

Human suicide, clinical treatment overview

Abstract

Suicide has high human mortality (0.5-1.2 million death each year). However, it is not well informed and predicable event in the clinic. Early clinical evidence suggests that a large variety of risk factors (external and internal stresses) may drive human neuropsychiatric instability and various suicide behavior and deaths in sufferers and victims. Influenced by different sources of risk factors (individual stresses, genetic cascade and unknown pathogenic consequences), clinical suicide prevention and treatment need ever-growing revolution-diagnostic and therapeutic transition (genetic study in drug targeting, personalized neuropsychiatric medicine and other sources of emotional supporting) with an unpredictable way.

To implement diagnostic and therapeutic transition, bridging the gap between clinical symptoms, molecular profiling, and psychiatric intervene has great medical importance. Currently, neural-psychiatric relation in the realm of integrating various molecular profiling, brain image and suicide behavior has provided profound knowledge and impacts in experimental and clinical investigations. To introduce these system integrations, public health and therapeutic databases should be analyzed.

Finally, medical success (neuropsychiatric status, tool access, brain image analysis, molecular targeting, genetic cascade and curative therapies) in the clinic will ensure high-quality pharmaceutical benefits for diathesis-specificity and potential different suffers. Next generation of clinical suicide prediction, pharmacology and therapeutic landscapes will be dawned in the near future.

Keywords: human suicide, neurobiology, nursery, education, psychopharmacology, modern technology, suicide prediction

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Introduction

Epidemics analysis

Global suicide death is huge (outnumber the death of war and homicide).¹ Approximately 2% of human mortality is associated with human suicide.² However, it is not predicable and well prevented in the society. Early clinical evidence suggests that a large variety of risk factors (external and internal stresses) may drive various suicide behavior and dramatically result in human deaths in the clinic.

The rates of SID vary between genders, ages, families and geographic locations. The mortality rates also vary between ways of suicide method selection (gas, pesticides, rope, gun or others) in the clinic. However, hidden nature of human suicide from suicide ideation to death is important for relevant intervention. By understanding these processes and molecules, medical intervention may be more effective.

Influenced by diverse risk factors (human stresses and pathogenic consequences), clinical suicide prevention and treatment measures need ever-growing diagnostic and therapeutic transition (genetics in drug selection and personalized medicine) with an unprecedented speed.³

Biomedical association

Internal (genes, molecules or pathogenesis) or external (financial, sociopolitical and interpersonal distortion) risk factors are mutually interacted to drive human suicide evidence and mortality. Male suicide deaths rank second for human beings at the age ranging from 14 to 34 in US.⁴ In addition, old male retirees with less economic supports show double rates of human suicide behaviors comparing with average male age groups.⁵ Their biomedical associations should be investigated in the future.

Unfortunately, human suicide is not well defined at genetic or molecular bases. Given a slow progress of knowledge for suicide behavioral and therapeutics, medications between west and east should be focused, especially in drug selection and dosing.⁶

Medical knowledge interaction

To implement diagnostic and therapeutic transition, integrating data of psychiatric score, molecular profiling and brain image should be a future trend.⁶ Advanced diagnostic system can provide profound impacts in experimental and clinical investigations. (Figure 1)

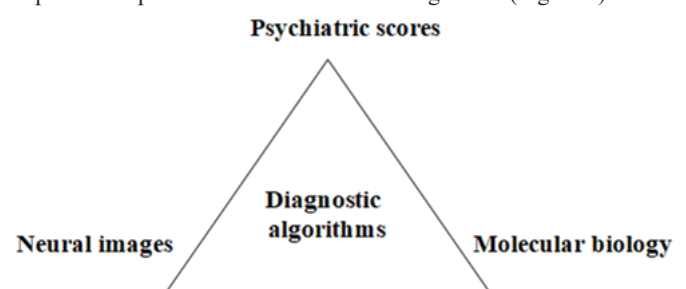


Figure 1 Different neurobiology advances from suicide-related diagnosis.

General outlook of biomedical study of suicide was outlined early.⁷⁻¹² Different topics are addressed in the followings.

Understanding relations and integration between neuropsychiatric diseases, clinical symptom distribution and suicide death rate can bring new hope for human suicide prevention, therapeutic discovery and death reduction in wide-ranges. To introduce novel systems, public health and therapeutic datasets should be retrievals, analyzed and machine-learning. Finally, medical success- including psychiatric

alleviation, tool access prohibition and suicide rate reduction can be progressed. Next generation of clinical suicide prediction, pharmacology and drug development will be dawned in the near future.

Historic introduction

There was a long history of human suicide record in literature (>two thousand years in history recording in both China and western).^{13,14} However, its medical study was not so long and noticeable. It was long neglected in public health circle and medical care. There is still little solidarity in medical knowledge and drug targeting for suicide until last century. To reduce the risk and incidence of human suicide, both genetic analysis and molecular profiling should be translated for clinical applications in future. After these efforts and transition, management strategies and therapeutic paradigms can be discovered.

