HYPOESTROGENISM
Estrogen Deficiency, Estrogen Deprivation

A lower than normal level of estrogen which is the primary sex hormone in women.

Related Diagnoses:
Obesity | Premature ovarian failure | Hypogonadism | Amenorrhoea | Uterine fibroids | Pelvic adhesions

About Hypoestrogenism

Hypoestrogenism, or estrogen deficiency, refers to a lower than normal level of estrogen, the primary sex hormone in women. In general, lower levels of estrogen may cause differences in the breasts, genitals, and skin.

Estrogen levels vary with woman's age (Tab. 1). The average value is about 150 pg/ml. In case of 10-20 pg/ml we speak about low levels of estrogen.

Lower levels of estrogen are typical and physiological in postmenopausal women. In young women hypoestrogenism is related to pathological background. Endocrine factors such as gonadal, adrenal and pituitary hormones are responsible for regulation of estrogen levels. In cases of any hypothalamic-pituitary insufficiency or disruption (functional hypothalamic amenorrhea, anorexia nervosa, Kallmann syndrome, hyperprolactinemia), ovarian failure (gonadal dysgenesis, premature ovarian failure), type 1 diabetes mellitus, and iatrogenic treatment (surgery, chemotherapy, radiotherapy), hypoestrogenism is very common. For young women's health, it may have short-term (hot flushes, sexual dysfunction) and long-term negative consequences (osteoporosis, cardiovascular disease, cognitive deterioration).

Also, there is a congenital form of hypoestrogenism. Congenital estrogen deficiency is a genetic condition by which the body is unable to produce or use estrogens. Conditions include aromatase deficiency, which is a condition where the enzyme aromatase is absent and androgens (usually a steroid hormone, that stimulates or controls the development and maintenance of male characteristics) are not converted to estrogens. The second one is estrogen insensitivity syndrome, a condition where the estrogen receptor is defective and estrogen are not biologically active.

Hypoestrogenism influences skeletal system, cardiovascular system and mental health:

Skeletal system

Estrogen promote osteoblastic activity and production of bone matrix, and in addition, are responsible for the growth spurt that often occurs during adolescence. It also promotes the conversion of the epiphyseal plate to the epiphysial line (i.e., cartilage to its bony remnant), thus bringing an end to the longitudinal growth of bones. Impairment of peak bone mass achievement, decresion of bone mass density and increased risk of bone fracture are consequences of hypoestrogenism in young women.

Hypoestrogenism in postmenopausal are associated with osteoporosis which leads to higher risk of pathological fractures.

Cardiovascular system
Cardiovascular system is threatened by endotelian (an interface between circulating blood or lymph in the lumen and the rest of the vessel wall) dysfunction and abnormal lipid profile.

Mental health

Hypoestrogenism is associated with mental disorders such as depressive mood, anxiety and sexual dysfunction. Estrogen has been proposed to act as a neuroprotectant (substance which preserve the neuronal structure and/or function) at several levels. In addition, estrogen deprivation is likely to initiate or enhance degenerative changes caused by oxidative stress (an imbalance between the systemic manifestation of reactive oxygen species and a biological system’s ability to readily detoxify the reactive intermediates or to repair the resulting damage), and to reduce the brain’s ability to maintain synaptic connectivity and cholinergic integrity leading to the cognitive decline seen in aged and disease-afflicted individuals. There is sufficient evidence that estradiol is a powerful neuroprotectant which might have use against Alzheimer’s disease (AD), stroke and Parkinson’s disease both in women and men.

Diagnosis of hypoestrogenism is simple. The only thing which is necessary is blood from which the serum is separated. The level of estrogen is than examinated from the serum in special laboratories.

Hormone replacement therapy (HRT) with estrogen can be used to treat hypoestrogenism both in premenopausal and postmenopausal women.

