



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

Mail Stop 3030

May 27, 2010

Via Facsimile and U.S. Mail

Mr. Paul V. Maier  
Chief Financial Officer  
Sequenom, Inc.  
3595 John Hopkins Court  
San Diego, California 92121

**Re: Sequenom, Inc.**  
**Form 10-K for the year ended December 31, 2009**  
**Filed March 16, 2010**  
**File No. 0-29101**

Dear Mr. Maier:

We have reviewed your filing and have the following comments. Where indicated, we think you should revise your documents in future filings in response to these comments. If you disagree, we will consider your explanation as to why our comments are inapplicable or a revision is unnecessary. Please be as detailed as necessary in your explanation. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure. After reviewing this information, we may raise additional comments.

Please understand that the purpose of our review process is to assist you in your compliance with the applicable disclosure requirements and to enhance the overall disclosure in your filing. We look forward to working with you in these respects. We welcome any questions you may have about our comments or any other aspect of our review. Feel free to call us at the telephone numbers listed at the end of this letter.

Form 10-K for the year ended December 31, 2009

Item 1. Business, page 1

Molecular Diagnostics and SEQuireDx<sup>tm</sup> Technology, page 2

1. We understand from your disclosure and other sources that in April 2009 you announced that the expected launch of your test for Trisomy 21 based on mRNA had been delayed and that you were no longer relying on your previously announced test data and results. We also understand that at that time you switched from pursuing a Trisomy 21 test based on mRNA to one based on DNA. If so, and with a view towards revised disclosure in future filings, please tell us why you switched from an mRNA based test to a DNA based test. Please tell us about the advantages and disadvantages of a DNA based test as compared to the mRNA based test that you were pursuing up until April 2009.
2. Please tell us and in your future filings please disclose why you are no longer relying on your previously announced research and development test data.
3. We understand from your current disclosure that you are developing your Trisomy 21 test based on DNA sequencing. Given your current disclosure that you are using circulating cell-free fetal (ccff) nucleic acid based assay technology, it is unclear from your current disclosure how your DNA test would detect aneuploidies since you are studying cell-free nucleic acid. With a view towards revised disclosure in future filings, please tell us what your technology currently involves. If it involves the study of ratios of detected fetal chromosomes, please tell us of the advantages and disadvantages of this approach over the mRNA tests in terms of reliability, sensitivity, cost, intellectual property, etc. If you have any publications or proof-of-concept papers regarding your development of a DNA based test, please include them with your response. Please note in this regard that we are not looking for detailed, confidential or proprietary information; what we are looking for is information that would provide sufficient disclosure so that your investors would have an adequate understanding of the diagnostic tests that you are trying to develop for aneuploidies.
4. We note from your risk factor disclosure that a special committee recommended remedial measures after their investigation into your research related issues. Please describe those measures, how they addressed the previous weaknesses and indicate what remains to be done in terms of implementing those measures.

Item 1A. Risk Factors, page 14

5. We note from your disclosure under “Item 3. Legal Proceedings” that you have agreed to issue a number of shares of your common stock equal to 9.95% of your outstanding common stock at the time of determination under a stipulation of settlement entered into

on December 24, 2009. In your future filings, please include risk factor disclosure regarding the potential for dilution to your existing shareholders from this provision.

We may not be able to form and maintain the collaborative relationships..., page 29

6. We note from your risk factor that you must achieve certain milestones, particularly regarding your planned Trisomy 21 test, or risk losing your exclusive license rights from Isis. Please generally describe the nature and timing of each milestone and your progress towards reaching those milestones to date so that your investors will understand this risk.

Item 9A. Controls and Procedures, page 60

7. We note your statement that “a controls and procedures, no matter how well conceived, implemented and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met.” Please revise future filings to state clearly, if true, that your disclosure controls and procedures are designed to provide reasonable assurance of achieving their objectives and that your principal executive officer and principal financial officer concluded that your disclosure controls and procedures are effective at that reasonable assurance level. In the alternative, please remove the reference to the level of assurance of your disclosure controls and procedures. Please refer to Section II.F.4 of Management’s Reports on Internal Control Over Financial Reporting and Certification of Disclosure in Exchange Act Periodic Reports, SEC Release No. 33-8238, available on our website at <<http://www.sec.gov/rules/final/33-8238.htm>>. This comment also applies to your Form 10-Q for the quarterly period March 31, 2010.

