

Discussion on the Value of Six-item Detection of Sex Hormones by Chemiluminescence Immunoassay in the Diagnosis and Treatment of Gynecological Endocrine Diseases

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Abstract: *Objective:* To explore the value of using chemiluminescence immunoassay to detect six sex hormones in the diagnosis and treatment of gynecological endocrine diseases, and to compare it with the indicators of healthy women. *Methods:* 50 patients with gynecological endocrine diseases admitted to our hospital from January 2022 to December 2023 were selected as the disease group, and 50 healthy women who underwent physical examinations in our hospital during the same period were selected as the healthy group. Chemiluminescence immunoassay was used to detect six sex hormones (follicle-stimulating hormone, luteinizing hormone, estradiol, progesterone, testosterone, and prolactin) in the two groups of research subjects, and the test results of the two groups were compared. *Results:* The levels of follicle-stimulating hormone, luteinizing hormone, testosterone and prolactin in the disease group were higher than those in the healthy group, while the levels of estradiol and progesterone were lower than those in the healthy group, and the differences were statistically significant ($P < 0.05$). *Conclusion:* The detection of six sex hormones by chemiluminescent immunoassay is of great value in the diagnosis and treatment of gynecological endocrine diseases. By comparing with the indicators of healthy women, it can provide a reliable basis for the diagnosis and treatment of diseases.

Keywords: Chemiluminescence immunoassay; Six items of sex hormones; Gynecological endocrine diseases; Healthy women; Diagnostic and therapeutic value

Online publication: December 26, 2025

1. Introduction

Gynecological endocrine diseases are very common among women, including polycystic ovary syndrome, premature ovarian failure, and dysfunctional uterine bleeding. They can damage women's health and affect fertility^[1]. Sex hormones have a great role in regulating female growth, development and reproductive functions, and abnormal levels are closely related to gynecological endocrine diseases. Chemiluminescence immunoassay has high sensitivity and specificity, and is widely used in hormone detection. Nowadays, women's life pressure is increasing, environmental factors have become complex, and the incidence of gynecological endocrine diseases is increasing every year, causing troubles for many women's lives. Early and accurate diagnosis and timely treatment are key to improving the prognosis of patients with

such diseases, and finding a reliable detection method is an important prerequisite for achieving this goal. Some previous detection methods were either insufficiently sensitive or cumbersome to operate, making it difficult to meet clinical needs. The emergence of chemiluminescence immunoassay provides the possibility to solve these problems, and it can accurately detect subtle changes in sex hormones. Based on these circumstances, this study used chemiluminescence immunoassay to detect six sex hormones in patients with gynecological endocrine diseases and healthy women. 50 patients with gynecological endocrine diseases admitted to our hospital from January 2022 to December 2023 were selected as the disease group. At the same time, 50 healthy women who underwent physical examinations in our hospital during the same period were selected as the healthy group. The results were compared and analyzed to clarify the value of this method in the diagnosis and treatment of gynecological endocrine diseases and provide some clinical reference.

2. Materials and methods

2.1. General information

Fifty patients with gynecological endocrine diseases admitted to our hospital from January 2022 to December 2023 were selected as the disease group, and 50 healthy women who underwent physical examinations in our hospital during the same period were selected as the healthy group. The age of the disease group was 22–55 years old, with an average age of (35.26 ± 6.38) years old; the age of the healthy group was 21–56 years old, with an average age of (34.89 ± 5.97) years old. Comparing the general data of the two groups, the difference was not statistically significant ($P > 0.05$) and was comparable. Inclusion criteria: (1) The disease group met the diagnostic criteria for gynecological endocrine diseases; (2) The healthy group had no gynecological diseases and endocrine-related diseases; (3) All research subjects gave informed consent. Exclusion criteria: (1) People with severe liver and kidney dysfunction; (2) People who have recently used drugs that affect sex hormone levels; (3) Women who are pregnant or lactating.

2.2. Method

Both groups of research subjects drew 3 ml of venous blood in the early morning on an empty stomach. After centrifuging the serum, chemiluminescence immunoassay was used to detect six sex hormones, including follicle-stimulating hormone, luteinizing hormone, estradiol, progesterone, testosterone, and prolactin. The detection instrument is the Abbott i2000 chemiluminescent immunoanalyzer, and the reagents match the original reagents. The operation should be strictly carried out in accordance with the instructions of the instrument and reagents.