Associated diseases

- premature ovarian silure (POF)
- anorexia nervosa
- Kalimann syndrome
- amenorrhea
- hyperprolactinemia
- type 1 diabetes mellitus

Complications

Hypoestrogenism is considered one of the major risk factors for developing uncomplicated urinary tract infections (UTIs) in postmenopausal women who do not take hormone replacement therapy.

Risk factors

Hypoestrogenism is associated with the use of gonadotropin-releasing hormone (GnRH) analogues in treatment of endometriosis.

Depot medroxyprogesterone acetate (DMPA) is a commonly used form of contraception. It leads to hypoestrogenism which causes dryness of the vagina and dyspareunia (painful sexual intercourse).

Impact on fertility

Hypoestrogenism caused by functional hypothalamic-pituitary disturbance have consequences for reproductive health. Hypothalamus produces gonadotropin-releasing hormone and it’s job is to regulate the levels of follicle stimulating hormone (FSH) and luteinizing hormone (LH). FSH and LH are hormones, which are secrete from pituitary gland. FSH stimulates the growth and recruitment of immature ovarian follicles in the ovary and an acute rise of LH triggers ovulation and development of the corpus luteum (a temporary endocrine structure in female ovaries which produces progesterone and moderate the levels of estrogen). A disruption between hypothalamic-pituitary-ovarian axis leads to anovulation due to neurohormonal backround. An anovulatory cycle is a menstrual cycle during which the ovaries do not release an oocyte. If ovulation does not take place then of course pregnancy becomes impossible.

There is also a lack of cyclical changes of estradiol (one of estrogen hormones) which leads to persistance of proliferative phase of endometrium. The disturbance during puberty causes primary amenorrhea (menstruation cycles never starting). In primary amenorrhea there is no enough hormones in body to produce a monthly period and also there is no enough hormone levels which induce ovulation. Again without ovulation women become unable to became pregnant naturally.
In postpubertal girls and women hypoestrogenism causes secondary amenorrhea (menstruation cycles ceasing). The level of hormones sometimes dropped and period or ovulation will not occur. In these cases, there is still possibility to conceive a child, but it depends on frequency of spontaneous ovulation.

**Prevention**

Hypoestrogenism can be prevented by hormonal replacement therapy (HRT), but prescription and dosage has to be determined by the doctors.

**Symptoms**

Presentations of low estrogen levels include hot flashes, headaches, lowered libido, and breast atrophy. Reduced bone density leading to secondary osteoporosis and atrophic changes such as pH change in the vagina is also linked to hypoestrogenism.

Low levels of estrogen can lead to dyspareunia and limited genital arousal because of changes in the four layers of the vaginal wall.

Very often the hypoestrogenism is diagnosed due to more often fractures caused by osteoporosis.

**Therapies**

**Self therapy**

Some food may help to increased the levels of estrogen naturally. This food contain phytoestrogens, which have estrogenic effect and can soften the symptoms.

- **Vegetables and fruits**
  - broccoli
  - green beans
  - winter squash
  - garlic
  - cassava

- **Seed and grains**
  - flaxseed
  - sesame

- **Legume and nuts**
  - soybean
  - pistachio
  - cashews
  - chestnuts
  - hazelnuts

- **Herbs**
  - Black Cohosh
  - Spearmint
  - Licorice
  - Red Clover
  - Ginko Biloba

**Conventional medicine**
Pharmacotherapy

Estrogen (hormonal) Replacement Therapy (HRT)

Hormone replacement therapy (HRT) with estrogen can be used to treat hypoestrogenism both in premenopausal and postmenopausal women. Estrogen Replacement Therapy (HRT) is a kind of hormone replacement therapy. Its goal is to mitigate discomfort caused by diminished circulating estrogen after menopause. The National Institutes of Health (one of the world’s largest medical research centers) found disparate results for all cause mortality with hormone replacement, finding it to be lower when HRT was begun earlier, between age 50-59, but higher when begun after age 60. In older patients, there was an increased incidence of breast cancer, heart attacks and stroke, although a reduced incidence of colorectal cancer and bone fracture. The Women’s Health Initiative recommended that women with non-surgical menopause take the lowest feasible dose of HRT for the shortest possible time to minimize associated risks.

