

Emerging medications for suicide prediction and therapeutic strategies

Abstract

Suicide has a high rate of human deaths (0.5-1.2 million deaths annually). It is suggested that large number of different factors may drive human suicide processes from thoughts to deaths. It is urgently needed for developing new therapies for human suicide. Good therapies will not success without complete understanding of its pathogenic roots. Unfortunately, the pathogenic root of human suicide has not been fully revealed. Among different risk factors, high quality clinical suicide prediction, prevention and treatment is needed. Human suicide prediction and prevention study has been translated from intangible entities into formal medication. A great deal of connection and unity between neurobiological aberration, different symptoms, and death cases is indispensable. To cope with these advances, public healthcare, biomedical foundation, and clinical databases are analyzed in this article.

Keywords: human suicide, neurobiology, psychopharmacology, drug develop, CNS disease, suicide prediction

Volume 9 Issue 1 - 2026

Da Yong Lu,¹ Hong Ying Wu,² Jin Yu Che,¹ Ting Ren Lu²

¹School of Life Sciences, Shanghai University, 99Shangda Road, Shanghai200444, PRC

²College of Science, Shanghai University, 99Shangda Road, Shanghai200444, PRC

Correspondence: Da Yong Lu, School of Life Sciences, Shanghai University, Shanghai200444, PRC, China

Received: January 27, 2026 | **Published:** February 16, 2026

Introduction

Epidemics analysis

Suicide has a high rate of human deaths, outnumbering total deaths of war and homicide and causing large-scales of social burden worldwide.^{1,2} It is suggested that different factors may drive human suicide events as well as sizable suicide deaths in the clinic. Developing effective therapeutics for human suicide is urgently needed.^{3,4} Good therapies will not success without complete understanding of its pathogenic roots. Unfortunately, the pathogenic root of human suicide has not been fully revealed. Among different risk factors, high quality clinical suicide prediction, prevention and treatment is needed.⁴⁻⁷

Clinical achievements

Human suicide prediction and prevention study has been translated from cultural entities into selected medication for more than thousand years.^{8,9} A great deal of connection and unity between neurobiological aberration, different symptoms and death cases is needed.⁴⁻⁷ To cope these advances, public healthcare, biomedical foundation, and clinical databases are analyzed in this article.

Suicide distribution worldwide

The events of suicide-induced death (SID) vary from genders, ages, families and geopolitical issues.⁹ The mortality rates also differ by methods and tools in the clinic.¹⁰ However, hidden nature of this variation is still unclear now. Bridging symptoms and molecules may be more decisive for clinical practice. Connection of epidemic information and stress may change the course of suicide prediction and management. Noticing and investigating different sources of risk factors, diagnostic and therapeutic transition (genetics in diagnosis and targets for drug development) should be pursuit.

Biological roots of suicide behaviors

Data collection and analysis

The roots of human suicide id difficult to define. Global actions and outlooks to discover suicide roots is boosted since 2005 in modern medication.⁴ The general advance is outlined. Factors (genes, toxic

materials or various pathogenesis pathways, and geopolitical stresses) totally determine human suicide from plan to deaths. Specialty are introduced for data collection and analysis. Teenage suicide deaths (age of 14 to 28) rank second in developed countries [11]. In addition, old male retirees with less economic supports show doubled rates to general human suicide. These clinical data and biomedical association should be analyzed internally and externally.

Genetic and molecular profiling integration

The causes of human suicide continue to define from psychiatric disorders.¹²⁻¹⁵ Given a slow accelerating pace of clinical dataset accumulation, therapeutic promotion between west and east is possible.^{6,7} Due to the obscure of biology roots for suicide, advanced diagnosis should be built.⁷ Figure 1 New foundation is possibly established by trinary data. For diagnostic updating, it needs better and greater data processing capability. It should be greater therapeutic benefiting and death reduction. The diagnostic systems in different regions, countries and companies should be parallel comparisons for quicker and better development of suicide preventive systems. By this route, more patients will be benefiting (Figure 2).