2.3. Observation indicators

The levels of six sex hormones (follicle-stimulating hormone, luteinizing hormone, estradiol, progesterone, testosterone, and prolactin) of the two groups of research subjects were compared.

2.4. Statistical methods

Data were analyzed using SPSS24.0. t-test for measurement data; χ^2 test for count data. $P < 0.05$ represents a significant difference.

3. Results

3.1. Comparison of follicle-stimulating hormone and luteinizing hormone levels between the two groups

The levels of follicle-stimulating hormone and luteinizing hormone in the disease group were higher than those in the healthy group ($P < 0.05$) (Table 1).

Table 1. Comparison of follicle-stimulating hormone and luteinizing hormone levels between the two groups (mean \pm SD, mIU/mL)

Group	Follicle-stimulating hormone	Luteinizing hormone
Healthy group (50)	6.23 \pm 1.56	5.89 \pm 1.42
Disease group (50)	12.56 \pm 3.21	10.32 \pm 2.87
<i>t</i>	12.541	9.783
<i>P</i>	0.000	0.000

3.2. Comparison of estradiol and progesterone levels between the two groups

The levels of estradiol and progesterone in the disease group were lower than those in the healthy group ($P < 0.05$) (**Table 2**).

Table 2. Comparison of estradiol and progesterone levels between the two groups (mean \pm SD, estradiol: pg/mL; progesterone: ng/mL)

Group	Estradiol (pg/mL)	Progesterone (ng/mL)
Healthy group (50)	156.32 \pm 32.45	8.23 \pm 2.15
Disease group (50)	89.65 \pm 25.32	3.56 \pm 1.23
<i>t</i>	11.454	13.332
<i>P</i>	0.000	0.000

3.3. Comparison of testosterone and prolactin levels between the two groups

The testosterone and prolactin levels in the disease group were higher than those in the healthy group ($P < 0.05$) (**Table 3**).

Table 3. Comparison of testosterone and prolactin levels between the two groups (mean \pm SD)

Group	Testosterone (ng/dL)	Prolactin (ng/mL)
Healthy group (50)	45.23 \pm 8.65	15.67 \pm 4.23
Disease group (50)	78.56 \pm 12.34	32.45 \pm 7.89
<i>t</i>	15.639	13.254
<i>P</i>	0.000	0.000

3. Discussions

The occurrence and development of gynecological endocrine diseases are closely related to sex hormone level disorders, so accurate detection of sex hormone levels is very important for disease diagnosis, treatment and prognosis assessment. As an advanced detection technology, chemiluminescence immunoassay combines the high sensitivity of chemiluminescence and the high specificity of immunoassay, and can quickly and accurately detect trace amounts of sex hormones in the body, thereby providing strong technical support for the diagnosis and treatment of gynecological endocrine diseases.

Judging from the results of this study, the follicle-stimulating hormone level in the disease group was significantly higher than that in the healthy group. The main function of follicle-stimulating hormone is to promote the development and maturation of follicles. In diseases such as ovarian hypofunction, because the ovary is less sensitive to follicle-stimulating hormone, the body will secrete more follicle-stimulating hormone to promote follicle development, resulting

in an increase in its level. For example, in patients with premature ovarian failure, the number and quality of follicles in the ovaries are reduced, which will cause the level of follicle-stimulating hormone to rise significantly. This is also one of the important indicators for the clinical diagnosis of premature ovarian failure. Detecting follicle-stimulating hormone through chemiluminescence immunoassay can promptly detect abnormal changes in its levels, providing a reliable basis for the diagnosis of ovarian function-related diseases. For some patients with ovarian hypofunction who have no obvious early symptoms, this detection method can detect the problem earlier, allowing the patient to receive treatment in time and delay the progression of the disease. The level of luteinizing hormone in the disease group was also higher than that in the healthy group. Luteinizing hormone plays a key role in ovulation and can promote the formation of the corpus luteum and the secretion of progesterone. In patients with polycystic ovary syndrome, elevated luteinizing hormone levels are common, which is related to dysregulation of the hypothalamic-pituitary-ovarian axis. Excessive luteinizing hormone levels will affect the normal development of follicles and ovulation, leading to irregular menstruation and infertility in patients. Accurate detection of luteinizing hormone levels with the help of chemiluminescence immunoassay can help diagnose and evaluate diseases such as polycystic ovary syndrome. It can also provide a reference for the formulation of subsequent treatment plans, such as regulating luteinizing hormone levels with drugs to restore normal ovulation function in patients. In clinical practice, many patients with polycystic ovary syndrome are troubled by abnormal ovulation. With accurate luteinizing hormone test results, doctors can use medications more targeted to improve treatment effects.

