



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

DIVISION OF
CORPORATION FINANCE

September 14, 2010

Martin P. Rosendale
Chief Executive Officer
Cytomedix, Inc.
416 Hungerford Drive, Suite 330
Rockville, Maryland 20850

**Re: Cytomedix, Inc.
Registration Statement on Form S-3
Filed August 19, 2010
File No. 333-168936**

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 statement 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.

Selling Security Holders, page 10

1. Given the nature and size of the transaction being registered, please tell us your basis for determining that the transaction is appropriately characterized as a transaction that is eligible to be made on a shelf basis under Rule 415(a)(1)(i). Please also address the following in your response.
 - It appears that the selling security holders currently do not have the right to acquire 333,334 of the shares underlying warrants that were issued pursuant to the guaranty agreements. Please advise how you concluded that it is appropriate to register these shares for resale.
 - We note your disclosure on page 15 that the warrants issued pursuant to the guaranty agreements were issued in part to secure your obligations under the promissory note that was executed in connection with your acquisition of Sorin Group USA, Inc. Please advise whether any proceeds from the resale of shares being offered on this

registration statement will be used to repay the company's debt obligations under the promissory note.

- With a view toward disclosure, please tell us whether any of the selling security holders were affiliated with Sorin Group USA, Inc.
2. With respect to the shares to be offered for resale by each selling security holder that is a legal entity, please disclose the natural person or persons who exercise the sole or shared voting and/or dispositive powers with respect to the shares to be offered by that shareholder.
 3. Please tell us whether the selling shareholders are broker-dealers or affiliates of a broker-dealer.

Signatures, page 25

4. 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.

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

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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.

Please contact Celia Soehner at (202) 551-3463 or Mary Beth Breslin, Senior Attorney, at (202) 551-3625 with any questions.

Sincerely,

Russell Mancuso
Branch Chief

cc (via facsimile): F. Alec Orudjev, Esq. — Cozen O'Connor