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Mini Review

INVESTIGATING DRUG RESPONSE ASSAY'S POTENTIAL FOR PRECISION THERAPY IN OVARIAN CANCER

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ABSTRACT

Different patient reactions to current standard of care anti-cancer medications are one of the biggest obstacles in the treatment of cancer. Different genetic, epigenomic, proteomic, and metabolic abnormalities across people with the same kind of cancer may contribute to these varied responses. Precision medicine is an emerging method in cancer therapies that takes into consideration distinct genomic abnormalities, environmental factors as well as lifestyle of individual patients. Using the patient's unique tumour features, this method enables clinicians and researchers to choose or forecast the treatments that would most likely benefit the patient. Predictive in vitro drug-response assays that measure the sensitivity of patient tumour cells to standard or experimental treatments are one type of precision medicine tool.

Keywords: Cancer therapeutics; Precision medicine; Drug response assays

INTRODUCTION

Cancer is a huge global health problem. According to the World Health Organization (WHO), cancer causes one out of every six fatalities and is the second biggest cause of mortality after cardiovascular disease. The American Cancer Society predicts that there will be 1,806,590 new cancer diagnoses and 606,520 cancer-related deaths in the United States in only 2020. For the clinical management of the majority of cancers, traditional cancer therapy techniques like surgery, radiation therapy, and chemotherapy still hold sway. Despite the fact that these treatments have improved the overall survival of many cancer patients, their effects may only be seen by a small number of cancers that are particularly responsive to treatment. Moreover, some treatments may cause long-term negative effects. Live patient tumour cells are exposed to several chemotherapeutic and other compounds in drug- response assays, which are in vitro platforms used to test the sensitivity of the patient's tumour cells to the drugs.

DISCUSSION

With years of ovarian cancer research experience, we worked together with colleagues to design a 3D organoid-based platform for high throughput drug screening. In this test, malignancies are removed from patients using techniques that have been accepted by the institutional review board (IRB). These cells can either be utilised fresh in the test or cryopreserved. Dissociated tumour cells

are suspended in Matrigel and plated around the rim of a well in a 96-well plate to produce a miniring, allowing the development and creation of several organoids within the same well. In this test, tumour organoids are given two days to grow before receiving medication in a dose-dependent way for three days. Organoids are expelled from the Matrigel after treatment. This strategy has a number of benefits as a platform for drug testing. First off, the ability to create organoids from a range of tumour materials, such as solid tumours, ascites, and pleural effusion, makes this assay practically feasible. Second, because this assay only requires a little amount of cellular input, biopsy samples can also be examined. Third, since assay results can be available a week after the clinical sample is collected they are compatible with the timetable for treatment decision-making. Placing organoids in deeper culture dish wells allows researchers to examine the histology of the cells. The choice of suitable models for preclinical research is one of the largest obstacles in the development of cancer drugs [1,2].

High throughput drug screening should be possible with a preclinical model, which should ideally reflect the heterogeneity and genetic landscape of the tumour as nearly as possible. Cancer cells cultivated in 2D culture, organoids/spheroids grown in 3D culture and patient-derived xenograft models are the three primary preclinical models for drug testing. Due to its capacity to combine two advantages the ability to accurately reproduce tumour architecture and compatibility with timely high throughput drug screening—3D cell culture models may prove to be the most promising tool in preclinical research. We have emphasised the importance of chemotherapy-response assays in ovarian cancer in this study. Yet there is no perfect model. In conclusion, this research looks at current chemo-response assays and how they might help patients with ovarian cancer have a better clinical result by foretelling ex vivo therapy responses. Development of such tests are specifically essential in the setting of ovarian cancer as most patients treated with the usual platinum-based chemotherapy eventually develop recurrent disease that is resistant to this treatment. The median overall survival of ovarian cancer patients with platinum resistant illness is around one year due to the lack of efficient second-line chemotherapies. As a result, the treatment of patients with ovarian cancer urgently requires novel therapeutic approaches. In recent years molecular targeted treatments have showed considerable promise for individualised treatment of ovarian cancer patients. For instance, inhibitors of poly (ADP-ribose) polymerase (PARP) and anti-angiogenic [3-6]

CONCLUSION

These assays must contain supporting tumor microenvironment cells for improved disease modelling in vitro, be compatible with automation and high throughput analysis in a cost-effective way, and use cell culture models that replicate the actual tumour architecture. Validation of these tests through well-planned prospective, blinded, multi-center clinical studies is also crucial for clinical translation. We think that a trustworthy bioassay-directed treatment selection could enhance patient quality of life while also lessening the financial burden imposed by the expenses related to administering ineffective treatment regimens.

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