immunosuppressive treatment. | ↔        | <b>Strong consensus</b> 28/28 |
| We suggest that screening for anal carcinoma in individuals without HIV follow methods similar for individuals with HIV.                                                                                                                                                                                                                         | ↑        | <b>Strong consensus</b> 28/28 |
| We suggest that the treatment of high-grade anal dysplasia in individuals without HIV be approached in a manner analogous to the treatment used for individuals with HIV.                                                                                                                                                                        | ↑        | <b>Strong consensus</b> 28/28 |

## AFFILIATIONS

<sup>1</sup>Department of Dermatology, Medical University of Vienna, Austria

<sup>2</sup>Department of Dermatology, University Hospital Essen, University Duisburg-Essen, Essen, Germany

<sup>3</sup>Department of Surgery, Barmherzige Brüder Krankenhaus Graz, Graz, Austria

<sup>4</sup>German Cancer Consortium (DKTK), Translational Skin Cancer Research, University Medicine Essen, Essen, and DKFZ, Heidelberg, Germany

<sup>5</sup>Infektiologikum Frankfurt, Frankfurt, Germany

<sup>6</sup>AIDS Hilfe Wien, Vienna, Austria

<sup>7</sup>Department of Radiotherapy, Radiological Oncology and Palliative Medicine, ViDia-Kliniken, Karlsruhe, Germany

<sup>8</sup>Department of Obstetrics and Gynecology, St. Elisabeth Hospital, Cologne and University Hospital of Duesseldorf, Duesseldorf, Germany

<sup>9</sup>Hospital and Clinic for Dermatology and Venereology, University Hospital Cologne, Cologne, Germany

<sup>10</sup>Department of Medicine III — Hematology and Oncology, Red Cross Hospital, Munich, Germany

<sup>11</sup>Praxis Bellaria/Klinik im Park, Zurich, Switzerland

<sup>12</sup>ICH, Hamburg, Germany

<sup>13</sup>Consultant Surgeon, Proctological Office Kiel, Department of Surgical Proctology, Park-Klinik, Kiel, Germany

<sup>14</sup>Department of Gynecology and Gynecologic Oncology, Medical University of Vienna, Vienna, Austria

<sup>15</sup>Department of Dermatology, Venereology, and Allergology, HELIOS St. Elisabeth Hospital Oberhausen, Oberhausen, Germany

<sup>16</sup>Private practice, Austria

<sup>17</sup>Pathology Rhein-Ruhr, Mülheim an der Ruhr, Germany

<sup>18</sup>Department of General Medicine, Gastroenterology and Infectious Diseases, Augustinerinnen Hospital, Cologne, Germany

<sup>19</sup>Ruhr-University, St. Josef Hospital, Department of Dermatology, Venereology, and Allergology, Center for Sexual Health und Medicine, Bochum, Germany

<sup>20</sup>Department of General, Visceral, Vascular and Transplant Surgery, University Hospital Essen, Essen, Germany

<sup>21</sup>Department of Surgery, Division of Transplantation, Medical University of Vienna, Vienna, Austria

<sup>22</sup>Medicine and Health Policy Unit, German AIDS Federation, Berlin, Germany

<sup>23</sup>Charité – Universitätsmedizin Berlin, Department of Colorectal Surgery, Campus Virchow Klinikum, Berlin, Germany

<sup>24</sup>Department of Dermatology, Venereology and Allergology, Division of Evidence-Based Medicine (dEBM), Charité – Universitätsmedizin Berlin, corporate member of Freie Universität Berlin and Humboldt-Universität zu Berlin, Berlin, Germany

<sup>25</sup>Department of Dermatology and Allergology, Clinic Bayreuth, Bayreuth, Germany

<sup>26</sup>Institute of Virology, National Reference Center for Papilloma- and Polyomaviruses, University of Cologne, Faculty of Medicine and University Hospital Cologne, Cologne, Germany

<sup>27</sup>Department of Public Health, Environments and Society, London School of Hygiene and Tropical Medicine, London, UK

## FUNDING

The revision of the guideline was supported by the *Clinician Scientist Research Fellowship 2022* of the *Austrian Society for Dermatology and Venereology* awarded to David Chromy.