Medical causalities and diagnosis

Current concept of human suicides

Though it is in an initial stage of human suicide study, some biomedical clues¹⁵ and diagnostic tools⁶ should be focused. Especially, past discoveries and therapeutic means should be reevaluated.⁷⁻¹² Moreover, human suicide behavior is not an absolutely impulsive act or behaviors. Outside crisis and stresses cannot be overlooked. After two decades of hard work, association began to emerge, like high incidence of human suicide in patients with mental disorders.¹⁶⁻²⁰

Co-morbid and suicide event involvements

Different symptoms and disease categories have been associated with suicide behaviors (co-morbidity consideration).¹⁶ Based on co-morbidity modalities, molecular clues, brain dysfunction and potential drug targets of co-diseases can be treated for the purpose of reducing suicide events in the clinic. Targeting mental health problems is the pillow framework for suicide-related drug industry in west society worldwide.¹⁹ Under this psychiatric modality and framework, new therapies are gradually developing in both pharmaceutical and medical arenas. (Figure 2)

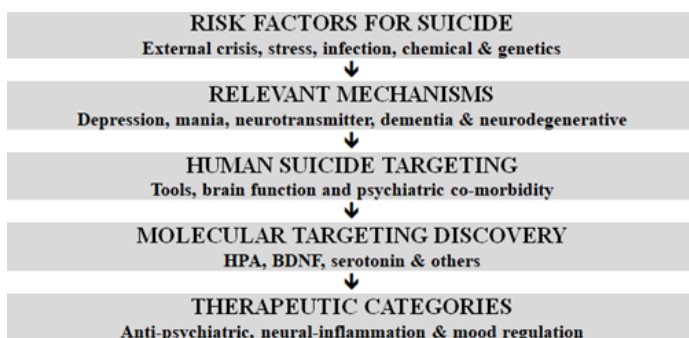


Figure 2 Potential link for suicide onset, progress and targeting.

Diagnosis algorithms and paradigms

Due to the discovery of some co-morbidity and various risk factors, a number of anti-psychiatric diagnostic and management strategies are suggested to alleviate potential suicide behaviors and mortality. Long prepared neuropsychiatric drug categories are under investigation and add some useful results. Correspondingly, relation between suicidal causality and therapeutic paradigms should be built for possibly suicide death prevention in different clinical settings.³ (Table 1)

Table 1 The linkage between clinical symptoms and neurobiological technology

| Psychological symptoms | Molecular technology |
|---------------------------------|--|
| Language: Speech speed (low) | Genetic/epigenetic (40 known genes) |
| Memory or abstract capability | Cerebral morphology |
| Decision-making: risky and slow | Functional morphology |
| Social distortion | Neurotransmitter (levels and function) |

To gain fundamental knowledge of human suicide, risk factors for genetic predisposition, molecular profiling and neural circuitry connection are well analyzed in statistically significant manner.¹⁹⁻²⁴ By upholding these biological studies, variable genomic techniques, suicide-associated biomarkers and effective therapeutic paradigms should be achieved after the integration between external and internal variables and stresses step by step and one by one.

Patho-therapeutic mechanisms

Molecular and morphology profiling

Currently suicide ideation is a common human instinct. Most of ordinary people in their lifetime consider suicide at least one moment. As a result, this public health challenge and economic burden needs to be noticed. Once diagnostic algorithm improved, advanced suicide diagnosis and targeted therapies may be possible and more effective.²⁵⁻²⁸

Psychiatric or physical trauma

From genetic or molecular consideration, bad experience may possibly trigger molecular events and behavior of suicide or self-harm. Based on this hypothesis, psychiatric trauma should be aimed for counteractive measures. Drug targets against different SID or suicide-relevant molecules^{18,29} individually or combinatorial is a modern challenge and future trends. This type of physiological study needs new ideas, hypothesis and effective drugs. With population size increases, more effective drug targeting this way will be identified.

Molecular pathways and network for suicide and psychiatric disease treatments

Major psychiatric diseases associated with suicide (co-morbid), especially autism, schizophrenia and mood disorders. Diagnostic categories and therapeutic targets have various drug selection systems and drug development. (Table 2)

Table 2 Molecular basis and classification for human suicide targets

| Molecular diagnostic basis | Pathogenesis pathways |
|----------------------------|---|
| Neuropsychiatric cascades | Hypothalamic-pituitary-adrenal axis (HPA) and others |
| Biomarkers | Bone-derived neurotrophic factor (BDNF) & others |
| Morphologic characters | structural- or functional magnetized resonance images |
| Neurotransmitters | Dopamine, serotonin and others |
| Patients or relatives | Questionnaire filling |
| Personal characters | Age, poverty, family and spirit |

By discovering neuropsychiatric genes or molecules, more effective targeted therapeutics or drugs will be developed.^{19,25,26} However, it is not restricted in neuropsychiatric genes or molecules.

Other pathogenesis pathways, like neuro-inflammation, deadly viral infections, reactive oxidative species (ROS) and toxic chemicals should also be focused and clinical application. Certainly, genetic or molecular studies are the top priority at present stage. A lot of different therapeutics and drugs are useful for different patients. Most of them is at the initial stages.^{19,26-34} New drug development strategies are developing.

