

Genetics in Suicide Treatments, Modern Diagnosis Establishments

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Abstract

Antidepressants can relieve human depression and reduce human depressive symptoms—including human suicide prevention. Although the mechanisms of action for these drugs remained to be established, researches focusing on revealing the relationship between efficacy and toxicities of antidepressants have been initiated in China and US. To deal with this suicide prevention and side-effective, new initiatives and revolutionary ideas have been proposed and assessed. Hopefully, therapeutic efficacies and outcomes by antidepressant treatments can be improved for clinical trials in future.

Keywords: Human genome; Human suicide; Drug response; Mental disorder; Genetic diagnostics; Medicinal chemistry; Next generation sequencing

Introduction

Human suicide is a common symptom of depression/mental illness worldwide [1-7]. Owing to long term economic depression in recent years, human suicide might still persist among most countries. In order to reduce human suicide, some good examples and paradigms have been speculated and systematical investigations have been underway [1-7].

Past Achievements of Suicide Therapy

PG technology detecting genes of many biological or pharmacological interests is mainly divided into two general categories—predicting risks and response of drugs and drug absorption, distribution, metabolism and excretion (ADME) by polymorphisms of human drug metabolizing enzymes or abnormal neural molecular targets. Approximately 300 human metabolic enzymes have been found. The genetic polymorphism changes of metabolizing enzymes decrease or increase the blood concentrations of antidepressants by different rates of drug ADME, which decide main parts of drug toxicities in human bodies. The side effects (risks) predictions of different types of antidepressants in determine polymorphisms of ADME are relatively less dramatic and severe, such as fatigue and vomiting etc. [4-7]. Drug-toxic molecules and drug-targeted molecules are proposed to be different mechanisms of action in many ways. Neural molecules or receptors have been proposed to be major gene encoding for both the suicidal ideations occurrence (risk) and therapeutic responses/outcomes [1-7]. How to systematically study the mechanisms of action that genes or biological molecules involve in suicide occurrence and therapeutics has been proposed early before. Favorable outcomes have been reported in this respect [8].

The best gene candidates for suicide therapy are not very clear now. Genetic panels affecting both drug-active and drug-toxic genes (molecules) in the same times might be optimal avenues for in-depth scientific investigations [9-16]. Other current achievements relating antidepressant drug therapies are offered in Table 1.

Medicinal Chemistry

Antidepressant agents belong to different categories of biological, genetic or molecular mechanisms or chemical molecules. Presently specifically genetic or molecular study for each antidepressant agent, such as citalopram etc. is the first step [17-21]. In future, finding the

relationship between chemical structures of antidepressant agents and their impacts on different individuals may prove to be more potential and clinical significance. Similarly, it needs more money in conventional routes [17-18]. Can we brainstorm more efficient assessment systems? May we invent or apply some new patents that focus on this matter and be potential future trends? [4].

Technical Details

Like many biomedical factors aforementioned, laboratory facility supports and technical details also determine the quality of experimental and clinical study outcomes and are important avenues for further updating clinical therapeutic protocols and medication efficacy [22-24]. Previously, the severity of drug risks and drug responses are decided by different toxicity symptoms. Integration of these two different symptom score systems as a whole is the first step testifying previous arguments and triggering genetic investigations determining and predictions of drug risks and responses in one PG system and other interesting topics [22-27].

Collecting data of relationship between chemical, genetics, environmental factors and therapeutic efficacy/outcomes is unavoidable study for in-depth understanding many important problems relating to previous speculations. Moreover, worldwide cooperation for accumulating rare inheritable disease-cases and sufficient GWAS

Animal models and studies	Optogenetics GEM
Clinical PG studies	Human metabolic enzymes, such as CYP2D6 Drug-active or drug-toxic genes (SNPs)
Genome-wide association studies (GWAS)	More than 10 genetic alleles are discovered
Other biological systems	Molecular Bioinformatics

Table 1: Brief outlines of current achievements relating to antidepressant therapies.

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(genome wide association study) data [9-16] is avenue to expedient the study of many important issues of drug neural toxicity and therapies.

Genome-Wide Associate Study (GWAS)

Invitation of genome-wide association study (GWAS) of suicide and antidepressant therapy PG might lead to the final solutions for predicting neural toxicity (risks) and responses of antidepressants to normal human beings. By taking GWAS, more than ten genetic allele difference between normal and antidepressant susceptible humans have been found. But only half of these alleles are statistical significance now. It may be explained as being affected by other genetic or environmental factors or shortages of human genomic sample sizes [22-25]. Next generation sequencing (NGS) techniques will increase the speed of genome sequencing (15,000-50,000 times) and dramatically reduce the cost of genome sequencing (less than seven thousand US dollar for one genome) [4-7]. In future, genome sequencing working forces and researchers may be changed from biomedical major students into mathematical or physics major students or scholars. The contributions by mathematics and physics students or scholars for genomic sequencing will be more significant than biomedical majored students because of the increasing importance of large scale data manipulations or analysis in NGS protocols. Moreover, after large scale PG study, antidepressant treatments will be sophisticated and more effective for each patient in future.

Other Technology

On the other hands, some basic biological, pharmacological and toxicological information changes after antidepressant treatments, such as optogenetic studies [25,26] or genetic engineering mice (GEM) [27] and other new technologies and patents must also be used to assess many opening hypotheses and systematic scientific studies, including this one and finally update antidepressant therapy PG and other clinical diagnostic and therapeutic systems. The techniques of optogenetic and genetic engineering mice (GEM) are new endeavors that can be used to study the functions and dysfunctions of specific genes in living bodies. Nonetheless, they are newly discovered technology and large flood of these approached and antidepressant therapy study will be soon done. Only then, many longstanding controversies can be resolved. So in future, a lot of intrinsic related things behind these differences can be discovered and better achieved by increasing worldwide cooperative efforts and activities in this regards. These researches will make great difference and impacts on antidepressant therapies in future. They are not only on medicinal chemistry, but also on pharmacology and toxicology topics.

Clinical Treatments

There is no therapeutic ideology for suicide origination now. Several types of diseases, such as mental disorders are possible targets for drug intervention [16,28-30].

Conclusion

In future, modern diagnostics for suicide and treatments in clinics might be strengthened. Increasing mandatory genetic/molecular/image diagnostic trials might be required in most advanced countries in future. Or even become a worldwide indispensable.

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