

## HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use FORTESTA® safely and effectively. See full prescribing information for FORTESTA.

FORTESTA® (testosterone) Gel for topical use CIII

Initial U.S. Approval: 1953

### WARNING: SECONDARY EXPOSURE TO TESTOSTERONE

See full prescribing information for complete boxed warning.

- Virilization has been reported in children who were secondarily exposed to testosterone gel. (5.2, 6.2)
- Children should avoid contact with unwashed or unclothed application sites in men using FORTESTA. (2.2, 5.2)
- Healthcare providers should advise patients to strictly adhere to recommended instructions for use. (2.2, 5.2, 17)

### INDICATIONS AND USAGE

FORTESTA is an androgen indicated for replacement therapy in males for conditions associated with a deficiency or absence of endogenous testosterone:

- Primary hypogonadism (congenital or acquired). (1)
- Hypogonadotropic hypogonadism (congenital or acquired). (1)

#### Limitations of Use

- Safety and efficacy of FORTESTA in men with “age-related hypogonadism” have not been established. (1)
- Safety and efficacy of FORTESTA in males less than 18 years old have not been established. (8.4)

### DOSAGE AND ADMINISTRATION

- Prior to initiating FORTESTA, confirm the diagnosis of hypogonadism by ensuring that serum testosterone has been measured in the morning on at least two separate days and that these concentrations are below the normal range. (2)
- Starting dose of FORTESTA is 40 mg of testosterone (4 pump actuations) applied topically once daily in the morning. (2.1)
- Apply to clean, dry, intact skin of the thighs. Do not apply FORTESTA to the genitals or other parts of the body. (2.2)
- Dose adjustment: FORTESTA can be dose adjusted between a minimum of 10 mg of testosterone (1 pump actuation) and a maximum of 70 mg of testosterone (7 pump actuations) on the basis of total serum testosterone concentrations 2 hours post FORTESTA application. The dose should be titrated based on the serum testosterone concentration from a single blood draw 2 hours after applying FORTESTA at approximately 14 days and 35 days after starting treatment or following dose adjustment. In addition, serum testosterone concentration should be assessed periodically thereafter. (2.1)
- Patients should wash hands immediately with soap and water after applying FORTESTA and cover the application site with clothing after the gel has dried. Wash the application site thoroughly with soap and water prior to any situation where skin-to-skin contact of the application site with another person is anticipated. (2.2)
- FORTESTA is not interchangeable with other topical testosterone products. (2.1)

### DOSAGE FORMS AND STRENGTHS

FORTESTA (testosterone) Gel is supplied as a metered-dose pump. One pump actuation delivers 10 mg of testosterone. (3)

### CONTRAINDICATIONS

- Men with carcinoma of the breast or known or suspected prostate cancer. (4, 5.1)
- Women who are pregnant. Testosterone may cause fetal harm. (4, 5.7, 8.1, 8.2)

### WARNINGS AND PRECAUTIONS

- Monitor patients with benign prostatic hyperplasia (BPH) for worsening of signs and symptoms of BPH. (5.1)
- Avoid unintentional exposure of women or children to FORTESTA. Secondary exposure to testosterone can produce signs of virilization. FORTESTA should be discontinued until the cause of virilization is identified. (5.2)
- Venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE) have been reported in patients using testosterone products. Evaluate patients with signs or symptoms consistent with DVT or PE. (5.4)
- Some postmarketing studies have shown an increased risk of myocardial infarction and stroke associated with use of testosterone replacement therapy. (5.5)
- Exogenous administration of androgens may lead to azoospermia. (5.8)
- Edema with or without congestive heart failure (CHF) may be a complication in patients with pre-existing cardiac, renal, or hepatic disease. (5.10)
- Sleep apnea may occur in those with risk factors. (5.12)
- Monitor serum testosterone, prostate specific antigen (PSA), hemoglobin, hematocrit, liver function tests and lipid concentrations periodically. (5.1, 5.3, 5.9, 5.13)
- FORTESTA is flammable until dry. (5.16)

### ADVERSE REACTIONS

The most common adverse reaction (incidence  $\geq 3\%$ ) is skin reactions at the application site (16.1%). (6.1)

To report SUSPECTED ADVERSE REACTIONS, contact Endo at 1-800-462-3636 or FDA at 1-800-FDA-1088 or [www.fda.gov/medwatch](http://www.fda.gov/medwatch).

### DRUG INTERACTIONS

- Androgens may decrease blood glucose and therefore may decrease insulin requirements in diabetic patients. (7.1)
- Changes in anticoagulant activity may be seen with androgens. More frequent monitoring of International Normalized Ratio (INR) and prothrombin time is recommended. (7.2)
- Use of testosterone with adrenocorticotrophic hormone (ACTH) or corticosteroids may result in increased fluid retention. Use with caution, particularly in patients with cardiac, renal or hepatic disease. (7.3)

### USE IN SPECIFIC POPULATIONS

There are insufficient long-term safety data in geriatric patients using FORTESTA to assess the potential risks of cardiovascular disease and prostate cancer. (8.5)

See 17 for PATIENT COUNSELING INFORMATION and Medication Guide.

Revised: 01/2022

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## FULL PRESCRIBING INFORMATION

### **WARNING: SECONDARY EXPOSURE TO TESTOSTERONE**

- Virilization has been reported in children who were secondarily exposed to testosterone gel [see *Warnings and Precautions (5.2) and Adverse Reactions (6.2)*].
- Children should avoid contact with unwashed or unclothed application sites in men using FORTESTA [see *Dosage and Administration (2.2) and Warnings and Precautions (5.2)*].
- Healthcare providers should advise patients to strictly adhere to recommended instructions for use [see *Dosage and Administration (2.2), Warnings and Precautions (5.2), and Patient Counseling Information (17)*].

