

## Draft Guidance on Methylphenidate Hydrochloride

This draft guidance, when finalized, will represent the current thinking of the Food and Drug Administration (FDA, or the Agency) on this topic. It does not establish any rights for any person and is not binding on FDA or the public. You can use an alternative approach if it satisfies the requirements of the applicable statutes and regulations. To discuss an alternative approach, contact the Office of Generic Drugs.

**Active Ingredient:** Methylphenidate hydrochloride

**Dosage Form; Route:** Extended release chewable tablet; oral

**Recommended Studies:** Two studies

1. Type of study: Fasting  
Design: Single-dose, two-treatment, two-period crossover in vivo  
Strength: 40 mg  
Subjects: Males and non-pregnant, non-lactating females, general population  
Additional comments: Tablets should be chewed completely before swallowing. The 90% confidence intervals (CIs) of the geometric mean test/reference ratios for the metrics ( $C_{max}$ ,  $AUC_{0-3}$ ,  $AUC_{3-7}$ ,  $AUC_{7-t}$ ,  $AUC_{0-\infty}$ ) should fall within the limits of 80.00-125.00%.

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2. Type of study: Fed  
Design: Single-dose, two-treatment, two-period crossover in vivo  
Strength: 40 mg  
Subjects: Males and non-pregnant, non-lactating females, general population  
Additional comments: Tablets should be chewed completely before swallowing. The 90% CIs of the geometric mean test/reference ratios for the metrics ( $C_{max}$ ,  $AUC_{0-4}$ ,  $AUC_{4-8}$ ,  $AUC_{8-t}$ ,  $AUC_{0-\infty}$ ) should fall within the limits of 80.00-125.00%.

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**Analyte to measure:** Methylphenidate in plasma

**Bioequivalence based on (90% CI):** Methylphenidate

Refer to the additional comments above for more guidance regarding bioequivalence.

**Additional strengths:** Bioequivalence of the 20 mg and 30 mg strengths to the corresponding reference product strengths may be demonstrated based on principles laid out in the FDA guidance on *Bioequivalence Studies With Pharmacokinetic Endpoints for Drugs Submitted Under an ANDA*.

**Dissolution test method and sampling times:**

For modified release drug products, applicants should develop specific discriminating dissolution methods. Alternatively, applicants may use the dissolution method set forth in any related

official United States Pharmacopeia (USP) drug product monograph or in the FDA's database, <http://www.accessdata.fda.gov/scripts/cder/dissolution/>, provided that applicants submit adequate dissolution data supporting the discriminating ability of such a method. If a new dissolution method is developed, submit the dissolution method development and validation report with the complete information/data supporting the proposed method. Conduct comparative dissolution testing on 12 dosage units for each strength of the test and reference products. Specifications will be determined upon review of the abbreviated new drug application.

Certain strengths of methylphenidate hydrochloride extended release chewable tablets are scored. To ensure the performance of the split tablet, perform manual as well as mechanical splitting and conduct dissolution testing of split tablet portions versus the whole tablet for both test and reference products.

In addition to the method above, submit dissolution profiles on 12 dosage units for each strength of the test and reference products generated using USP Apparatus 1 at 100 rpm and/or Apparatus 2 at 50 rpm in at least three dissolution media (pH 1.2, 4.5 and 6.8 buffer). Agitation speeds may be increased if appropriate. It is acceptable to add a small amount of surfactant if necessary. Include early sampling times of 1, 2, and 4 hours and continue every 2 hours until at least 80% of the drug is released to provide assurance against premature release of drug (dose dumping) from the formulation.

Due to concerns of dose dumping of drug from this product when taken with alcohol, conduct additional dissolution testing on all strengths using various concentrations of ethanol in the dissolution medium as follows:

Testing Conditions: 900 mL, 0.1N HCl, USP Apparatus 2 (paddle) at 50 rpm, with or without alcohol;

Test 1: 12 units tested according to the proposed method (with 0.1 N HCl) with data collected every 15 minutes for a total of 2 hours

Test 2: 12 units analyzed by substituting 5% (v/v) of test medium with Alcohol USP and data collection every 15 minutes for a total of 2 hours

Test 3: 12 units analyzed by substituting 20% (v/v) of test medium with Alcohol USP and data collection every 15 minutes for a total of 2 hours

Test 4: 12 units analyzed by substituting 40% (v/v) of test medium with Alcohol USP and data collection every 15 minutes for a total of 2 hours

Conduct testing on both test and reference products accordingly, and provide data on individual unit, means, range and %CV.