Surgical therapy

There is no surgical therapy for this condition.

Assisted reproduction

If conservative medical treatments fail to achieve a full term pregnancy, the physician may suggest the patient undergo in vitro fertilization (IVF). IVF and ART generally start with stimulating the ovaries to increase egg production. Most fertility medications are agents that stimulate the development of follicles in the ovary. After stimulation, the physician surgically extracts one or more eggs from the ovary, and unites them with sperm in a laboratory setting, with the intent of producing one or more embryos. Fertilization takes place outside the body, and the fertilized egg is reinserted into the woman’s reproductive tract, in a procedure called embryo transfer.

Find more about related issues

Diagnoses

Obesity
A disease of excess body fat that can have a negative effect on health, leading to reduced life expectancy and other health problems.
Learn more at: www.fertilitypedia.org/therapy/diag/obesity

Premature ovarian failure
The loss of function of the ovaries before age 40.
Learn more at: www.fertilitypedia.org/therapy/diag/premature-ovarian-failure

Hypogonadism
A medical term which describes a diminished functional activity of the gonads – the testes and ovaries.
Learn more at: www.fertilitypedia.org/therapy/diag/hypogonadism

Amenorrhoea
The absence of a menstrual period in women of reproductive age.
Learn more at: www.fertilitypedia.org/therapy/diag/amenorrhoea

Uterine fibroids
The most common benign smooth muscle tumors of the uterus encountered in women of reproductive age.
Learn more at: www.fertilitypedia.org/therapy/diag/uterine-fibroids

Pelvic adhesions
A form of abdominal adhesions in the pelvis.
Learn more at: www.fertilitypedia.org/therapy/diag/pelvic-adhesions

Risk factors
Low level of estrogen
A diminished level of blood estrogen level.
Learn more at: www.fertilitypedia.org/therapy/rf/low-level-of-estrogen

Symptoms

Absence of menstrual periods
The absence of a menstrual period in a woman of reproductive age.
Learn more at: www.fertilitypedia.org/edu/symptoms/absence-of-menstrual-periods-1

Infrequent menstruation
The medical term for infrequent, often light menstrual periods (intervals exceeding 35 days).
Learn more at: www.fertilitypedia.org/edu/symptoms/infrequent-menstruation-1

Therapies

Egg donation
Process by which a woman donates eggs for purposes of assisted reproduction or biomedical research.
Learn more at: www.fertilitypedia.org/edu/therapies/egg-donation

ICSI
A micromanipulative fertilization technique in which a single sperm is injected directly into an egg.
Learn more at: www.fertilitypedia.org/edu/therapies/icsi

Sperm donation
The procedure in which a man (sperm donor) provides his sperm for fertility treatment.
Learn more at: www.fertilitypedia.org/edu/therapies/sperm-donation

Standard IVF
A process in which an egg is fertilised by sperm outside the body: in vitro. Own or donated gametes may be used.
Learn more at: www.fertilitypedia.org/edu/therapies/standard-ivf

Gallery

Table
A table of reference range of estrogen.

<table>
<thead>
<tr>
<th>Estrogen - females</th>
<th>Reference range</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 29</td>
<td>149 pg/mL</td>
</tr>
<tr>
<td>30 - 39</td>
<td>210 pg/mL</td>
</tr>
<tr>
<td>&gt; 40</td>
<td>152 pg/mL</td>
</tr>
<tr>
<td>Low estrogen</td>
<td>10 - 20 pg/mL</td>
</tr>
<tr>
<td>High estrogen</td>
<td>&gt;&gt; 220 pg/mL</td>
</tr>
</tbody>
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Sources

“Follicle-stimulating hormone” [https://en.wikipedia.org/wiki/Follicle-stimulating_hormone] —sourced from Wikipedia licensed under CC BY-SA 3.0