## CONFLICT OF INTEREST STATEMENT

The conflict-of-interest declarations of all authors can be reviewed online <https://register.awmf.org/de/leitlinien/detail/055-007>

## ORCID

David Chromy  <https://orcid.org/0000-0002-1807-8258>

Doris Helbig  <https://orcid.org/0000-0002-5841-4631>

Alexander Kreuter  <https://orcid.org/0000-0003-2275-499X>

## REFERENCES

- Esser S, Kreuter A, Oette M, et al. German-Austrian guidelines on anal dysplasia and anal cancer in HIV-positive individuals: prevention, diagnosis, and treatment. *J Dtsch Dermatol Ges*. 2015;13:1302-1319.
- Aigner F, Siegel R, Werner RN, et al. S3-Leitlinie Analkarzinom. *coloproctology*. 2021;43:150-216.
- Clifford GM, Georges D, Shiels MS, et al. A meta-analysis of anal cancer incidence by risk group: Toward a unified anal cancer risk scale. *Int J Cancer*. 2021;148:38-47.
- Rudolph JE, Calkins KL, Xu X, et al. Comparing Cancer Incidence in an Observational Cohort of Medicaid Beneficiaries With and Without HIV, 2001–2015. *J Acquir Immune Defic Syndr*. 2024;95:26-34.
- Saraiya M, Unger ER, Thompson TD, et al. US assessment of HPV types in cancers: implications for current and 9-valent HPV vaccines. *J Natl Cancer Inst*. 2015;107:djv086.
- Lin C, Franceschi S, Clifford GM. Human papillomavirus types from infection to cancer in the anus, according to sex and HIV status: a systematic review and meta-analysis. *Lancet Infect Dis*. 2018;18:198-206.
- Gervaz P, Hirschel B, Morel P. Molecular biology of squamous cell carcinoma of the anus. *Br J Surg*. 2006;93:531-538.
- Lin C, Slama J, Gonzalez P, et al. Cervical determinants of anal HPV infection and high-grade anal lesions in women: a collaborative pooled analysis. *Lancet Infect Dis*. 2019;19:880-891.

