

Draft Guidance on Difluprednate

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Active Ingredient: Difluprednate

Dosage Form; Route: Emulsion; ophthalmic

Strength: 0.05%

Recommended Study: Two options: in vitro or in vivo study

I. In vitro option:

To qualify for the in vitro option for this drug product pursuant to 21 CFR 320.24 (b)(6), , all the following criteria should be met.

- i. The test and Reference Listed Drug (RLD) formulations are qualitatively¹ and quantitatively² the same (Q1/Q2)
- ii. Acceptable comparative physicochemical characterization of the test and RLD formulations. The comparative study should be performed on at least three exhibit lots of both test and reference products.³

Parameters to measure: Globule size distribution, viscosity profile as a function of applied shear, pH, zeta potential, osmolality, surface tension and drug distribution in different phases of the formulation.

Bioequivalence based on (95% upper confidence bound): Population bioequivalence (PBE) based on D₅₀ and SPAN (alternatively harmonic intensity-weighted average particle diameter and polydispersity index derived from cumulant analysis of the intensity size distribution) for the globule size distribution only (the other parameters do not require PBE analysis). The applicants should provide no less than 10 datasets from 3 batches each of the Test and Reference products to be used in the PBE analysis. Sponsors should compare the size parameter upon serial dilution (if applicable) of the Test and Reference products, and provide histograms of size distribution data of each diluted sample.

- iii. Acceptable comparative in vitro drug release rate tests of difluprednate from the test and Reference formulations. The methodology used for in vitro drug release testing

¹ Q₁ (qualitative sameness) means that the test product uses the same inactive ingredient(s) as the reference product.

² Q₂ (quantitative sameness) means that the concentrations of the inactive ingredient(s) used in the test product are within ±5% of those used in the reference product.

³ All 3 exhibit batches should be at least 1/10 the size of the commercial batch and the manufacturing process used for the 3 exhibit batches should be reflective of the process used for the commercial batch.

should be able to discriminate the effect of process variability in the production of the test formulation.

II. In vivo option:

Recommended studies: One study

Type of study: Bioequivalence study with pharmacokinetic (PK) endpoint

Design: Single-dose, parallel design, in vivo in aqueous humor

Strength: 0.05%

Subjects: Patients undergoing indicated cataract surgery

Additional comments: Please refer to the Draft Guidance on Loteprednol Etabonate ophthalmic suspension/drops⁴ for additional comments regarding the In Vivo pharmacokinetic study in aqueous humor.

Analytes to measure (in appropriate biological fluid): Difluprednate in aqueous humor

Bioequivalence based on (90% CI): Difluprednate

Dissolution test method and sampling times: Not applicable

⁴ <http://www.fda.gov/downloads/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/UCM249244.pdf>