Drug development and applications

Most available drugs

Nowadays, the most used drugs are ketamine, lithium and clozapine.¹⁹ It commonly treats patients in suicide ideation and scores. It is unsuitable for patients with long-term onset and progress. Pharmaceutical renovation, such as nano-drugs or other structural modifications may help this dilemma of therapeutic short-live.

Yet, lithium and clozapine take effective in relatively long-term. They must be aimed on long-term alleviating suicide ideation, multiple symptoms and disease management. Of course, target and mechanism study of these drugs must be welcomed for the reduction of suicide behaviors and deaths.

Therapeutic evaluation

Clinical study of drug evaluation is a long-term challenge. It matters the quality of drug development. The evaluation of different management system is difficult to reach due to limited control groups in the society. In normal comparisons of different therapy, control groups of same genomic background of normal people are hard to organize. Today, management evaluation is commonly to compare clinical data “before and after” of intervention.^{19,32} These evaluative cross-sectional comparative studies are now popularized in normal suicide investigations and drug development. Further ideas and techniques, like computational-based tools and technology will be jointly integrated for easier patient recruitments.^{35,36}

Importance of basic scientific studies

Since most psychiatric diseases are chronic diseases, curable therapeutics will be a miracle.²³⁻²⁶ Development of curative efficacy should be based on targeting genetics and molecules of disease origins and progress. In order to accomplish this challenge, imaging or molecular profiling diagnostics and therapeutics should be future trends.³⁷⁻⁴⁴ However, the understanding of molecular mechanisms of suicide causality and others is important yet difficult to identify. To promote this topic, mental health problem diagnosis should be linked to increasing number of different molecules, complex pathways and multilayer.

Future direction

Modern diagnosis

Advanced neuropsychiatric diagnosis (integration of psychiatric score, morphology and molecules) should be a dominant paradigm for suicide diagnosis and treatments in the future. This diagnostic improvement might be based on the process of advanced computational approaches (integration and mimics). By this pathway, clinical situation for suicide prediction and prevention will be promoted. In the era of widespread artificial intelligence utilization, great improvement for suicide prevention may be expected soon.^{35,36}

Psychiatrists or clinicians review and treat patients from the analysis of psychiatric sign and scores. This pattern of clinical trials and drug development was challenging by modern technology approaches

(biological profiling from genome to multi-omics).⁴⁵⁻⁵¹ Combination and integration of both inside and outside stresses is obviously better than those of one system.⁵¹ How to promote psychiatric disorder diagnosis should be the mission of modern science and technology.

Molecular targeting for suicide

Currently, the study for targeted drugs for human suicide is a new pharmaceutical challenge. In order to update and improve this situation, molecular drug mechanism and target study is indispensable.⁵²⁻⁵⁵ From the past, molecular study ranges from pathogenic profiling, drug targets, mechanisms and response predictions should be established at poly-genetic or molecular profiles and external stress. By upholding these efforts, more effective drugs could be marketing.

Emotional stimulation

Apart therapeutics against genes or molecules, emotional stimulation, like seeing funny movies, participating healthy sports or pleasure talking may also be useful for symptom alleviation.²⁸ Combination drug and emotional stimulation will be more effective.

From suicide ideation to suicide deaths

There is a complex process (unclaimed pathogenesis cascade) from suicide ideation to suicide deaths. Figure 3 shows dynamic framework of these relations. The drug evaluation might be complex and high-technique demanding now. Further work (promoters to inhibitors) to evaluate each molecules and drugs will be fruitful and indispensable.

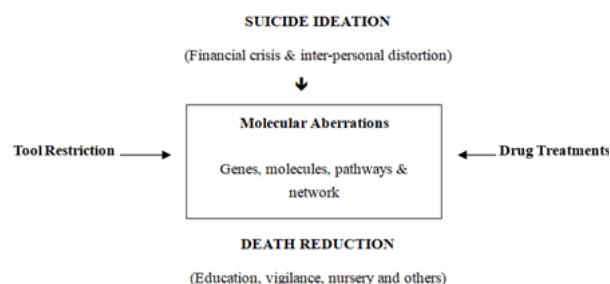


Figure 3 Dynamic process from suicide ideation to death reductions.

Knowledge breakthroughs

Neuropsychiatric pathological knowledge and anti-psychiatric approaches can help us to alleviate suicide ideation and behaviors at the greatest extent. To attain this goal, clinical knowledge improvement and technical breakthrough is indispensable, especially curative treatments in the future. Only through molecular biological discovery, manipulation and targeting, a great therapeutic difference (curative therapy) can be made in the clinical trials.

Conclusion

New vision should be created for the promotion of anti-suicide prevention in the clinic. The relationships and integration between chemical, genetic, molecular, morphologic, neurologic, environmental, social and cultural factors should go individually and curable treatments by the utility of bio-agents or PM.¹¹ In search for suicide-related causations and targeting, molecular biology knowledge is the key issue. By initiating this ambitious plan, new breakthroughs for death reduction can be expected.

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Conflicts of interest

Authors declare there is no conflicts of interest with other institutes and academics.

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