9. Wei F, Gaisa MM, D'Souza G, et al. Epidemiology of anal human papillomavirus infection and high-grade squamous intraepithelial lesions in 29 900 men according to HIV status, sexuality, and age: a collaborative pooled analysis of 64 studies. *Lancet HIV*. 2021;8:e531-e543.
10. van der Zee RP, Wit F, Richel O, et al. Effect of the introduction of screening for cancer precursor lesions on anal cancer incidence over time in people living with HIV: a nationwide cohort study. *Lancet HIV*. 2023;10:e97-e106.
11. Kreuter A, Potthoff A, Brockmeyer NH, et al. Anal carcinoma in human immunodeficiency virus-positive men: results of a prospective study from Germany. *Br J Dermatol*. 2010;162:1269-1277.
12. Palefsky JM, Lee JY, Jay N, et al. Treatment of Anal High-Grade Squamous Intraepithelial Lesions to Prevent Anal Cancer. *N Engl J Med*. 2022;386:2273-2282.
13. Clifford GM, Combes JD, Etienney I. International Anal Neoplasia Society's 2023 Scientific Meeting - Persistence and clearance of histological anal high-grade lesions in the ANRS-EP57-APACHES study. *Sexual Health*. 2023;20:xviii-xiv.
14. Walker RJB, Easson AM, Hosni A, et al. Anal Cancers in Previously Screened Versus Unscreened Patients: Tumor Stage and Treatment Outcomes. *Dis Colon Rectum*. 2024;67:32-41.
15. Machalek DA, Poynten M, Jin F, et al. Anal human papillomavirus infection and associated neoplastic lesions in men who have sex with men: a systematic review and meta-analysis. *Lancet Oncol*. 2012;13:487-500.
16. Tong WW, Jin F, McHugh LC, et al. Progression to and spontaneous regression of high-grade anal squamous intraepithelial lesions in HIV-infected and uninfected men. *Aids*. 2013;27:2233-2243.
17. Goldstone SE, Lensing SY, Stier EA, et al. A Randomized Clinical Trial of Infrared Coagulation Ablation Versus Active Monitoring of Intra-anal High-grade Dysplasia in Adults With Human Immunodeficiency Virus Infection: An AIDS Malignancy Consortium Trial. *Clin Infect Dis*. 2019;68:1204-1212.
18. Deshmukh AA, Damgacioglu H, Sonawane K, et al. International Anal Neoplasia Society's 2023 Scientific Meeting - Determining optimal anal cancer screening algorithms for men who have sex with men with HIV: a modelling study. *Sexual Health*. 2023;20:xviii-xiv.
19. Cardoso R, Guo F, Heisser T, et al. Colorectal cancer incidence, mortality, and stage distribution in European countries in the colorectal cancer screening era: an international population-based study. *Lancet Oncol*. 2021;22:1002-1013.
20. Burke CA. Number needed to screen to detect adenomas, advanced adenomas and colorectal cancer is higher in women than in similarly aged men. *Evid Based Med*. 2012;17:159-160.
21. QIWiG. Nutzenbewertung eines HPVTests im Primärscreening des Zervixkarzinoms – Aktualisierung. *IQWiG-Berichte – Nr 222*. 2014.
22. Cachay ER, Gilbert T, Qin H, Mathews WC. Clinical Predictors and Outcomes of Invasive Anal Cancer for People With Human Immunodeficiency Virus in an Inception Cohort. *Clin Infect Dis*. 2024;79(3):709-716.
23. Nayar R, Wilbur DC. The Pap test and Bethesda 2014. *Cancer Cytopathol*. 2015;123:271-281.
24. Fenger C, Nielsen VT. Dysplastic changes in the anal canal epithelium in minor surgical specimens. *Acta Pathol Microbiol Scand A*. 1981;89:463-465.
25. Darragh TM, Colgan TJ, Cox JT, et al. The Lower Anogenital Squamous Terminology Standardization Project for HPV-Associated Lesions: background and consensus recommendations from the College of American Pathologists and the American Society for Colposcopy and Cervical Pathology. *J Low Genit Tract Dis*. 2012;16:205-242.
26. van der Zee RP, Meijer C, Cumming T, et al. Characterisation of anal intraepithelial neoplasia and anal cancer in HIV-positive men by immunohistochemical markers p16, Ki-67, HPV-E4 and DNA methylation markers. *Int J Cancer*. 2021;149:1833-1844.
27. van der Zee RP, Richel O, van Noesel CJM, et al. Cancer Risk Stratification of Anal Intraepithelial Neoplasia in Human Immunodeficiency Virus-Positive Men by Validated Methylation Markers Associated With Progression to Cancer. *Clin Infect Dis*. 2021;72:2154-2163.
