Proceedings International
Platinum Open Access Journal (ISSN 2668-6384)

Proceedings, Abstract
Volume 4, Issue 1, 2022, 25
https://doi.org/10.33263/Proceedings41.025

Potential Added Value of Flow Cytometry Single-cell Analysis of Solid Tumors †

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† Presented at 1st OncoHub Conference – Connecting Scientists for Next Generation Cancer Management (13-15 October 2021, virtual)

Received: 25.10.2021; Accepted: 5.02.2022; Published: 14.02.2022

Abstract: Flow cytometry (FCM) is unique in measuring multiples parameters quantitatively, on a large number of cells, at an individual level. FCM is based on direct immuno-labeling with fluorochrome-conjugated antibodies giving high sensitivity and sparing time in sample preparation. FCM can be performed on fresh tissue after enzymatic or mechanical dissociation. The tumor must be compared to adjacent normal tissue. Epithelial cells and leukocytes are easily distinguished, and both tumor cells and Tumor-infiltrating lymphocytes can be analyzed simultaneously. Expression of epithelial antigens, cytokeratin isoforms, Tumor-Associated Antigens (TAA), neoantigens, cell proliferation rate, heteroploidy, hormone or growth factor receptors, immuno- regulatory proteins, and adhesion molecules can tell about differentiation, capacity for tissue invasion, metastasis seeding. Tumor heterogeneity can be explored quantitatively, and rare, potentially emerging clones with poor prognosis can be detected early. FCM can also be used to detect circulating tumor cells, measuring metastatic potential at diagnosis or during treatment, especially during surgical removal. Detecting CTC could be a way for early detection of tumors before it is clinically expressed. So FCM could be a very helpful tool for cancer diagnosis, stratification, and prognosis evaluation and orientating personalized treatment, including adjuvant therapy and immunotherapy. Still, more development is required to have enough available conjugated antibodies for tumor cells to be evaluated and to know better the tumor phenotypes regarding tissue of origin and the potential invasiveness while anti-tumor immunity is already largely characterized.

Keywords: flow cytometry; solid tumor heterogeneity; tumor cell; tumor antigens; liquid biopsy.

Funding

This research received no external funding.

Acknowledgments

This research has no acknowledgment.

Conflicts of Interest

The authors declare no conflict of interest.