

Leuprorelin as a Treatment for Endometriosis ^[1]

By: Santora, Emily Guerrero, Anna Keywords: [Endometriosis](#) ^[2] [endometrium](#) ^[3] [endometriotic lesions](#) ^[4] [pelvic pain](#) ^[5] [leuprorelin](#) ^[6] [leuprolide acetate](#) ^[7] [Lupron](#) ^[8] [Uterus](#) ^[9] [disease](#) ^[10]

Leuprolide acetate, or leuprorelin, is a manufactured drug that has been prescribed as a treatment for [endometriosis](#) ^[11], a medical condition in which body tissue that typically lines the [uterus](#) ^[12] grows outside of the [uterus](#) ^[12], since 1989. Leuprorelin is a modified version of a [gonadotropin](#) ^[13]-releasing [hormone](#) ^[14], a type of [hormone](#) ^[14] that helps regulate the female menstrual cycle. The drug inhibits the production of [estrogen](#) ^[15], a female sex [hormone](#) ^[14] that enables endometrial gland growth. After two weeks of injections, leuprorelin stops the production of [estrogen](#) ^[15], and without [estrogen](#) ^[15], endometrial glands become inactive. That decreases the growth of uterine tissue outside of the [uterus](#) ^[12], which helps decrease the pain associated with [endometriosis](#) ^[11]. Although physicians commonly prescribe leuprorelin as of 2019, women with [endometriosis](#) ^[11] have reported adverse side effects and health complications.

Healthcare professionals diagnose [endometriosis](#) ^[11] by finding endometriotic lesions in a woman's pelvic region, or the lower part of the trunk of the body, beneath the abdomen and above the thighs. Women with [endometriosis](#) ^[11] often experience pelvic pain. Specific pain symptoms of women with [endometriosis](#) ^[11] are dysmenorrhoea, or painful menstrual cramps, and dyspareunia, or painful [sexual intercourse](#) ^[16]. Healthcare professionals diagnose a woman with [endometriosis](#) ^[11] by monitoring the woman's symptoms and taking medical images or tissue samples of the [uterus](#) ^[12]. As of 2019, healthcare professionals do not know the cause of [endometriosis](#) ^[11] and no cure for the disease exists. Instead, healthcare professionals are able to treat symptoms, like pelvic pain, by prescribing medications like leuprorelin.

During the 1970s, researchers Andrew Schally and Roger Guillemin extracted and classified chemicals that signaled the [pituitary gland](#) ^[17], or the part of the brain responsible for releasing certain [hormones](#) ^[18], to activate what they called releasing factors. Schally and Guillemin worked in separate laboratories and studied how the brain interacts with glands that produce [hormones](#) ^[18]. The researchers extracted substances from the hypothalamus of the brains of [sheep](#) ^[19] and pigs. The hypothalamus helps regulate [hormone](#) ^[14] production by sending signals to the [pituitary gland](#) ^[17], thyroid gland, and gonad glands. The pituitary, thyroid, and gonad glands produce [hormones](#) ^[18] that travel through the bloodstream to start or stop different metabolic processes in the body. In 1969, Schally and Guillemin had independently isolated and purified a protein from the hypothalamus called thyroid releasing factor. Then, in 1971, Schally had discovered the structure of one particular [hormone](#) ^[14] produced in the hypothalamus, which he called [gonadotropin](#) ^[13]-releasing [hormone](#) ^[14]. Gonadotropin-releasing [hormone](#) ^[14] triggers the release of gonadotropins, or [hormones](#) ^[18] that the [pituitary gland](#) ^[17] releases, which participate in growth, sexual development, and reproductive function of mammals.

During the 1970s and 1980s, researchers learned more about [gonadotropin](#) ^[13]-releasing [hormone](#) ^[14] and eventually developed the chemical leuprorelin. 1971, Schally described [gonadotropin](#) ^[13]-releasing [hormone](#) ^[14] in relation to the secretion of two gonadotropins: follicle stimulating [hormones](#) ^[18], or FSH, and luteinizing [hormones](#) ^[18], or LH. The [pituitary gland](#) ^[17] releases both, FSH and LH. In women, FSH and LH trigger [ovulation](#) ^[20], or the release of an [egg](#) ^[21], during the middle of the menstrual cycle. A year later, in 1972, Schally began to develop a modified [gonadotropin](#) ^[13]-releasing [hormone](#) ^[14] to create new methods of [birth control](#) ^[22]. He created a chemical that caused an initial increase in FSH and LH production, but after continued use, the chemical suppressed FSH and LH production. That modified [gonadotropin](#) ^[13]-releasing [hormone](#) ^[14] suppresses [estrogen](#) ^[15] generation and thereby prevents the [ovulation](#) ^[20], the release of eggs, during a woman's menstrual cycle. In 1980, he began to apply this chemical to treat various disorders. In 1985, the US [Food and Drug Administration](#) ^[23], or FDA, approved the [gonadotropin](#) ^[13]-releasing [hormone](#) ^[14] leuprorelin to treat prostate cancer in males. Healthcare professionals started administering leuprorelin to patients with [endometriosis](#) ^[11] in 1989.

