



DIVISION OF
CORPORATION FINANCE

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

September 27, 2012

Via E-mail

Martin P. Rosendale
Chief Executive Officer
Cytomedix, Inc.
209 Perry Parkway, Suite 7
Gaithersburg, MD 20877

**Re: Cytomedix, Inc.
Registration Statement on Form S-3
Filed August 31, 2012
File No. 333-183703**

Dear Mr. Rosendale:

We have limited our review of your registration statement to those issues we have addressed in our 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 statements and providing the requested information. Where 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.

Fee Table

1. We note that you are seeking to register the resale of shares issuable upon the exercise of warrants, of which only 30% appear to be currently exercisable. We note that the remaining 70% of these warrants are exercisable only upon the issuance of the third post-closing consideration mentioned in section 2.4 of the Exchange and Purchase Agreement filed as exhibit 2.1 to your Form 8-K filed on February 9, 2012. As it does not appear that the issuance of the third post-closing consideration has yet occurred, please tell us why you believe it is appropriate to register for resale the shares underlying the warrants that are not yet exercisable. Alternatively, revise your fee table to remove the shares underlying warrants not yet exercisable from registration.
2. We note that footnote (1) as written appears to exceed the scope of Rule 416. Please revise the footnote to track the language of Rule 416.

Prospectus Summary, page 1

3. Please revise your Summary to highlight your current financial position, including quantified disclosure of your history of net losses, accumulated deficit, and substantial indebtedness, as well as your audit report containing an explanatory paragraph that substantial doubt exists as to your ability to continue as a going concern. Please also quantify the amount of cash that you are spending per month and how long your present funds will last at your current monthly rate. Finally, please also disclose any liquidity sources and what your capital needs will be for the near term.

Risk Factors, page 3

4. Please revise to eliminate the third sentence of the italicized introductory paragraph and revise as necessary to include a discussion of all material risks in your risk factor section.

We may need substantial additional financing..., page 3

5. We note your disclosure that you have registered over 12 million shares for sale by Lincoln Park Capital pursuant to an equity line financing arrangement that ends in January 2013. Here and elsewhere in your document, as appropriate, please revise to quantify the number of these shares that remain unsold.

Signatures, page 27

6. Please revise to indicate below the second paragraph of text required on the signature page who is signing in the capacity of controller or principal accounting officer. Refer to Instruction 1 to Signatures on Form S-3.

Exhibit 5.1

7. Please file an opinion that does not contain the limitation on reliance contained in the penultimate sentence of the opinion. For guidance, please refer to Section II.B.3.d of Staff Legal Bulletin No. 19, available on the Commission's website.

Exhibits 23.1, 23.2 and 23.3

8. We reference the disclosure in Exhibit 23.2 that the copy of the audit report in the Form 10-K includes a typographical error in the date. Please amend your December 31, 2011 Form 10-K incorporated by reference in this Registration Statement to include an audit report with the correct date. Please also have your auditors remove the language related to the error in their audit report in the updated consent.
9. To the extent there is a delay in requesting effectiveness of your registration statement, or there is any change, other than typographical, made to the financial statements, or there

have been intervening events since the prior filing that are material to the company, please provide currently dated and signed consents from your independent accountants with your next amendment.

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.

Martin Rosendale
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You may contact Julie Sherman at (202) 551-3640 or Brian Cascio, Accounting Branch Chief, at (202) 551-3676 if you have any questions regarding comments on the financial statements and related matters. Please contact Tom Jones at (202) 551-3602 or Mary Beth Breslin, Senior Attorney, at (202) 551-3625 with any other questions.

Sincerely,

/s/ Mary Beth Breslin for

Amanda Ravitz
Assistant Director

cc (via e-mail): F. Alec Orudjev, Esq.