28. Goldie SJ, Kuntz KM, Weinstein MC, et al. The clinical effectiveness and cost-effectiveness of screening for anal squamous intraepithelial lesions in homosexual and bisexual HIV-positive men. *Jama*. 1999;281:1822-1829.
29. Dias Goncalves Lima F, Viset JD, Leeflang MMG, et al. The Accuracy of Anal Swab-Based Tests to Detect High-Grade Anal Intraepithelial Neoplasia in HIV-Infected Patients: A Systematic Review and Meta-analysis. *Open Forum Infect Dis*. 2019;6:ofz191.
30. Gage JC, Ghosh A, Boronovo S, et al. A comparison of dacron versus Flocked nylon swabs for anal cytology specimen collection. *Acta Cytol*. 2011;55:364-367.
31. Wiley DJ, Hsu HK, Ganser MA, et al. Comparison of nylon-flocked swab and Dacron swab cytology for anal HSIL detection in transgender women and gay, bisexual, and other men who have sex with men. *Cancer Cytopathol*. 2019;127:247-257.
32. Wiley DJ, Hsu H, Bolan R, et al. Comparison of 2 anal cytology protocols to predict high-grade anal intraepithelial neoplasia. *J Low Genit Tract Dis*. 2013;17:414-424.
33. Silva-Klug AC, Saumoy M, Baixeras N, et al. Comparison of two sample collection devices for anal cytology in HIV-positive men who have sex with men: Cytology brush and Dacron swab. *Cytopathology*. 2021;32:646-653.
34. Darragh TM, Jay N, Tupkelewicz BA, et al. Comparison of conventional cytologic smears and ThinPrep preparations from the anal canal. *Acta Cytol*. 1997;41:1167-1170.
35. Chiao EY, Giordano TP, Palefsky JM, et al. Screening HIV-infected individuals for anal cancer precursor lesions: a systematic review. *Clin Infect Dis*. 2006;43:223-233.
36. Darragh TM, Winkler B. Anal cancer and cervical cancer screening: key differences. *Cancer Cytopathol*. 2011;119:5-19.
37. Poljak M, Kocjan BJ. Commercially available assays for multiplex detection of alpha human papillomaviruses. *Expert Rev Anti Infect Ther*. 2010;8:1139-1162.
38. Szarewski A, Mesher D, Cadman L, et al. Comparison of seven tests for high-grade cervical intraepithelial neoplasia in women with abnormal smears: the Predictors 2 study. *J Clin Microbiol*. 2012;50:1867-1873.
39. Arbyn M, Simon M, Peeters E, et al. 2020 list of human papillomavirus assays suitable for primary cervical cancer screening. *Clin Microbiol Infect*. 2021;27:1083-1095.
40. Torres M, Silva-Klug A, Ferrer E, et al. Detecting anal human papillomavirus infection in men who have sex with men living with HIV: implications of assay variability. *Sex Transm Infect*. 2023;99(3):187-190.
41. Gaisa MM, Sigel KM, Deshmukh AA, et al. Comparing Anal Cancer Screening Algorithms Using Cytology and HPV DNA Testing in Three High-risk Populations. *J Infect Dis*. 2021;224(5):881-888.
42. Hillman RJ, Berry-Lawhorn JM, Ong JJ, et al. International Anal Neoplasia Society Guidelines for the Practice of Digital Anal Rectal Examination. *J Low Genit Tract Dis*. 2019;23:138-146.
43. Nyitray AG, Hicks JT, Hwang LY, et al. A phase II clinical study to assess the feasibility of self and partner anal examinations to detect anal canal abnormalities including anal cancer. *Sex Transm Infect*. 2018;94:124-130.
44. Richel O, Hallensleben ND, Kreuter A, et al. High-resolution anoscopy: clinical features of anal intraepithelial neoplasia in HIV-positive men. *Dis Colon Rectum*. 2013;56:1237-1242.
45. Squeo GC, Geba MC, Kane WJ, et al. Impact of a High-Resolution Anoscopy Clinic on Management of Anal Dysplasia in Women Living With HIV. *Am Surg*. 2023;89:4689-4695.
46. Gimenez F, Costa-e-Silva IT, Daumas A, et al. The value of high-resolution anoscopy in the diagnosis of anal cancer precursor lesions in HIV-positive patients. *Arq Gastroenterol*. 2011;48:136-145.
47. Goon P, Morrison V, Fearnhead N, et al. High resolution anoscopy may be useful in achieving reductions in anal cancer local disease failure rates. *Eur J Cancer Care (Engl)*. 2015;24:411-416.
48. Silvera R, Gaisa MM, Goldstone SE. Random biopsy during high-resolution anoscopy increases diagnosis of anal high-grade squa-