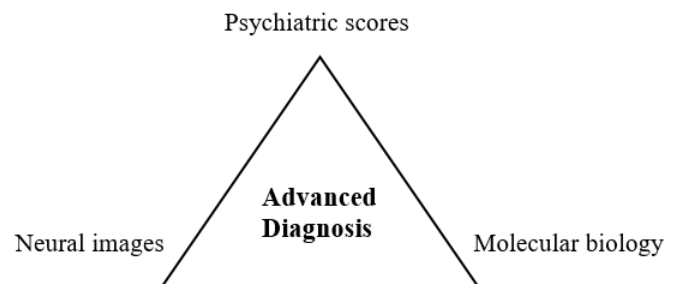


Figure 1 Different category integration for human suicide-related diagnosis

Knowledge gains in history

From initial analysis of clinical data, many associated factors will be testified. Due to different technical levels and financial status of different countries, no uniform diagnostic system will be used to all countries or hospitals. Diagnostic and therapeutic transition should

be separately undergone. History for major breakthroughs in suicide studies is pictured in Figure 3.^{8,9} Uniting symptoms, molecules, images and psychiatry needs greater power in biomedical or pharmaceutical progresses. Currently, neural-psychiatric evidence and methodology plays key roles in suicide study (omics, image, behavior and clinical trials).¹²⁻¹⁵ General outlook of biomedical study, suicide prediction and prevention should be possible.¹⁶ Different topics and frontiers in suicide are mapped.

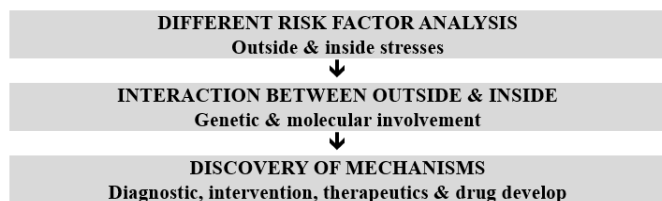


Figure 2 Potential link for suicide onset and progress

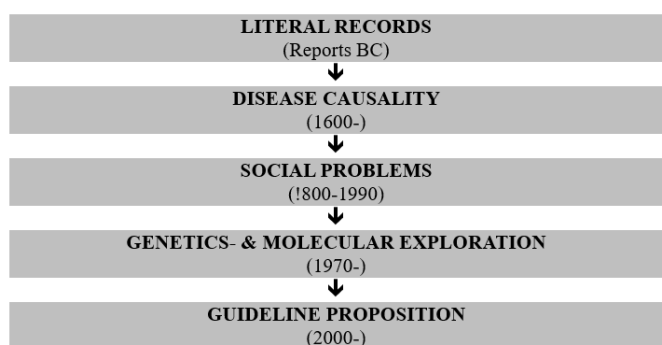


Figure 3 Chronology of suicide knowledge progress

Relation knowledge progress

A great deal of relation discoveries between neurobiological aberration, symptom variations and overall death declines are at central stage.¹⁶⁻²¹ To rollout new systems and techniques, large scale of data-monitoring and retrievals should be developed at any times and among different researchers. Novel guideline of suicide prediction, pharmacology, and therapeutics should be gradually formed.

Medical and clinical insights

Immaturity of suicide prediction

Currently, it is the beginning of biomedical suicide prediction. New diagnostic tools are aimed. External and internal stresses may be united for different clinical situations. Many of risk factors causing human deaths are systematically updated. After two decades of hard work, increasing association between suicide behaviors and different types of human mental diseases are solidified.¹² High-quality suicide predictions are leveraged among external stresses, pathogenesis cascade and therapeutic potentiality.

Current knowledge

Neuropsychiatric symptoms and diseases are associated with suicide prediction and personalized therapies.⁷ Among various co-morbid, mental health problems are the main pathways for current medications. Anti-psychiatric treatments are gradually utilized in the clinic (Figure 4).