## **1 INDICATIONS AND USAGE**

FORTESTA is indicated for replacement therapy in males for conditions associated with a deficiency or absence of endogenous testosterone:

- Primary hypogonadism (congenital or acquired) – testicular failure due to conditions such as cryptorchidism, bilateral torsion, orchitis, vanishing testis syndrome, orchiectomy, Klinefelter’s syndrome, chemotherapy, or toxic damage from alcohol, heavy metals. These men usually have low serum testosterone concentrations and gonadotropins (follicle stimulating hormone [FSH] and luteinizing hormone [LH]) above the normal range.
- Hypogonadotropic hypogonadism (congenital or acquired) – gonadotropin or luteinizing hormone-releasing hormone (LHRH) deficiency or pituitary-hypothalamic injury from tumors, trauma, or radiation. These men have low serum testosterone concentrations but have gonadotropins in the normal or low range.

### **Limitations of Use**

- Safety and efficacy of FORTESTA in men with “age-related hypogonadism” (also referred to as “late-onset hypogonadism”) have not been established.
- Safety and efficacy of FORTESTA in males <18 years old have not been established [see *Use in Specific Populations (8.4)*].

## **2 DOSAGE AND ADMINISTRATION**

Prior to initiating, FORTESTA confirm the diagnosis of hypogonadism by ensuring that serum testosterone concentrations have been measured in the morning on at least 2 separate days and that these serum testosterone concentrations are below the normal range.

## 2.1 Dosing and Dose Adjustment

The recommended starting dose of FORTESTA is 40 mg of testosterone (4 pump actuations) applied once daily to the thighs in the morning. The dose can be adjusted between a minimum of 10 mg of testosterone and a maximum of 70 mg of testosterone. To ensure proper dosing, the dose should be titrated based on the serum testosterone concentration from a single blood draw 2 hours after applying FORTESTA at approximately 14 days and 35 days after starting treatment or following dose adjustment. In addition, serum testosterone concentration should be assessed periodically thereafter. Table 1 describes the dose adjustments required at each titration step.

**Table 1: Dose Adjustment Criteria**

Total Serum Testosterone Concentration 2 hours Post FORTESTA Application	Dose Titration
Equal to or greater than 2,500 ng/dL	Decrease daily dose by 20 mg (2 pump actuations)
Equal to or greater than 1,250 and less than 2,500 ng/dL	Decrease daily dose by 10 mg (1 pump actuation)
Equal to or greater than 500 and less than 1,250 ng/dL	No change: continue on current dose
Less than 500 ng/dL	Increase daily dose by 10 mg (1 pump actuation)

The application site and dose of FORTESTA are not interchangeable with other topical testosterone products.

## 2.2 Administration Instructions

FORTESTA should be applied directly to clean, dry, intact skin of the front and inner thighs. Do not apply FORTESTA to the genitals or other parts of the body. Patients should be instructed to use one finger to gently rub FORTESTA evenly onto the front and inner area of each thigh as directed in Table 2.

**Table 2: Application of FORTESTA**

Total Dose of Testosterone	Total Pump Actuations	Pump Actuations per Thigh	
		Thigh #1	Thigh #2
10 mg	1	1	0
20 mg	2	1	1
30 mg	3	2	1
40 mg	4	2	2
50 mg	5	3	2
60 mg	6	3	3
70 mg	7	4	3

Once the application site is dry, the site should be covered with clothing [*see Clinical Pharmacology (12.3)*]. Wash hands thoroughly with soap and water. Avoid applying the gel to the thigh adjacent to the scrotum. Avoid fire, flames, or smoking until the gel has dried since alcohol based products, including FORTESTA, are flammable.

The patient should avoid swimming or showering or washing the administration site for a minimum of 2 hours after application [see *Clinical Pharmacology* (12.3)].

To obtain a full first dose, it is necessary to prime the canister pump. To do so, with the canister in the upright position, slowly and fully depress the actuator eight times. The first 3 actuations may result in no discharge of gel. Safely discard the gel from the first 8 actuations. It is only necessary to prime the pump before the first dose.

**Strict adherence to the following precautions is advised in order to minimize the potential for secondary exposure to testosterone from FORTESTA-treated skin:**

- Children and women should avoid contact with unwashed or unclothed application site(s) of men using FORTESTA.
- FORTESTA should only be applied to the front and inner thighs (area of application should be limited to the area that will be covered by the patient's shorts or pants).
- Patients should wash their hands immediately with soap and water after applying FORTESTA.
- Patients should cover the application site(s) with clothing (eg, shorts of sufficient length or pants) after the gel has dried.
- Prior to any situation in which skin-to-skin contact with the application site is anticipated, patients should wash the application site(s) thoroughly with soap and water to remove any testosterone residue.
- In the event that unwashed or unclothed skin to which FORTESTA has been applied comes in direct contact with the skin of another person, the general area of contact on the other person should be washed with soap and water as soon as possible.

### **3            DOSAGE FORMS AND STRENGTHS**

FORTESTA (testosterone) Gel for topical use only, is supplied in a metered-dose pump. One (1) pump actuation delivers 10 mg of testosterone.

### **4            CONTRAINDICATIONS**

- FORTESTA is contraindicated in men with carcinoma of the breast or known or suspected carcinoma of the prostate [see *Warnings and Precautions* (5.1) and *Adverse Reactions* (6.1)].
- FORTESTA is contraindicated in women who are pregnant. Testosterone can cause virilization of the female fetus when administered to a pregnant woman [see *Use in Specific Populations* (8.1, 8.2)].

