Circulating tumor cells in localized prostate cancer: isolation, cultivation in vitro and relationship to T-stage and Gleason score.

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Abstract

The most promising near-term application of circulating tumor cells (CTCs) monitoring relates to the development of targeted cancer therapies, and the need to tailor such treatments to individual tumor characteristics. A high number of new innovative technologies to improve methods for detecting CTCs, with extraordinarily high sensitivity, have recently been presented. The identification and characterization of CTCs require extremely sensitive and specific methods that are able to isolate CTCs with the possibility of cultivation and downstream analysis of in vitro culture of separated CTCs. In this original research paper, we demonstrate that it is possible to isolate human CTCs from a patient with prostate cancer, with subsequent cultivation and proliferation in vitro. We show that the use of a filtration device implemented by MetaCell® can fulfill all the requirements mentioned above. Fifty-five patients with localized prostate cancer have so far been enrolled into the study. CTCs were detected in the blood samples of 28 (52%) out of the 55 patients. We report successful isolation of CTCs from patients with prostate cancer, capturing cells with a proliferative capacity in 18 (64.3%) out of the 28 CTC-positive patients. Direct correlation with Gleason score and T stage was not proven. The cells, captured by a size-based filtration approach, remain in a good state, unaffected by any antibodies or lysing solutions. During the filtration process, no interactions occurred between antibodies and antigens on the surface of CTCs. This biological interaction is specific for immunomagnetic methods. The MetaCell device provides the possibility of reaching virgin CTCs suitable for subsequent cultivation or single-cell analysis. This aspect will have an important impact on the future design of clinical trials testing new drugs against targets expressed on metastatic cancer cells. In addition to measurement of CTC counts, future trials with targeted therapies should also include the assessment of the specific therapeutic target on CTCs.

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