

# Proposals for the #Enzian addendum and update: an international expert survey for item generation

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## ABSTRACT

**Background:** Accurate and standardised characterisation of endometriosis extent is essential for patient counselling regarding pain and fertility outcomes, surgical planning, multidisciplinary communication, and clinical research. The Enzian classification has been applied in Central Europe for over two decades, while the updated #Enzian classification, published in 2021, has subsequently gained broader international acceptance.

**Objectives:** To evaluate international expert perspectives and generate potential items informing updates to selected compartments of the #Enzian classification.

**Methods:** Twenty-six internationally recognised experts in endometriosis surgery, imaging, and reproductive medicine were invited to participate in a structured survey. The electronic questionnaire comprised 29 single-choice and open-ended items addressing five #Enzian compartments: T (tuboovarian condition), B (sacrouterine ligaments, cardinal ligaments, pelvic sidewall), C (rectum), FB (bladder), and FA (adenomyosis). Responses were collected anonymously, analysed descriptively, and thematically grouped. Consensus thresholds followed established criteria.

**Main Outcome Measures:** Expert perspectives regarding the need for revision of selected #Enzian compartments and proposed modifications.

**Results:** Twenty-three experts responded (88.5%). Strong agreement for revision was observed for compartments B, C, and FB (>80%). Moderate agreement (>60%) supported updates to compartments T and FA. Specific suggested refinements included adding the suffix d within compartment T to reflect tubal dilatation (73.9% in favour) and the suffix P within compartment B to denote pelvic sidewall/parametrial involvement (78.3% in favour). For colorectal disease (compartment C), respondents supported reporting lesion–anal verge distance and multifocality. A graded FA1–FA3 system for adenomyosis was favoured (73.9%). Opinions regarding descriptors of bladder endometriosis were heterogeneous.

**Conclusions:** Experts identified clear priorities for refining the #Enzian classification, particularly regarding parametrial involvement, colorectal deep endometriosis and adenomyosis extent. These findings could provide a structured framework to inform subsequent Delphi consensus rounds.

**What is New?** The study identifies international expert-agreed priorities for refinement of selected #Enzian classification compartments.

**Keywords:** Adenomyosis, colorectal, Delphi consensus, endometriosis, fertility, reproductive medicine

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## Introduction

Endometriosis is a chronic, oestrogen-dependent condition characterised by heterogeneous phenotypes, including superficial peritoneal implants, ovarian endometrioma, deep endometriosis (DE) affecting various anatomical locations and adenomyosis.<sup>1</sup> Accurate and standardised description of disease extent is essential for patient counselling regarding pain and fertility outcomes, surgical planning, multidisciplinary communication and clinical research. Traditional staging systems, including the revised American Society for Reproductive Medicine (ASRM) score, have limited ability to describe deep and extragenital disease in anatomical detail, while the American Association of Gynaecological Laparoscopists (AAGL) score reflects surgical complexity rather than providing comprehensive non-invasive anatomical mapping system.<sup>2-4</sup> These limitations prompted the development of anatomically oriented classification systems, including the Enzian classification, used in central European countries over two decades and accepted worldwide since its updated #Enzian version published in 2021.<sup>5</sup>

The #Enzian classification was designed as a comprehensive non-invasive and surgical description system encompassing peritoneal, ovarian, deep and extragenital endometriosis as well as selected adhesions, structured by anatomical compartments, it can be applied using transvaginal ultrasound (TVS), magnetic resonance imaging (MRI), surgical assessment, thereby bridging pre-operative evaluation and intra-operative findings. Several studies have demonstrated high accuracy of the classification when combined with TVS<sup>6-8</sup> whose use is supported by a recent consensus statement on imaging and classification of DE.<sup>9</sup> Diagnostic accuracy and inter-observer agreement for ultrasound<sup>10</sup> and MRI-based #Enzian have been reported as promising, particularly for selected compartments.<sup>11</sup>

Despite these advances, several limitations of the current #Enzian system have been highlighted. Narrative reviews and comparative studies underline its complexity,<sup>12</sup> variable performance of specific compartments,<sup>9</sup> and limited descriptors for certain clinically relevant features, such as correlation with pain,<sup>13,14</sup> fertility outcomes, distal tubal pathology, and parametrial and pelvic sidewall involvement. The absence of standardised non-invasive infertility assessment frameworks underscores the need for more comprehensive, reproducible tools such as #Enzian to bridge this critical diagnostic deficit. Recent

proposals to convert #Enzian into a four-stage system further illustrate the current drive toward harmonisation with other classification schemes.<sup>15</sup>

Artificial intelligence (AI) applications in MRI and ultrasound rely heavily on detailed anatomical inputs, with deep learning models achieving substantial improvements in lesion detection and segmentation. Comprehensive and granular datasets may become increasingly relevant for effective AI integration in endometriosis imaging.<sup>16</sup> Against this background, we conducted an international survey among experts in endometriosis surgery, imaging and medically assisted reproduction to evaluate the perceived need for targeted refinement of selected #Enzian compartments and to identify priorities for a future revision of the classification.