## **5 WARNINGS AND PRECAUTIONS**

### **5.1 Worsening of Benign Prostatic Hyperplasia (BPH) and Potential Risk of Prostate Cancer**

- Patients with BPH treated with androgens are at an increased risk of worsening of signs and symptoms of BPH. Monitor patients with BPH for worsening signs and symptoms.
- Patients treated with androgens may be at increased risk for prostate cancer. Evaluation of the patients for the presence of prostate cancer prior to initiating and during treatment with androgens is appropriate [*see Contraindications (4)*].

### **5.2 Potential for Secondary Exposure to Testosterone**

Cases of secondary exposure resulting in virilization of children have been reported in postmarketing surveillance of testosterone gel products. Signs and symptoms have included enlargement of the penis or clitoris, development of pubic hair, increased erections and libido, aggressive behavior, and advanced bone age. In most cases, these signs and symptoms regressed with removal of the exposure to testosterone gel. In a few cases, however, enlarged genitalia did not fully return to age-appropriate normal size, and bone age remained modestly greater than chronological age. The risk of transfer was increased in some of these cases by not adhering to precautions for the appropriate use of the topical testosterone product. Children and women should avoid contact with unwashed or unclothed application sites in men using FORTESTA [*see Dosage and Administration (2.2), Use in Specific Populations (8.1), and Clinical Pharmacology (12.3)*].

Inappropriate changes in genital size or development of pubic hair or libido in children, or changes in body hair distribution, significant increase in acne, or other signs of virilization in adult women should be brought to the attention of a physician and the possibility of secondary exposure to testosterone gel should also be brought to the attention of a physician. Testosterone gel should be promptly discontinued until the cause of virilization has been identified.

### **5.3 Polycythemia**

Increases in hematocrit, reflective of increases in red blood cell mass, may require lowering or discontinuation of testosterone. Check hematocrit prior to initiating treatment. It would also be appropriate to re-evaluate the hematocrit 3 to 6 months after starting treatment, and then annually. If hematocrit becomes elevated, stop therapy until hematocrit decreases to an acceptable concentration. An increase in red blood cell mass may increase the risk of thromboembolic events.

### **5.4 Venous Thromboembolism (VTE)**

There have been postmarketing reports of venous thromboembolic events, including deep vein thrombosis (DVT) and pulmonary embolism (PE), in patients using testosterone products, such as FORTESTA. Evaluate patients who report symptoms of pain, edema, warmth and erythema in the lower extremity for DVT and those who present with acute shortness of breath for PE. If a

venous thromboembolic event is suspected, discontinue treatment with FORTESTA and initiate appropriate workup and management.

## **5.5 Cardiovascular Risk**

Long-term clinical safety trials have not been conducted to assess the cardiovascular outcomes of testosterone replacement therapy in men. To date, epidemiologic studies and randomized controlled trials have been inconclusive for determining the risk of major adverse cardiovascular events (MACE), such as non-fatal myocardial infarction, non-fatal stroke, and cardiovascular death, with the use of testosterone compared to non-use. Some studies, but not all, have reported an increased risk of MACE in association with use of testosterone replacement therapy in men. Patients should be informed of this possible risk when deciding whether to use or to continue to use FORTESTA.

## **5.6 Abuse of Testosterone and Monitoring of Serum Testosterone Concentrations**

Testosterone has been subject to abuse, typically at doses higher than recommended for the approved indication and in combination with other anabolic androgenic steroids. Anabolic androgenic steroid abuse can lead to serious cardiovascular and psychiatric adverse reactions [*see Drug Abuse and Dependence (9)*].

If testosterone abuse is suspected, check serum testosterone concentrations to ensure they are within therapeutic range. However, testosterone levels may be in the normal or subnormal range in men abusing synthetic testosterone derivatives. Counsel patients concerning the serious adverse reactions associated with abuse of testosterone and anabolic androgenic steroids. Conversely, consider the possibility of testosterone and anabolic androgenic steroid abuse in suspected patients who present with serious cardiovascular or psychiatric adverse events.

## **5.7 Use in Women**

Due to the lack of controlled evaluations in women and potential virilizing effects, FORTESTA is not indicated for use in women [*see Contraindications (4) and Use in Specific Populations (8.1, 8.2)*].

## **5.8 Potential for Adverse Effects on Spermatogenesis**

With large doses of exogenous androgens, including FORTESTA, spermatogenesis may be suppressed through feedback inhibition of pituitary FSH which could possibly lead to adverse effects on semen parameters including sperm count.

## **5.9 Hepatic Adverse Effects**

Prolonged use of high doses of orally active 17-alpha-alkyl androgens (eg, methyltestosterone) has been associated with serious hepatic adverse effects (peliosis hepatis, hepatic neoplasms, cholestatic hepatitis, and jaundice). Peliosis hepatis can be a life-threatening or fatal complication. Long-term therapy with testosterone enanthate has produced multiple hepatic adenomas. FORTESTA is not known to cause these adverse effects.

## **5.10 Edema**

Androgens, including FORTESTA, may promote retention of sodium and water. Edema, with or without congestive heart failure, may be a serious complication in patients with preexisting cardiac, renal, or hepatic disease [see *Adverse Reactions (6.2)*].

## **5.11 Gynecomastia**

Gynecomastia may develop and persist in patients being treated with androgens, including FORTESTA, for hypogonadism.

## **5.12 Sleep Apnea**

The treatment of hypogonadal men with testosterone may potentiate sleep apnea in some patients, especially those with risk factors such as obesity or chronic lung diseases.

## **5.13 Lipids**

Changes in serum lipid profile may require dose adjustment or discontinuation of testosterone therapy.

