



NDA 218353

COMPLETE RESPONSE

University of California San Francisco
Department of Radiology and Biomedical Imaging
Attention: Thomas A. Hope, MD
Professor in Residence
185 Berry Street, Suite 350
San Francisco, CA 94107

Dear Dr. Hope:

Please refer to your new drug application ((b) (4))
for Floretyrosine F 18 Injection.

We have completed our review of this application, as amended, and have determined that we cannot approve this application in its present form. We have described our reasons for this action below and, where possible, our recommendations to address these issues.

CLINICAL/STATISTICAL

- (1) The clinical data submitted in this application did not provide substantial evidence of effectiveness for floretyrosine F 18. The efficacy study, 18F-TLX101-CDx-203, was considered adequate and well-controlled but demonstrated borderline diagnostic performance with lower bounds of the 95% confidence intervals ranging from 58% to 73% for sensitivity and from 36% to 51% for specificity across the three blinded central readers. In addition, it was a single center study and had potential for bias in reference standard determination, further limiting its persuasiveness.

Evidence provided as confirmatory evidence of effectiveness was not sufficiently strong to complement study 18F-TLX101-CDx-203. Four studies were examined as confirmatory evidence, including one re-read of images obtained from expanded access use of floretyrosine F 18, GBM-RET-01, and three published retrospective studies. GBM-RET-01 used a higher administered activity than intended for labeling, had potential for unblinding of the reference standard evaluators, and had more than 10% of patients with missing reference standard results. The remaining studies shared design issues including use of different image evaluation methods than intended for labeling and lack of per reader results.

To address these issues, a second adequate and well-controlled efficacy study, which could be conducted in the same patient population or a closely related condition, or other robust confirmatory evidence of efficacy is necessary. Optimization of the administered dose of floretyrosine F 18 could also be considered.

PRESCRIBING INFORMATION

We reserve comment on the proposed labeling until the application is otherwise adequate. We encourage you to review the labeling review resources on the Prescription Drug Labeling Resources¹ and Pregnancy and Lactation Labeling Final Rule² websites, including regulations and related guidance documents and the Selected Requirements for Prescribing Information (SRPI) – a checklist of important format items from labeling regulations and guidances.

CARTON AND CONTAINER LABELING

We reserve comment on the proposed labeling until the application is otherwise adequate.

SAFETY UPDATE

When you respond to the above deficiencies, include a safety update as described at 21 CFR 314.50(d)(5)(vi)(b). The safety update should include data from all nonclinical and clinical studies/trials of floretyrosine F 18 under consideration regardless of indication, dosage form, or dose level.

- (1) Describe in detail any significant changes or findings in the safety profile.
- (2) When assembling the sections describing discontinuations due to adverse events, serious adverse events, and common adverse events, incorporate new safety data as follows:
 - Present new safety data from the studies/clinical trials for the proposed indication using the same format as in the original submission.
 - Present tabulations of the new safety data combined with the original application data.
 - Include tables that compare frequencies of adverse events in the original application with the retabulated frequencies described in the bullet above.

¹ <https://www.fda.gov/drugs/laws-acts-and-rules/prescription-drug-labeling-resources>

² <https://www.fda.gov/drugs/labeling-information-drug-products/pregnancy-and-lactation-labeling-drugs-final-rule>

- For indications other than the proposed indication, provide separate tables for the frequencies of adverse events occurring in clinical trials.
- (3) Present a retabulation of the reasons for premature trial discontinuation by incorporating the drop-outs from the newly completed trials. Describe any new trends or patterns identified.
 - (4) Provide case report forms and narrative summaries for each subject who died during a clinical trial or who did not complete a trial because of an adverse event. In addition, provide narrative summaries for serious adverse events.
 - (5) Describe any information that suggests a substantial change in the incidence of common, but less serious, adverse events between the new data and the original application data.
 - (6) Provide updated exposure information for the clinical studies/trials (e.g., number of subjects, person time).
 - (7) Provide a summary of worldwide experience on the safety of floretyrosine F 18. Include an updated estimate of use for floretyrosine F 18 marketed in other countries.
 - (8) Provide English translations of current approved foreign labeling not previously submitted.

Within one year after the date of this letter, you are required to resubmit or take other actions available under 21 CFR 314.110. If you do not take one of these actions, we may consider your lack of response a request to withdraw the application under 21 CFR 314.65. You may also request an extension of time in which to resubmit the application.

A resubmission must fully address all the deficiencies listed in this letter and should be clearly marked with "**RESUBMISSION**" in large font, bolded type at the beginning of the cover letter of the submission. The cover letter should clearly state that you consider this resubmission a complete response to the deficiencies outlined in this letter. A partial response to this letter will not be processed as a resubmission and will not start a new review cycle.

You may request a meeting or teleconference with us to discuss what steps you need to take before the application may be approved. If you wish to have such a meeting, submit your meeting request as described in the draft guidance for industry *Formal Meetings Between the FDA and Sponsors or Applicants of PDUFA Products*.

The product may not be legally marketed until you have been notified in writing that this application is approved.

If you have any questions, contact

(b) (4)

Sincerely,

{See appended electronic signature page}

(b) (4)

This is a representation of an electronic record that was signed electronically. Following this are manifestations of any and all electronic signatures for this electronic record.

/s/

(b) (4)

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