

Triple-Negative Breast Cancer and Recent Advancements in Treatment

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Description

Cancer is a major disease imposing a major burden on the socio-economic status of the patients. With recent advancements in genome sequencing and analysis early diagnosis with identification of novel biomarkers and assessment of various cancer types has improved [1,2]. Apart from genomics, a combinatorial proteogenomic approach is also practiced to gain better insights on cancer biomarkers [3]. Along with this computational biology has aided research with new tools like machine learning based decision support system as a prognosis for cancer [4].

Breast cancer has four molecular subtypes which are predominantly based on genes involved. Triple Negative Breast Cancer (TNBC) is considered as an aggressive tumour which lacks progesterone and estrogen receptors along with human epidermal growth factor receptor 2 protein. TNBC in particular is associated with frequent recurrence and chemo resistance. Till date no clear consensus has been achieved as a standardized care for TNBC.

15 drugs are currently in research/trials for chemotherapy against TNBC. Among the existing therapies, the common class of agents consisting of taxanes and anthracycline are in treatment regimens [5]. Apart from the regular chemotherapeutic regimens new modes of treatment are under clinical trials.

With the aid of technology, the drug discovery process has also taken a leap in discovering novel drugs both synthetic and natural derivatives. Anti-metabolite based GEICAM trials with adjuvant Capecitabine after standard neo-adjuvant chemotherapy in clinical trials stage III. The disease free survival rate was found to be low in the trials. On the similar lines, Create X trial a randomized phase III trial has reported an increase in disease free survival rate. These anti-metabolite-based drugs target the DNA synthesis pathways proving to be crucial in treatment of TNBC. Novel therapies include

to optimize the effectiveness of the specific natural compounds. The synergistic effect of naturals has to be explored in the preclinical stage for enhanced anti-cancer activity.

The global research community emphasizes on novel targets along with naturals as an effective treatment regimen. The role of computational biology is of high importance in drug discovery research. High throughput screening, pharmacophore analysis, QSAR based robust pipelines have been set and are being optimized with respect to application of force fields. Handful numbers of commercial and open source software's are available to achieve the same. A

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