- mous intraepithelial lesions. *J Acquir Immune Defic Syndr*. 2014;65:65-71.
49. Oette M, Wieland U, Schünemann M, et al. Anal chromoendoscopy using gastroenterological video-endoscopes: A new method to perform high resolution anoscopy for diagnosing intraepithelial neoplasia and anal carcinoma in HIV-infected patients. *Z Gastroenterol*. 2017;55:23-31.
  50. Hillman RJ, Cuming T, Darragh T, et al. 2016 IANS International Guidelines for Practice Standards in the Detection of Anal Cancer Precursors. *J Low Genit Tract Dis*. 2016;20:283-291.
  51. Kreuter A, Siorokos C, Oellig F, et al. High-grade Dysplasia in Anogenital Warts of HIV-Positive Men. *JAMA Dermatol*. 2016;152:1225-1230.
  52. Koblin BA, Hessel NA, Zauber AG, et al. Increased incidence of cancer among homosexual men, New York City and San Francisco, 1978–1990. *Am J Epidemiol*. 1996;144:916-923.
  53. Aldersley J, Lorenz DR, Misra V, et al. Increased risk of anal squamous cell carcinoma in HIV-positive men with prior hepatitis B virus infection. *Aids*. 2019;33:145-152.
  54. Poynten IM, Jin F, Roberts JM, et al. The Natural History of Anal High-grade Squamous Intraepithelial Lesions in Gay and Bisexual Men. *Clin Infect Dis*. 2021;72:853-861.
  55. Brogden DRL, Walsh U, Pellino G, et al. Evaluating the efficacy of treatment options for anal intraepithelial neoplasia: a systematic review. *Int J Colorectal Dis*. 2021;36:213-226.
  56. Goldstone RN, Goldstone AB, Russ J, Goldstone SE. Long-term follow-up of infrared coagulator ablation of anal high-grade dysplasia in men who have sex with men. *Dis Colon Rectum*. 2011;54:1284-1292.
  57. Marks DK, Goldstone SE. Electrocautery ablation of high-grade anal squamous intraepithelial lesions in HIV-negative and HIV-positive men who have sex with men. *J Acquir Immune Defic Syndr*. 2012;59:259-265.
  58. Silling S, Kreuter A, Hellmich M, et al. Human papillomavirus onco-gene mRNA testing for the detection of anal dysplasia in HIV-positive men who have sex with men. *J Clin Virol*. 2012;53:325-331.
  59. Dupin C, Siproudhis L, Henno S, et al. Use of human papillomavirus genotyping and biomarkers for targeted screening of anal dysplasia in human immunodeficiency virus-infected patients. *Dig Liver Dis*. 2015;47:423-428.
  60. Goldstone SE, Johnstone AA, Moshier EL. Long-term outcome of ablation of anal high-grade squamous intraepithelial lesions: recurrence and incidence of cancer. *Dis Colon Rectum*. 2014;57:316-323.
  61. Richel O, de Vries HJ, van Noesel CJ, et al. Comparison of imiquimod, topical fluorouracil, and electrocautery for the treatment of anal intraepithelial neoplasia in HIV-positive men who have sex with men: an open-label, randomised controlled trial. *Lancet Oncol*. 2013;14:346-353.
  62. Burgos J, Curran A, Landolfi S, et al. The effectiveness of electrocautery ablation for the treatment of high-grade anal intraepithelial neoplasia in HIV-infected men who have sex with men. *HIV Med*. 2016;17:524-531.
  63. Burgos J, Martin-Castillo M, Landolfi S, et al. Brief Report: Effectiveness of Trichloroacetic Acid vs. Electrocautery Ablation for the Treatment of Anal High-Grade Squamous Intraepithelial Lesion in HIV-Infected Patients. *J Acquir Immune Defic Syndr*. 2018;79:612-616.
  64. Gaisa MM, Liu Y, Deshmukh AA, et al. Electrocautery ablation of anal high-grade squamous intraepithelial lesions: Effectiveness and key factors associated with outcomes. *Cancer*. 2020;126:1470-1479.
  65. Burgos J, Curran A, Garcia J, et al. Effectiveness of trichloroacetic acid versus electrocautery for the treatment of anal high-grade squamous intraepithelial lesions in persons with HIV. *Infect Dis (Lond)*. 2024;1-9.
  66. Goldstone RN, Hasan SR, Drury S, et al. A trial of radiofrequency ablation for anal intraepithelial neoplasia. *Int J Colorectal Dis*. 2017;32:357-365.
  67. Goldstone RN, Hasan SR, Goldstone SE. Brief Report: Radiofrequency Ablation Therapy for Anal Intraepithelial Neoplasia: Results From a Single-Center Prospective Pilot Study in HIV+ Participants. *J Acquir Immune Defic Syndr*. 2017;76:e93-e97.
