

RESEARCH MONOGRAPH . COMPOUND PROFILE

Nandrolone

19-nortestosterone; the parent compound of the nandrolone class of AAS; the decanoate ester is approved for anemia and osteoporosis.

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ABSTRACT

Nandrolone (17-beta-hydroxyestr-4-en-3-one; CAS 434-22-0; molecular formula C₁₈H₂₆O₂; molecular weight 274.40) is the parent compound of the 19-nortestosterone (nandrolone) class of AAS; the 19-nor modification reduces aromatization to estrogen and prevents 5-alpha-reduction to a more potent metabolite. The compound itself binds AR with affinity approximately 5-fold higher than testosterone but with reduced effects in some tissues (5-alpha-reduction by 5-AR produces dihydronandrolone, which has lower AR affinity than nandrolone, in contrast to testosterone-DHT relationship; the result is reduced androgenic side effects). The decanoate ester (Deca-Durabolin) provides a 14-day half-life for IM administration; the phenylpropionate ester provides a shorter (3 to 4 day) half-life. Approved for anemia of chronic kidney disease and (historically) osteoporosis. Schedule III. Widely used in non-medical bodybuilding for lean mass gains and (anecdotally) joint support. The "deca dick" sexual dysfunction is attributed to the progestogenic activity of nandrolone metabolites. Used as the canonical 19-nor AAS in research.

1. Compound Identification

Nandrolone is described as 19-nortestosterone (parent of nandrolone class). 19-nortestosterone; the parent compound of the nandrolone class of AAS; the decanoate ester is approved for anemia and osteoporosis.

1.1 Class summary

19-nortestosterone (parent of nandrolone class)

1.2 Subtitle

19-nortestosterone; the parent compound of the nandrolone class of AAS; the decanoate ester is approved for anemia and osteoporosis.

2. Abstract

Nandrolone (17-beta-hydroxyestr-4-en-3-one; CAS 434-22-0; molecular formula $C_{18}H_{26}O_2$; molecular weight 274.40) is the parent compound of the 19-nortestosterone (nandrolone) class of AAS; the 19-nor modification reduces aromatization to estrogen and prevents 5-alpha-reduction to a more potent metabolite. The compound itself binds AR with affinity approximately 5-fold higher than testosterone but with reduced effects in some tissues (5-alpha-reduction by 5-AR produces dihydronandrolone, which has lower AR affinity than nandrolone, in contrast to testosterone-DHT relationship; the result is reduced androgenic side effects). The decanoate ester (Deca-Durabolin) provides a 14-day half-life for IM administration; the phenylpropionate ester provides a shorter (3 to 4 day) half-life. Approved for anemia of chronic kidney disease and (historically) osteoporosis. Schedule III. Widely used in non-medical bodybuilding for lean mass gains and (anecdotally) joint support. The "deca dick" sexual dysfunction is attributed to the progestogenic activity of nandrolone metabolites. Used as the canonical 19-nor AAS in research.

3. Mechanism of Action

19-nortestosterone parent compound; AR agonism with reduced 5-alpha-reduction potency and reduced aromatization. Progestogenic metabolite activity.

The mechanistic profile described above represents the consensus position from peer-reviewed literature where available; for compounds with sparse formal characterization, this section reflects vendor-grade reports and structurally-related class pharmacology and should be interpreted with appropriate caution.

4. Pharmacokinetics and Routes of Administration

Pharmacokinetic data are summarized within the abstract for compounds with formal Phase 1 records. Compounds without published human pharmacokinetic studies are noted as such; investigators should treat the absence of data as a research limitation.

5. Reported Research Dose Ranges

Clinical (anemia) 50 to 200 mg IM every 2 to 4 weeks; non-medical AAS use is supratherapeutic.

Doses are scaled from clinical use where the compound is approved as a medicine, from Phase 2/3 trials where development advanced, or from rodent dose-response data scaled by allometric assumptions where the compound has no human clinical record. Investigators should treat dose ranges from research-chemical-grade vendors as starting points for their own pharmacokinetic and tolerability characterization rather than validated dosing recommendations.

6. Sourcing and Quality Verification

Investigators should obtain analytical confirmation of identity (mass spectrometry; for peptides, additionally amino acid analysis or N-terminal sequencing) and purity (HPLC area-percent, ideally greater than 95 percent) on every lot. Vendor certificates of analysis vary in quality; third-party analytical confirmation through independent laboratories (e.g., Janoshik Analytical, Anabolic Lab) is the gold standard for research-grade peptides and small molecules.

For compounds with established pharmaceutical-grade marketing in any jurisdiction, sourcing from the marketed product (where legal and accessible) provides the highest quality assurance.

7. Reconstitution and Handling

Peptides should be reconstituted in bacteriostatic water or sterile water for injection in the volume appropriate to the desired concentration; lyophilized peptides should be allowed to come to room temperature before reconstitution to minimize precipitation. Reconstituted peptides should be stored refrigerated and used within the timeframe specified by the manufacturer (typically 14 to 30 days for bacteriostatic water reconstitutions, shorter for sterile water).

Small molecules: storage conditions vary by compound; consult the certificate of analysis for the specific product. Most are stable at room temperature in dry, dark conditions; oxidation-sensitive compounds (e.g., catecholamine precursors) require cool storage and protection from light.

8. Stack Interaction Considerations

Investigators combining this compound with other research substances should consider receptor-level interactions (additive effects at shared targets), enzyme-level interactions (CYP-mediated drug-drug interactions where applicable), and pharmacodynamic interactions (additive sedation, additive serotonergic activity, additive hemodynamic effects).

The stack interaction section in published monographs of well-characterized compounds is necessarily incomplete for any specific combination; investigators should treat novel combinations with elevated caution and titrate gradually.

9. References

1. Kicman AT. Pharmacology of anabolic steroids. Br J Pharmacol 2008.
2. Hartgens F, Kuipers H. Effects of androgenic-anabolic steroids in athletes. Sports Med 2004.
3. Mosby's Drug Reference. Nandrolone decanoate. 2018.

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