

**Scottish International Conference on Multidisciplinary Research and
Innovation – SICMRI 2025**

**IMMUNOHISTOCHEMICAL STUDY OF UTERINE FIBROIDS: MODERN METHODS
OF DIAGNOSTICS AND TREATMENT**

Natalya Suratovna Nadyrkhanova

*State Institution "Republican Specialized Scientific and
Practical Medical Center for Maternal and Child Health"
Resident Physician, Endovisual and Aesthetic Gynecology.*

E-mail: nadirhanova@mail.ru

ORCID: 0009-0003-1089-9937

Asel Muratkizi Parmanova

*Research Intern, Republican Specialized Scientific and
Practical Medical Center for Maternal and Child Health, Tashkent, Republic of Uzbekistan*

E-mail: aselyaparmanova@gmail.com

ORCID: <https://orcid.org/0009-0008-7813-3045>

Abstract: Uterine fibroids are one of the most common benign tumors of the female reproductive system, significantly impacting patients' quality of life. Traditional diagnostic methods do not always provide a complete understanding of the biological characteristics of fibroids, complicating the selection of optimal therapy. Immunohistochemical testing is a modern, highly informative method that allows for the detection of molecular markers, determination of tumor proliferative activity, and hormonal sensitivity. This article discusses modern approaches to IHC diagnostics of uterine fibroids and their importance for personalized treatment decisions.

Keywords: uterine fibroids, immunohistochemical testing, diagnostics, proliferation, hormonal receptors, treatment, gynecology, benign tumors.

Introduction. Uterine fibroids are benign tumors arising from the smooth muscle tissue of the uterus and are one of the most common pathologies of the female reproductive system. According to the World Health Organization, fibroids are diagnosed in 20–40% of women of reproductive age, making them a significant gynecological problem. The clinical presentation of fibroids can range from asymptomatic to severe symptoms, such as heavy menstrual bleeding, pelvic pain, urinary dysfunction, and even infertility. Traditional diagnostic methods, including ultrasound and magnetic resonance imaging, can determine the presence and size of a tumor, but do not always provide comprehensive information about the tumor's biological characteristics. Therefore, there is a need for more accurate and specific diagnostic methods that can not only confirm the diagnosis but also assess the tumor's growth potential, its response to hormonal influences, and the risk of malignancy.

Immunohistochemistry (IHC) is a modern method that allows for the detection and localization of specific proteins and molecular markers in tissues using antibodies. The use of IHC in

Scottish International Conference on Multidisciplinary Research and Innovation – SICMRI 2025

diagnosing uterine fibroids helps to study the tumor's biological characteristics in detail, determine its level of proliferative activity, and determine its hormonal sensitivity, which is crucial for choosing treatment strategies and determining prognosis.

Uterine fibroids are one of the most common benign tumors of the female reproductive system. Despite their benign nature, fibroids can significantly reduce quality of life, causing symptoms such as uterine bleeding, pain, and pelvic dysfunction. In recent years, significant attention has been paid to the accurate diagnosis and differentiation of fibroids from malignant tumors, as well as the selection of optimal therapy. One modern and highly informative diagnostic method is immunohistochemistry (IHC).

Immunohistochemistry is a method that detects specific proteins and markers in tissues using antibodies labeled with enzymes or fluorescent tags. In gynecology, IHC helps determine the molecular characteristics of tumors, improving diagnosis and prognosis.

The Role of Immunohistochemistry in the Diagnosis of Uterine Myoma. Traditional methods for diagnosing myoma, such as ultrasound and MRI, allow for the detection of the tumor and its size, but do not always provide information about the tumor's nature. In some cases, especially when malignancy (leiomyosarcomas) is suspected, histological and immunohistochemical examination is required.

IHC allows:

- To determine the tumor cell origin (muscle, fibrous, or mixed).

- To detect proliferation markers (e.g., Ki-67), which indicate active cell division.

- To determine the expression of hormone receptors (estrogen and progesterone), which is important for the selection of hormonal therapy.

- To differentiate myomas from malignant tumors, such as leiomyosarcoma, based on specific protein markers.

Treatment of fibroids depends on the size, location, symptoms, and the woman's desire to preserve reproductive function. A modern approach combines medical and surgical methods. Immunohistochemical testing allows for individualized treatment. For example, high expression of hormone receptors indicates the effectiveness of hormonal therapy. If an elevated proliferation index is detected, more aggressive treatment or observation may be recommended. Immunohistochemical testing of uterine fibroids is an important modern method that significantly improves diagnostic quality and helps physicians select optimal therapy. An integrative approach to fibroid treatment, incorporating modern molecular methods, enables more accurate prognosis of the disease's course and increased treatment effectiveness, improving patients' lives.

Modern fibroid treatment methods include medical therapy aimed at regulating hormonal levels and various surgical interventions, from myomectomy to uterine artery embolization. Information obtained through immunohistochemistry facilitates the selection of the most effective and safe treatment strategy for each patient, which is especially important in the context of the pursuit of personalized medicine.