## **5.14 Hypercalcemia**

Androgens, including FORTESTA, should be used with caution in cancer patients at risk of hypercalcemia (and associated hypercalciuria). Regular monitoring of serum calcium concentrations is recommended in these patients.

## **5.15 Decreased Thyroxine-binding Globulin**

Androgens, including FORTESTA, may decrease concentrations of thyroxine-binding globulins, resulting in decreased total T4 serum concentrations and increased resin uptake of T3 and T4. Free thyroid hormone concentrations remain unchanged, however, and there is no clinical evidence of thyroid dysfunction.

## **5.16 Flammability**

Alcohol based products, including FORTESTA, are flammable; therefore, patients should be advised to avoid smoking, fire, or flame until the FORTESTA gel has dried.

# **6 ADVERSE REACTIONS**

## **6.1 Clinical Trial Experience**

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in clinical practice.

In a controlled multicenter, open-label, non-comparative 90-day clinical study, 149 hypogonadal patients were treated with FORTESTA [see *Clinical Studies (14.1)*]. Adverse reactions occurred in 22.8% (34/149) of patients. The most common adverse reaction reported in this study was skin

reactions associated with the site of application (16.1%; 24/149) of which 79% (19/24) were mild and the remainder were moderate (21%; 5/24) (Table 3).

**Table 3: Adverse Reactions Reported in >1% of Patients in the US Phase 3 Clinical Trial of FORTESTA**

Adverse Reaction	Number (%) of Patients N = 149
Skin reaction	24 (16.1%)
Prostatic specific antigen increased	2 (1.3%)
Abnormal dreams	2 (1.3%)

During the 90-day trial 5 patients (3.4%) discontinued treatment because of adverse reactions. These reactions were: 1 patient with contact dermatitis (considered probably related to FORTESTA application), 1 with application site reaction (considered probably related to FORTESTA application), 1 with gastrointestinal hypomotility (considered possibly related to FORTESTA application), 1 with severe dyspnea (considered not related to FORTESTA application), and 1 with moderate contusion (considered not related to FORTESTA application).

## 6.2 Postmarketing Experience

The following adverse reactions have been identified during post approval use of FORTESTA. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure (Table 4).

**Table 4: Adverse Drug Reactions from Post Approval Experience of FORTESTA by System Organ Class**

System Organ Class	Adverse Reaction
Blood and lymphatic system disorders	Polycythemia
Eye disorders	Vitreous detachment
Gastrointestinal disorders	Abdominal symptoms
General disorders and administrative site conditions	Application site erythema, irritation, pruritus, and swelling; fatigue, influenza like illness, and malaise
Investigations	Decreased serum testosterone, increased hematocrit and hemoglobin
Musculoskeletal and connective tissue disorders	Pain in extremity
Nervous system disorders	Dizziness, headache, and migraine
Reproductive system and breast disorders	Erectile dysfunction and priapism
Skin and subcutaneous tissue disorders	Allergic dermatitis, erythema, rash, and papular rash
Vascular disorders	Venous thromboembolism
Cardiovascular disorders	Myocardial infarction and stroke

## **Secondary Exposure to Testosterone in Children**

Cases of secondary exposure to testosterone resulting in virilization of children have been reported in postmarketing surveillance of testosterone gel products. Signs and symptoms of these reported cases have included enlargement of the clitoris (with surgical intervention) or the penis, development of pubic hair, increased erections and libido, aggressive behavior, and advanced bone age. In most cases with a reported outcome, these signs and symptoms were reported to have regressed with removal of the testosterone gel exposure. In a few cases, however, enlarged genitalia did not fully return to age appropriate normal size, and bone age remained modestly greater than chronological age. In some of the cases, direct contact with the sites of application on the skin of men using testosterone gel was reported. In at least 1 reported case, the reporter considered the possibility of secondary exposure from items such as the testosterone gel user's shirts and/or other fabric, such as towels and sheets [*see Warnings and Precautions (5.2)*].

## **7 DRUG INTERACTIONS**

### **7.1 Insulin**

Changes in insulin sensitivity or glycemic control may occur in patients treated with androgens. In diabetic patients, the metabolic effects of androgens may decrease blood glucose and, therefore, may decrease insulin requirements.

### **7.2 Oral Anticoagulants**

Changes in anticoagulant activity may be seen with androgens, therefore more frequent monitoring of international normalized ratio (INR) and prothrombin time are recommended in patients taking anticoagulants, especially at the initiation and termination of androgen therapy.

### **7.3 Corticosteroids**

The concurrent administration of testosterone with adrenocorticotrophic hormone (ACTH) or corticosteroids may result in increased fluid retention and requires careful monitoring particularly in patients with cardiac, renal, or hepatic disease.

## **8 USE IN SPECIFIC POPULATIONS**

### **8.1 Pregnancy**

#### Risk Summary

FORTESTA is contraindicated in pregnant women. Testosterone is teratogenic and may cause fetal harm based on data from animal studies and its mechanism of action [*see Contraindications (4) and Clinical Pharmacology (12.1)*]. Exposure of a female fetus to androgens may result in varying degrees of virilization. In animal developmental studies, exposure to testosterone in utero resulted in hormonal and behavioral changes in offspring and structural impairments of reproductive tissues in female and male offspring. These studies did not meet current standards for nonclinical development toxicity studies.

## Data

### *Animal Data*

In developmental studies conducted in rats, rabbits, pigs, sheep, and rhesus monkeys, pregnant animals received intramuscular injection of testosterone during the period of organogenesis. Testosterone treatment at doses that were comparable to those used for testosterone replacement therapy resulted in structural impairments in both female and male offspring. Structural impairments observed in females included increased anogenital distance, phallus development, empty scrotum, no external vagina, intrauterine growth retardation, reduced ovarian reserve, and increased ovarian follicular recruitment. Structural impairments seen in male offspring included increased testicular weight, larger seminal tubular lumen diameter, and higher frequency of occluded tubule lumen. Increased pituitary weight was seen in both sexes.