Estradiol is the main estrogen and plays an important role in the development and maintenance of female reproductive organs. In this study, the estradiol level in the disease group was lower than that in the healthy group, which is common in diseases such as ovarian hypofunction and menopausal syndrome. Reduced estradiol levels can lead to thinning of the endometrium, menstrual disorders, and, in severe cases, affect fertility. Using chemiluminescence immunoassay to detect estradiol levels can clearly reflect the estrogen status in the body, which is of great significance for judging ovarian function and assessing the health status of menopausal women. During treatment, the dose of estrogen supplementation therapy can also be adjusted by monitoring estradiol levels to achieve the best effect. For menopausal women, appropriate estrogen supplementation is very important, not only to relieve uncomfortable symptoms but also to avoid overdosing, and accurate estradiol detection is an important basis for adjusting the dosage.

Progesterone is mainly secreted by the corpus luteum, and its level is closely related to the function of the corpus luteum. The progesterone level in the disease group was lower than that in the healthy group, suggesting that the luteal function may be insufficient. Insufficient luteal function will affect the implantation of the fertilized egg and maintenance of pregnancy, and can easily lead to miscarriage, shortened menstrual cycle, etc. ^[2] Detecting progesterone levels by chemiluminescence immunoassay can promptly detect abnormal luteal function and provide assistance in the diagnosis and treatment of infertility, habitual abortion, and other diseases. In clinical treatment, doctors can timely supplement progesterone based on progesterone level testing results to improve pregnancy success rates and reduce miscarriage. Many patients with habitual miscarriage have insufficient luteal corpus function. After timely supplementation of progesterone, the pregnancy success rate is significantly improved. Although testosterone is an androgen, it is also present in women's bodies to a certain extent. Excessive levels can have adverse effects on women's reproductive functions and appearance. Testosterone levels in the disease group in this study were higher than those in the healthy group, which is common in patients with polycystic ovary syndrome. Excessive testosterone can inhibit ovulation, leading to irregular menstruation, hirsutism, acne, etc. Chemiluminescence immunoassay can accurately detect subtle changes in testosterone levels, which is important for the diagnosis and monitoring of polycystic ovary syndrome. During treatment, the therapeutic effect can be evaluated by monitoring testosterone levels, such as using anti-androgens to see if testosterone levels decrease, and then adjusting the treatment plan. For polycystic ovary syndrome patients with symptoms such as hirsutism and acne, reducing testosterone levels can effectively improve these external manifestations and improve the patient's quality of life. The main function of prolactin is to promote mammary gland development and milk secretion. Increased levels of prolactin will inhibit gonadal axis function, leading to menstrual disorders, amenorrhea, infertility, etc. ^[3] The prolactin level in the disease group was higher than that in the healthy group, which may be related to pituitary microadenoma, drug

effects, etc. The chemiluminescent immunoassay method has high sensitivity for detecting prolactin and can promptly detect abnormalities in its levels, providing a basis for the diagnosis of prolactinoma and other diseases. For gynecological endocrine diseases caused by excessive prolactin levels, the treatment effect can be evaluated by detecting prolactin levels. For example, after using drugs such as bromocriptine, it is necessary to see whether prolactin returns to normal to determine whether the treatment is effective. Some patients experience amenorrhea due to excessive prolactin. After drug treatment, as prolactin levels decrease, menstruation can gradually return to normal.