  68. Vergara-Fernandez O, Solórzano-Vicuña D, Coss-Adame E, Trejo-Avila M. Outcomes of radiofrequency ablation for anal high-grade squamous intraepithelial lesions. *Tech Coloproctol*. 2021;25:701-707.
  69. Goldstone SE, Terlizzi JP, Levine RA, et al. A Prospective, Dual-Center Trial of Circumferential Radiofrequency Ablation of Anal High-Grade Squamous Intraepithelial Lesions Demonstrate Improved Long-term Efficacy Over Historical Controls of Targeted Ablation. *Dis Colon Rectum*. 2023;66:764-773.
  70. Cranston RD, Hirschowitz SL, Cortina G, Moe AA. A retrospective clinical study of the treatment of high-grade anal dysplasia by infrared coagulation in a population of HIV-positive men who have sex with men. *Int J STD AIDS*. 2008;19:118-120.
  71. Weis SE, Vecino I, Pogoda JM, Susa JS. Treatment of high-grade anal intraepithelial neoplasia with infrared coagulation in a primary care population of HIV-infected men and women. *Dis Colon Rectum*. 2012;55:1236-1243.
  72. Sirena G, Videla S, Piñol M, et al. Long-term effectiveness of infrared coagulation for the treatment of anal intraepithelial neoplasia grades 2 and 3 in HIV-infected men and women. *Aids*. 2013;27:951-959.
  73. Corral J, Parés D, García-Cuyás F, et al. Clinical results of infrared coagulation as a treatment of high-grade anal dysplasia: a systematic review. *Tech Coloproctol*. 2019;23:707-712.
  74. Brown SR, Skinner P, Tidy J, et al. Outcome after surgical resection for high-grade anal intraepithelial neoplasia (Bowen's disease). *Br J Surg*. 1999;86:1063-1066.
  75. Chang GJ, Berry JM, Jay N, et al. Surgical treatment of high-grade anal squamous intraepithelial lesions: a prospective study. *Dis Colon Rectum*. 2002;45:453-458.
  76. Pineda CE, Berry JM, Jay N, et al. High-resolution anoscopy targeted surgical destruction of anal high-grade squamous intraepithelial lesions: a ten-year experience. *Dis Colon Rectum*. 2008;51:829-835; discussion 35–37.
  77. Singh JC, Kuohung V, Palefsky JM. Efficacy of trichloroacetic acid in the treatment of anal intraepithelial neoplasia in HIV-positive and HIV-negative men who have sex with men. *J Acquir Immune Defic Syndr*. 2009;52:474-479.
  78. Cranston RD, Baker JR, Liu Y, et al. Topical application of trichloroacetic acid is efficacious for the treatment of internal anal high-grade squamous intraepithelial lesions in HIV-positive men. *Sex Transm Dis*. 2014;41:420-426.
  79. Esser S, Kreuter A, Potthoff A, et al. EACS2023: 607 – Efficacy and safety of topical trichloroacetic acid vs. electrocautery for the treatment of anal intraepithelial neoplasia in HIV-positive patients (TECAIN) – a randomized controlled trial. *HIV Med*. 2023;24(Suppl 5):3-788.
  80. Fuertes I, Chivite I, Cranston RD, et al. Short-term effectiveness and tolerability of carbon dioxide laser for anal high-grade squamous intraepithelial lesions in individuals living with HIV. *Int J STD AIDS*. 2022;33:709-717.
  81. Cappello C, Cuming T, Bowring J, et al. High-Resolution Anoscopy Surveillance After Anal Squamous Cell Carcinoma: High-Grade Squamous Intraepithelial Lesion Detection and Treatment May Influence Local Recurrence. *Dis Colon Rectum*. 2020;63:1363-1371.
  82. Nathan M, Hickey N, Mayuranathan L, et al. Treatment of anal human papillomavirus-associated disease: a long term outcome study. *Int J STD AIDS*. 2008;19:445-449.
  83. Aynaud O, Buffet M, Roman P, et al. Study of persistence and recurrence rates in 106 patients with condyloma and intraepithelial neoplasia after CO<sub>2</sub> laser treatment. *Eur J Dermatol*. 2008;18:153-158.
  84. Siegenbeek van Heukelom ML, Gosens KCM, Prins JM, de Vries HJC. Cryotherapy for Intra- and Perianal High-Grade Squamous Intraepithelial Lesions in HIV-Positive Men who have Sex with Men. *Am J Clin Dermatol*. 2018;19:127-132.
  85. van der Snoek EM, den Hollander JC, Aans JB, et al. Photodynamic therapy with systemic meta-tetrahydroxyphenylchlorin in the treatment of anal intraepithelial neoplasia, grade 3. *Lasers Surg Med*. 2012;44:637-644.
  86. Welbourn H, Duthie G, Powell J, Moghissi K. Can photodynamic therapy be the preferred treatment option for anal intraepithelial