Testosterone exposure in utero also resulted in hormonal and behavioral changes in offspring. Hypertension was observed in pregnant female rats and their offspring exposed to doses approximately twice those used for testosterone replacement therapy.

## **8.2 Lactation**

### Risk Summary

FORTESTA is not indicated for use in females.

## **8.3 Females and Males of Reproductive Potential**

### Infertility

During treatment with large doses of exogenous androgens, including FORTESTA, spermatogenesis may be suppressed through feedback inhibition of the hypothalamic-pituitary-testicular axis [*see Warnings and Precautions (5.8)*], possibly leading to adverse effects on semen parameters including sperm count. Reduced fertility is observed in some men taking testosterone replacement therapy. Testicular atrophy, subfertility, and infertility have also been reported in men who abuse anabolic androgenic steroids [*see Drug Abuse and Dependence (9.2)*]. With either type of use, the impact on fertility may be irreversible.

## **8.4 Pediatric Use**

The safety and efficacy of FORTESTA in pediatric patients <18 years old has not been established. Improper use may result in acceleration of bone age and premature closure of epiphyses.

## **8.5 Geriatric Use**

There have not been sufficient numbers of geriatric patients involved in controlled clinical studies utilizing FORTESTA to determine whether efficacy in those over 65 years of age differs from younger subjects. Of the 149 patients enrolled in the pivotal clinical study utilizing FORTESTA, 20 were over 65 years of age. Additionally, there are insufficient long-term safety data in geriatric patients to assess the potential risks of cardiovascular disease and prostate cancer.

Geriatric patients treated with androgens may also be at risk for worsening of signs and symptoms of BPH.

## **8.6 Renal Impairment**

No studies were conducted in patients with renal impairment.

## **8.7 Hepatic Impairment**

No studies were conducted in patients with hepatic impairment.

# **9 DRUG ABUSE AND DEPENDENCE**

## **9.1 Controlled Substance**

FORTESTA contains testosterone, a Schedule III controlled substance in the Controlled Substances Act.

## **9.2 Abuse**

Drug abuse is intentional non-therapeutic use of a drug, even once, for its rewarding psychological and physiological effects. Abuse and misuse of testosterone are seen in male and female adults and adolescents. Testosterone, often in combination with other anabolic androgenic steroids (AAS), and not obtained by prescription through a pharmacy, may be abused by athletes and bodybuilders. There have been reports of misuse of men taking higher doses of legally obtained testosterone than prescribed and continuing testosterone despite adverse events or against medical advice.

### Abuse-Related Adverse Reactions

Serious adverse reactions have been reported in individuals who abuse anabolic androgenic steroids, and include cardiac arrest, myocardial infarction, hypertrophic cardiomyopathy, congestive heart failure, cerebrovascular accident, hepatotoxicity, and serious psychiatric manifestations, including major depression, mania, paranoia, psychosis, delusions, hallucinations, hostility, and aggression.

The following adverse reactions have also been reported in men: transient ischemic attacks, convulsions, hypomania, irritability, dyslipidemias, testicular atrophy, subfertility, and infertility.

The following additional adverse reactions have been reported in women: hirsutism, virilization, deepening of voice, clitoral enlargement, breast atrophy, male-pattern baldness, and menstrual irregularities.

The following adverse reactions have been reported in male and female adolescents: premature closure of bony epiphyses with termination of growth, and precocious puberty.

Because these reactions are reported voluntarily from a population of uncertain size and may include abuse of other agents, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

## 9.3 Dependence

### Behaviors Associated with Addiction

Continued abuse of testosterone and other anabolic steroids, leading to addiction is characterized by the following behaviors:

- Taking greater dosages than prescribed
- Continued drug use despite medical and social problems due to drug use
- Spending significant time to obtain the drug when supplies of the drug are interrupted
- Giving a higher priority to drug use than other obligations
- Having difficulty in discontinuing the drug despite desires and attempts to do so
- Experiencing withdrawal symptoms upon abrupt discontinuation of use

Physical dependence is characterized by withdrawal symptoms after abrupt drug discontinuation or a significant dose reduction of a drug. Individuals taking supratherapeutic doses of testosterone may experience withdrawal symptoms lasting for weeks or months which include depressed mood, major depression, fatigue, craving, restlessness, irritability, anorexia, insomnia, decreased libido and hypogonadotropic hypogonadism.

Drug dependence in individuals using approved doses of testosterone for approved indications has not been documented.

## 10 OVERDOSAGE

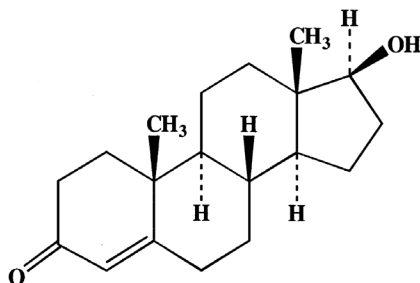
There is a single report of acute overdosage after parenteral administration of an approved testosterone product in the literature. This subject had serum testosterone concentrations of up to 11,400 ng/dL, which were implicated in a cerebrovascular accident. There were no reports of overdose in the FORTESTA clinical trial.

Treatment of overdosage would consist of discontinuation of FORTESTA, washing the application site with soap and water, and appropriate symptomatic and supportive care.