Item 10. Directors, and Executive Officers and Corporate Governance, page 65

8. We note that on page 6 of the proxy statement that you have incorporated by reference into your Form 10-K your disclosure regarding the specific experience, qualifications, attributes and skills of each nominee for director appears to focus largely on their prior service as officers and directors. Your disclosure does not address clearly what elements of a nominee’s experience you considered that led you to conclude that such person should serve as your director. If you selected your nominees simply because they served as officers and directors, please state that clearly in your future filings. Otherwise, provide an in depth discussion of the elements of their experience that you considered in reaching the decision to nominate them, as required by Item 401(e) of Regulation S-K.

Item 11. Executive Compensation, page 65

9. Based upon our review of the Part III information that you have incorporated by reference from your proxy statement into your Form 10-K, it does not appear that you included any disclosure in response to Item 402(s) of Regulation S-K in your proxy statement. Please

advise us of the basis for your conclusion that such disclosure was not necessary and describe the process you undertook to reach that conclusion.

10. We note your disclosure on page 38 of the proxy statement that you have incorporated by reference into your Form 10-K that you target stock option awards for your named executive officers at the 50<sup>th</sup> to 75<sup>th</sup> percentile of your peer companies. Given that you target stock option awards, please briefly discuss in your applicable future filings how each stock option award you provide to the named executive officers relates to the data you have analyzed from the peer companies and include an analysis of where actual stock option awards fell within the targeted range. If any of your named executive officers are compensated at levels that are materially different from the targeted levels of stock option awards, please also provide discussion and analysis as to why.
11. Please explain how you determined the amount of each restricted stock unit award made to your named executive officers in December 2009, as disclosed on page 39 of your proxy statement that you have incorporated by reference into your Form 10-K. Refer to Item 402(b)(v) of Regulation S-K.

Note 8 – Commitments and Contingencies, page F-24

Collaboration, Development and Licensing Agreements, page F-25

12. We note that in exchange for modifying certain terms of your agreement with ISIS, you agreed to increase your specified minimum royalty payments. If material, please revise future filings to disclose the timing and amount of minimum royalty payments due under the agreement.

Note 11 – Income Taxes, page F-34

13. We note the significance of the “credits and other” line item in your Federal statutory rate reconciliation. Please revise future filings to disclose any material components that comprise this balance. Provide us with a sample of your proposed disclosure.

Exhibits 31.1 and 31.2

14. We note that in each of the certifications filed as exhibits 31.1 and 31.2 the language in each of the certifications referring to the report has been changed to refer to the annual report. In future filings, please ensure the form of the certification is exactly as set out in Item 601(b)(31)(i) of Regulation S-K.

As appropriate, please respond to these comments within 10 business days or tell us when you will provide us with a response. Please furnish a cover letter that keys your responses to our comments and provides any requested information. Detailed cover letters greatly facilitate

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our review. Please understand that we may have additional comments after reviewing your responses to our comments.

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 all information required under the Securities Exchange Act of 1934 and that they have provided all information investors require for an informed investment decision. 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.

In connection with responding to our comments, please provide, in writing, a statement from the company acknowledging that:

- the company is responsible for the adequacy and accuracy of the disclosure in the filing;
- staff comments or changes to disclosure in response to staff comments do not foreclose the Commission from taking any action with respect to the filing; and
- the company may not assert staff comments as a defense in any proceeding initiated by the Commission or any person under the federal securities laws of the United States.

In addition, please be advised that the Division of Enforcement has access to all information you provide to the staff of the Division of Corporation Finance in our review of your filing or in response to our comments on your filing.

You may contact Eric Atallah, Staff Accountant, at (202) 551-3663 or me at (202) 551-3643 if you have questions regarding comments on the financial statements and related matters. Please contact Ruairi Regan, Staff Attorney, at (202) 551- 3269, or Tim Buchmiller, Reviewing Attorney, at (202) 551-3635 if you have questions on any other comments. In this regard, do not hesitate to contact me or Martin James, Senior Assistant Chief Accountant, at (202) 551-3671 with any questions.

Sincerely,

Kevin L. Vaughn  
Accounting Branch Chief