Leuprorelin can reduce the pain women experience with [endometriosis](#) ^[11]. The FDA approved leuprorelin to treat [endometriosis](#) ^[11] in females in 1989 after researchers found that the drug reduced symptoms of [endometriosis](#) ^[11] and the size of endometriotic lesions, or inflamed sores visible in the [uterus](#) ^[12] that are a common symptom of [endometriosis](#) ^[11]. At a molecular level, leuprorelin suppresses signals sent from the [pituitary gland](#) ^[17] to the ovaries, which are responsible for [estrogen](#) ^[15] production. The US [National Institutes of Health](#) ^[24], or NIH, headquartered in Bethesda, Maryland, identifies leuprorelin as a hazardous drug, which means that only healthcare professionals with personal protective gear such as gloves and laboratory coats can handle the drug. The NIH expresses that women who plan to become pregnant should not receive leuprorelin injections due to potential risks to the [fetus](#) ^[25]. According to healthcare professionals, leuprorelin injections are not a reliable [birth control](#) ^[22] method.

A healthcare professional administers a leuprorelin injection to decrease a patient's endometrial gland growth, which helps to decrease symptoms of pain that women with [endometriosis](#) ^[11] often experience. There are two different types of leuprorelin

dosages that a patient may receive, including an 11.25 mg injection every three months, or a 3.75 mg injection every month. Leuporelin is usually administered over six months. During the first week of injections, [estrogen](#)^[15] levels temporarily increase, which may worsen painful symptoms. After [estrogen](#)^[15] levels begin to decrease, painful symptoms subside. After about two months of injections, [menstruation](#)^[26] usually stops. Leuporelin may cause menopause-like symptoms, such as bone-thinning and hot flashes due to the decreased production of [estrogen](#)^[15]. Patients who experience those side effects may also concurrently participate in add-back therapy. During add-back therapy, a patient also takes a daily pill that contains small doses of [estrogen](#)^[15] or [progesterone](#)^[27], which are female reproductive [hormones](#)^[18]. Low levels of those [hormones](#)^[18] help control some of the negative side effects of leuporelin like hot flashes and bone-thinning.

There are several studies on the negative side effects of leuporelin injections for women with [endometriosis](#)^[11]. During clinical trials of the drug, researchers found that most women experienced bone-thinning while receiving injections. Most women in the clinical trials also reported hot flashes, or sudden sweating, and headaches. Furthermore, the Endometriosis Research Center in Delray Beach, Florida, found that half of women surveyed experienced negative side effects that persisted for more than six months, and a fourth of women surveyed experienced side effects that persisted for more than five years. In another study conducted by the Endometriosis Research Center, half of the women surveyed stated that leuporelin injections did not help subside painful symptoms of [endometriosis](#)^[11]. In several studies with women who did not have [endometriosis](#)^[11] but did receive leuporelin injections, researchers noted that most women experienced difficulties with memory and coordination.

Despite the negative side effects, as of 2019, physicians commonly prescribe leuporelin injections to patients experiencing pain or [infertility](#)^[28] associated with [endometriosis](#)^[11]. Leuporelin injections are also used during fertility treatments like [in vitro fertilization](#)^[29]. As of 2019, an oral leuporelin drug has entered phase II clinical trials for patients with [endometriosis](#)^[11], which means researchers are testing the drug's short-term side effects and its effectiveness compared to other treatments.

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version of a gonadotropin-releasing hormone, a type of hormone that helps regulate the female menstrual cycle. The drug inhibits the production of estrogen, a female sex hormone that enables endometrial gland growth. After two weeks of injections, leuporelin stops the production of estrogen, and without estrogen, endometrial glands become inactive. That decreases the growth of uterine tissue outside of the uterus, which helps decrease the pain associated with endometriosis. Although physicians commonly prescribe leuporelin as of 2019, women with endometriosis have reported adverse side effects and health complications.

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