## 11 DESCRIPTION

FORTESTA is a clear, colorless, odorless, gel containing testosterone. The product may attain slightly yellow color during its shelf-life. FORTESTA is available in a metered-dose pump. Each pump actuation provides 10 mg of testosterone and each container is capable of dispensing 120 pump actuations. One (1) pump actuation dispenses 0.5 g of gel.

The active pharmacologic ingredient in FORTESTA is testosterone. Testosterone USP is a white to almost white powder described chemically as 17-beta hydroxyandrost-4-en-3-one.



Testosterone

$C_{19}H_{28}O_2$

MW 288.42

Pharmacologically inactive ingredients in FORTESTA are: propylene glycol, purified water, ethanol, 2-propanol, oleic acid, carbomer 1382, triethanolamine, and butylated hydroxytoluene.

## 12 CLINICAL PHARMACOLOGY

### 12.1 Mechanism of Action

Endogenous androgens, including testosterone and dihydrotestosterone (DHT), are responsible for the normal growth and development of the male sex organs and for the maintenance of secondary sex characteristics. These effects include the growth and maturation of the prostate, seminal vesicles, penis, and scrotum; the development of male hair distribution, such as facial, pubic, chest, and axillary hair; laryngeal enlargement; vocal cord thickening; and alterations in body musculature and fat distribution. Testosterone and DHT are necessary for the normal development of secondary sex characteristics.

Male hypogonadism, a clinical syndrome resulting from insufficient secretion of testosterone, has 2 main etiologies. Primary hypogonadism is caused by defects of the gonads, such as Klinefelter's syndrome or Leydig cell aplasia, whereas secondary hypogonadism is the failure of the hypothalamus or pituitary to produce sufficient gonadotropins (FSH, LH).

### 12.2 Pharmacodynamics

No specific pharmacodynamic studies were conducted using FORTESTA.

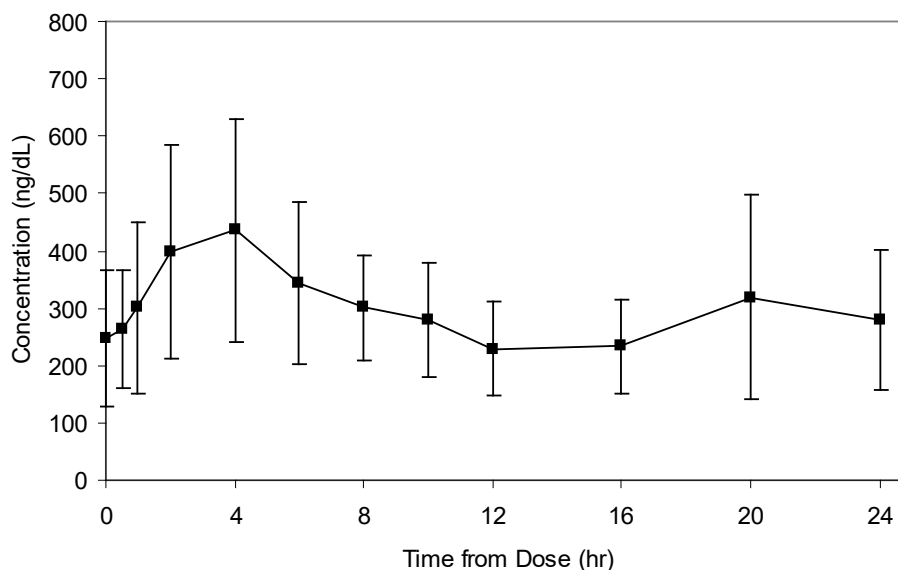
### 12.3 Pharmacokinetics

#### Absorption

FORTESTA delivers physiologic amounts of testosterone, producing serum testosterone concentrations that approximate normal concentrations ( $> 300$  ng/dL) seen in healthy men.

FORTESTA provides continuous transdermal delivery of testosterone for 24 hours following a single application to clean, dry, intact skin of the front and inner thighs (Figure 1).

**Figure 1: Mean ( $\pm$ SD) Serum Total Testosterone Concentrations on Day 7 in Patients Following FORTESTA Once-Daily Application of 40 mg of Testosterone (N=12)**



### Distribution

Circulating testosterone is primarily bound in the serum to sex hormone-binding globulin (SHBG) and albumin. Approximately 40% of testosterone in plasma is bound to SHBG, 2% remains unbound (free) and the rest is loosely bound to albumin and other proteins.

### Metabolism

Testosterone is metabolized to various 17-keto steroids through 2 different pathways. The major active metabolites of testosterone are estradiol and DHT.

### Excretion

There is considerable variation in the half-life of testosterone concentration as reported in the literature, ranging from 10 to 100 minutes. About 90% of a dose of testosterone given intramuscularly is excreted in the urine as glucuronic acid and sulfuric acid conjugates of testosterone and its metabolites. About 6% is excreted in the feces, mostly in the unconjugated form. Inactivation of testosterone occurs primarily in the liver.

### *Potential for Testosterone Transfer*

The potential for testosterone transfer from healthy males dosed with FORTESTA to healthy females was evaluated in a placebo-controlled, 3-way crossover study. The washout period was approximately 29 days. Six (6) males were treated with either FORTESTA (30 mg testosterone) or placebo to 1 thigh only. At 2 hours after the application of FORTESTA to males, the females rubbed their forearms for 15 minutes on the thigh of the males. Serum concentrations of testosterone were monitored in females for 24 hours after the transfer procedure. When direct skin-to-skin transfer occurred with FORTESTA mean average concentration ( $C_{avg}$ ) increased

by 134% and mean maximum concentration ( $C_{\max}$ ) increased by 191%, compared to direct skin-to-skin transfer with placebo. When transfer occurred with FORTESTA while covering a thigh with boxer shorts, mean  $C_{\text{avg}}$  decreased by 3% and mean  $C_{\max}$  increased by 2%, compared to direct skin-to-skin transfer with placebo [see *Dosage and Administration* (2.2)].