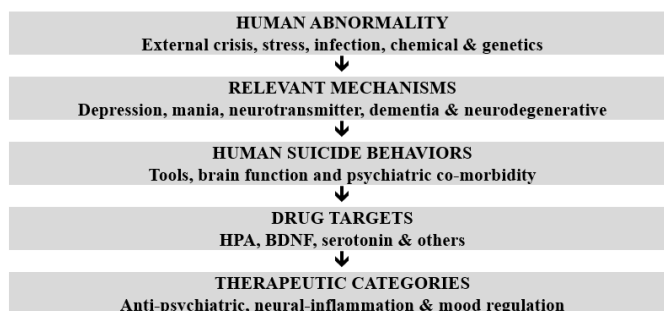


Figure 4 Potential link for suicide cascade

Advanced diagnosis

Alleviating potential suicide behaviors and mortality should be mainly based on existing neuropsychiatric drug categories in Figure 1. Correspondingly, therapeutic paradigms should be built in two biomedical approaches (Table 1).²¹ Risk factors for genetic predisposition, molecular dysfunctions, multi-omics profiling and neural circuitry connection are well analyzed in the past.¹⁹⁻²¹ Many pathophysiological breakthroughs and therapeutic promotion by integrating external and internal variables and stresses step by step and one by one. Figure 5 shows this interaction and mutual-benefiting. These pathways can be more understood for clinical data and genomic distribution.

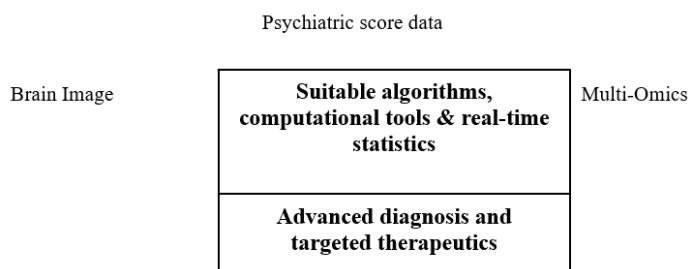


Figure 5 Future trends of suicide diagnostic and therapeutic progresses in the clinic

Table 1 The linkage between clinical symptoms and neurobiological technology

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

Difficulty for suicide statistics

Since human mental health problems and scores can be borrowed for suicide prediction and preventions. Once this kind of diagnostic measure materialized, advanced suicide targeting therapies may be possible.²²⁻²⁸ Based on clinical discovery of genetic and neuroscience status, deep trauma may increase suicide and self-harm behaviors.²⁹⁻³¹ Drug development pipelines for trauma is hotspot for clinical trials. This path of pathophysiological cascade needs new needs new light. To achieve continual fruits, clinical evidence and pharmacological targets should be evaluated by different forms of statistical and

computational tools. With population size increases, new therapeutic targets and drugs will emerge;

- Fearful attitude
- Skeptical attitude
- Orientation to happiness
- Manic-depressiveness
- Life satisfaction
- Belief in the paranoiac stress
- Schizotypic perceive (elusion)
- Transliminality
- Somatic complaints

Neuropsychiatric pathways, cascade and networks

Major neuropsychiatric diseases were earliest clues to associate with suicide events, like autism, schizophrenia, and mood disorders. (Tables 2 & 3) Diagnostic and therapeutic targets are collected for drug evaluation, development, and clinical therapeutic selection in Table 2. The strong association between suicide and mental diseases in genes or bioinformatics are effective ways for drug development advances.^{32–34}

Table 2 Associations between neurotransmitters and disease categories

Neurotransmitters	Neuronal diseases
Dopamine	Schizophrenia, gabling & hypersexual
Serotonin	Depressive diseases & emotional activity
Noradrenaline	Normal psychiatric function and neural transmission

Table 3 Different measurements for suicide prevention

Measurements	Patients or targets	References
Education	Teenage or teachers	11
Brain functions	Behaviors, cognitive & mood	16, 29
Mood stimulate	Positive moods or pleasure	23
Trauma	Pain alleviation	28
Tool restriction and cutoff	Deadly tools and weapons	10
Traditional medicine	Herbal medicine	38,39
Other diseases	Co-morbid	24

