November 7, 2019

United States Securities and Exchange Commission
Division of Corporation Finance
Office of Life Sciences
Attn: Sasha Parikh, Kevin Vaughn
Washington, D.C. 20549

Re: AcelRx Pharmaceuticals, Inc.
Form 10-K for the Fiscal Year Ended December 31, 2018, as amended by that certain Form 10-K/A
Filed March 7, 2019 and April 30, 2019, respectively
File No. 001-35068

Ladies and Gentlemen:

AcelRx Pharmaceuticals, Inc. (the "***Company***") is providing this letter in response to comments (the "***Comments***") received from the staff of the U.S. Securities and Exchange Commission's Division of Corporation Finance (the "***Staff***") by letter dated October 25, 2019 with respect to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2018, filed on March 7, 2019, as amended by that certain Form 10-K/A for the fiscal year ended December 31, 2018, filed on April 30, 2019.

Set forth below are the Company's responses to the Comments. For your convenience, the Company has incorporated the Comments into this response letter.

Form 10-K for the Fiscal Year Ended December 31, 2018, as amended by that certain Form 10-K/A for the Fiscal Year Ended December 31, 2018

Business
Clinical Trials, page 8

1. *Please address the following regarding your disclosure of certain serious adverse events (SAEs) experienced by patients in the clinical trials of certain product candidates:*

   - *You disclose in a risk factor on page 34 that in the phase 3 active-comparator clinical trial (IAP309), double-blind, placebo-controlled, orthopedic surgery trial (IAP311) and phase 3 multi-center, open-label study (IAP312), patients experienced serious adverse events (SAEs) that were assessed as "possibly or probably related to the study drug." Please provide us proposed disclosure to be provided in future filings identifying each treatment related SAE "possibly or probably" related to Zalviso.*

   - *Further on page 9, you disclose that in the IAP312 study "A total of 5 patients experienced serious adverse events, but all were considered unrelated to study drug by investigators." This disclosure appears to contradict your disclosure on page 34. Please clarify for us whether the SAEs in the IAP312 study were related or unrelated to Zalviso. Revise such disclosure in future filings to reconcile the apparent contradiction.*

Company Response: The Company respectfully acknowledges the Staff's comment. The Company undertakes to identify serious adverse events (collectively, "***SAEs***") "possibly or probably" related to Zalviso for the IAP309 and IAP311 trials in the risk factors section included in future filings, as applicable. The Company will also disclose such SAEs in any Clinical Trials section included in its annual reports on Form 10-K, if applicable. As it relates to the contradiction noted by the Staff in the second bullet of the Staff's comment, the Company confirms that there were no SAEs "possibly or probably" related to Zalviso, the study drug in the IAP 312 trial. The Company undertakes to revise the referenced risk factor disclosure in future filings to eliminate the noted inconsistency. In addition, the Company will also revise the referenced risk factor to correct other information, including percentages and patient count.

Below is the revised risk factor that the Company proposes to include in future filings, as applicable:

"Zalviso may cause adverse effects or have other properties that could delay or prevent regulatory approval or limit the scope of any approved label or market acceptance. DSUVIA may cause adverse effects or have other properties that could limit market acceptance.

Adverse events, or AEs, caused by Zalviso could cause us, other reviewing entities, clinical trial sites or regulatory authorities to interrupt, delay or halt any future FDA-required clinical trials and could result in the denial of regulatory approval. Phase 2 clinical trials we conducted with Zalviso did generate some AEs, but no serious adverse events, or SAEs, related to the trial drug. In our Phase 3 active-comparator clinical trial (IAP309), 8% of Zalviso-treated patients dropped out of the trial prematurely due to an AE (11% in the IV patient-controlled morphine group), and we observed three SAEs that were assessed as possibly or probably related to study drug (one – respiratory depression - in the Zalviso group and two – abdominal distension and ileus - in the IV patient-controlled morphine group). In our Phase 3, double-blind, placebo-controlled, abdominal surgery trial (IAP310), 6% of Zalviso-treated patients dropped out of the trial prematurely due to an AE (9% in placebo group). There were no SAEs determined to be related to study drug. In our Phase 3, double-blind, placebo-controlled, orthopedic surgery trial (IAP311), 7% of Zalviso-treated patients dropped out of the trial prematurely due to an AE (7% in placebo group). Four patients (three in the Zalviso group and one in the placebo group) experienced an SAE considered possibly or probably related to the trial drug by the investigator. The SAEs possibly or probably attributed to Zalviso were severe oxygen saturation decreased, sinus tachycardia and confusional state. In our Phase 3 multicenter, open-label study of Zalviso (IAP312), 3% of patients dropped out prematurely due to an AE. Five patients experienced treatment emergent SAEs in the IAP312 study and none of these were considered possibly or probably related to the study drug by the investigator.

In our Phase 2 DSUVIA placebo-controlled bunionectomy study (SAP202), two patients in the DSUVIA 30 mcg group (5%) discontinued treatment due to an AE. There were no SAEs deemed related to DSUVIA. In our Phase 3 placebo-controlled abdominal surgery study (SAP301), one DSUVIA-treated patient (1%) dropped out of the trial prematurely due to an AE (4% in placebo group). There were two SAEs determined to be related to study drug in the placebo-treated group and no related SAEs in the DSUVIA group. In our Phase 3 open-label, single-arm emergency room study (SAP302), no DSUVIA-treated patients dropped out of the trial prematurely due to an AE. One patient had an SAE - angina pectoris - possibly related to study drug. In our post-operative study in patients aged 40 years or older (SAP303), 3% of DSUVIA-treated patients dropped out of the trial prematurely due to an AE. There were no SAEs deemed related to study drug.

If DSUVIA or, if approved, Zalviso cause serious or unexpected side effects after receiving marketing approval, a number of potentially significant negative consequences could result, including:

- regulatory authorities may withdraw their approval of the product or impose restrictions on its distribution in the form of a modified REMS program;
- regulatory authorities may require the addition of labeling statements, such as warnings or contraindications;
- we may be required to change the way the product is administered or conduct additional clinical trials;

- we could be sued and held liable for harm caused to patients; or,
- our reputation may suffer.

Any of these events could prevent us from achieving or maintaining market acceptance of DSUVIA or, if approved, Zalviso, and could substantially increase the costs of commercializing our products."

* * *

Please contact Ruben A. Garcia at (650) 306-8252 with any questions or further comments regarding the Company's responses to the Staff's Comments.

Sincerely,

/s/ Raffi Asadorian

Raffi Asadorian
Chief Financial Officer

cc: Raffi Asadorian, *AcelRx Pharmaceuticals, Inc.*
Ruben A. Garcia, *AcelRx Pharmaceuticals, Inc.*
Mark B. Weeks, *Cooley LLP*
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