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Mini Review

A NEW DRUG DESIGN TECHINQUES FOR CHEMICAL BIOLOGY

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ABSTRACT

Chemical techniques and frequently tiny molecules created by synthetic chemistry are applied to the manipulation and study of biological processes in the field of chemical biology. By utilising the principles of biological genesis, its functional framework can be applied to everything from small chemical substances to complex pharmaceuticals. The fundamentals and practical applications of chemical biology are highlighted in this chapter in order to find novel therapeutic leads. Drug discovery is a lengthy, intricate process with many moving parts. Chemical toolsets with the best therapeutic potential are used by chemical biology to verify both natural and manufactured substances. Phenotypic and target-based screening techniques are used to screen compounds in order to find and define the effective hits.

Keywords: Ubiquitin-mediatedproteasomaldegradationsystem; (UPS)E3ubiquitinligase ; Medicinal chemistry

INTRODUCTION

A scientific branch called chemical biology integrates the study of both chemistry and life. The study and modification of biological systems is done using chemical tools, analysis, and frequently tiny compounds made by synthetic chemistry. Chemical biology deals with the application of chemistry to biology, as opposed to biochemistry, which studies the chemistry of biomolecules and controls biochemical pathways both within and between cells (synthesis of biomolecules, the simulation of biological systems, etc.)It is obvious that the line separating chemistry and biology used to be almost smooth. The scientists who can use an integrated combination of chemical, structural, biophysical, computational, and molecular biological methodologies to challenges in these fields will be the ones best suited to produce significant improvements in biology and medicine. However, the traditional, single-disciplinary focus of the system for teaching researchers in the various branches of chemistry (analytical, inorganic, organic, and physical) has largely been upheld. Although some researchers have expanded the scope of their research questions or methods, an organised and integrated programme that exposes young scientists to the full range of systems and the wide array of concepts, techniques, and methods that they will need to master in order to conduct successful research is frequently lacking at the level of research training [1-3].

MATERIALS AND METHODS

As it enables the insertion of non-natural amino acids and the incorporation of "posttranslational changes" like phosphorylation, glycosylation, acetylation, and even ubiquitination at the residue level, chemical synthesis of proteins is a useful technique in chemical biology. These skills are useful for chemical biologists because post-translational changes, which are well known to control the structure and function of proteins, can be utilised to investigate and modify the functionality of proteins. Although strictly biological methods have been created to accomplish these goals, generating small quantities of the desired protein can frequently be accomplished through the chemical synthesis of peptides, which has a lower technical and practical barrier. Chemical biologists use the short peptide fragments produced by synthesis to create polypeptide chains of the size of proteins [4].

DISCUSSION

Genes that generate tiny bioactive compounds have been found using functional or homology screening techniques. Functional metagenomic studies are made to look for particular phenotypes that are connected to molecules that have particular properties. On the other side, homology metagenomic studies are made to look at genes in order to find conserved sequences that have previously been linked to the expression of physiologically active substances.The identification of new genes that encode physiologically active compounds is made possible by functional metagenomic research. These tests include pH assays, which can check for pH changes caused by newly created molecules using a pH indicator on an agar plate, and top agar overlay assays, which use antibiotics to produce zones of growth inhibition against test bacteria. Screening for the expression of genes using a method called substrate-induced gene expression (SIGEX).

The rapid finding of genes with homologous sequences to previously identified genes involved in the manufacture of physiologically active chemicals has been facilitated by homology-based metagenomic research. Once the genes are sequenced, researchers will be able to compare hundreds of bacterial genomes at once. Homology metagenomic studies have an advantage over functional metagenomic tests in that they do not need a host organism system to express the metagenomes. As a result, this method may reduce the time needed to analyse nonfunctional genomes. Several novel proteins and tiny compounds were also found as a result of these. Additional lantibiotic cyclases were also discovered by an in silico analysis from the Global Ocean Metagenomic Survey [5,6].

CONCLUSION

Fluorescence techniques are frequently used by chemical biologists to investigate the functionalities of biological macromolecules. Fluorescence has several advantages over other methods, including high sensitivity, non-intrusiveness, safe detection, and the capacity to alter the fluorescence signal. Green fluorescent protein (GFP), which Roger Y. Tsien and others discovered, hybrid systems, and quantum dots have all made it possible to more precisely determine the position and function of proteins in recent years. Small organic dyes, green fluorescent proteins, and quantum dots are the three main categories of fluorophores that are employed. Small organic dyes, which are typically less than 1 kDa, have undergone modifications to boost their photostability and brightness while lowering self-quenching.

To speed up the development of antibiotic drugs, computational techniques are helpful tools for analysing and directing studies. The two main categories of computer-aided drug design (CADD) methods currently in use are structure-based drug design (SBDD) and ligand-based drug design (LBDD). To pinpoint essential locations and interactions crucial to each macromolecular target's specific biological functions, SBDD techniques examine the three-dimensional structural data of their macromolecular targets, often proteins or RNA. Such knowledge can then be used to create antibiotic medications that can compete with crucial interactions involving the target and obstruct the biological pathways necessary for the microorganism's survival (s).

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