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ANATOMY OF THE FASCIAE OF THE FEMALE PELVIS: STRUCTURE, FUNCTION AND CLINICAL SIGNIFICANCE

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Abstract

The connective-tissue framework of the female pelvis - collectively referred to as the endopelvic fascia - provides essential structural support for the bladder, uterus, vagina, and rectum, and plays a central role in maintaining urinary and fecal continence. Despite decades of anatomical and surgical study, the terminology used to describe these fascial structures remains inconsistent across the literature, complicating both teaching and clinical communication. This review summarizes the current understanding of pelvic fascial anatomy, with particular emphasis on the three-level support system described by DeLancey, the histological nature of the endopelvic fascia, and its relevance to conditions such as pelvic organ prolapse (POP) and stress urinary incontinence. The review also discusses ongoing controversies regarding fascial nomenclature and highlights areas where further anatomical clarification is needed to guide reconstructive pelvic surgery.

Keywords: endopelvic fascia, pelvic floor, DeLancey levels of support, pelvic organ prolapse, female pelvic anatomy

1. Introduction

The female pelvic floor is a complex, three-dimensional structure composed of bone, muscle, ligaments, nerves, and connective tissue, all working together to support the pelvic viscera and preserve normal urinary, fecal, and sexual function. Among these components, the fascial layers — often grouped under the general term *endopelvic fascia* — have attracted particular clinical interest because their weakening or disruption is directly implicated in pelvic organ prolapse and related dysfunctions.

Unlike fascia elsewhere in the body, the endopelvic fascia is not a single discrete sheet but rather a continuous fibromuscular network of collagen, elastin, and smooth muscle that envelops the pelvic organs and anchors them to the pelvic sidewall and bony pelvis [1].

Because this tissue cannot always be isolated as a distinct anatomical layer on gross dissection, its very existence and classification have been debated in the literature for more than fifty years [1,2].

The aim of this paper is to [1] summarize the current anatomical understanding of the pelvic fasciae in the female, [2] describe the clinically important three-level support system, and [3] discuss the clinical relevance of this anatomy for the diagnosis and surgical treatment of pelvic floor disorders.

2. Materials and Methods

This is a narrative literature review. Sources were identified through searches of PubMed/MEDLINE and Google Scholar using the terms endopelvic fascia, pelvic floor anatomy, DeLancey levels of support, pelvic organ prolapse, and fascial nomenclature. Classic anatomical atlases (Gray's Anatomy, Netter's Atlas of Human Anatomy) were used as supplementary reference sources for illustrations and terminology [3,4]. Articles published in English between 1990 and 2025 were prioritized, with emphasis on peer-reviewed anatomical, gynecological, and urogynecological journals.

3. Overview of Pelvic Support Anatomy

Pelvic organ support depends on the interaction of three structural components [5]:

Bony pelvis — the anchoring framework for the fascial and muscular attachments.

Pelvic floor musculature — primarily the levator ani muscle group, which forms the muscular "floor" of the pelvis.

Endopelvic fascia — the fibromuscular connective-tissue network connecting the viscera to the muscular and bony pelvis.