- neoplasia? Initial results of a pilot study. *Photodiagnosis Photodyn Ther*. 2014;11:20-21.
87. Wieland U, Brockmeyer NH, Weissenborn SJ, et al. Imiquimod treatment of anal intraepithelial neoplasia in HIV-positive men. *Arch Dermatol*. 2006;142:1438-1444.
  88. Kreuter A, Potthoff A, Brockmeyer NH, et al. Imiquimod leads to a decrease of human papillomavirus DNA and to a sustained clearance of anal intraepithelial neoplasia in HIV-infected men. *J Invest Dermatol*. 2008;128:2078-2083.
  89. Fox PA, Nathan M, Francis N, et al. A double-blind, randomized controlled trial of the use of imiquimod cream for the treatment of anal canal high-grade anal intraepithelial neoplasia in HIV-positive MSM on HAART, with long-term follow-up data including the use of open-label imiquimod. *Aids*. 2010;24:2331-2335.
  90. Cranston RD, Baker JR, Siegel A, et al. A Pilot Study of the Immunologic, Virologic, and Pathologic Consequences of Intra-anal 5% Imiquimod in HIV-1-Infected Men With High-Grade Squamous Intraepithelial Lesions. *Dis Colon Rectum*. 2018;61:298-305.
  91. Fuertes I, Bastida C, Lopez-Cabezas C, et al. The effectiveness and tolerability of imiquimod suppositories to treat extensive intra-anal high-grade squamous intraepithelial lesions/warts in HIV-infected individuals. *Int J STD AIDS*. 2019;30:1194-1200.
  92. Hidalgo-Tenorio C, García-Martínez CM, Pasquau J, et al. Risk factors for  $\geq$  high-grade anal intraepithelial lesions in MSM living with HIV and the response to topical and surgical treatments. *PLoS One*. 2021;16:e0245870.
  93. Graham BD, Jetmore AB, Foote JE, Arnold LK. Topical 5-fluorouracil in the management of extensive anal Bowen's disease: a preferred approach. *Dis Colon Rectum*. 2005;48:444-450.
  94. Richel O, Wieland U, de Vries HJ, et al. Topical 5-fluorouracil treatment of anal intraepithelial neoplasia in human immunodeficiency virus-positive men. *Br J Dermatol*. 2010;163:1301-1307.
  95. Snyder SM, Siekas L, Aboulafia DM. Initial Experience with Topical Fluorouracil for Treatment of HIV-Associated Anal Intraepithelial Neoplasia. *J Int Assoc Physicians AIDS Care (Chic)*. 2011;10:83-88.
  96. Stier EA, Goldstone SE, Einstein MH, et al. Safety and efficacy of topical cidofovir to treat high-grade perianal and vulvar intraepithelial neoplasia in HIV-positive men and women. *Aids*. 2013;27:545-551.
  97. Sendagorta E, Bernardino JI, Álvarez-Gallego M, et al. Topical cidofovir to treat high-grade anal intraepithelial neoplasia in HIV-infected patients: a pilot clinical trial. *Aids*. 2016;30:75-82.

**How to cite this article:** Chromy D, Aigner F, Becker JC, et al. German-Austrian guideline on screening for anal dysplasia and anal carcinoma in people living with HIV. *JDDG: Journal der Deutschen Dermatologischen Gesellschaft*. 2025;23:1025–1040. <https://doi.org/10.1111/ddg.15719>