Measurements for suicide prediction and prevention

Different therapeutics and drugs are effective to different patients.^{35–37} Different types of management strategies in the clinic are tabulated (Table 3)

Pharmaceutical study

Main clinical trials

Today, the drugs for suicide prevention come from different types. The effect and responses are short-live affecting patients with ideation or plan. However, long-term symptoms, repeat and progress should use new types of drugs. Nano-drugs, gene therapy, or other structural modifications may correct the shortcoming of long-term drug treatment.⁴⁰

Drug evaluation

In therapeutic studies, control groups of normal people are difficult to recruit. Today, the cross-sectional study (comparison of clinical

data “before and after” of treatment) is enhanced. These evaluative routines are future trends. Computational-based tools and technology will jointly analyze large-scale clinical data in easy ways. It is the main pathways for pharmaceutical evaluation (effective and toxicity of drugs) in the clinic. Accordingly, twin, family, and ethnic group study should also be useful.

Curative pharmaceutical selection

Development of curative drugs are based on genetics and molecules of disease onset (approximate 40-50 human genes are associated). Since genes with neuropsychiatric disease are often polygenic, molecular spectra or profiles for mental disorders are complex and efficacy. These therapeutic study may bear possibility of curative study for suicide. To facilitate clinical treatment study, diagnosis should be linked to multi-omics, neural axis and multiple levels of observation.

Future direction

Fulfilment of modern diagnosis

Advanced neuropsychiatric diagnosis should be based on integrative information. This diagnostic updating for suicide prediction might be based on new computations. Large-scale of clinical evidence and data should be translated. New era of suicide prediction platforms may dawn quickly.

Emotional stimulation and regulation

According to law of general medicine (folk medicine or traditional Chinese medicine), many human illnesses are caused by angry in context of ancient Chinese medical books. Emotional stimulation, like smile, comedy, music and sports maybe reduce suicide rates. Regulation of angry feeling might be useful by emotional pleasant (Figure 6).

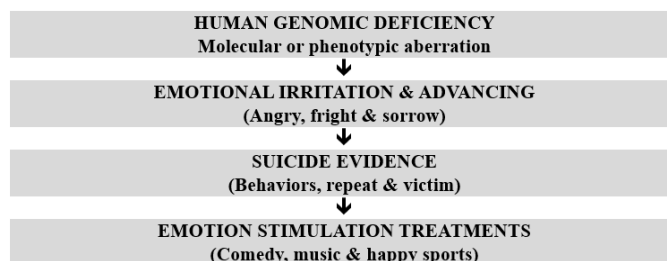


Figure 6 Emotional ways of suicide emergency and treatment mechanisms

Long-persistent models

More recently, it has been found that chronic exposure of risk chemicals, like pesticide, herbicide and drugs may lead to depressive symptoms in people. Its consequence and outcomes are concluded in Figure 7. This biomedical approach is very useful for suicide prediction and prevention and animal model establishment.

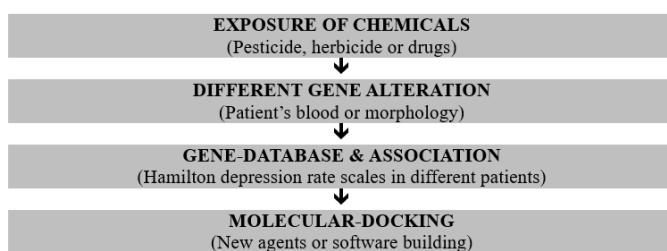


Figure 7 Neurobiological study of potential risk factors in long term

Drug toxicity study

Drug toxicity is an important topic for pharmacological, clinical and toxicology study. Many neuropsychiatric agents main source of drugs for mental disorders or suicide were discovered to have genotoxic characters.⁴¹ Though contradiction in different authors or reports, the evaluative methods (comet, micronucleus or many others) or cell types (lymphocyte or others) variations may change the outcomes of experimental studies. In preliminary study, anti-psychiatric drugs more associated with suicide like schizophrenia, delusional disorders and affective disorders have much high-incidence of genotoxic activity and function. To improve suicide prediction and prevention, toxicology study of these drugs is indispensable.