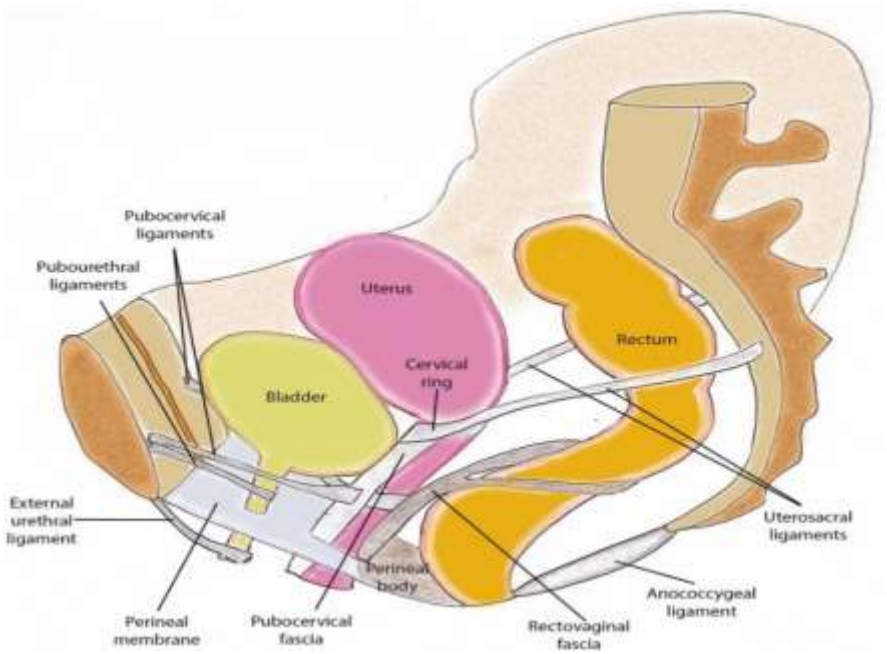


Figure 1. Schematic overview of the principal connective-tissue and ligamentous supports of the female pelvis, including the pubocervical and rectovaginal fasciae and uterosacral support. . Source: Reproduced from Salvador et al. [6], original Fig.3(CC BY 4.0).

Histologically, the endopelvic fascia is not composed of dense regular connective tissue in the way that fascia of the limbs is; it is largely smooth muscle, elastin, and collagen, which has led some authors to propose the more accurate term fibromuscular connective tissue rather than "fascia" in the strict histological sense [1,7].

3.1 The Three Support Axes

The pelvic support system can be conceptually divided into three axes:

The upper vertical axis — support of the uterus and vaginal apex.

The midhorizontal axis — support of the mid-vagina and bladder base.

The lower vertical axis — support of the distal vagina and urethra.

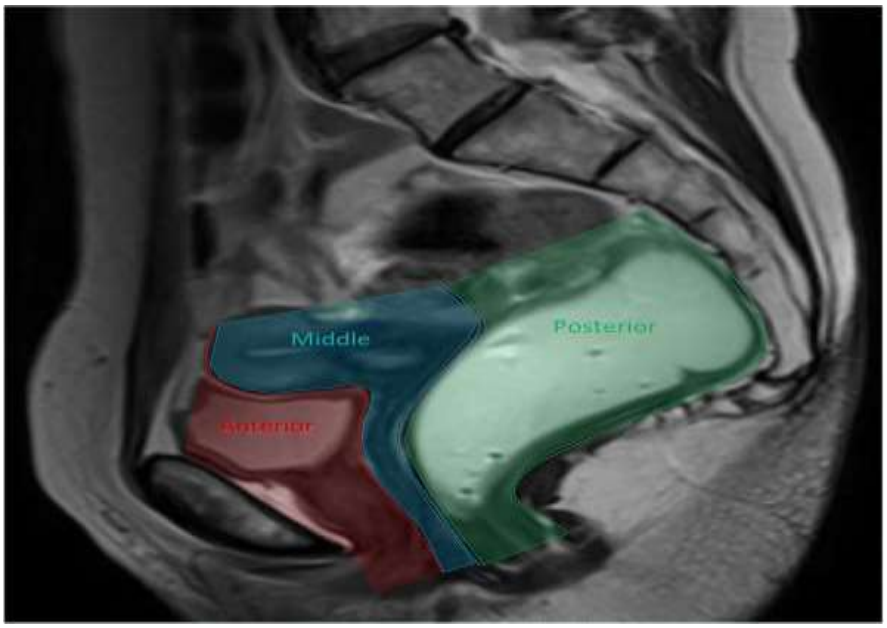


Figure 2. Mid-sagittal T2-weighted MR image illustrating the anterior, middle, and posterior pelvic compartments and their spatial relationships. Source: Reproduced from Salvador et al. [6], original Fig. 2 (CC BY 4.0).

3.2 DeLancey's Levels of Support

The most widely used clinical framework for understanding vaginal and pelvic organ support is the three-level model first described by John DeLancey [8]:

Level	Structures involved	Clinical correlate when damaged
Level I	Cardinal and uterosacral ligament complex; suspends the vaginal apex/cervix superiorly and posteriorly toward the sacrum	Apical/uterine prolapse, vaginal vault prolapse
Level II	Pubocervical fascia (anteriorly) and rectovaginal fascia (posteriorly); lateral attachment of the mid-vagina to the arcus tendineus fasciae pelvis	Anterior (cystocele) and posterior (rectocele) compartment prolapse
Level III	Fusion of the distal vagina with the urogenital diaphragm, perineal body, and levator ani	Urethral hypermobility, distal vaginal/perineal descent

Table 1. DeLancey's three levels of pelvic support and their clinical correlates

Damage to any one of these levels can produce a corresponding, clinically distinct pattern of pelvic organ prolapse, which is why this classification remains central to both diagnosis and surgical planning (e.g., sacrocolpopexy for Level I defects, anterior/posterior colporrhaphy for Level II defects) [8,9].

