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Volume 1 • Issue 4 • 2017

Scientia Ricerca

Editorial

Clinical Biotechnology and Microbiology

ISSN: 2575-4750

Genetics for Human Suicide, a Possible Breakthrough

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Received: November 04, 2017; **Published:** November 06, 2017

Abstract

Antidepressants can relief human depressive symptoms-possibly association with human suicide events. The mechanisms of action for these drugs remains to be established. The relationships between efficacy and toxicities of antidepressants have also been proposed more recently. To deal with the hot topic of suicide prevention and treatments, more revolutionary ideas must be assessed. Hopefully, therapeutic outcomes by antidepressant treatments can be improved in future.

Keywords: *Human genome; Human suicide; Mental disorder; Genetic diagnostics; Drug developments; suicide prevention; Suicide treatments; Molecular target*

Volume 1 Issue 4 November 2017

Introduction

Human suicide is the causality of a great number of human mortality, which is a common symptom of human 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 investigated during the past several decades-including the developments of selective serotonin reuptake inhibitors (SSRIs) [1-7]. Following content represents these kinds of biomedical efforts.

Pharmaceutical Achievement of Clinical Suicide/Depressive Therapy

The causality of human suicides can be diversified; several major factors are enlisted as;

Human mental illness [8];

Past physical or psychiatric traumas [9];

Environmental/economical burden or pressures [10];

Human genetic changes [4-5];

Current therapeutics show some positive outcomes in suicidal/mental illness treatments [11].

In this article, we will discuss the possible pathways of human genetic causality and diagnostics.

Commonly utilized modality

Pharmacogenetics (PG) technology detects human genes of many biological or pharmacological interests and is mainly divided into two general categories-predicting risks/response of drugs (abnormal neural molecular targets) and absorption, distribution, metabolism and excretion (ADME) of therapeutic agents. Approximately 300 human metabolic enzymes are available for drug metabolism. The side effects (risks) predictions of different kinds 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 varied in many ways. Neural molecules or receptors have been proposed to be major genes encoding for both the suicidal 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 [11].

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 [12-18]. Other major achievements relating antidepressant drug therapies are offered in Table 1.

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 allels are discovered
Other biological systems	Molecular Bioinformatics

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

Therapeutic targets

Antidepressant agents belong to different categories of genetic, molecular, biological mechanisms and/or chemical structures. Presently specifically genetic or molecular study for each antidepressant agent, such as citalopram etc, is the first step [19-23].

In future, finding the relationship between chemical structures of drugs and their efficacy on different individual patients may prove to be of great clinical significance. Similarly, it needs more money in conventional routes of experimental study and clinical utilities [19-20].

Technical Details

Genetic or molecular approaches

Like many biomedical factors aforementioned, laboratory facility supports and technical details also determine the quality of suicide study [24-26]. Previously, the severity of drug risks and drug responses are decided by different types of toxicity symptoms. Integration of these two different types of diagnostics (symptom score systems as well as genetic/molecular technology) is a future trend [24-26].

Genome-wide association study (GWAS)

Invitation of genome-wide association study (GWAS) of suicide and therapy might lead to final solutions for suicide diagnostics, treatments and epidemic control. By taking GWAS, more than ten genetic allele difference between normal and mental illness persons have been found. But only half of these alleles is statistically significant now.

It may be explained as being affected by other genetic or environmental factors or shortages of human genomic sample sizes [24-27]. 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 [27-28].

The contributions by mathematics and physics students or scholars for genomic sequencing will be more significant comparing with biomedical majored students because of large scale data manipulations or analysis in NGS protocols. Moreover, after large scale PG study, future suicide treatments will be sophisticated and more effective.

Other technology and animal models

In order to follow this new avenue, genetic technology, such as optogenetic studies [29] or genetic engineering mice (GEM) [30] and other new technologies and patents must also be used to assess many opening hypotheses and systematic scientific studies. 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, these new technology will flood in world lab quickly. Only then, many longstanding controversies can be resolved. So in future, a lot of intrinsic relations behind the scenes can be discovered and better achieved by global cooperative efforts in this regards. These researches will make a great difference in the fields of suicide prevention and therapies in future. They are not only on medicinal chemistry, but also on pharmacology and toxicology.

Conclusion

There is no well-established ideology for suicide causality and treatment now. Several types of diseases, such as mental disorders are possible targets for drug intervention [1-7, 31-32]. In future, modern diagnostics for suicide and treatments in clinics must be strengthened and categorized. Increasing mandatory genetic/molecular/image diagnostic trials are required in most advanced countries in future. Or even become a worldwide indispensable.

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