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HORMONAL AND METABOLIC FACTORS IN THE DEVELOPMENT OF UTERINE FIBROIDS

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ABSTRACT

Uterine fibroids (leiomyomas) are the most common benign tumors of the female reproductive system, affecting up to 70–80% of women during their lifetime. Although their exact etiology remains unclear, increasing evidence highlights the critical role of hormonal and metabolic factors in their development and progression. Estrogen and progesterone are key drivers of fibroid growth, while metabolic disturbances such as obesity, insulin resistance, and chronic inflammation further exacerbate the condition. This article aims to explore the interplay between hormonal and metabolic factors in the pathogenesis of uterine fibroids, based on current clinical and experimental data. Understanding these mechanisms is essential for improving prevention and treatment strategies.

Keywords: uterine fibroids, leiomyoma, estrogen, progesterone, insulin resistance, obesity, metabolism

INTRODUCTION

Uterine fibroids, also known as Uterine Fibroids, are benign smooth muscle tumors of the uterus that commonly occur in women of reproductive age. According to the World Health Organization, fibroids represent one of the leading causes of gynecological morbidity worldwide.

Fibroids are estrogen- and progesterone-dependent tumors. Their growth is influenced by endocrine and metabolic factors, making them a complex condition involving both hormonal regulation and systemic metabolic health.

Risk factors include:

- Early menarche
- Obesity
- Nulliparity
- Genetic predisposition

This article examines how hormonal and metabolic factors contribute to the initiation and growth of uterine fibroids.

MATERIALS AND METHODS

This study is a narrative review of scientific literature from PubMed, Scopus, and Web of Science.

Inclusion Criteria:

- Studies published between 2010 and 2024
- Women diagnosed with uterine fibroids
- Studies addressing hormonal and metabolic mechanisms

Diagnostic Methods:

- Ultrasound imaging
- MRI (in complex cases)

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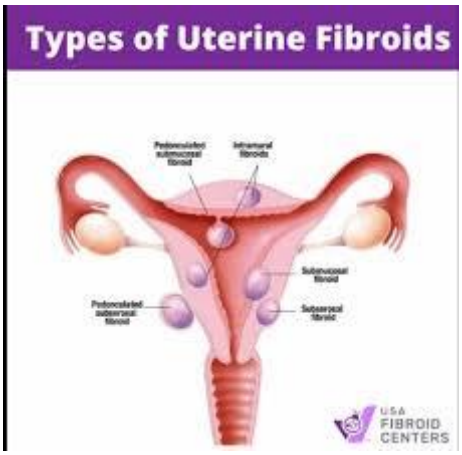
- Histopathological confirmation

RESULTS

1. Epidemiology of Uterine Fibroids

Uterine fibroids affect:

- Up to 70–80% of women by age 50
- Higher prevalence in obese and African-descendant populations



2. Hormonal Factors in Fibroid Development

a. Estrogen

Estrogen promotes fibroid growth by:

- Stimulating smooth muscle cell proliferation
- Increasing extracellular matrix production
- Enhancing growth factor expression

Fibroids contain a higher density of estrogen receptors compared to normal myometrium.

b. Progesterone

Progesterone plays a crucial role by:

- Promoting cell proliferation
- Inhibiting apoptosis
- Enhancing fibrotic tissue formation

Recent studies suggest that progesterone may be even more important than estrogen in fibroid growth.

3. Metabolic Factors in Fibroid Development

a. Obesity

Obesity increases estrogen production via aromatization in adipose tissue, leading to hormonal imbalance.