All three levels can be identified on static, resting T2-weighted MRI in standard orthogonal planes: Level I is best appreciated on coronal and axial images (cardinal and uterosacral ligaments), Level II on axial, coronal, and sagittal images (lateral vaginal wall adjacent to, but distinct from, the levator ani), and Level III by the loss of this normal separation between the vagina and levator ani [10].

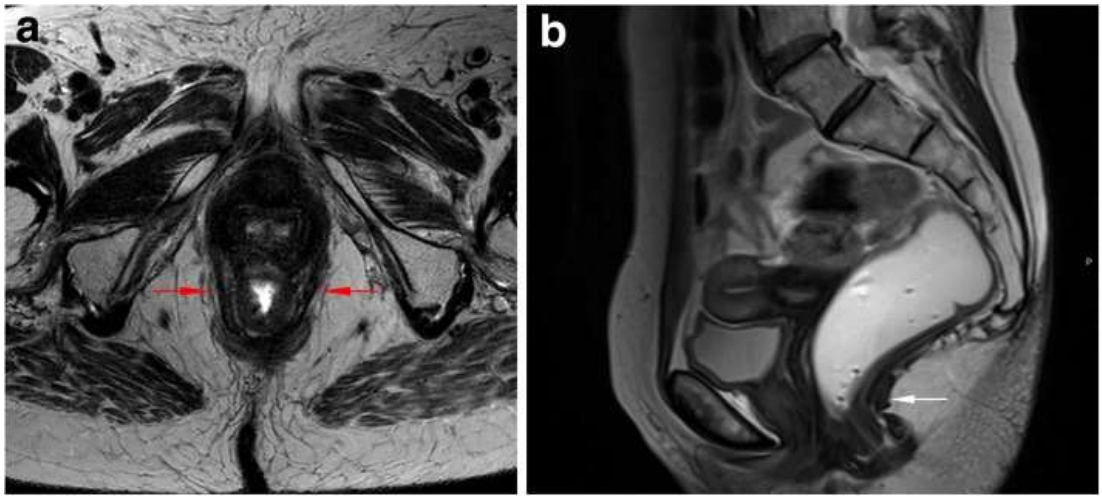


Figure 3. T2-weighted MR images in axial and sagittal planes demonstrating pelvic floor support anatomy; arrows indicate the relevant supporting structures. Source: Reproduced from Salvador et al. [6], original Fig. 6a–b (CC BY 4.0).