## Methods

This study represents a preliminary, item-generating international expert survey designed to inform subsequent Delphi rounds evaluating potential updates to the #Enzian classification. The survey was created to explore expert views on the established current version of the #Enzian classification of endometriosis.<sup>5</sup> Twenty-six experts were purposively selected based on academic contribution and recognised clinical expertise in endometriosis, imaging and fertility. The original #Enzian development team was included to preserve continuity. Invitations were distributed by e-mail, and participation was voluntary and anonymous, with no personal identifiers. A structured electronic questionnaire comprising 29 items (single-choice and open-ended) was developed. The instrument targeted five compartments of the #Enzian system, as agreed during the initial in-person core expert group meeting in May 2025: B (sacrouterine ligaments, cardinal ligaments, pelvic sidewall)-questions 1-6; T (tuboovarian condition)-questions 7-12; C (bowel)-questions 13-19; FB (bladder)-questions 20-24 and FA (adenomyosis)-questions 25-29.

All questions addressed both, the perceived need for revision and agreement with proposed modifications (e.g., suffixes, numeric indices, anatomical distances). The questionnaire was distributed electronically using the blind carbon copy function. A 30-day response window was provided, with an estimated completion time of five minutes. The questionnaire is available on <https://www.surveymonkey.com/r/V7QCTRV>.

Quantitative (single choice) responses were tabulated and analysed descriptively. Free-text answers were

standardised and thematically grouped. Consensus thresholds were applied in line with previously published works<sup>9</sup> as follows: experts provided binary responses (agree/disagree); grades of agreement were defined as strong agreement (more than 80% agree), moderate agreement (more than 60% agree), equipoise (40%-60% agree), or disagreement (less than 40% agree). The summary of this survey and their levels of agreement are presented in this work. The study fulfilled criteria for minimal-risk survey research, and although formal ethical approval was not required, compliance with local survey research standards was ensured.

## Results

Of 26 invited experts, 23 completed the survey with a response rate of 88.5%. Respondents represented geographically diverse regions: Australia (1), Austria (2), Belgium (1), Brazil (1), Canada (1), France (1), Germany (5), Hungary (2), Italy (6), Poland (1), Portugal (1), Switzerland (2), and the United Kingdom (2).

Most experts endorsed revising the #Enzian classification according to the following compartments: T (tubo-ovarian condition), B (sacrouterine ligaments, cardinal ligaments, pelvic sidewall), C (rectum), FB (bladder) and FA (adenomyosis) (Table 1). Strong agreement (>80%) was achieved for revising topics concerning compartments (81.6%), C (82.6%), and FB (82.6%). Moderate agreement (>60%) was reached for compartments T and FA (73.9% each).

Participants reached moderate agreement that the current description of compartment T does not provide sufficient information regarding the presence or absence of tubal dilatation, a feature that may suggest impaired tubal function. Within this exploratory item, 73.9% supported adding the suffix d to better describe this possible pathology within compartment T. The proposed suffix was not intended to grade the severity of dilatation or to define management decisions, but rather to

improve structured documentation of potentially fertility-relevant pathology. Opinions diverged on a further subclassification describing tubal content (hydrosalpinx vs. hematosalpinx) with only 21.7% supporting its inclusion, whereas 56.5% considered it an unnecessary level of detail and a further 21.7% did not support the item on the basis on their prior response (disagreement with suggested suffix d addition), indicating an overall lack of agreement.

There was moderate agreement (78.3%) to support the addition of a suffix p within compartment B to denote pelvic sidewall and/or lateral parametrial involvement. In this exploratory survey, lateral parametrial involvement was used to describe disease extending laterally towards the pelvic sidewall, including clinically relevant proximity to or involvement of ureteric or nerve structures. Experts emphasised the surgical relevance of the lateral disease extension, with 78.3% reporting that such involvement always (47.8%) or often (30.4%) influences their operative strategy, and a further 21.8% indicating that it occasionally does so.

Regarding the compartment C (rectum), moderate agreement was reached for documenting distance from the anal verge to the lowermost rectal DE lesion (73.9%) and necessity to record the number of rectal nodules (78.3%), in addition to existing lesion size descriptors used. Respondents also noted that these variables better support surgical planning, particularly for the low rectal lesions: 69.6% survey participants reported lesion proximity to the anal verge as being a frequent determinant in operative decision-making, and 65.2% supported the suffix "L" use within compartment C for lesions <5 cm from the anal verge.

