Draft Guidance on Betamethasone Dipropionate; Calcipotriene

This draft guidance, when finalized, will represent the current thinking of the Food and Drug Administration (FDA, or the Agency) on this topic.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: Betamethasone dipropionate; Calcipotriene
Dosage Form; Route: Aerosol, foam; topical
Recommended Studies: Three studies

1. Type of study: Pilot vasoconstrictor study
   Design: A pilot dose duration-response study using the reference product under un-occluded conditions
   Strength: 0.064%; 0.005%
   Subjects: Males and nonpregnant, nonlactating females, general population
   Additional comments: Refer to the guidance for industry Topical Dermatological Corticosteroids: In Vivo Bioequivalence.

2. Type of study: Pivotal vasoconstrictor study
   Design: A pivotal bioequivalence study under un-occluded conditions
   Strength: 0.064%; 0.005%
   Subjects: Males and nonpregnant, nonlactating females, general population
   Additional comments: See comments above.

3. Type of study: Bioequivalence study with clinical endpoint
   Design: Randomized, double blind, parallel, placebo controlled in vivo
   Strength: 0.064%; 0.005%
   Subjects: Males and nonpregnant, nonlactating females with psoriasis vulgaris (plaque psoriasis)
   Additional comments: Specific recommendations are provided below.

Analytes to measure (in appropriate biological fluid): Not applicable

Bioequivalence based on (90% CI): Pivotal vasoconstrictor study; clinical endpoint

Waiver request of in vivo testing: Not applicable

Dissolution test method and sampling times: Not applicable

Recommended Nov 2019
Applicants intending to propose an alternative approach by which to demonstrate bioequivalence should refer to the guidance for industry Controlled Correspondence Related to Generic Drug Development and the guidance for industry Formal Meetings Between FDA and ANDA Applicants of Complex Products Under GDUFA for additional information describing the procedures on how to clarify regulatory expectations regarding your individual drug development program.

Additional comments regarding the bioequivalence with clinical endpoint study:

1. The Office of Generic Drugs (OGD) recommends conducting a bioequivalence study with a clinical endpoint in the treatment of stable psoriasis vulgaris comparing the test product versus the reference product and vehicle control, each applied once daily as an adequate layer to the affected area(s) for 28 days (4 weeks). The two co-primary endpoints are the proportions of subjects with treatment success on the Physician’s Global Assessment (PGA) and clinical success on the Psoriasis Area Severity Index (PASI) scale at the target lesion site at the Week 4 visit (study Day 29).

2. Inclusion Criteria (the sponsor may add additional criteria)
   a. Male or nonpregnant, nonlactating females aged at least 18 years with a clinical diagnosis of stable (at least 6 months) psoriasis vulgaris involving 5% to 30% body surface area (BSA).
   b. A PGA of disease severity of at least moderate disease severity (grade ≥ 3, per Table 1).
   c. A plaque elevation of at least moderate severity (grade ≥ 3, per Table 2) at the target lesion site. The most severe lesion at Baseline should be identified as the target lesion.

Table 1. Physician’s Global Assessment (PGA) of Disease Severity

<table>
<thead>
<tr>
<th>Score</th>
<th>Grade</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
<td>No plaque elevation above normal skin level; may have residual non-erythematous discoloration; no psoriatic scale; no erythema</td>
</tr>
<tr>
<td>1</td>
<td>Minimal</td>
<td>Essentially flat with possible trace elevation; faint erythema; no psoriatic scale</td>
</tr>
<tr>
<td>2</td>
<td>Mild</td>
<td>Slight but definite elevation of plaque above normal skin level; may have up to moderate erythema (red coloration); fine scales with some lesions partially covered</td>
</tr>
<tr>
<td>3</td>
<td>Moderate</td>
<td>Moderate elevation with rounded or sloped edges to plaque; moderate erythema (red coloration); somewhat coarse scales with most lesions partially covered</td>
</tr>
<tr>
<td>4</td>
<td>Severe</td>
<td>Marked elevation with hard, sharp edges to plaque; severe erythema (very red coloration); coarse, thick scales with virtually all lesions covered and a rough surface</td>
</tr>
<tr>
<td>5</td>
<td>Very Severe</td>
<td>Very marked elevation with very hard, sharp edges to plaque; very severe erythema (extreme red coloration); very coarse, thick scales with all lesions covered and a very rough surface</td>
</tr>
</tbody>
</table>
Table 2. Severity of Psoriasis Area Severity Index (PASI) at the Target Lesion Site

