E-SYMPOSIUM PROCEEDINGS

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REVIEW ON THE EXPANDING ROLE OF CAR-T THERAPY FROM HEMATOLOGICAL CANCER TO AUTO IMMUNITY

Dr. Monika P[1], Mr. Lingeshwar B[2], Mahalakshmi K[2]

[1]Assistant Professor, Department of Pharmacy Practice, School of Pharmaceutical Sciences, VISTAS, Chennai, India
[2]Research Scholar, Department of Pharmacy Practice, School of Pharmaceutical Sciences, VISTAS, Chennai, India

lingedh973@gmail.com

Abstract: N Chimeric Antigen Receptor T-cell (CAR-T) therapy represents a significant advancement in cancer immunotherapy, utilizing genetically modified T lymphocytes that express synthetic receptors designed to recognize specific tumor-associated antigens. These engineered immune cells combine antibody-like specificity with T-cell cytotoxic functionality, enabling targeted elimination of malignant cells. The clinical significance of this approach has been validated through FDA approval of multiple CAR-T therapeutics, including tisagenlecleucel (Kymriah) for B-cell acute lymphoblastic leukemia (B-ALL) and axicabtagene ciloleucel (Yescarta) for diffuse large B-cell lymphoma (DLBCL). Current CAR-T applications predominantly target hematological malignancies through recognition of lineage-specific surface markers including CD19, CD20, CD22, and B-cell maturation antigen (BCMA). These targets have demonstrated clinical efficacy due to their restricted expression patterns and accessibility to circulating CAR-T cells. Recent investigational applications have expanded beyond oncology to address autoimmune pathologies, where CAR-T cells can be engineered to target autoreactive B-cells or pathogenic plasma cells implicated in conditions such as systemic lupus erythematosus, myasthenia gravis, and refractory autoimmune cytopenias. Despite promising clinical outcomes, CAR-T therapy faces substantial challenges including potentially severe immune-related adverse events such as cytokine release syndrome and neurotoxicity, which require specialized monitoring and management protocols. Additional limitations include manufacturing complexity, substantial production costs, and variable persistence of therapeutic cells, factors that collectively restrict broader clinical implementation.

Keywords: Immunotherapy, Engineered T-cells, Targeted Therapy, Cytokine Release Syndrome, Cellular Persistence.

IMPLEMENTING PERSONALIZE MEDICINE UTILIZING PRINCIPLES OF PHARMACOGENOMICS

Mr. Shivansh Singh

UG Scholar, Delhi College of Pharmacy, DIRD, Holambi Khurd, India

shivansh010104@gmail.com

Abstract: Pharmacogenomics represents the scientific discipline investigating how genetic variation influences individual drug responses, providing a foundational framework for implementing precision medicine approaches. The core objectives of pharmacogenomic implementation include optimization of therapeutic efficacy through genetically-informed medication selection and dosing, minimization of adverse drug reactions through identification of genetic risk factors, discovery of novel drug targets through elucidation of disease-related genetic pathways, and development of comprehensive genetic profiles that predict both disease susceptibility and treatment response patterns. Implementation of pharmacogenomic principles offers substantial potential benefits to healthcare systems through increased treatment success rates, reduced adverse event frequencies, and enhanced efficiency of pharmaceutical development pipelines. These improvements derive from the capacity to identify genetic determinants of drug metabolism, target engagement, and adverse effect susceptibility prior to treatment initiation. Tangible healthcare cost reductions may be realized through decreased medication failure rates, reduced hospitalization for adverse drug reactions, and streamlined clinical trial designs incorporating genetic stratification approaches. The advancement of pharmacogenomic implementation faces several challenges including standardization of testing methodologies, integration of genetic data into clinical decision support systems, provider education regarding interpretation of genetic information, and development of regulatory frameworks for genetic test validation.

Keywords: Precision Medicine, Genetic Variation, Drug Response, Therapeutic Optimization, Personalized Healthcare.