Conclusion

Multiple and complex suicide prediction and prevention should be used in the clinic. The relationships and integration between factors of chemical, genetic, molecular, morphologic, neurologic, environmental, social and cultural factors should go personalized and curable ways in the future. In search for suicide-related molecular mechanisms and therapeutic targets, like gene therapies⁴² can play key roles for medical updating. By initiating curative therapy, new breakthroughs for death reduction can be expected.

Acknowledgments

None.

Conflicts of interest

The authors declares that there are no conflicts of interest.

References

- Anderson M, Jenkins R. The challenge of suicide prevention. *Dis Manag Health Outcomes*. 2005;13:245–253.
- Lu DY. *Suicide Risks and Treatments, New Ideas and Future Perspectives*. New York, NY: Nova Science Publishers; 2017.
- Lu DY, Wu HY, Cao S, Che JY. An overview of suicide study. *EC Psychol Psychiatry*. 2021;10(3):37–43.
- Mann JJ, Michel CA, Auerbach RP. Improving suicide prevention through evidence-based strategies: a systematic review. *Am J Psychiatry*. 2021;178(7):611–624.
- Isometsa E. Suicidal behavior in mood disorders—who, when, and why? *Can J Psychiatry*. 2014;59(3):120–130.
- DiBlasi E, Kang J, Docherty AR. Genetic contributions to suicidal thoughts and behaviors. *Psychol Med*. 2021;51(13):2148–2155.
- Lu DY, Wu HY. Human suicide, molecular framework. *J Psychol Clin Psychiatry*. 2025;16(5):176–183.
- Shandilya S. Suicide and suicide prevention: a historical review. *Res J Soc Sci*. 2018;9(12):35–40.
- Lu DY, Wu HY, Cao S, et al. Historical analysis of suicide. *J Transl Genet Genom*. 2020;4:33.
- Cai Z, Junus A, Chang Q, et al. The lethality of suicide methods: a systematic review and meta-analysis. *J Affect Disord*. 2022;300:121–129.
- Rutz W. Preventing suicide and premature death by education and treatment. *J Affect Disord*. 2001;62(1):123–129.
- Lu DY, Zhu PP, Wu HY, et al. Human suicide study, is there an association between suicide and mental illness. *Metabolomics*. 2016;6(3):186.
- Na EJ, Lee H, Myung W, et al. Risks of completed suicide of community individuals with ICD-10 disorders across age groups: a nationwide population-based nested case-control study in South Korea. *Psychiatry Investig*. 2019;16(4):314–324.
- Lu DY, Wu HY. Neuropsychiatric insights for human suicide. *Int J Sci Res Updates*. 2021;1(2):11–18.
- Mann JJ, Rizk MM. A brain-centric model of suicide behavior. *Am J Psychiatry*. 2020;177(10):902–916.
- Lu DY, Zhu PP, Wu HY, et al. Human suicide risk and treatment study. *Cent Nerv Syst Agents Med Chem*. 2018;18(3):206–212.
- Malhotra D, Sebat J. CNVs: harbingers of a rare variant revolution in psychiatric genetics. *Cell*. 2012;148(6):1223–1241.
- Lu DY, Wu HY. Neuropsychiatric approaches for human suicide prediction and management. *Int J Neuropsychol Behav Sci*. 2021;2(3):87–91.
- Wang LL, Li JM, Liu HL, et al. Influence factors for decision making performance of suicide attempts and suicide ideation: the roles of somatic markers and explicit knowledge. *Front Psychol*. 2021;12:693879.
- Lu DY, Wu HY, Xu B, et al. Neurobiology for human suicide. *Int J Sci Res Arch*. 2021;2(2):120–125.
- Lu DY. Human suicide, clinical treatment overview. *J Psychol Clin Psychiatry*. 2025;16(1):24–28.
- Lu DY. Suicide study, new approaches. *J Psychol Clin Psychiatry*. 2025;16(2):80–81.
- Lu DY, Wu HY, Lu TR. Human suicide, management landscape. *Psychol J Res Open*. 2024;6(3):1–2.
- Salis F, Belfiori M, Bellisai A, et al. Cognitive impairment in people living with HIV and the impact of mood: results from a cross-sectional study. *J Clin Med*. 2024;13(6):1633.
- Desmyter S, Bijttebier S, Van Heeringen K. The role of neuroimaging in our understanding of the suicidal brain. *CNS Neurol Disord Drug Targets*. 2013;12(7):921–929.
- Yuan Q, Seow E, Ablin E, et al. Direct and moderating effects of personality on stigma towards mental illness. *BMC Psychiatry*. 2018;18(1):358.
- Jiang JJ, Yan ZZ, Sheng C, et al. A novel detection tool for mild cognitive impairment patients based on eye movement and electroencephalogram. *J Alzheimers Dis*. 2019;72(2):389–399.
- Lu DY, Che JY, Wu HY, et al. Suicide risks and prevention, neuropathogenic study. *Edeweiss Psychiatry*. 2020;4(1):124.
- Marshall M. The hidden links between mental disorders. *Nature*. 2020;581:19–21.
- Sokolowski M, Wasserman D. Genetic origins of suicidality? a synopsis of genes in suicidal behaviours, with regard to evidence diversity, disorder specificity, and neurodevelopmental brain transcriptomics. *Eur Neuropsychopharmacol*. 2020;37:1–11.
- Orsolini L, Latini R, Pompili M, et al. Understanding the complex of suicide in depression: from research to clinics. *Psychiatry Investig*. 2020;17(3):207–221.
- Lu DY, Lu TR. Drug discovery for suicide management. *EC Pharmacol Toxicol*. 2021;9(11):76–86.
- Lu DY, Lu TR, Che JY, Zhu PP, et al. Genetics and bioinformatics studies of antidepressant drug therapeutic efficacies and toxicities, a current overview. *Recent Pat CNS Drug Discov*. 2014;9(3):193–199.
- While D, Bickley H, Roscoe A, et al. Implementation of mental health service recommendations in England and Wales and suicide rates, 1997–2006: a cross-sectional and before-and-after observational study. *Lancet*. 2012;379:1005–1012.
- Drinkwater KG, Denovan A, Dagnall N. Paranormal belief, psychopathological symptoms and well-being: latent profile analysis and longitudinal assessment of relationship. *PLoS One*. 2024;19(3):e0297403.