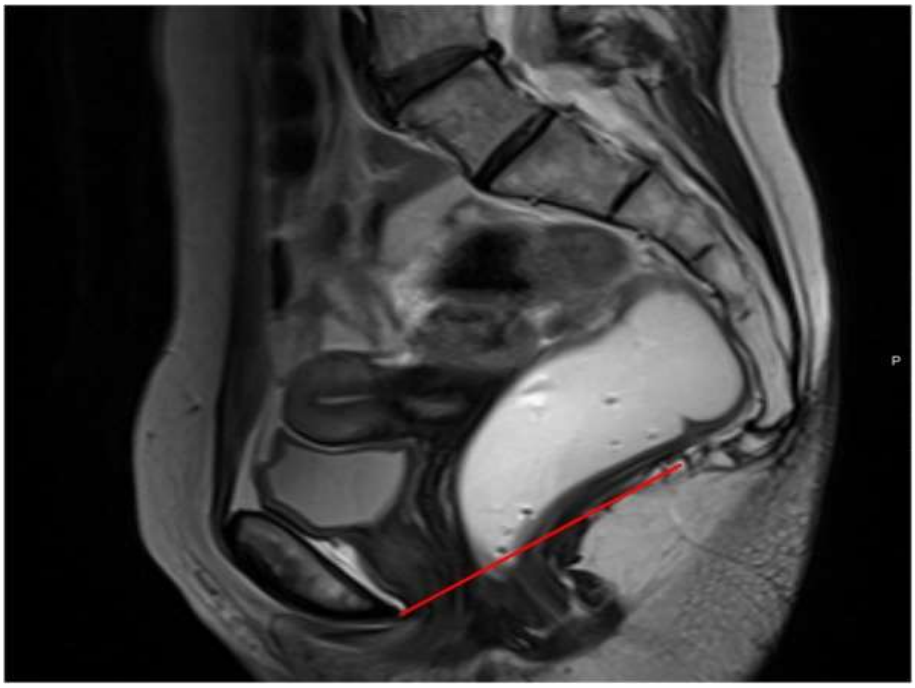


Figure 4. Mid-sagittal T2-weighted MR image demonstrating the pelvic floor reference line used for assessment of pelvic support. Source: Reproduced from Salvador et al. [6], original Fig. 5 (CC BY 4.0).

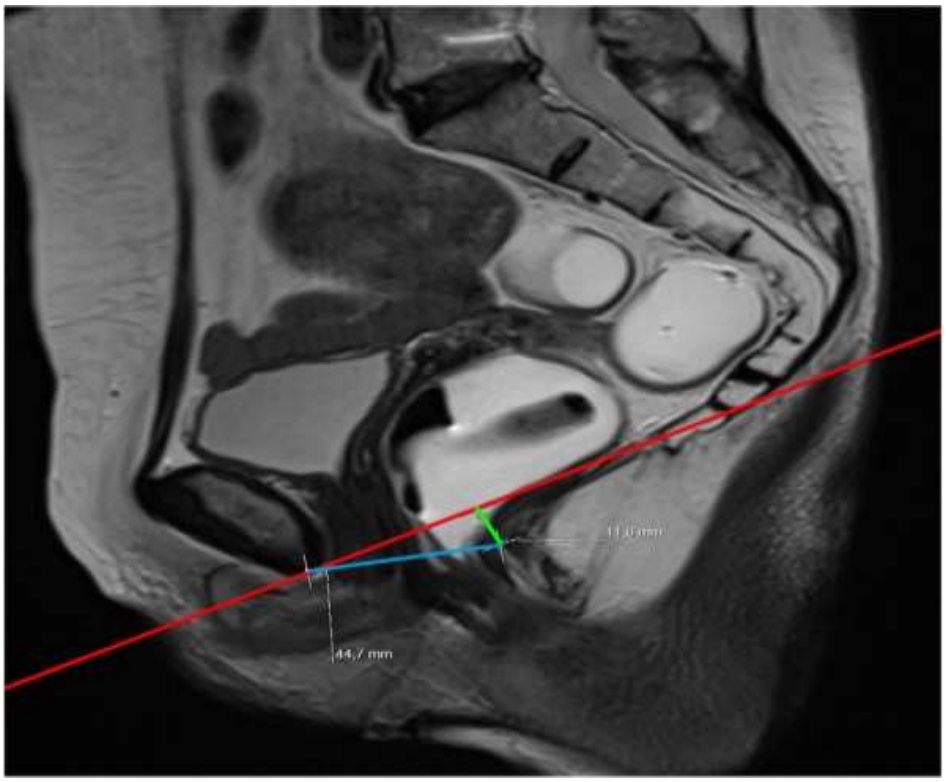


Figure 5. Sagittal T2-weighted MR image demonstrating measurement of pelvic organ position and pelvic floor descent relative to reference lines. Source: Reproduced from Salvador et al. [6], original Fig. 7 (CC BY 4.0).

4. Regional Fascial Structures

Pubocervical fascia — supports the bladder base; its attenuation is associated with anterior compartment (cystocele) prolapse [1,9].

Rectovaginal septum (Denonvilliers-equivalent fascia in the female) — separates the vagina from the rectum; defects contribute to rectocele [9].

Cardinal ligaments (transverse cervical ligaments) — lateral condensations of connective tissue carrying the uterine vessels, providing apical support [1,8].

Uterosacral ligaments — posterior condensations connecting the cervix/vaginal apex to the presacral fascia; key for apical suspension procedures [8].

Arcus tendineus fasciae pelvis (ATFP) — a linear condensation of the obturator internus fascia, serving as the lateral attachment line for the pubocervical fascia [2].

