

Developments in Gene Therapy and Immunotherapy

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Editorial

Yang et al. demonstrated that PD-L [1] defends and protects through its presence of exosomes. Exosomes have the ability to disrupt T-cell functions. The inhibition of PD-L1-containing exosomes could enhance the PD-L1 therapy for anti-tumor efforts. In higher stages of cancer, there are higher levels of PD-L1, which are believed to be secreted from tumors that stop T-cell killing activities. With both anti-tumor therapy and inhibition of exosome secretion, anti-tumor immunity will be enhanced.

News from multiple sources shows a new standard [2], in the care of Waldenström macroglobulinemia patients. From a trial testing the differences between using rituximab versus rituximab and ibrutinib, there is significant evidence proving rituximab coupled with ibrutinib counteracts the effects of mutations. In the phase III trial, there were improved responses from treatment with both rituximab and ibrutinib, making it the new standard for treatment. The use of both rituximab and ibrutinib reduced both the chances of death and further progression of the disease. Both drugs are used to improve overall survival, response rate, and safety.

Non-Hodgkin's lymphoma (NHL) is a cancer involving cancerous growth of B-cells. The BTK gene, encoded by Bruton's tyrosine kinase, has a large role in B-cell functions. In the past, NHL was treated by inhibiting BTK kinase activities. In many cancers, there has been a resistance to ibrutinib, which is used to inhibit BTK. A new method [3], to treat NHL is through degrading certain proteins using proteolysis-targeting chimera (PROTAC). PROTAC has been found to be effective in degrading BTK that is resistant to ibrutinib. The method of degradation rather than inhibition shows a powerful method in treating future cancers insusceptible to drugs.

One of the main goals of the phase III IMpassion 130 study, progression free survival, has been achieved. The study focused on progression free survival (PFS) in triple negative breast cancer patients [4]. The use of both atezolizumab and albumin-bound paclitaxel improve PFS significantly more than just albumin-bound paclitaxel. Overall survival is positive and overall safety is similar to other treatments. By utilizing a double-blind experiment with randomization, this study proves to be proceeding in the right direction.

The global life sciences sector is transforming by advancing its technological methods to focus more on the patient. A 2018 Global life sciences outlook [5], concluded that companies are trying to incorporate new advancements like artificial intelligent (AI) to gather more data to improve their methods, but they also need to implement strong security measures. Creating a more united workplace by giving employees more freedom and allowing departments to work together will maximize overall efficiency. The companies are trying to focus on what their patients want like by trying to keep prices as low as possible.

The growth in the life sciences sector causes a lot of unpredictability. As a result, companies are trying to combat this obstacle by observing trends to create strategies to succeed in the future.

When the BRAF aserine/threonine kinase is mutated, a series of pathways are triggered, which ultimately results in uncontrolled cell growth and development. Based a recent study, there are [6], high amounts of PD-L1 expression with BRAF mutant NSCLC. When comparing BRAF V600E and BRAF non-mutant tumors, there are no major differences between the two. The responses and immune checkpoint inhibitors (ICPi) activity were similar. This study was not perfect and had its own set of limitations that allow for some hypotheses, but more research is needed to support those ideas.

Practically every eukaryote has multiple chromosomes, but the advantage of many chromosomes is unknown. The genome of *Saccharomyces cerevisiae* was examined. The chromosomes were fused, and the centromeres and telomeres were deleted. One drawback of combining 16 chromosomes was the loss of interchromosomal interactions, which impacted the structure of the fused chromosome. It was discovered that the 125 bp single point centromere can separate and cut a 11.8 MB chromosome. One functional single-chromosome was successfully created [7], although it is not as efficient in terms of reproduction, competition, and growth.

The Cancer Genome Project has concluded after over 10 years of research. Data was collected by sequencing and annotating thousands of tumors from about 33 cancers. By looking at the tumors on a molecular level, they can be better characterized. The data is used to enhance our knowledge on how these tumors function. An in-depth analysis of the data allows for patterns to be analyzed for future work [8].

T cells have the ability to fight against cancer cell, which is triggered by antibodies. In situ vaccination was used to determine an immunostimulatory agent that could induce T cell activities [9]. The TLR ligand is used to give rise to OX40 expression, which helps T cell functions. The anti OX40 antibody starts the antitumor actions. The anti OX40 antibody coupled with a TLR ligand can be a potential cure to cancer and even prevent it.

The FDA has begun to implement actions based on the Cures Act [10]. One thing the FDA is starting to do is improve clinical trials by employing virtual patients. These virtual patients respond based on data from past trials and other knowledge to hopefully replace real patients in the future. The FDA is also trying to make clinical trials more efficient by testing multiple drugs and multiple diseases in a single trial instead of the one-drug one-disease trials, which is called Mater Clinical Trail Protocols. By doing this, the FDA aims to cut costs and increase efficiency. To increase efficiency, the FDA plans on creating a continuous trial without three distinct phases and creating surrogate endpoints. Both of these will reduce the time spent on trials.

Surrogate end points are used in trials that span a long period of time to speed up approvals. With these new innovations, the FDA aims to improve care with efficiency and affordability.

References

1. Yang Y, Li CW, Chan LC, Wei Y, Hsu JM, et al. (2018) Exosomal PD-L1 harbors active defense function to suppress T cell killing of breast cancer cells and promote tumor growth. *Cell Res* 28: 862-864.
2. Ibrutinib/Rituximab Emerges as New Standard in Waldenstrom Macroglobulinemia.
3. Sun Y, Zhao X, Ding N, Gao H, Wu Y, et al. (2018) PROTAC-induced BTK degradation as a novel therapy for mutated BTK C481S induced ibrutinib-resistant B-cell malignancies. *Cell Res* 28: 779-781.
4. IMpassion130 study shows improved PFS in triple negative breast cancer.
5. Life sciences healthcare/articles/global-life-sciences-sector-outlook.
6. Dudnik E, Peled N, Nechushtan H, Wollner M, Onn A, et al. (2018) BRAF Mutant Lung Cancer: Programmed Death Ligand 1 Expression, Tumor Mutational Burden, Microsatellite Instability Status, and Response to Immune Check-Point Inhibitors. *J Thoracic Oncology* 13: 1128-1137.
7. Shao Y, Lu N, Wu Z, Cai C, Wang S, et al. (2018) Qin, Creating a functional single-chromosome yeast. *Nature* 560: 331-335.
8. Hoadley KA, Yau C, Hinoue T, Stuart JM, Benz CC, et al. (2018) Pan-Cancer Atlas. *Cell* 173: 291-304.
9. Barfi S, Czerwinski DK, Levy S, Alam IS, Mayer AT (2018) Eradication of spontaneous malignancy by local immunotherapy. *Sci Transl Med* 10: p4488.
10. US Food and Drug Administration. US Department of Health and Human Services.