Experts reached moderate agreement (73.9%) regarding exploration of a graded FA1–FA3 system to better characterise according to the estimated proportion myometrial involvement. This proposal should be interpreted as an item for further evaluation rather than

**Table 1.** Consensus rates for revising the #Enzian classification according to respective compartments.

| Compartment         | Percent in favour | Level of agreement |
|---------------------|-------------------|--------------------|
| B (Parametrium)     | 81.6%             | Strong agreement   |
| C (Bowel)           | 82.6%             | Strong agreement   |
| FB (Bladder)        | 82.6%             | Strong agreement   |
| T (Fallopian tubes) | 73.9%             | Moderate agreement |
| FA (Adenomyosis)    | 73.9%             | Moderate agreement |

Thresholds: >80% agreed: strong agreement, 60-80% agreed: moderate agreement, 40%-60% agreed: equipoise, <40% agreed: disagreement.

a validated quantitative grading system. Although strong agreement (82.6%) was observed regarding the need for revising FB descriptors for bladder endometriosis, no single descriptor achieved agreement: 34.8% favoured maximum lesion diameter, 34.8% supported recording the distance between the lesion and the ureteral orifice irrespective of lesion size, 13.0% were uncertain, and 17.4% proposed alternative approaches in free-text comments, including ureteral involvement or trigonal extension descriptions.

Thematic analysis of free-text responses identified several recurring suggestions, summarised in Table 2. Key issues included the need for a more detailed description of compartment B, clinically relevant descriptors of possible tubal pathology within compartment T, inclusion of lesion-to-anal-verge distance and multifocality for colorectal disease within compartment C, and clearer differentiation between focal and diffuse adenomyosis in alignment with MUSA criteria.<sup>17</sup> Views and opinions on bladder endometriosis (FB) classification remained heterogeneous, with many experts preferring simplicity and descriptive annotations rather than additional coding.

Discussion

Main findings

The present work reports the results of an international expert survey conducted as a preliminary item generation step to inform future Delphi-based refinement of the current #Enzian classification. The findings suggest that several clinically relevant anatomical features may currently be insufficiently represented, particularly within compartments B, C and FB. This likely reflects increasing recognition of the importance of parametrial extension, colorectal multifocality, and bladder-related descriptors in contemporary endometriosis imaging and surgical

practice. Nevertheless, variability regarding the preferred implementation of these descriptors highlights the complexity of balancing anatomical details with practical usability within an integrated classification system. Expert support for including lesion-to-anal-verge distance and multifocality in colorectal DE further suggests that lesion size descriptors alone may not adequately reflect the complexity and surgical relevance of rectosigmoid disease. This may be particularly relevant since the surgical literature shows that these variables indeed correlate with operative complexity, choice of technique, and postoperative morbidity.<sup>18,19</sup> Furthermore, these descriptors may support not only operative planning but also patient counselling and informed consent, particularly in cases of low rectal disease where surgical morbidity may substantially differ. Recent prospective data have additionally demonstrated promising diagnostic accuracy of structured ultrasound assessment for rectosigmoid DE using the IDEA protocol and #Enzian classification framework, supporting the feasibility of more anatomically detailed preoperative reporting.<sup>20</sup>

The strong interest in refining parametrial and pelvic sidewall descriptors also reflects increasing awareness of the importance of these anatomical regions in both imaging and surgical management of DE. Recently published methodological consensus papers have further standardised ultrasound assessment of the pelvic sidewall and parametrium, potentially facilitating broader implementation and reproducibility of these evaluations in clinical practice.<sup>21,22</sup>

Moderate agreement regarding modifications to the compartment T reflects growing recognition of the importance of documenting tubal pathology, including tubal dilatation, which may impact reproductive outcomes. The proposed suffix d was intended as an exploratory

| Table 2. Thematic synthesis of open-ended responses across compartments. |                                                                                |                                                               |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------|
| Compartment                                                              | Key themes                                                                     | Illustrative comments (paraphrased)                           |
| T (Fallopian tubes)                                                      | Tubal dilatation; patency and adhesion quality                                 | "Hydrosalpinx vs hematosalpinx distinction is not necessary." |
| B (Parametrium)                                                          | Need for lateral clarity; suffix p; ureter/nerve involvement                   | "Add suffix p for lateral sidewall involvement."              |
| C (Bowel)                                                                | Distance from anal verge; multifocality; number of nodules                     | "Record in cm and add 'mf' for multifocality."                |
| FB (Bladder)                                                             | Heterogeneous views; importance of trigone/ureter proximity; prefer simplicity | "Describe trigonal involvement narratively."                  |
| FA (Adenomyosis)                                                         | Distinguish focal vs diffuse; consider % myometrial involvement                | "Add suffix 'f' or 'd' for focal/diffuse."                    |