5. Clinical Significance

Understanding the fascial anatomy of the female pelvis is essential for several reasons:

Pelvic organ prolapse (POP) — the descent of the bladder, uterus, vaginal vault, or rectum is directly related to site-specific fascial defects. Accurate identification of the affected "level" guides the choice of surgical repair [8,9].

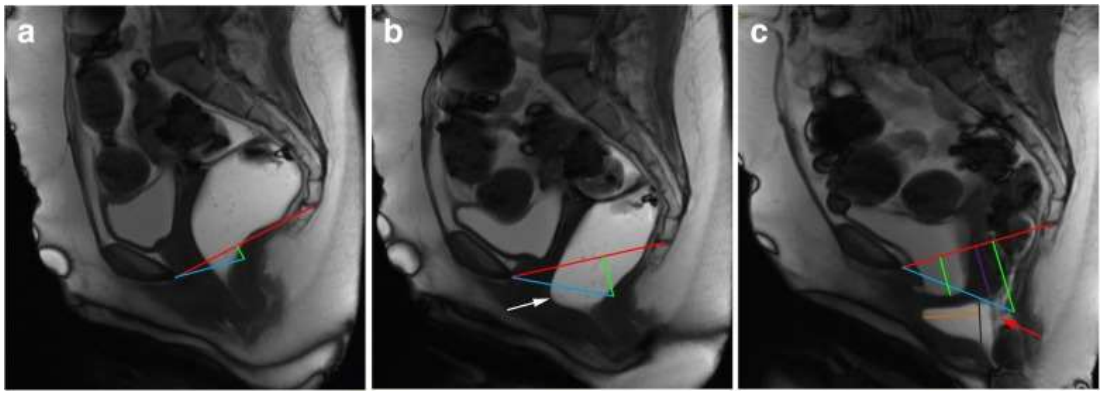


Figure 6. Serial sagittal MR images during dynamic pelvic floor assessment, illustrating changes in pelvic organ position and support with straining/evacuation. . Source: Reproduced from Salvador et al. [6], original Fig. 9(CC BY 4.0).

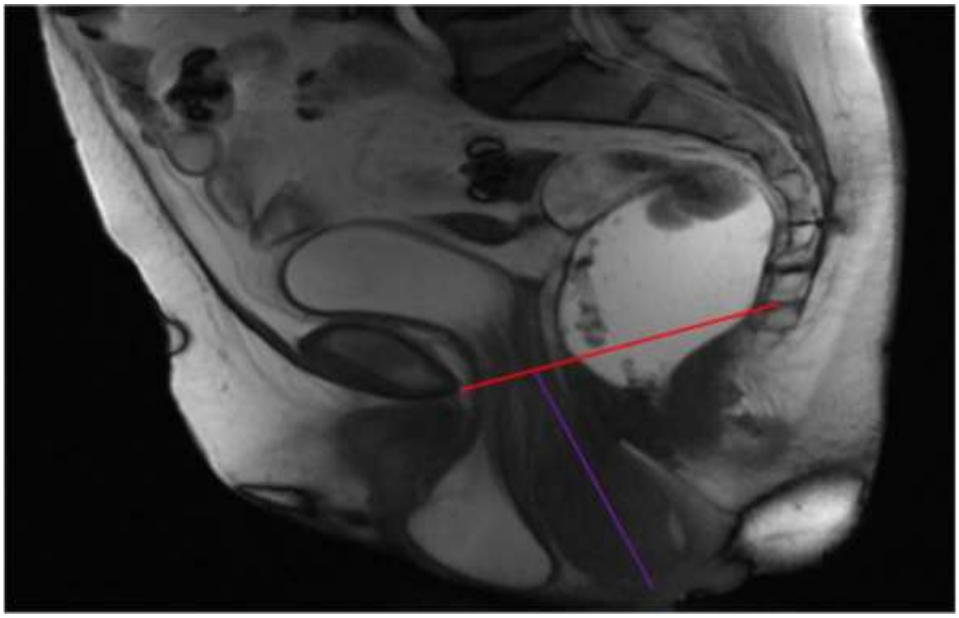


Figure 7. Sagittal T2-weighted MR image illustrating pelvic floor reference measurements used in the assessment of pelvic organ support. . Source: Reproduced from Salvador et al. [6], original Fig. 11(CC BY 4.0).