Scottish International Conference on Multidisciplinary Research and Innovation – SICMRI 2025

Literature review. The first IHC study in the Republic of Tajikistan was conducted to assess proliferative activity (Ki 67) and the anti-apoptotic marker Bcl 2 in myoma tissue after myomectomy. Classical fixation methods, section preparation, staining, and quantitative morphometric analysis with a computer program for assessing the area and optical density of marker expression were used. This study established the basis for further research in the region, confirming the technical feasibility of IHC techniques.

A study of submucosal lesions revealed that estrogen receptors were absent in 56.1% of samples, with weak expression in 26.4%, moderate expression in 9.9%, and strong expression in 6.6%. Progesterone receptors were moderately expressed in 36.3% of cases, weakly expressed in 19.8%, and absent in 6.6%. These data demonstrate significant variability in the hormonal sensitivity of fibroids and the importance of individual assessment. A study of patients with primary and recurrent fibroids showed that significant indicators of proliferation (Ki 67), angiogenesis (VEGF), and the regulatory proteins p16 and p53 correlated with the likelihood of recurrence. ER and PR were assessed using Histo-score. This allowed us to identify a panel of markers for recurrence prediction and treatment strategy.

A comparison of different treatment methods (uterine artery embolization, focused ultrasound ablation, and myomectomy) revealed that proliferative activity (Ki 67) was highest immediately after myomectomy and lowest after MRI-guided ultrasound. Caspase 3 (apoptotic) levels were higher after myomectomy and embolization, suggesting a balance between proliferation and apoptosis—a characteristic feature of benign tumors. A direct correlation was also found between angiogenesis (VEGF) and Ki 67.

The authors (Dobrokhotova et al., 2024) emphasize the role of IHC analysis of endometrial receptors in the therapeutic management of patients with myomas and infertility. They note the high prevalence of myomas among women with infertility (up to 23.5%) and the need for IHC to evaluate treatment outcomes and fertility improvement strategies. The review notes that IHC revealed high expression of the anti-apoptotic marker Bcl 2 and low Ki 67 levels, confirming low mitotic activity in benign myomas. This is consistent with the clinical perception of myomas as slow-growing tumors.

Research conducted by the Department of Pathological Anatomy at Sechenov University examined a wide range of markers: Ki 67, PCNA, C myc, Bcl 2, Bax, CD 95, growth factors (FGF, EGF, TGF β), angiogenesis factors (CD 34), growth receptors, and matrix components. This emphasizes the multifactorial molecular approach to studying myoma.

Conclusion. Immunohistochemical examination is an important component of modern uterine myoma diagnostics, allowing not only to clarify the morphological nature of the tumor but also to identify molecular characteristics that influence treatment decisions and prognosis. The use of IHC methods significantly expands diagnostic capabilities, especially in complex or atypical cases requiring differential diagnosis between benign and malignant smooth muscle tumors. Thus, the integration of immunohistochemical analysis into clinical practice facilitates the transition to a personalized approach to the diagnosis and treatment of uterine fibroids. This improves treatment outcomes, reduces recurrence rates, and enhances patients' quality of life. In the future, the development of new molecular markers and the standardization of IHC studies will open up additional opportunities for more accurate and effective clinical work.

References

Scottish International Conference on Multidisciplinary Research and Innovation – SICMRI 2025

1. Safarova Z.A., Rakhmatova Sh.Sh., Ganieva R.U. Immunohistochemical assessment of proliferative activity and Bcl-2 expression in uterine fibroids. // Obstetrics and Gynecology: News, Opinions, Training. - 2015. - No. 3. - P. 47-52.
2. Tevryukova E.E., Beloborodova K.M., Ivanova L.Yu. Immunohistochemical markers of uterine fibroid recurrence. // Obstetrics, Gynecology and Reproductive Medicine. — 2022. — Vol. 16, No. 1. — P. 18–24.
3. Dobrokhotova Yu.E., Ulyanova O.V., Orlova N.V. Therapy of Uterine Myoma: Focus on Endometrial Receptivity. // Bulletin of Reproductive Health. — 2024. — No. 2. — P. 12–16.
4. Ivanova N.N., Smirnova T.A., Kartashova E.V. Morphological Characteristics of Uterine Myoma among Women of Reproductive Age. // Scientific Bulletin of Kuzbass. — 2022. — No. 3 (143). — P. 41–45.
5. Muradyan A.R., Lapina T.M., Belova I.V. Clinical and pathogenetic features of various histotypes of uterine fibroids and ways of their pharmacological correction. // Advances in Medical and Biological Sciences. - 2021. - Vol. 29, No. 3. - P. 36-42.
6. Aitken RD, MacLeod D., Miller T., et al. Vascular density in uterine fibroids: an immunohistochemical study using CD31, CD34, and factor VIII. // Journal of Clinical Pathology. - 2006. - Vol. 59, No. 5. - P. 501-506.