36. Li JN, Bi HR. Clarification of the molecular mechanisms underlying glyphosate-induced major depressive disorder: a network toxicology approach. *Ann Gen Psychiatry*. 2024;23(1):8.
37. Lu DY, Lu TR, Zhu PP. Undesired neural side-effects of a drug, a chemical and genetic interrelated problem. *Cent Nerv Syst Agents Med Chem*. 2010;10(2):108–112.
38. Kwon CY, Lee B. The effect of herbal medicine on suicidal behavior: a protocol for systematic review and meta-analysis. *Healthcare*. 2023;11(10):1387.
39. Lu DY, Lu TR. Herbal medicine in new era. *Hosp Palliat Med Int J*. 2019;3(4):125–130.
40. Lu DY, Che JY, Wu HY, et al. Suicide curative treatment study and drug development. *Int J Pharm Sci Clin Res*. 2023;3(2):97–108.
41. Durnev AD, Eremina NV, Zhanataev AK et al. Genotoxicity of psychotropic drugs in experimental and clinical studies. *Zh Nevrol Psikhiatr Im SS Korsakova*. 2022;122(10):7–16.
42. Shahcheraghi SH, Ayatollahi J, Lotfi M, et al. Gene therapy for neuropsychiatric disorders: potential targets and tools. *CNS Neurol Disord Drug Targets*. 2023;22(1):51–65.