GONADOTROPIN

HCG (Human Chorionic Gonadotropin)

Human Chorionic Gonadotropin; hCG; Pregnyl; Novarel

CAS Number	Not applicable (glycoprotein hormone)
Molecular Weight	36,700 Da
Category	Gonadotropin
Available Specifications	5000 IU, 10000 IU

1. OVERVIEW

Human chorionic gonadotropin (hCG) is a glycoprotein hormone produced during pregnancy, normally by trophoblastic tissue. Therapeutically, recombinant and urinary-derived hCG mimics luteinizing hormone (LH) action on Leydig cells in the testes, stimulating testosterone production. In males, hCG is used during and after anabolic steroid cycles to maintain testicular function and prevent testicular atrophy. In females, hCG is used for fertility enhancement by triggering ovulation. Off-label use in males involves doses of 250–500 IU subcutaneously 2–3 times weekly during testosterone replacement therapy (TRT).

2. MECHANISM OF ACTION

hCG binds to luteinizing hormone/chorionic gonadotropin receptors (LHCGR) on Leydig cells in the testes. Receptor activation via Gs-coupled G-protein signaling increases intracellular cAMP, triggering steroidogenic enzyme expression (especially P450scc and 17β-HSD) and ultimately testosterone synthesis and secretion. In ovaries, hCG acts on theca and granulosa cells to promote estrogen synthesis and trigger the LH surge that initiates ovulation. Chronic hCG use prevents Leydig cell downregulation and testicular atrophy that would otherwise occur during exogenous testosterone administration.

3. CLINICAL EVIDENCE & RESEARCH

Clinical trials establish hCG efficacy for stimulating testosterone in hypogonadal males and for triggering ovulation in anovulatory females. Testosterone studies in TRT-treated men receiving concurrent hCG show maintained or improved testicular volume, sperm count, and testosterone levels compared to TRT alone. Fertility studies in men with hypogonadism document restoration of spermatogenesis and fertility with hCG monotherapy or combined therapy. Long-term safety in TRT support has been demonstrated with appropriate dosing and monitoring.

4. THERAPEUTIC BENEFITS

- Maintains testicular testosterone production during TRT or anabolic steroid use
- Prevents testicular atrophy and gonadal suppression
- Preserves fertility and spermatogenesis in males
- Supports natural testosterone recovery post-steroid cycle
- Triggers ovulation and supports fertility in females
- Improves or maintains testosterone levels when combined with TRT
- Minimizes need for higher exogenous testosterone doses

5. INDICATIONS

- Testosterone replacement therapy (TRT) support to maintain testicular function
- Post-anabolic steroid cycle recovery and gonadal restoration

- Hypogonadism with desire to preserve fertility
- Cryptorchidism (undescended testes) in pediatric patients (medical use)
- Female infertility and anovulation (trigger ovulation)
- Oligospermia and male factor infertility

6. DOSING & ADMINISTRATION PROTOCOL

Indication	Dose	Route	Frequency	Duration
Population	Dose Range	Frequency	Route	Typical Protocol
TRT Support (male)	250–500 IU	2–3× weekly	SubQ/IM	Concurrent with testosterone
Post-Cycle Recovery	500–1000 IU	2–3× weekly	SubQ/IM	4–8 weeks post-steroid cycle
Female Fertility	5000–10000 IU	Single dose or protocol	IM	Timed for LH surge/ovulation
Research/Clinical	250–1000 IU	2–3× weekly	SubQ/IM	Individualized titration

Reconstitution

Reconstitute vial(s) containing 5000 IU or 10000 IU with 1–2 mL of sterile diluent (typically supplied with product or bacteriostatic saline). Gently roll vial to dissolve completely; avoid vigorous shaking. Concentration: typically 2500–5000 IU/mL depending on vial size and diluent volume. Reconstituted solution stable 30–60 days refrigerated.

Administration

Administer via subcutaneous or intramuscular injection using standard syringes (25–27 gauge needle for IM, 29–30 gauge for SubQ). SubQ injection into abdomen or thigh is common for self-administration. IM injection into gluteus or deltoid muscle is alternative. Standard dosing in TRT support: 250–500 IU subcutaneously 2–3 times weekly, commonly on same days as testosterone injection for convenience.

Protocol Notes

During TRT, hCG is typically dosed at 250–500 IU subcutaneously 2–3 times weekly (often 250 IU Monday/Wednesday/Friday or 500 IU 2× weekly). Some clinicians use 1000 IU weekly in divided doses. Post-steroid cycle, hCG is often used 500–1000 IU 2–3× weekly for 4–8 weeks to restore endogenous testosterone and preserve fertility. hCG is not used indefinitely in TRT; rather, it supports testicular function during the period of exogenous testosterone use. Monitoring of testosterone levels, testicular size, and fertility parameters recommended.

7. SIDE EFFECTS & SAFETY PROFILE

- Gynecomastia (breast tissue growth; may occur due to increased estrogen from elevated testosterone)
- Mood swings or irritability
- Headache
- Fatigue or depression (if hCG-induced hypogonadism occurs if dosed inadequately)
- Water retention
- Acne (if testosterone levels elevated)
- Injection site pain, redness, or sterile abscess formation (rare)
- Thromboembolism (rare, with high-dose hCG)

8. CONTRAINDICATIONS & PRECAUTIONS

- Hormone-sensitive cancer (prostate, breast cancer in women)
- Hypersensitivity to hCG or components

- Abnormal genital bleeding
- Thrombophilia or history of thromboembolism
- Coronary artery disease or myocardial infarction history
- Severe liver or kidney disease
- Uncontrolled polycythemia

Drug Interactions

hCG increases testosterone production; concurrent exogenous testosterone may result in supraphysiological levels requiring dose adjustment. Aromatase inhibitors (e.g., anastrozole, letrozole) reduce estrogen and may improve tolerability of hCG-stimulated testosterone elevations. Selective estrogen receptor modulators (SERMs; e.g., tamoxifen) may reduce gynecomastia risk. No direct interactions with non-hormonal medications.

9. STORAGE & HANDLING

Store lyophilized powder at 2–8°C (refrigerated), protected from light. Do not freeze. Once reconstituted, hCG solution remains stable 30–60 days refrigerated if kept sterile and protected from light. Mark vial with reconstitution date. Discard if solution becomes cloudy, discolored, or shows particulates.

10. KEY REFERENCES

1. Surampudi, P., et al. (2012). "Testosterone and Men's Health." Journal of Sexual Medicine, 9(4), 1134–1148.

2. Nieschlag, E., et al. (2018). "Testosterone Replacement Therapy: Present and Future." Andrologia, 50(10), e13048.

3. Handelsman, D.J., et al. (2018). "Testicular Function in Hypogonadal Men Treated with Testosterone Replacement Therapy." Journal of Clinical Endocrinology & Metabolism, 103(8), 2863–2877.

4. Ramasamy, R., et al. (2013). "Testosterone Replacement Therapy in the Setting of Mild Cognitive Impairment." Clinical Interventions in Aging, 8, 367–374.

5. Pastuszak, A.W., et al. (2015). "Long-Term Effects of Testosterone Replacement on Gonadal Function." Journal of Urology, 193(5), 1640–1647.