### ***Effect of Showering***

In a 2-way crossover study, the effects of showering on the pharmacokinetics of total testosterone following application of FORTESTA (30 mg testosterone to each thigh; total 60 mg testosterone) were assessed in 7 hypogonadal males. There were two 7-day treatment phases, with showering 2 hours post FORTESTA application, and without showering on Day 7 of each treatment phase. Showering decreased  $C_{\text{avg}}$  by 3% and it increased  $C_{\max}$  by 13% [see *Dosage and Administration* (2.2)].

### ***Effect of Hand Washing and Application Site (Inner Thigh) Washing***

In an open-label, single-dose study, the amount of residual testosterone on the application finger and application site after washing was evaluated in 12 healthy male subjects. Prior to application of FORTESTA, each index finger and each intended application site (left and right front and inner thighs) was wiped using dry sponges to assess baseline skin testosterone. Subjects then used each index finger to rub FORTESTA (40 mg testosterone) onto each inner thigh. On one side, the index finger was immediately wiped using dry sponges to collect residual testosterone. On the other side, each subject washed their hands with liquid soap and warm tap water immediately after drug application, then wipe the index finger using dry sponges to collect residual testosterone. A mean (SD) of 0.002 (0.006) mg of residual testosterone (ie, 99.8% reduction compared to when hand was not washed) was recovered after washing hands with liquid soap and warm tap water.

Two (2) hours after the application of FORTESTA onto each inner thigh, one thigh was wiped using dry sponges. On the other thigh, the application site was washed with liquid soap and warm tap water, dried, and then wiped using dry sponges. The sponges were assayed for testosterone. A mean (SD) of 0.24 (0.009) mg of residual testosterone (ie, 94.3% reduction compared to when application site was not washed) was recovered after application site washing.

## **13 NONCLINICAL TOXICOLOGY**

### **13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility**

#### **Carcinogenesis**

Testosterone has been tested by subcutaneous injection and implantation in mice and rats. In mice, implant-induced cervical-uterine tumors metastasized in some cases. There is suggestive evidence that injection of testosterone into some strains of female mice increases their susceptibility to hepatoma. Testosterone is also known to increase the number of tumors and decrease the degree of differentiation of chemically induced carcinomas of the liver in rats.

## Mutagenesis

Testosterone was negative in the in vitro Ames and in the in vivo mouse micronucleus assays.

## Impairment of Fertility

The administration of exogenous testosterone has been reported to suppress spermatogenesis in the rat, dog, and non-human primates, which was reversible on cessation of the treatment.

# 14 CLINICAL STUDIES

## 14.1 Clinical Study in Hypogonadal Males

FORTESTA was evaluated in a multicenter, 90-day open-label, non-comparative trial of 149 hypogonadal males with body mass index (BMI)  $\geq 22$  kg/m<sup>2</sup> and  $< 35$  kg/m<sup>2</sup> and 18 to 75 years of age (mean age 54.5 years). The patients were screened for a single serum total testosterone concentration  $< 250$  ng/dL, or 2 consecutive serum total testosterone concentrations  $< 300$  ng/dL. Patients were caucasian (80.5%), black (10.1%), Hispanic (7.4%), and other (2.0%).

FORTESTA was applied once each morning to the thighs at a starting dose of 40 mg of testosterone (4 pump actuations) per day. The dose was adjusted between a minimum of 10 mg and a maximum of 70 mg testosterone on the basis of total serum testosterone concentration obtained 2 hours post FORTESTA application on Days 14, 35, and 60 ( $\pm 3$  days).

The primary endpoint was the percentage of patients with  $C_{avg}$  within the normal range (greater than or equal to 300 ng/dL and less than or equal to 1140 ng/dL) on Day 90. In patients treated with FORTESTA, 77.5% (100/129) had  $C_{avg}$  within the normal range on Day 90. The secondary endpoint was the percentage of patients with  $C_{max}$  above 3 pre-determined limits. The percentages of patients with  $C_{max}$  greater than 1500 ng/dL, and between 1800 and 2499 ng/dL on Day 90 were 5.4% and 1.6%, respectively. No patient had a  $C_{max}$  greater than or equal to 2500 ng/dL on Day 90.

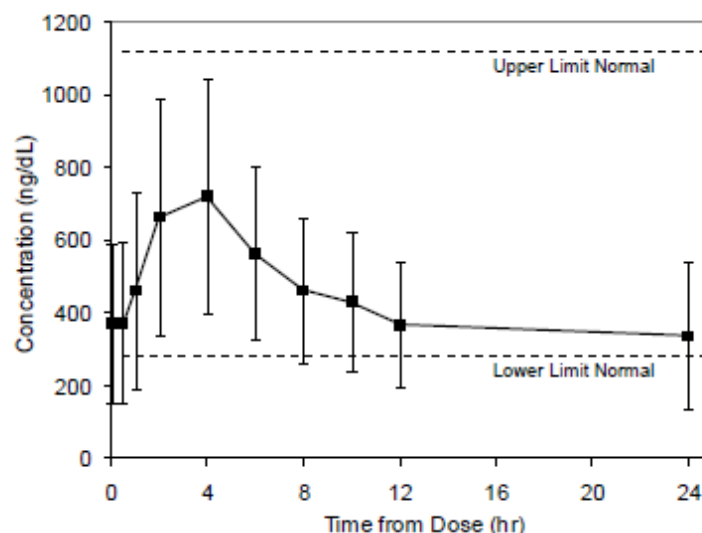
Dose titrations on Days 14, 35, and 60 resulted in mean (SD)  $C_{avg}$  and  $C_{max}$  for final doses of 10 mg to 70 mg on Day 90 shown in Table 5.