The chemiluminescent immunoassay method has many advantages in detecting six sex hormones. The detection speed is fast, and the results can be produced in a short time, which meets the needs of rapid clinical diagnosis. The test results have good reproducibility, and there is little difference in test results at different times and different batches, ensuring accuracy and reliability^[4]. Compared with other detection methods, it does not require cumbersome operating steps, has a high degree of automation, reduces the impact of human factors on the detection results, and improves detection efficiency. These advantages make the chemiluminescent immunoassay method widely used in the diagnosis and treatment of gynecological endocrine diseases, and have become a common method for clinical detection of six sex hormones. In primary hospitals, this efficient and accurate testing method can also help doctors better diagnose diseases, allowing patients to get more accurate test results without going to large hospitals. Comparing the six levels of sex hormones in patients with gynecological endocrine diseases with healthy women can more clearly detect abnormal changes in sex hormone levels under disease conditions and provide clear reference standards for disease diagnosis^[5,6]. In clinical practice, doctors can accurately diagnose the disease based on the patient's clinical symptoms and the results of six sex hormone tests. For example, in patients with irregular menstruation, if the levels of follicle-stimulating hormone and luteinizing hormone are elevated and the estradiol level is reduced, it may indicate ovarian hypofunction; if the levels of testosterone and prolactin are elevated, it may indicate polycystic ovary syndrome or pituitary microadenomas. This diagnostic method that combines symptoms and test results can reduce misdiagnosis and missed diagnosis. During the course of disease treatment, regular testing of six levels of sex hormones can evaluate the treatment effect and adjust the treatment plan in a timely manner. For example, in patients with polycystic ovary syndrome, after drug treatment, if the testosterone level decreases and the ratio of luteinizing hormone and follicle-stimulating hormone returns to normal, it means that the treatment is effective; if there is no significant change in the test results, it is necessary to consider adjusting the treatment drug or dose^[7,8].

At the same time, long-term monitoring of six levels of sex hormones can also predict disease prognosis. For example, the level of follicle-stimulating hormone in patients with premature ovarian failure continues to increase, indicating further decline in ovarian function and poor prognosis. Through dynamic monitoring, doctors can adjust treatment strategies in a timely manner to improve patient prognosis as much as possible. In addition, the six-item test of sex hormones can also be used for disease prevention and health management. Regular testing for healthy women can help them understand their endocrine status and detect potential health problems in a timely manner. For example, a slight increase in prolactin levels is found during physical examination. Although there are no obvious clinical symptoms, diseases such as pituitary microadenoma can be ruled out through further examination, so as to achieve early detection and early intervention to prevent the occurrence of gynecological endocrine diseases. For women with a family history of gynecological endocrine diseases, regular testing is even more necessary, and preventive measures can be taken in advance. Although the detection cost of chemiluminescence immunoassay is slightly higher than that of some traditional methods, considering the accuracy and efficiency of its detection, it is worth it from the overall diagnosis and treatment effect. It can reduce misdiagnosis and mistreatment caused by inaccurate detection and reduce the overall medical cost of patients. With the continuous development of technology, the cost of chemiluminescent immunoassay may gradually decrease, allowing it to be used in a wider range of applications. In future clinical practice, chemiluminescence immunoassay can also be combined with other detection methods to form a more complete diagnosis and treatment system and provide better medical services for patients with gynecological endocrine diseases. For example, combined with ultrasound examination, it can provide a more comprehensive understanding of the patient's condition and improve the accuracy of diagnosis^[9,10].

4. Conclusion

In summary, the chemiluminescence immunoassay method to detect six sex hormones is of great value in the diagnosis and treatment of gynecological endocrine diseases. By comparing with the indicators of healthy women, it can provide a reliable basis for disease diagnosis and help doctors accurately judge the condition; it can be used to evaluate the effect during treatment and guide the adjustment of treatment plans; it can also provide a reference for disease prognosis assessment and prevention. Therefore, in clinical work, we should pay attention to the application of chemiluminescence immunoassay in the detection of six sex hormones, give full play to its advantages, and provide better services for the diagnosis and treatment of patients with gynecological endocrine diseases.

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Disclosure statement

The author declares no conflict of interest.

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