UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

DIVISION OF
CORPORATION FINANCE

December 8, 2010

Richard King
President and Chief Executive Officer
AcelRx Pharmaceuticals, Inc.
575 Chesapeake Drive
Redwood City, CA 94063

Re: AcelRx Pharmaceuticals, Inc.
Registration Statement on Form S-1
Filed November 12, 2010
File No. 333-170594

Dear Mr. King:

We have reviewed your registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

General

1. Please note that when you file a pre-effective amendment containing pricing-related information, we may have additional comments. As you are likely aware, you must file this amendment prior to circulating the prospectus.

2. Please note that when you file a pre-effective amendment that includes your price range, it must be bone fide. We interpret this to mean that your range may not exceed $2 if you price below $20 and 10% if you price above $20.

3. Please note that where we provide examples to illustrate what we mean by our comments, they are examples and not complete lists. If our comments are applicable to portions of the filing that we have not cited as examples, please make the appropriate changes in accordance with our comments.

4. Please provide us proofs of all graphic, visual or photographic information you will provide in the printed prospectus prior to its use.

5. Please provide an explanation of the following terms where you first use them:

    - "bioadhesive excipient"
    - "high oral transmucosal uptake"

Sufentanil Nano Tabs, page 1

6. You disclose in the last paragraph of this subsection that you have one issued patent in Europe. Please expand your disclosure in the Prospectus Summary section to disclose that this patent is currently subject to opposition by third parties.

Risks Associated with Our Business, page 5

7. Please expand your bulleted list of risks to also state that the design for the device component of your product candidates is still under development and may not be fully functional or commercially viable.

Risk Factors, page 12

We might be unable to service our current debt…, page 14

8. Please expand your disclosure to describe the installment payment due dates, the current interest rate on the debt and amount of the installment payments, as well as the date when the outstanding $6.4 million will become due.

Our product candidates may cause adverse effects…, page 16

9. Please quantify the frequency or number of AEs observed in your clinical studies, as compared to the subjects treated with placebo.

We rely on limited sources of supply…, page 19

10. Please file copies of supplier agreements as exhibits and describe the material terms of the agreements in your filing or, alternatively, please tell us why you are not substantially dependent on those suppliers.

Our design for the device component of our product candidates…, page 20

11. Please expand you disclosure in the Business section to describe the stage of development for each of your devices.

Our future success depends on our ability to retain key executives…, page 26

12. Please expand your risk factor to disclose that each of your executive officers is employed "at-will."

13. This risk factor addresses two separate risks: (1) the risk of retaining key executives and other qualified personnel; and (2) the risk that consultant and avisors may be employeed by others and may have commitments under consulting or advisory contracts with other entities that may limit their availability to the company. Please separate the disclosure of these two risks under two appropriately titled risk factors.

Business, page 66

ARX-01 – Acute Post-Operative Pain, page 66

14. We note that you are using data from 2002 and 2003 for the percentage of errors resulting in patient deaths. Please update your disclosure with more recent data.

Sufentanil NanoTab PCA System—ARX-01 Clinical Program, page73

15. Please describe what you mean by the "summed pain intensity difference" when you first use this phrase.

Sufentanil/Triazolan NanoTab—ARX-03 Clinical Program, page 82

16. Please describe what you mean by "Richmond Agitation-Sedation Scale" when you first use this phrase.

Intellectual Property, page 84

17. Please expand your disclosure to provide the expiration date of the European Patent you hold. Also, with respect to this European Patent and the rest of the patent applications, please disclose what these patent and patent applications relate to.

Executive Compensation, page 105

Cash Bonuses, page 111

18. We note that in connection with the hiring of Messrs. King and Welch the compensation committee approved annual cash bonus targets. To the extent these bonuses will be paid based on the achievement of performance goals set in advance, please describe the performance goals. To the extent quantifiable, please quantify the performance metrics. Alternatively, if the bonuses will be awarded at the discretion of the board and no performance goals were set in advance, please disclose that fact.

Long-Term Equity Incentive Awards, page 111

19. Please expand your disclosure to describe and quantify, to the extent quantifiable, the corporate milestones and financial milestones that will result in the grant of an option covering 1% of the company for Mr. King and an option covering 100,000 shares for Mr. Welch. Please also disclose when the achievement of these milestones will be measured.