**Table 5: Mean ( $\pm$ SD) Steady-State Testosterone Concentrations ( $C_{avg}$  and  $C_{max}$ ) by Final Dose on Day 90**

		Final Dose						
		10mg (n=1)	20mg (n=6)	30mg (n=16)	40mg (n=30)	50mg (n=26)	60mg (n=27)	70mg (n=23)
$C_{avg}$ (ng/dL)	Mean	196	464	392	444	483	441	415
	SD		205	164	176	156	163	136
$C_{max}$ (ng/dL)	Mean	503	971	775	855	964	766	724
	SD		399	278	417	389	292	313

Figure 2 summarizes the pharmacokinetic profiles of total testosterone in patients completing 90 days of FORTESTA treatment administered as 40 mg of testosterone once-daily for the initial 14 days followed by possible titration according to follow-up testosterone measurements.

**Figure 2: Mean ( $\pm$ SD) Steady-State Serum Total Testosterone Concentrations on Day 90 (N=129)**



Additionally, there were no clinically significant changes from baseline for SHBG (slight decrease), estradiol (slight increase), and ratio of DHT to total testosterone (slight increase) at Day 90.

## 16 HOW SUPPLIED/STORAGE AND HANDLING

FORTESTA is supplied in 60 g canisters with a metered dose pump that delivers 10 mg of testosterone per complete pump actuation. The metered dose pump is capable of dispensing 120 metered pump actuations. One (1) pump actuation dispenses 0.5 g of gel.

FORTESTA is available in packages of 1, 2, and 3 canisters (NDC 63481-183-16, NDC 63481-183-17, and NDC 63481-183-18, respectively).

Store at controlled room temperature 20°C-25°C (68°F-77°F); excursions permitted to 15°C-30°C (59°F-86°F). [See USP]. Do Not Freeze.

Used FORTESTA canisters should be discarded in household trash in a manner that prevents accidental application or ingestion by children or pets.

## 17 PATIENT COUNSELING INFORMATION

**See FDA-approved Medication Guide.**

Patients should be informed of the following information:

### 17.1 Use in Men with Known or Suspected Prostate or Breast Cancer

Men with known or suspected prostate or breast cancer should not use FORTESTA [see *Contraindications (4)* and *Warnings and Precautions (5.1)*].

## 17.2 Potential for Secondary Exposure to Testosterone and Steps to Prevent Secondary Exposure

Secondary exposure to testosterone in children and women can occur with the use of testosterone gel in men. Cases of secondary exposure to testosterone in children have been reported.

Physicians should advise patients of the reported signs and symptoms of secondary exposure which may include the following:

- In children; unexpected sexual development including inappropriate enlargement of the penis or clitoris, premature development of pubic hair, increased erections, and aggressive behavior.
- In women; changes in hair distribution, increase in acne, or other signs of testosterone effects.
- The possibility of secondary exposure to FORTESTA should be brought to the attention of a healthcare provider.
- FORTESTA should be promptly discontinued until the cause of virilization is identified.

Strict adherence to the following precautions is advised to minimize the potential for secondary exposure to testosterone from FORTESTA in men *[see Medication Guide]*:

- **Children and women should avoid contact with unwashed or unclothed application site(s)** of men using FORTESTA.
- Patients using FORTESTA should apply the product as directed and strictly adhere to the following:
  - **Wash hands** with soap and water after application.
  - **Cover the application site(s)** with clothing after the gel has dried.
  - **Wash the application site(s) thoroughly** with soap and water prior to any situation where skin-to-skin contact of the application site with another person is anticipated.
- In the event that unwashed or unclothed skin to which FORTESTA has been applied comes in contact with the skin of another person, the general area of contact on the other person should be washed with soap and water as soon as possible *[see Dosage and Administration (2.2), Warnings and Precautions (5.2), and Clinical Pharmacology (12.3)]*.

## 17.3 Potential Adverse Reactions with Androgens

Patients should be informed that treatment with androgens may lead to adverse reactions which include:

- Changes in urinary habits such as increased urination at night, trouble starting your urine stream, passing urine many times during the day, having an urge that you have to go to the bathroom right away, having a urine accident, being unable to pass urine, and weak urine flow.

- Breathing disturbances, including those associated with sleep, or excessive daytime sleepiness.
- Too frequent or persistent erections of the penis.
- Nausea, vomiting, changes in skin color, or ankle swelling.

#### **17.4 Patients Should Be Advised of the Following Instructions for Use**

- **Read the Medication Guide before starting FORTESTA therapy and reread it each time the prescription is renewed.**
- **FORTESTA should be applied and used appropriately to maximize the benefits and to minimize the risk of secondary exposure in children and women.**
- Keep FORTESTA out of the reach of children.
- **FORTESTA is an alcohol based product and is flammable; therefore avoid fire, flame, or smoking until the gel has dried.**
- It is important to adhere to all recommended monitoring.
- Report any changes in their state of health, such as changes in urinary habits, breathing, sleep, and mood.
- FORTESTA is prescribed to meet the patient's specific needs, therefore, the patient should never share FORTESTA with anyone.
- Wait 2 hours before swimming or washing following application of FORTESTA. This will ensure that the greatest amount of FORTESTA is absorbed into their system.

Manufactured by: Pharbil Waltrop GmbH, Im Wirrigen 25, 45731 Waltrop, Germany

Distributed by: Endo Pharmaceuticals Inc., Malvern, PA 19355

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