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Journal of Tumor Research

Perspective

Types and Detection Methods on Circulating of Tumor Cells

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DESCRIPTION

Circulating Tumor Cells (CTCs) are cancer cells that divide away from the primary tumor and appear in the circulatory system as singular clusters or units. Dr. Thomas Ashworth first described CTCs in 1869. The transfer and embedding occur at a new site. This process is commonly known as tumor metastasis. Indeed, CTC range from 7.2–10 microns for small-cell type cancers (e.g., small cell lung carcinoma), 11.8 to 23.9 microns for solid tumor cells and 8.9–15.3 microns for blood type cancers.

Types

There are four types of circulating tumor cells. Cytokeratin-negative CTCs are characterized by the absence of cytokeratin's or EpCAM, which may specify an undifferentiated phenotype that circulating cancer stem cells or the attainment of a mesenchymal phenotype that is known as epithelial-mesenchymal transition, or EMT. These types of circulating tumor cells might be the most resistant and most disposed to metastasis. They are also more difficult to separate because they precise neither CD45 nor cytokeratin's. Otherwise, their gene expression, morphology, and genomics are related to those of other cancer cells.

Apoptotic Circulating Tumor Cells (CTCs) are present in the peripheral blood of metastatic colorectal cancer patients and are linked with liver metastasis but not CTCs. These may be used to display treatment response, as done experimentally by the Epic Sciences method that recognizes cytoplasmic blebbing or nuclear fragmentation related to apoptosis. Measuring the ratio of apoptotic CTCs to traditional CTCs from the baseline to treatment provides indications of treatment efficacy in targeting and killing the cancer cells. Small CTCs are also known as CD45-negative and cytokeratin-positive, but they are similar to white blood cells in size and shape. Essentially, small CTCs have cancer-specific biomarkers that classify them as CTCs. Small CTCs have been involved in progressive disease and separation into small cell carcinomas, which frequently require a different therapeutic course. As in an earlier study, CTCs are responsible for tumor metastasis. Still, considering that most deaths caused by cancer are due to metastasis, A new cancer therapy that considers CTCs as a target has been proposed by scientists. Thus, the disorder of cancer cell distribution would represent a controlling therapeutic strategy.

CONCLUSION

However, due to the lack of a technical assessment of the effects of CTC clearance *in vivo*, most of studies assume that CTC elimination could radically prevent tumor metastasis. To address this condition, they transplanted Green Fluorescent Protein (GFP) expressing the CTCs into mice, applied photodynamic therapy to specifically kill GFP-expressing CTCs, evaluated the therapeutic efficacy of CTC removal, and finally showed that CTC elimination metastases can prevent and prolong the survival time of the tumor-bearing mice. The most extensively used method for CTC detection and isolation is immune-based detection, where antibodies are used to selectively bind cell surface antigens. Tumor cells have different cell surface markers than blood cells, so they can be separated from the circulatory cells. CTCs from whole blood can be separated on the filter by rotating the disc, and the time taken to isolate CTCs from 3 mL of whole blood is less than 1 min. For CTC counting, immunostaining can be done on the disc.

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Received: 07-Feb-2022, Manuscript No. JTDR-22-18208; **Editor assigned:** 11-Feb-2022, PreQC No. JTDR-22-18208 (PQ); **Reviewed:** 25-Feb-2022, QC No. JTDR-22-18208; **Revised:** 04-Mar-2022, Manuscript No. JTDR-22-18208 (R); **Published:** 11-Mar-2022, DOI:10.35248/2684-1258.22.8.167.

Citation: Zang X (2022) Types and Detection Methods on Circulating of Tumor Cells. J Tumor Res.8:167.