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Adalimumab antibody affinity maturation: An in silico approach

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Abstract

Rheumatoid arthritis (RA) is a chronic inflammatory autoimmune disease that occurs in about 5 per 1000 people. Tumor necrosis factor-α (TNF-α) is an inflammatory marker in the inflammatory processes of RA. Therefore, TNF-α might serve as a therapeutic target for the treatment of RA. Adalimumab is a human monoclonal antibody (IgG1) against TNF-α which has been approved by FDA for the treatment of arthritis and other inflammatory related diseases. For a successful immunotherapy the different features of therapeutic antibodies such as binding affinity should be improved. In this regard, we have lunched an in silico approach to increase the affinity of adalimumab to TNF-α. We find the important amino acids of the adalimumab antibody using different software and web servers, and then replaced these amino acids with others to improve antibody binding affinity. Finally, we examined the binding affinity of antibody variants to the antigen using different docking programs. The results indicated that the replaced new amino acids in the binding site of adalimumab increase the affinity of the antibody to TNF-α. In conclusion it should be pointed out that, the employed in silico approach could pave the way for increasing the affinity of antibodies. Increased affinity enhances the biological action of the antibody, which in turn improves the therapeutic effects. Furthermore, the increased antibody affinity can reduce the therapeutic dose of the antibody, resulting in lower toxicity and handling cost.

Biography:

Shirin Eyvazi has completed his PhD in field of medical biotechnology from Shahid Beheshti University of Medical Sciences, Tehran, Iran. She is expert in molecular biology techniques and has published more than 12 papers in ISI journals. She teaches molecular biology at university.

Speaker Publications:

1. "Synthesis and Application of Magnetic@Layered Double Hydroxide Multicore-Shell Nanostructure as a Novel Anti-Inflammatory Drugs Nanocarrier"; 2020.
2. "Molecular mechanisms associated with quinolone resistance in Enterobacteriaceae: review and update"; Transactions of the Royal Society of Tropical Medicine and Hygiene; 2020.
3. "Transplantation of Stem Cells as a Potential Therapeutic Strategy in Neurodegenerative Disorders"; Current Stem Cell Research & Therapy; 2020.
4. "Polycyclic aromatic hydrocarbons degradation by aquatic bacteria isolated from Khazar Sea, the world's largest lake"; 2019.
5. "Epigenetic Modifications in Gastric Cancer: Focus on DNA Methylation; 2020, Gene; Vol 742:144577.

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