<table>
<thead>
<tr>
<th>Score</th>
<th>Grade</th>
<th>Erythema</th>
<th>Scaling</th>
<th>Plaque Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Clear</td>
<td>No evidence of erythema</td>
<td>No evidence of scaling</td>
<td>No evidence of plaques above normal skin level</td>
</tr>
<tr>
<td>1</td>
<td>Almost Clear</td>
<td>Pink discoloration, minimal erythema</td>
<td>Occasional fine scales hardly noticeable</td>
<td>Slight, just discernable elevation above normal skin level</td>
</tr>
<tr>
<td>2</td>
<td>Mild</td>
<td>Light red coloration</td>
<td>Slight but definite roughness, fine scale</td>
<td>Discernable elevation above normal skin level upon examination, but not pronounced</td>
</tr>
<tr>
<td>3</td>
<td>Moderate</td>
<td>Moderate redness, but not dark</td>
<td>Moderate roughness, somewhat coarse scaling</td>
<td>Definite plaque formation with rounded/sloped edges to plaque</td>
</tr>
<tr>
<td>4</td>
<td>Severe</td>
<td>Dark red coloration</td>
<td>Marked roughness, coarse/thick scaling,</td>
<td>Marked elevation with hard, distinct edges to plaque</td>
</tr>
<tr>
<td>5</td>
<td>Very Severe</td>
<td>Very dark red coloration with induration</td>
<td>Very thick scales covering extensive area</td>
<td>Very marked elevation, very hard and sharp edges to plaque</td>
</tr>
</tbody>
</table>

3. Exclusion Criteria (the sponsor may add additional criteria)
   a. Females who are pregnant, breast feeding, or planning a pregnancy.
   b. Females of childbearing potential who do not agree to utilize an adequate form of contraception.
   c. Current diagnosis of unstable forms of psoriasis in the treatment area, including guttate, erythrodermic, exfoliative or pustular psoriasis.
   d. Other inflammatory skin disease in the treatment area that may confound the evaluation of the psoriasis vulgaris (e.g., atopic dermatitis, contact dermatitis, tinea corporis).
   e. Presence of pigmentation, extensive scarring, pigmented lesions or sunburn in the treatment areas, which could interfere with the rating of efficacy parameters.
   f. History of psoriasis unresponsive to topical treatments.
   g. History of hypersensitivity to any component of the test or reference product.
   h. Current or past history of hypercalcemia, vitamin D toxicity, severe renal insufficiency, or severe hepatic disorders.
   i. Current immunosuppression.
j. Use within six months prior to Baseline of biologic treatment for psoriasis (e.g., infliximab, adalimumab, alefacept).

k. Use within three months prior to Baseline of: 1) chemotherapy, or 2) radiation therapy.

l. Use within two months prior to Baseline of: 1) immunosuppressive drugs (e.g., tacrolimus, pimecrolimus), or 2) oral retinoids.

m. Use within one month prior to Baseline of: 1) systemic steroids, 2) systemic antibiotics, 3) other systemic anti-psoriatic treatment, 4) PUVA therapy, 5) UVB therapy, or 6) systemic anti-inflammatory agents.

n. Use within 2 weeks prior to Baseline of: 1) topical anti-psoriatic drugs (e.g., salicylic acid, anthralin, coal tar, calcipotriene, tazarotene), 2) topical corticosteroids, or 3) topical retinoids.

4. Body Surface Area (BSA) percentage is no longer requested as an individual component sign in the PASI scale but the BSA percentage and distribution should be recorded at Baseline.

5. Due to the possibility of elevated serum calcium levels with calcipotriene absorption, serum calcium, serum albumin and albumin-corrected serum calcium levels should be included in serum chemistry analysis. Subjects with elevation in serum calcium outside the normal range should be discontinued from the study. The serum calcium level should be corrected for serum albumin level as follows:

   “corrected” serum calcium = serum calcium mg/dL + (0.8 x [4.0-albumin g/dL])

6. Calcium levels of subjects should be compared between study treatment groups to ensure that similar effects are seen with both active treatments. The number of subjects with elevated serum calcium levels and the mean albumin corrected calcium levels at baseline and at Week 4 should also be compared in all study treatment groups.

7. The recommended co-primary endpoints are:
   a. The proportion of subjects in each treatment group with treatment success [defined as absent or very mild disease, a score of 0 or 1, within the treatment area(s)] on the PGA of disease severity at the Week 4 visit (study Day 29), and
   b. The proportion of subjects in each treatment group with clinical success (defined as absent or mild, a score of 0 or 1, at the target lesion site) on the PASI at the Week 4 visit (study day 29). Each psoriatic sign of scaling, erythema, and plaque elevation should have a score of 0 or 1 at Week 4 (study Day 29) for the subject to be considered a success. The target lesion is to be identified at Baseline as the most severe lesion.

8. The site and size of the treatment area should be compared and tabulated for each treatment group.

9. Please refer to the product-specific guidance on adapalene; benzoyl peroxide topical gel 0.3%; 2.5% entitled Guidance on Adapalene; Benzoyl Peroxide for a recommended approach to statistical analysis and study design for bioequivalence studies with clinical endpoints.
10. Study data should be submitted in a standardized format. Please refer to the study data standards published at www.fda.gov¹.

¹ Study Data Standards for Submission to CDER and CBER available at: https://www.fda.gov/industry/study-data-standards-resources/study-data-submission-cder-and-cber