b. Insulin Resistance

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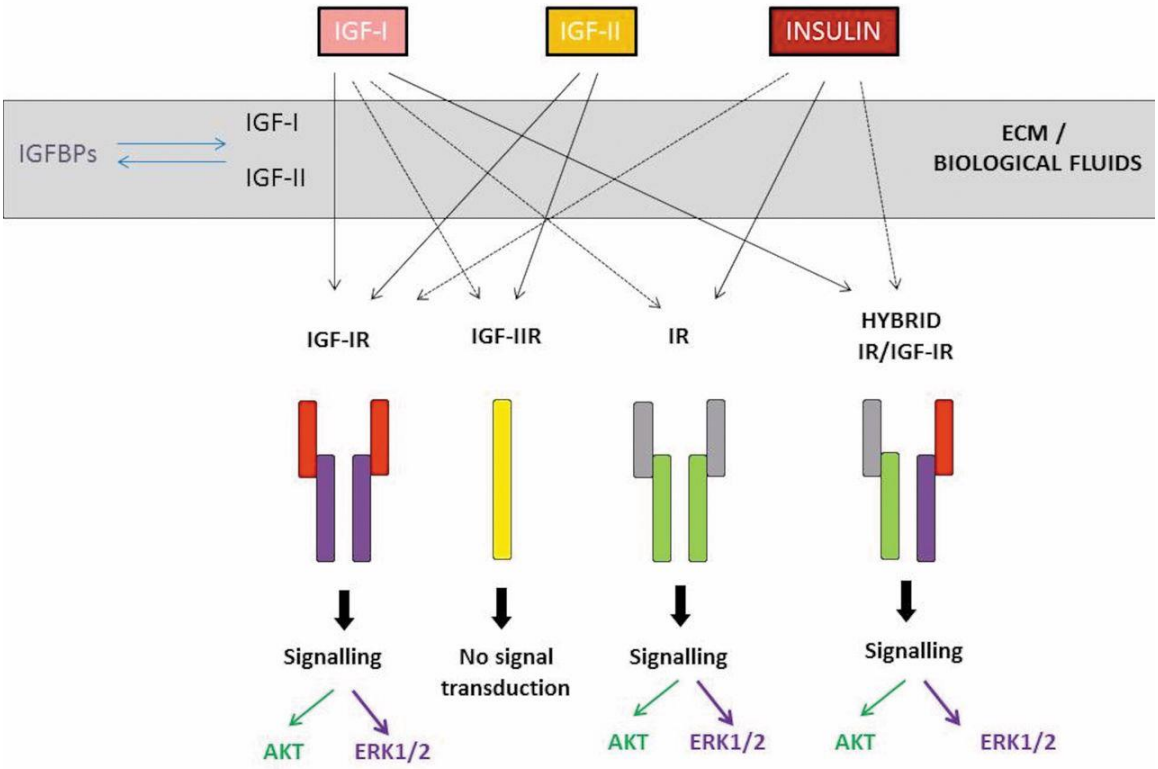
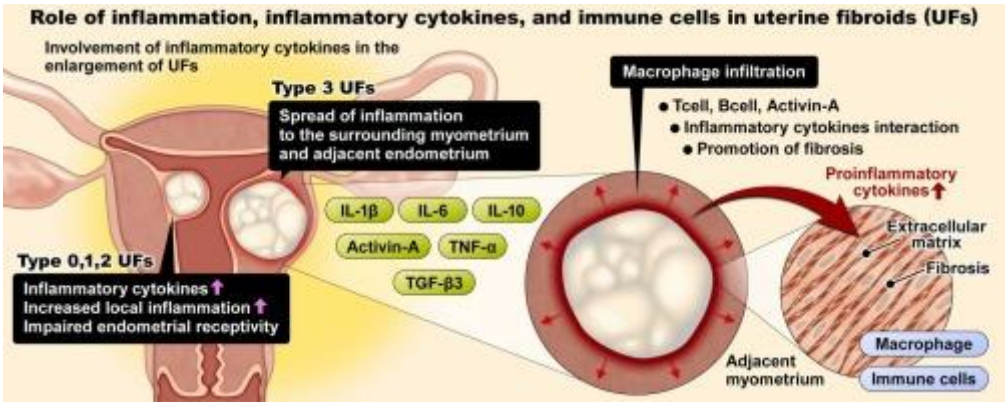
Insulin resistance contributes to fibroid growth through:

- Hyperinsulinemia
- Activation of insulin-like growth factors (IGFs)
- Increased cell proliferation

c. Chronic Inflammation

Adipose tissue secretes inflammatory cytokines (e.g., TNF-α, IL-6), which promote fibroid growth.





4. Pathophysiological Interactions

The interaction between hormonal and metabolic factors is complex:

- Obesity → increased estrogen → fibroid growth
- Insulin resistance → IGF activation → smooth muscle proliferation
- Inflammation → tissue remodeling → tumor expansion

5. Clinical Manifestations

Common symptoms include:

- Heavy menstrual bleeding

- Pelvic pain and pressure
- Infertility
- Enlarged uterus

Complications:

- Anemia
- Pregnancy complications
- Reduced quality of life

DISCUSSION

The development of uterine fibroids is strongly influenced by both hormonal and metabolic factors. Estrogen and progesterone act as primary growth drivers, while metabolic abnormalities amplify their effects.

Diagnostic Approach:

- Pelvic ultrasound
- MRI for detailed evaluation
- Hormonal profile assessment

Management Strategies:

- Hormonal therapy (GnRH agonists, progestins)
- Non-hormonal therapy (NSAIDs, tranexamic acid)
- Surgical options (myomectomy, hysterectomy)

Targeting metabolic factors such as obesity and insulin resistance may improve treatment outcomes.

CONCLUSION

Uterine fibroids are hormonally responsive tumors whose development is significantly influenced by metabolic factors. The interaction between estrogen, progesterone, insulin resistance, and inflammation plays a central role in their pathogenesis. A comprehensive approach addressing both hormonal and metabolic aspects is essential for effective management.

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