Stress urinary incontinence — loss of the normal fascial and ligamentous support of the urethra (Level III/pubourethral ligaments) contributes to urethral hypermobility [4].

Surgical anatomy — procedures such as sacrocolpopexy, uterosacral ligament suspension, and anterior/posterior repair are designed to restore specific fascial levels rather than simply "tightening" tissue [2,8].

Obstetric trauma — vaginal delivery can stretch or tear the endopelvic fascia and levator ani, predisposing to prolapse later in life [4,11].

6. Discussion: Controversies in Terminology

Despite its clinical importance, the terminology surrounding pelvic fascia remains inconsistent. Dissection-based comparative studies have shown that the official anatomical nomenclature (Terminologia Anatomica) does not adequately capture the structures that are clinically relevant to pelvic surgeons, and that many commonly used clinical terms (e.g., "pubocervical fascia," "rectovaginal fascia") do not correspond precisely to any discrete, dissectible layer [1]. Some anatomists have questioned whether the endopelvic "fascia" should be classified as true fascia at all, given its largely smooth-muscle and elastin composition, favoring the term *fibromuscular connective tissue* instead [1,2].

More broadly, this reflects a wider problem in fascia research: international efforts, such as those by the Fascia Research Society's Fascia Nomenclature Committee, have attempted to standardize the definition of "fascia" and "the fascial system" across the body, but pelvic-specific consensus is still incomplete [7]. This lack of standardized terminology has practical consequences, contributing to confusion in surgical reporting and making cross-study comparison of outcomes more difficult [1,7].

7. Conclusion

The fasciae of the female pelvis form a continuous fibromuscular support system that is fundamental to the normal position and function of the pelvic organs. DeLancey's three-level model remains the most clinically useful framework for understanding site-specific pelvic organ support and guiding surgical correction of prolapse. However, persistent inconsistencies in fascial terminology highlight the need for continued anatomical research and international consensus, which would benefit both anatomical education and clinical/surgical practice in gynecology and urogynecology.

Imaging figures. Figures 2–5 are attributed to Salvador et al. [6] under the Creative Commons Attribution 4.0 license (https://creativecommons.org/licenses/by/4.0/).

References

1. Fritsch H, et al. Terminologia Anatomica versus unofficial descriptions and nomenclature of the fasciae and ligaments of the female pelvis: a dissection-based comparative study. Am J Obstet Gynecol. 2005;193(4):1565-1573.
2. Raychaudhuri B, Cahill D. Pelvic Fasciae in Urology. Ann R Coll Surg Engl. 2008;90(8):633-637.
3. Netter FH. Atlas of Human Anatomy. Philadelphia: Elsevier.
4. Standring S, ed. Gray's Anatomy: The Anatomical Basis of Clinical Practice. Elsevier.
5. Thomas J. Pelvic-support defects: a guide to anatomy and physiology. OBG Management (mdedge.com clinical review).
6. Salvador JC, Coutinho MP, Venâncio JM, Viamonte B. Dynamic magnetic resonance imaging of the female pelvic floor—a pictorial review. Insights Imaging. 2019;10:4. doi:10.1186/s13244-019-0687-9. Figures 2, 5, 6 and 7 of the source article reproduced here as Figures 2, 4, 3 and 5, respectively. Licensed under CC BY 4.0.
7. Stecco C, Schleip R, et al. Fascial nomenclature: Update on related consensus process. Clin Anat. 2019;32(7):929-933.
8. DeLancey JO. Anatomic aspects of vaginal eversion after hysterectomy. Am J Obstet Gynecol. 1992;166(6 Pt 1):1717-1728.
9. Miklos JR, Moore RD. Anatomy of pelvic support. Curr Opin Obstet Gynecol. 2002;14(4):387-395.
10. Hübner M, DeLancey JO. Levels of pelvic floor support; what do they look like on Magnetic Resonance Imaging? Geburtshilfe Frauenheilkd. 2018;78(10):117-118.
11. Kelović B, Kelović B, Lesko Kelović V, Maurac Pašalić I, Pavić M. Anatomical Basis of Pelvic Floor Defects. Southeastern European Medical Journal. 2025;9(S2):40-59.