Notes to Financial Statements, page F-8

Note 1. Organization and Summary of Significant Accounting Policies, page F-8

Liability Associated with Warrants to Purchase Convertible Preferred Stock, page F-12

20. You state that "changes in the estimated fair value of the convertible preferred stock during the period are recorded through other income…" Based on your other disclosures it appears that you are referring to your convertible preferred stock warrants. Please revise your disclosures to refer to the convertible preferred stock warrants or further advise us about why changes in the estimated fair value of the convertible preferred stock during the period are recorded in operations.

Note 7. Warrants, page F-20

21. We note the fair values disclosed for the convertible preferred stock warrants at December 31, 2008 and 2009, and September 30, 2010. The total liabilities summed from the disclosures ($10,000+ 986,000+ 1,200,000 = $2,196,000) do not equal that stated on the balance sheet for September 30, 2010 of $2,219,000. Please revise your disclosures such that the total convertible preferred stock warrant liabilities are consistent with the balance sheet or further advise us about why these amounts do not equal.

22. With regards to valuing your 2010 warrants to purchase Series C convertible preferred stock, you disclose that you evaluated multiple potential outcomes using the intrinsic value or Black-Scholes value with multiple scenarios, and discounted the values back to September 30, 2010. Aside from the scenarios disclosed, please tell us what other scenarios were simulated in your evaluation of potential outcomes to determine a value for your warrants. Also tell us how you evaluated the various outcomes from the scenarios to arrive at your final estimate for the 2010 warrant. Additionally, please tell us what accounting literature was relied upon in making your determination that using the intrinsic value was appropriate for valuing your warrants.

Note 11. Net Loss Per Share of Common Stock, page F-32

23. Please revise your disclosures for total convertible preferred stock warrants such that your quantitative disclosures and qualitative disclosures at note 7 for the total convertible

preferred stock warrants are consistent. For example, at Note 5 and 7 you disclose that 10,000 convertible preferred stock warrants were issued in 2007 (Series A), 225,000 were issued in 2008 (Series B), and 913,056 were issued in 2009 (Series C). This disclosure is not consistent with your disclosures at page F-32 that 923,056 convertible preferred stock warrants were outstanding at December 31, 2008 and 2009, and for the nine months ended September 30, 2009 and 2010.

24. Please revise your disclosure for the total "stock options to purchase common stock" outstanding at December 31, 2009 (2,657,500) to be consistent with the "number of shares underlying outstanding options" at Note 10 Stock-Based Compensation (2,662,500) or further advise us about why these amounts should be different.

We urge all persons who are responsible for the accuracy and adequacy of the disclosure in the filing to be certain that the filing includes the information the Securities Act of 1933 and all applicable Securities Act rules require. Since the company and its management are in possession of all facts relating to a company's disclosure, they are responsible for the accuracy and adequacy of the disclosures they have made.

Notwithstanding our comments, in the event you request acceleration of the effective date of the pending registration statement please provide a written statement from the company acknowledging that:

- should the Commission or the staff, acting pursuant to delegated authority, declare the filing effective, it does not foreclose the Commission from taking any action with respect to the filing;

- the action of the Commission or the staff, acting pursuant to delegated authority, in declaring the filing effective, does not relieve the company from its full responsibility for the adequacy and accuracy of the disclosure in the filing; and

- the company may not assert staff comments and the declaration of effectiveness as a defense in any proceeding initiated by the Commission or any person under the federal securities laws of the United States.

Please refer to Rules 460 and 461 regarding requests for acceleration. We will consider a written request for acceleration of the effective date of the registration statement as confirmation of the fact that those requesting acceleration are aware of their respective responsibilities under the Securities Act of 1933 and the Securities Exchange Act of 1934 as they relate to the proposed public offering of the securities specified in the above registration statement. Please allow adequate time for us to review any amendment prior to the requested effective date of the registration statement.

You may contact Christine Allen at (202) 551-3652 or Lisa Vanjoske at (202) 551-3614 if you have questions regarding comments on the financial statements and related matters. Please contact Sebastian Gomez Abero at (202) 551-3578 or Dan Greenspan at (202) 551-3623 with any other questions.

Sincerely,

Jeffrey P. Riedler
Assistant Director

Cc: Mark B. Weeks
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