descriptor to better integrate documentation of fertility-relevant parameters into the #Enzian classification rather than to directly determine management strategies. Importantly, no agreement was achieved regarding subclassification of hydrosalpinx vs. hematosalpinx, suggesting that experts favoured simplified descriptors at this preliminary stage. Although not formally evaluated within this survey, additional imaging markers such as “kissing ovaries” may also warrant consideration within subsequent Delphi rounds due to their recognised association with posterior compartment disease.<sup>23</sup> Proposed refinements to compartment FB underscore the heterogeneity of bladder endometriosis and the absence of universally accepted descriptors reflecting lesion complexity and surgical relevance. However, no clear agreement emerged regarding whether lesion size and/or proximity to the ureteral orifice should be prioritised within future #Enzian classification descriptors. Interest in exploring a graded FA1–FA3 scheme for adenomyosis may reflect increasing recognition of the need for more structured adenomyosis phenotyping within endometriosis classification systems. Importantly, this proposal should not be interpreted as a validated quantitative grading system, as objective volumetric assessment of adenomyosis remains challenging in both imaging and surgical practice. Furthermore, differentiation between focal and diffuse adenomyosis based on direct and indirect MUSA criteria remains complex and requires further validation for their extent within the classification.

Persistent challenges regarding symptom-disease correlation in endometriosis<sup>24</sup> further support the need for more structured and anatomically detailed classification systems. Limited standardised phenotyping may reduce the ability to analyse symptom patterns, reproductive outcomes and disease severity prospectively. However, recent prospective imaging research, particularly the work of Exacoustos and colleagues, demonstrates that when standardised and anatomically detailed descriptors are applied, such as RADAR graphical mapping in conjunction with the #Enzian classification, clinically meaningful correlations with symptoms may indeed be achieved.<sup>10</sup> These findings highlight the need for consistent, prospective data acquisition across all clinical pathways, including assisted reproductive techniques, as robust symptom–disease analyses fundamentally rely on high diagnostic quality. In parallel, contemporary AI applications increasingly rely on high-quality structured anatomical datasets, further emphasising the

potential future relevance of refined and reproducible classification.<sup>16</sup> Nevertheless, implementation of such approaches remains highly dependent on expert imaging assessment, particularly in TVS, and standardised methodology which remains inconsistently implemented across clinical settings.<sup>25</sup>

Overall, the thematic convergence observed across expert responses indicates that future alterations of the #Enzian classification should prioritise (i) improved delineation of parametrial and pelvic sidewall disease, (ii) more comprehensive characterisation of colorectal involvement, (iii) standardised descriptors for tubal pathology, and (iv) integration of contemporary sonographic criteria for describing the extent of adenomyosis.

Importantly, the absence of universal agreement across several proposed items likely reflects complexity and heterogeneity of endometriosis, differences in surgical approaches, imaging modality expertise and clinical priorities among international experts. Rather than weakening the findings, this observation reinforces the rationale for a structured Delphi process with aim to refine, prioritise and harmonise expert perspectives into even more widely applicable and acceptable classification system.

### **Strengths and Limitations**

The strength of the present work is that it includes the opinion of twenty-three purposively selected experts, including original #Enzian developers reflecting a high external validity within the expert community. Several limitations should be acknowledged. Only selected #Enzian compartments were evaluated, while other potentially relevant domains (e.g. A, O, and F categories outside FB/FA) were beyond the scope of this preliminary survey. Additionally, binary response formats may oversimplify complex anatomical and clinical considerations, making qualitative free-text responses potentially crucial to contextual interpretation. Finally, only moderate agreement was reached on several topics which can be seen as promising but requires refinement and further consensus testing.

### **Clinical implications**

In summary, this work constitutes a structured item-generation phase designed to inform subsequent Delphi consensus processes and to support the further evolution of the #Enzian classification. The proposed exploratory

items aim to enhance its clinical relevance, surgical utility, and compatibility with contemporary imaging and emerging AI-based applications.

### Unanswered questions and future research

At this stage, no definitive classification changes are proposed, and further Delphi rounds are necessary to refine, prioritise, and validate the suggested modifications.

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**Ethical approval:** The study fulfilled criteria for minimal-risk research. Formal ethical approval was not required, and the study was conducted in accordance with local survey research standards.

**Informed consent:** Completion of the survey was taken as implied informed consent.

**Data sharing:** The data supporting the findings of this study are available from the corresponding author upon reasonable request.

**Transparency:** The authors confirm that this manuscript is an honest, accurate, and transparent account of the study being reported, and that no important aspects of the study have been omitted.

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